



The  
University  
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**Sustainable behaviour in the workplace: An investigation of  
contextual spillover effects from work to home through the lens of  
Identity Process Theory**

By:

Caroline Verfuertth

No. 150214139

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Management School

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## **ABSTRACT**

**BACKGROUND.** A transition toward sustainable lifestyles and changing individual behaviour plays a crucial role in tackling global challenges such as climate change. Spillover effects describe when one environmentally sustainable behaviour (ESB) leads to another, often initiated by a behaviour change intervention. Thus, studying spillover effects is a promising approach to better understand the holistic relationship between ESBs within and between different contexts (e.g. work, home).

Based on identified literature gaps, this thesis addressed the following research questions: (1) “How does a behaviour change intervention in the workplace affect environmentally sustainable behaviours at home?” (2) “What role does identity play in the emergence of positive and negative contextual spillover effects (or a lack thereof)?”. Building on Identity Process Theory, a theoretical framework was proposed that explains positive, negative, and a lack of spillover.

**METHOD.** A mixed-methods approach was used to assess spillover from work to home by evaluating the effects of a meat reduction intervention in a workplace on employees’ ESBs at home with an intervention-control group design. In a private sector company, 82 employees were surveyed and 26 semi-structured interviews were conducted. A multinomial regression was used to analyse the quantitative and template analysis to analyse the qualitative data.

**FINDINGS.** The findings provide evidence for both positive and a lack of spillover effects. The quantitative results showed no change in red meat consumption at home nor in other, related ESBs at home. The qualitative data analysis, on the other hand found positive contextual spillover effects (e.g. increase in local food consumption). Furthermore, identity was found to play an important role for positive spillover effects, which was found both in the quantitative and qualitative data.

**DISCUSSION.** Theoretical and practical implications are discussed, including future research. This study provides insights into contextual spillover effects from a behaviour change intervention at work to ESBs at home.

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|   |            |
|---|------------|
| <b>ABSTRACT .....</b>   | <b>2</b>   |
| <b>ACKNOWLEDGEMENT .....</b>  | <b>3</b>   |
| <b>TABLE OF FIGURES .....</b>   | <b>5</b>   |
| <b>TABLE OF TABLES .....</b>  | <b>6</b>   |
| <b>1 INTRODUCTION.....</b>  | <b>8</b>   |
| 1.1 FOCUS ON MEAT CONSUMPTION .....                                       | 9          |
| 1.2 FOCUS ON IDENTITY AND SPILLOVER .....                                 | 10         |
| 1.3 STRUCTURE OF THE THESIS .....   | 11         |
| <b>2 LITERATURE REVIEW .....</b>  | <b>13</b>  |
| 2.1 WHAT IS SPILLOVER? .....  | 13         |
| 2.2 FACTORS THAT INFLUENCE SPILLOVER.....                                 | 22         |
| 2.3 CONTEXTUAL SPILLOVER.....   | 27         |
| 2.4 THEORETICAL FRAMEWORKS OF SPILLOVER.....                              | 31         |
| 2.5 RESEARCH GAPS .....   | 35         |
| 2.6 INTEGRATED FRAMEWORK OF SPILLOVER .....                               | 39         |
| 2.7 RESEARCH OBJECTIVES.....  | 46         |
| <b>3 METHODOLOGY .....</b>  | <b>47</b>  |
| 3.1 MIXED METHODS APPROACH .....  | 50         |
| 3.2 DATA COLLECTION .....   | 59         |
| 3.3 BEHAVIOUR CHANGE INTERVENTION .....                                   | 71         |
| 3.4 INTEGRATING QUANTITATIVE AND QUALITATIVE DATA .....                   | 74         |
| 3.5 REFLEXIVITY.....  | 75         |
| 3.6 PILOT STUDY – WASTE SEPARATION IN OFFICES .....                       | 77         |
| <b>4 MAIN STUDY – INTERVENTION &amp; DATA COLLECTION .....</b>            | <b>81</b>  |
| 4.1 THE CONTEXT OF THE COLLABORATIVE PROJECT .....                        | 81         |
| 4.2 DEVELOPMENT OF THE INTERVENTION AND DATA COLLECTION.....              | 86         |
| <b>5 MAIN STUDY FINDINGS.....</b>   | <b>117</b> |
| 5.1 QUANTITATIVE DATA ANALYSIS AND RESULTS.....                           | 118        |
| 5.2 QUALITATIVE DATA ANALYSIS & RESULTS .....                             | 146        |
| 5.3 INTEGRATION OF THE QUANTITATIVE AND QUALITATIVE FINDINGS .....        | 172        |
| 5.4 CONCLUSION .....  | 197        |
| <b>6 DISCUSSION .....</b>   | <b>199</b> |
| 6.1 REASSESSMENT OF THE CONCEPTUAL FRAMEWORK .....                        | 199        |
| 6.2 CONTRIBUTIONS TO THE SPILLOVER LITERATURE .....                       | 223        |
| 6.3 IMPLICATIONS .....  | 233        |
| 6.4 LIMITATIONS .....   | 237        |
| 6.5 FUTURE RESEARCH.....  | 249        |
| <b>7 CONCLUSION .....</b>   | <b>254</b> |
| 7.1 SUMMARY OF THE THESIS .....   | 254        |
| 7.2 MAIN CONTRIBUTIONS .....  | 256        |
| <b>8 REFERENCES.....</b>  | <b>259</b> |
| <b>9 APPENDICES.....</b>  | <b>282</b> |
| 9.1 APPENDIX A – PILOT STUDY: WASTE SEPARATION IN UNIVERSITY OFFICES..... | 282        |
| 9.2 APPENDIX B – MAIN STUDY: BEHAVIOUR CHANGE INTERVENTION .....          | 313        |
| 9.3 APPENDIX C – MAIN STUDY: FINDINGS .....                               | 350        |



## TABLE OF FIGURES

|  |     |
|--|-----|
| Figure 1: Emission savings of individual actions in CO2 per year (Wynes & Nicholas, 2017, p. 4)...   | 10  |
| Figure 2: Illustration of key concepts and research questions in this thesis. ....   | 13  |
| Figure 3: Theoretical reasons for positive spillover (Thøgersen, 2012a; p. 25) .....   | 32  |
| Figure 4: Identity Process Theory (adapted from Jaspal et al., 2019, p. 240).....  | 38  |
| Figure 5: Proposed conceptual framework of spillover. ....   | 40  |
| Figure 6: Methodology Overview.....  | 50  |
| Figure 7: Illustration of Convergent Parallel Design (Creswell & Plano Clark, 2011a) .....   | 58  |
| Figure 8: Study Design .....   | 62  |
| Figure 9: Outline of canteen in Sheffield.....   | 84  |
| Figure 10: Pre-intervention canteen in Sheffield. Left: Seating area in the canteen; middle: salad bar; right: cold meat cuts.....                                   | 85  |
| Figure 11: Canteen in Leeds. Left: serving counter; middle: sandwich bar; right: break area .....  | 85  |
| Figure 12: Advertisement for project in canteen as it was displayed in the canteen in Sheffield.....   | 89  |
| Figure 13: Stages of change distribution in sample (T1) .....  | 92  |
| Figure 14: Example of sorting task.....  | 95  |
| Figure 15: Social norm and self-identity messages (left) and identification chart (right) .....  | 103 |
| Figure 16: Pictures of posters about calcium, protein, and iron (source: <a href="https://www.simplehappykitchen.com">https://www.simplehappykitchen.com</a> ) ..... | 104 |
| Figure 17: Food options that were provided as part of a cold buffet in the canteen before the intervention .....   | 106 |
| Figure 18: Example pages from the recipe booklet for the salad bar.....  | 107 |
| Figure 19: Example pages from the recipe booklet for the 'premium meals'.....  | 108 |
| Figure 20: Examples of food information charts provided for the employees.....   | 109 |
| Figure 21: Photos from workshop.....   | 110 |
| Figure 22: Workshop voting summary .....   | 111 |
| Figure 23: Bagasse plates and information material display during behaviour change intervention..  | 113 |
| Figure 24: Food and menu of sustainable food week .....  | 114 |
| Figure 25: Overview of findings chapter .....  | 117 |
| Figure 26: Interpretation of findings with regard to spillover.....  | 117 |
| Figure 27: Illustration of sample composition and mortality.....   | 122 |
| Figure 28: Red meat consumption at T1 and T2.....  | 134 |
| Figure 29: Fruit and vegetable consumption at T1 and T2.....   | 134 |
| Figure 30: Changes in food waste avoidance behaviour in % .....  | 138 |
| Figure 31: Changes in red meat consumption in % .....  | 141 |
| Figure 32: Visualisation example .....   | 149 |
| Figure 33: Overlaid photographs of visualisation.....  | 150 |
| Figure 34: Illustration of Themes from Pre-intervention Interviews .....   | 154 |
| Figure 35: Overview of key themes from post-intervention interviews .....  | 160 |
| Figure 36: Overview of theoretical framework.....  | 181 |
| Figure 37: Visualisation task illustrating increased centrality of terms .....   | 185 |
| Figure 38: Visualisation associated with increased British food consumption and changed food shopping.....   | 188 |
| Figure 39: Visualisation task illustrating changed centrality of terms.....  | 189 |
| Figure 40: Visualisation awareness.....  | 190 |
| Figure 41: Compartmentalisation and suppression visualisation.....   | 193 |
| Figure 42: Compartmentalisation visualisation .....  | 194 |
| Figure 43: Visualisation showing negative spillover.....   | 196 |
| Figure 44: Pathway to positive spillover.....  | 201 |
| Figure 45: Pathway between Behaviour Change intervention at Work and Increase of ESBs at Home .....  | 202 |
| Figure 46: Integration of Information into Self .....  | 203 |
| Figure 47: Self-affirmation and Mental Accounting Strategies .....   | 207 |
| Figure 48: Barriers and Facilitators to Positive Spillover Effects.....  | 209 |

|  |     |
|--|-----|
| Figure 49: Adapted Pathway to Positive Spillover .....   | 211 |
| Figure 50: Pathway to the Lack of Spillover as Proposed in the Original Framework.....   | 212 |
| Figure 51: Lack of Spillover .....   | 213 |
| Figure 52: Lack of spillover.....  | 215 |
| Figure 53: Positive and the lack of Spillover .....  | 217 |
| Figure 54: Pathway to negative spillover as per the original framework.....  | 218 |
| Figure 55: Revised conceptual framework for contextual spillover effects.....  | 222 |
| Figure 56: Illustration of sequential exploratory design used in Pilot Study .....   | 285 |
| Figure 57: Intervention - Information and feedback.....  | 291 |
| Figure 58: Bin audit .....   | 292 |
| Figure 59: Invitation to take part in pilot study (intervention group example).....  | 301 |
| Figure 61: Consent form for the focus groups .....   | 303 |
| Figure 62: Information Sheet survey .....  | 304 |
| Figure 63: Consent form for online survey.....   | 305 |
| Figure 64: Ethics approval for pilot study .....   | 305 |
| Figure 65: Example of the Boxplot diagram that were used to identify outliers .....  | 312 |
| Figure 66: Company online newsletter to promote pre-intervention survey (Example 1).....   | 316 |
| Figure 67: Company online newsletter to promote pre-intervention survey (Example 2).....   | 317 |
| Figure 68: Company online newsletter to promote pre-intervention survey (Example 3).....   | 317 |
| Figure 69: Company online newsletter to promote post-intervention survey.....  | 318 |
| Figure 70: Leaflet to promote post-intervention survey .....   | 318 |
| Figure 71: Pre-intervention interview invitation.....  | 326 |
| Figure 72: Leaflets that advertised the behaviour change intervention and invited employees to participate in the survey, interviews, and the pre-intervention workshops to discuss the new menu . | 333 |
| Figure 73: Feedback to behaviour change intervention .....   | 342 |
| Figure 74: Agreement to statement "Eating less meat means I would have to change who I am." ....   | 343 |
| Figure 75: Agreement to statement "Eating less meat imposes a change on my current lifestyle." ...   | 343 |
| Figure 76: Agreement to statement "Eating less meat threatens my freedom." .....   | 343 |
| Figure 77: Flow chart categorising amounts of meat consumption .....   | 347 |

## TABLE OF TABLES

|   |     |
|---|-----|
| Table 1: 20-question checklist to measure spillover by Galizzi & Whitmarsh (2019, p. 8) ..... | 48  |
| Table 2: Four perspectives for mixed methods research.....                                    | 52  |
| Table 3: Overview of used methods .....   | 60  |
| Table 4: Assessing quantitative research adapted from Collins et al. (2014) .....             | 67  |
| Table 5: Assessing qualitative research adapted from Mays and Popes (1995) .....              | 71  |
| Table 6: Overview Hypotheses Results from Pilot Study.....                                    | 78  |
| Table 7: Stages of behaviour change intervention design.....                                  | 86  |
| Table 8: Measures included in the surveys .....   | 89  |
| Table 9: Sample description T1 .....  | 92  |
| Table 10: Stages of model of self-regulated behavioural change .....                          | 93  |
| Table 11: Suggestions for sustainable food in canteen .....                                   | 96  |
| Table 12: Assessment of Guidelines for a sustainable diet.....                                | 97  |
| Table 13: CO2 emission for diet types (Source: Scarborough et al., 2014).....                 | 98  |
| Table 14: Behaviour change techniques .....   | 100 |
| Table 15: Example material sorted by theme and aim.....                                       | 105 |
| Table 16: Summary of scales included in analysis .....  | 120 |
| Table 17: Demographic of dropouts vs. continued .....   | 123 |
| Table 18: Dropout Analysis .....  | 124 |
| Table 19: Demographics of survey participants at T1 .....                                     | 125 |
| Table 20: Assumptions of ANOVA variance analysis .....  | 128 |

|   |     |
|---|-----|
| Table 21: Behaviour change scores .....   | 130 |
| Table 22: Multicollinearity of predictor variables .....  | 132 |
| Table 23: Crosstab distribution across groups .....   | 135 |
| Table 24: Multinomial logistic regression for change red meat and fruit and vegetable consumption ..... | 136 |
| Table 25: Multinomial logistic regression to tests hypotheses H2a-H2d.....                              | 137 |
| Table 26: Changes of identity variables.....  | 139 |
| Table 27: Step Summary (SPSS Output) .....  | 140 |
| Table 28: Multinomial logistic regression to tests hypotheses H3a-3b .....                              | 142 |
| Table 29: Multinomial logistic regression to tests hypotheses H3c-H3f .....                             | 144 |
| Table 30: Hypotheses summary.....   | 146 |
| Table 31: Participant information .....   | 147 |
| Table 32: Step-by-step template analysis of interview data based on Braun and Clarke (2006).....        | 152 |
| Table 33: Interviewees' survey data on key variables .....  | 175 |
| Table 34: Focus group participants.....   | 286 |
| Table 35: Summary of focus group themes - barriers to recycling at work.....                            | 287 |
| Table 36: Survey sample demographics .....  | 289 |
| Table 37: Types and numbers of audited offices .....  | 292 |
| Table 38: Types of contamination material in bins.....  | 293 |
| Table 39: Summary of scales - pilot study.....  | 294 |
| Table 40: Assumption testing .....  | 298 |
| Table 41: Overview hypotheses.....  | 298 |
| Table 42: Drop-out analysis.....  | 309 |
| Table 43: Tests of Normality all scales.....  | 310 |
| Table 44: Skewness and Kurtosis scores for all scales .....   | 310 |
| Table 45: Levene test.....  | 311 |
| Table 46: Wilcoxon test excluding outlier case 38.....  | 312 |
| Table 47: Survey Schedule and Text for Intervention Group T2 Survey .....                               | 322 |
| Table 48: Survey Schedule and Text for Control Group T2 Survey.....                                     | 323 |
| Table 49: Interview guide T1.....   | 327 |
| Table 50: Interview Guide T2.....   | 327 |
| Table 51: Sample description T2 (intervention group only).....  | 341 |
| Table 52: Suggestions for future changes in the canteen.....  | 344 |
| Table 53: Levene Test.....  | 351 |
| Table 54: FMAX.....   | 352 |
| Table 55: Between subject ANOVA for exposure to intervention .....                                      | 353 |
| Table 56: Between subject ANOVA for changes in variables for exposure to intervention .....             | 353 |
| Table 57: Test of Normality for change scores of DV .....   | 353 |
| Table 58: Survey Items .....  | 354 |
| Table 59: Summary of the template.....  | 356 |

*“The world has enough for everyone's need, but not enough for everyone's greed.”*

*— Mahatma Gandhi*

## 1 INTRODUCTION

Threats of climate change, acidification of oceans, air pollution and biodiversity loss can be linked to human activities and unsustainable lifestyles (IPCC, 2014). To reduce climate change effects, the UK, for instance, pledged for an 80% reduction of carbon net emissions by 2050 in comparison to 1990 in their Climate Change Act (Parliament of the United Kingdom, 2008). However, to date, the overall progress is mixed and more drastic measures are needed to achieve these emission targets (Committee on Climate Change, 2018). The COP21 Paris Agreement highlighted that sustainable lifestyles and sustainable patterns of consumption and production play an essential role in achieving climate goals (COP21, 2015). Hence, while technical solutions and environmental policies play an important role in tackling these issues, it is very clear that people also need to change their behaviours and lifestyles (Defra, 2008).

Current lifestyles have detrimental effects on the environment and a change in the way people live and consume would have significant positive impact for the environment (Wynes & Nicholas, 2017). For instance, the UK's average carbon footprint is 13.56 tonnes per year, however, in order to meet climate goals by 2050 everyone on the planet should only have an average footprint of 1.05 tonnes per year (WWF, 2019). As such, today's environmental challenges require a rethinking in the way most people live, particularly in developed countries and richer people in developing countries (Thøgersen & Crompton, 2009). Previous studies have shown that behaviour change at an individual level can significantly reduce human impact on the environment (e.g. Gardner & Stern, 2008), as well as contribute to acceptance of environmental policies (e.g. Steinhilber & Matthies, 2016; Thøgersen & Noblet, 2012). Thus, it is important to investigate factors and strategies that promote sustainable behaviours and lifestyles. This thesis aims to contribute to a better understanding of lifestyle changes by focussing on individual behaviour change, based on the thinking that a change in the current consumer culture and a transition to a more sustainable society is necessary (Jackson, 2005).

Behaviour change interventions are popular tools to promote environmentally sustainable behaviours (ESBs) at an individual, community, and organisational level (Cox et al., 2012). They can be understood as “coordinated sets of activities designed to change specified behaviour patterns” (Michie, van Stralen, & West, 2011, p. 2). ESB can be understood as “behavior that harms the environment as little as possible, or even benefits the environment” (Steg & Vlek, 2009, p. 309). While evaluations of behaviour change programmes are widely established (Michie et al., 2014), the link between different ESBs (e.g. food and energy consumption) or contexts (e.g. work and home), is rarely accounted for. However, to bring about significant environmental change, an understanding of the

impact of behaviour change programmes spanning across several behavioural domains and contexts is essential.

Spillover theory offers an avenue of accelerating a shift towards sustainable lifestyles by contributing a better understanding of the links between ESBs (Nash et al., 2017). Generally, spillover effects occur when one ESB leads to another, often initiated by a behaviour change intervention (Nash et al., 2017). In this thesis, spillover is defined as the effect that a behaviour change intervention has on behaviours not targeted by the intervention (Truelove, Carrico, Weber, Raimi, & Vandenberg, 2014). Spillover can be positive, where the first environmentally sustainable behaviour leads to a secondary behaviour, or negative where an environmentally sustainable behaviour leads to an environmentally harming behaviour. Research on spillover effects is an emerging topic and several reviews on the literature have been published in recent years (for reviews see e.g. Dolan & Galizzi, 2015; Nash et al., 2017; Nilsson, Bergquist, & Schultz, 2016; Thøgersen & Crompton, 2009; Truelove, Carrico, Weber, Raimi, & Vandenberg, 2014). However, to date, most studies investigating spillover effects have focused on spillover between behaviours, while research investigating spillover effects between settings is still scarce. As people spend a large amount of their time within different settings (e.g. work and home), understanding the potential for spillover between them is important in promoting more sustainable lifestyles (Klade, Mert, Seebacher, & Schultz, 2013). Thus, understanding how behaviour change interventions that take place in one setting (e.g. workplace) affect environmentally sustainable behaviours also in other settings (e.g. home) can help promoting sustainable lifestyles more cost-effectively. This thesis aims to contribute to a better understanding of such contextual spillover effects by assessing spillover effects from a workplace behaviour change intervention to ESBs at home.

## **1.1 FOCUS ON MEAT CONSUMPTION**

This thesis is focussed in particular on sustainable food consumption and, more specifically, the reduction of meat consumption as a way to live more environmentally sustainable. Food production and consumption has a detrimental effect on our environment. A feasibility assessment of mitigation options by the IPCC (Bazaz et al., 2018) found that, above all, individual behaviour change is one of the main drivers for mitigation changes in dietary shifts. It is estimated that 20-30% of anthropogenic GHG emissions are emitted by the food sector (Garnett, 2014b). A report by the WWF estimates, that the UK food supply alone contributed to the extinction of 33 species (WWF, 2017). As such, diet changes can play a key role in reducing the anthropogenic impact on the earth's biodiversity. More specifically, a reduction in meat consumption and transition to a plant-based diet was identified to be one of the single most beneficial changes both for the environment and for people's health (e.g. De Boer, Schösler, & Aiking, 2014; Garnett, 2014a; Van Dooren, Marinussen, Blonk, Aiking, & Vellinga, 2014; Willett et al., 2019).

Meat consumption has more recently been associated with climate change and was identified as one of the key lifestyle choices that impacts climate change (Poore & Nemecek, 2018). Wynes and Nicholas (2017) found that changing to a plant-based diet saves four times the amount of carbon with an average of 800kg per person per year (see Figure 1). For example, when comparing kgCO<sub>2</sub> of different diet types, it was found that people who followed a meat heavy diet emitted about 2.5x as much CO<sub>2</sub> in comparison to people who follow a plant-based diet (Scarborough et al., 2014). As such, a reduction in meat consumption can be considered to be one of the highest lifestyle factors that influence climate change (Willett et al., 2019) and, therefore, changing meat intake could have beneficial impacts in helping to address climate change.

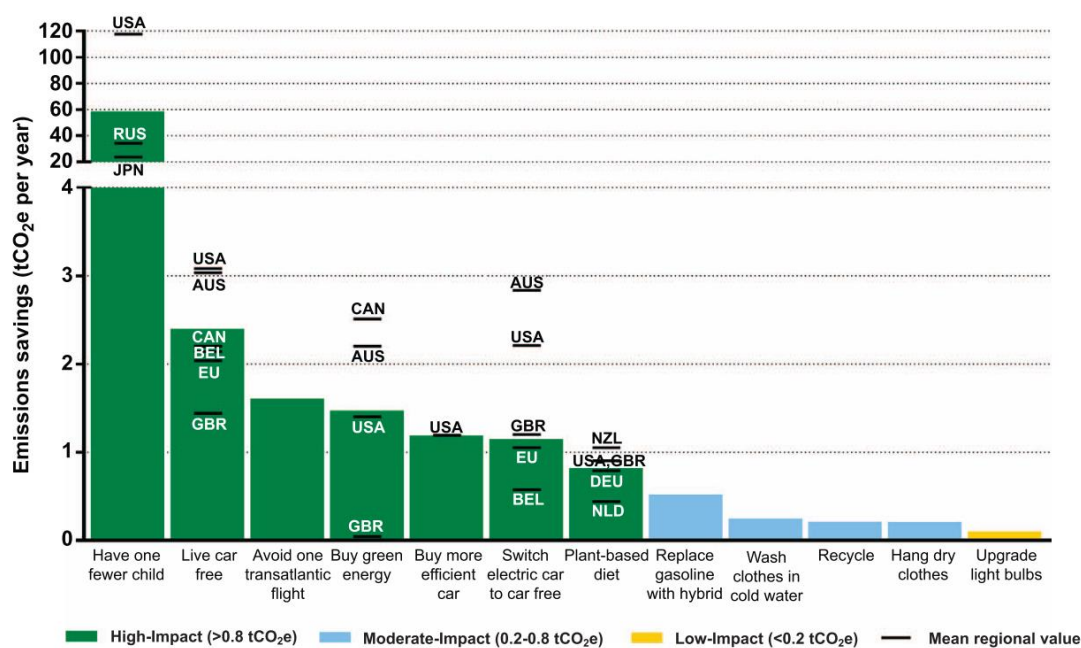


Figure 1: Emission savings of individual actions in CO<sub>2</sub> per year (Wynes & Nicholas, 2017, p. 4)

## 1.2 FOCUS ON IDENTITY AND SPILLOVER

This thesis is focussed on the role of identity and identity change on the outcome of positive, negative, and the lack of spillover. Previous literature suggests that identity could play an important role for spillover effects (e.g., Lacasse, 2016; Nik Ramli & Naja, 2012; Whitmarsh & O’Neill, 2010). Building on this research, this thesis aims to better understand the underlying processes that identity might have for positive, negative and a lack of spillover. The emphasis of this thesis is on the investigation of identity-related processes that might influence the relationships between an initial ESB (e.g. promoted through a behaviour change intervention) and positive, negative and the lack of spillover.

### 1.3 STRUCTURE OF THE THESIS

This thesis is divided into seven chapters, each contributing to answering the research question: ‘How does a behaviour change intervention in the workplace affect environmentally sustainable behaviours at home?’ and ‘What role does identity play in the emergence of positive and negative contextual spillover effects (or a lack thereof)?’. This chapter, the introduction (CH1), aims to outline the problem in which this thesis is embedded and to give an overview of the thesis. The next chapter, the literature review (CH 2), provides an overview of the relevant literature and concepts that are used in spillover research. Moreover, evidence for different types of spillover, namely positive, negative and the lack of spillover, are discussed and factors that drive such spillover effects are identified. The purpose of this chapter (CH1) is to identify gaps in the literature and to outline the relevant concepts and theories that informed this research. Based on the identified gaps, a theoretical framework is proposed. The framework aims to explore pathways to positive, negative, and the lack of spillover subsequent to a persuasive appeal (e.g. behaviour change intervention) through identity change processes. Drawing on Identity Process Theory (Breakwell, 1986, 2014a), the framework analyses spillover effects through identity changes that might occur as a result of a behaviour change intervention and, subsequently, lead to positive, negative, or a lack of spillover.

The methodology chapter (CH 3) outlines the mixed methods approach that was used in this thesis. Based on a pragmatist paradigm, a convergent parallel design was used to collect quantitative and qualitative data. Furthermore, a quasi-experimental design was used to assess spillover effects from a behaviour change intervention in the workplace to ESBs at home. The quantitative data collection consisted of a pre- and post-intervention survey of employees, while the qualitative data collection included interview data and a visualisation task. Additionally, the methodology chapter provides an overview of the data analyses approaches that were used in this thesis and a reflexivity section. Lastly, the methodology chapter provides a short section of ‘lessons learnt’ from a pilot study that was conducted prior to the main study of this thesis.

Chapter 4 (CH 4) outlines the development, implementation, and evaluation of the behaviour change intervention in the main study in collaboration with a private sector organisation. The chosen target behaviours of the intervention were (1) to reduce meat consumption, particularly red meat, and (2) to increase plant-based food consumption, particularly vegetable and fruit intake. The behaviour change intervention of the main study consisted of a changed menu and an information campaign. The menu changes were developed in collaboration with the chef of the organisation’s canteen and employees’ suggestions in the pre-intervention survey and included a reduction in meat and particularly red meat availability (i.e. reduction of 80%) and were implemented for one week. The campaign included information about the environmental impacts of meat consumption and plant-based alternatives and accompanied the menu changes. The chapter concludes with an evaluation of the

behaviour change intervention and, more specifically, employees' reactions of the employees towards the changes implemented during the intervention.

In the fifth chapter (CH 5), the findings of the main study are outlined in three parts. First, the results of the pre- and post-intervention survey are presented. A multinomial logistic regression was used to test three sets of hypotheses, all of which test the effects of the behaviour change intervention on ESBs in the home setting and address the research question of this thesis. In the second section, the findings from the pre- and post-intervention interviews and the visualisation task are presented. The template analysis approach was used to analyse the qualitative data and several themes around positive and the lack of spillover were identified. Furthermore, a number of factors that influence spillover from a workplace intervention to ESBs at home emerged. Third, the findings from the quantitative and qualitative data analysis is assessed in relation to the theoretical framework. For this, the evidence for each proposed pathway – positive, negative, and a lack of spillover – is assessed.

Chapters six (CH 6) and seven (CH 7) constitute the discussion and conclusion chapters. In the discussion chapter, the conceptual framework is reassessed in the light of the findings from the main study. Further, contributions of this thesis to the spillover literature are discussed with a specific focus on contextual spillover (i.e. spillover between different contexts), the role of identity for spillover effects, as well as theoretical and methodological contributions. This is followed by implications for policy makers and practitioners and limitations of this research. The last chapter draws overall conclusions of this thesis with a focus on what novel contribution this thesis makes to better understanding spillover effects. The appendix includes additional material that is referred to throughout the thesis as well as more details about the pilot study.



## 2 LITERATURE REVIEW

The aim of this chapter is to provide an overview of the relevant literature and to identify research gaps that will be addressed in this thesis. The first section reviews current research on spillover theory in order to identify knowledge gaps and to contextualise the empirical and theoretical contribution of this thesis. The review is divided into the following subsections: concepts of spillover (section 2.1) factors influencing spillover (section 2.2), contextual spillover (section 2.3), and theoretical frameworks of spillover (section 2.4). In the second section (2.5), the identified research gaps and a new framework for spillover is proposed to analyse positive, negative and a lack of spillover through the lens of *identity process theory* (Breakwell, 1986; Jaspal & Breakwell, 2014)(2.6). Lastly, the research objectives of this thesis are introduced (section 2.7). The key concepts and research questions of this thesis are illustrated in Figure 2.

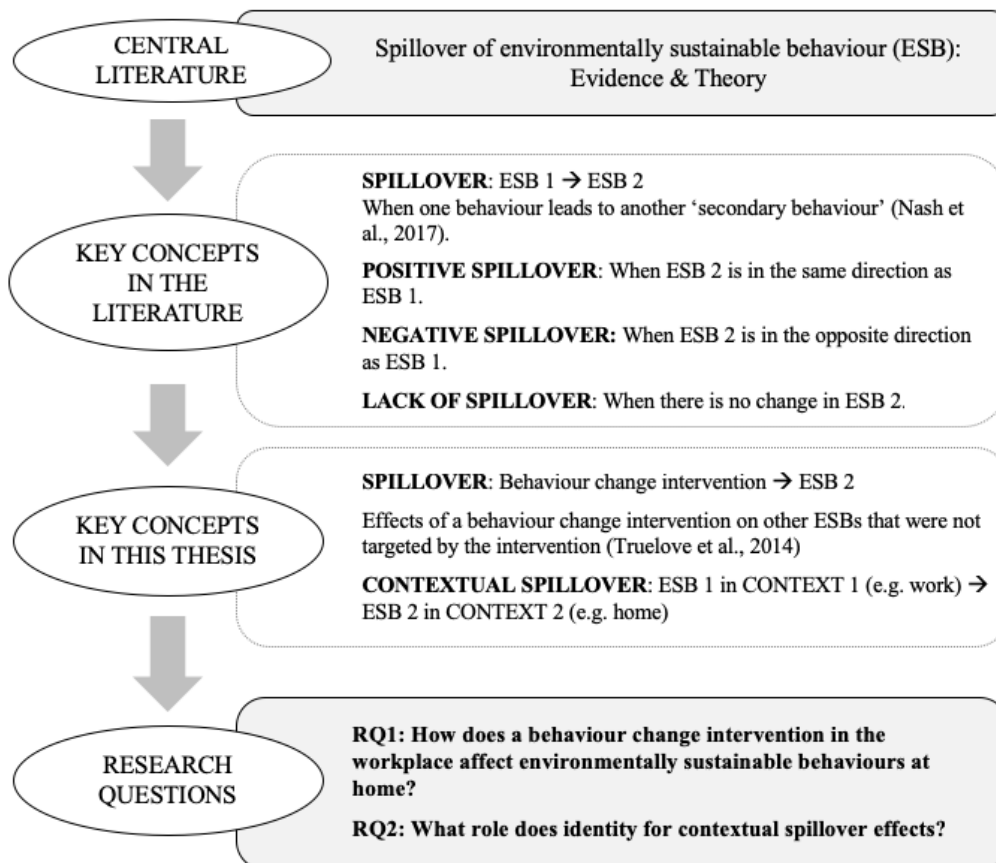


Figure 2: Illustration of key concepts and research questions in this thesis.

### 2.1 WHAT IS SPILOVER?

A spillover effect occurs when one behaviour leads to another 'secondary behaviour' (Nash et al., 2017). The secondary behaviour can be in the same direction as the initial behaviour, which is referred to as positive spillover, or in the opposite direction which is often labelled negative spillover

(Thøgersen & Ölander, 2003). For example, a positive spillover effect is when an individual reduces energy consumption and then also increases recycling activities. Conversely, a negative spillover effect occurs when a reduction in energy consumption is followed by reduced recycling activities. Thus, positive spillover describes instances when an ESB can be linked to an increase in non-target ESBs (or a decrease in environmentally harming behaviours); whereas negative spillover describes instances when an ESB can be linked to a decrease in other ESBs (or an increase in environmentally harming behaviours). A lack of spillover describes instances when neither positive nor negative spillover effects are observed.

Spillover effects of environmentally sustainable behaviours (ESBs) have been widely discussed in recent years (for a review, see e.g., Nash et al., 2017). This has produced several varying concepts, methodologies, terminologies and definitions of spillover. The following section gives an overview of current approaches to researching spillover effect and reviews different concepts and definitions that are commonly used in this field of research. The section aims to provide a better understanding of what spillover effects are by giving an overview of commonly used concepts (2.1.1), definitions (2.1.2), and terminology (2.1.3) of spillover effects, followed by an overview of different types of spillover that are frequently studied; i.e. positive, negative, and the lack of spillover (2.1.4).

## **2.1.1 CONCEPTS OF SPILLOVER**

Three approaches to conceptualising spillover can be identified in the literature. While the three approaches describe a similar phenomenon, they differ in their assumptions about what spillover is. A frequently used approach conceptualises spillover effects as the common link between past and future behaviours (e.g. Lauren, Fielding, Smith, & Louis, 2016; van der Werff, Steg, & Keizer, 2014b). For example, Thøgersen and Ölander (2003) define the influence of ESBs on one another over time in a cross-lagged design as spillover. In their research, they interpret an increase in, for example, consumption of organic products at time point one followed by an increase in recycling behaviour at a later time point as positive spillover (Thøgersen & Ölander, 2003). According to this concept, spillover effects occur over time as a result of a common link or underlying motive between two or more ESBs.

Analysing secondary effects (i.e. spillover effects) of a behaviour change intervention on other ESBs that were not targeted by the intervention is another frequently used approach to conceptualise spillover (Truelove et al., 2014). As such, a spillover effect is the change of an ESB (positive or negative) that was not targeted by a behaviour change intervention (Truelove et al., 2014). For example, in an empirical study Lanzini and Thøgersen (2014) assessed spillover effects by investigating the influence of a monetary intervention designed to increase green purchasing behaviour on nine secondary ESBs. According to this concept of spillover, spillover effects only occur as secondary effect of behaviour change interventions. For instance, it would be described positive spillover when a

behaviour change intervention targeting household recycling also increased people's energy-saving behaviour. This concept is based on the assumption that spillover is triggered by an intervention, as opposed to individuals passively engaging in ESBs over time as proposed by the first approach. It should be noted that these approaches overlap and a clear distinction between them is difficult.

A third approach, or rather a comment on agency, is proposed by Uzzell and Rätzzel (2013, 2018) who argue that the commonly used conceptualisations of spillover (i.e. see above) fall short of taking individuals' agency into account. The idea is that the mechanisms described in the former two approaches are not necessarily passive but are more active 'carryover' effects. Following their argument, individuals are active agents that shape, adjust and negotiate their behaviours and social environments as much as they are being shaped by their environment. Uzzell and Rätzzel (2013, 2018) criticise that the commonly used term spillover implies an automatized behavioural process of one behaviour triggering a secondary behaviour in a rather mechanical process. Instead, they propose the use of the term 'border crossing' which, according to them, reflects the assumption that individuals are agents that actively engage in behaviours (Uzzell & Rätzzel, 2013, 2018). Uzzell and Rätzzel (2013, 2018) use the term border crossing to describe the crossing of an individual between two contexts and actively engaging in two or more ESBs in both contexts.

### **2.1.2 DEFINITIONS**

Besides different concepts, several definitions of spillover can be found in the literature, which have different implications for investigating spillover effects. Sintov et al. (2017, p. 5) define spillover as a "causal process whereby the performance of one behaviour causes a secondary behaviour" concluding that, in order to investigate spillover effects, causality must be included in the research design. Causality between spillover behaviours has also been implied by other researchers; however, research design implications are often not discussed. Nash et al. (2017) propose four levels at which spillover effects can be characterised. According to Nash et al. (2017) the secondary (i.e. spillover) behaviour "must be different (i.e., not related components of a single behaviour), sequential (where one behaviour follows another), sharing a motive (e.g., environmentalism), and involving a common link (e.g., reducing CO<sub>2</sub> emissions)." (p. 2).

Nash et al.'s (2017) approach has conceptual and methodological implications for assessing spillover effects. First, at a descriptive level, spillover behaviours must be different from the initial behaviours; e.g. when recycling behaviour is found to be related to energy conserving behaviour. This implies that the first behaviour should be conceptually different from the secondary spillover behaviour. Second, at the time level, to assess the sequential or causal occurrence of the initial and the secondary spillover behaviour, the two behaviours must be measured at two or more distinct time points to be considered as spillover. Methodologically this implies that a spillover adequate research design assesses

ESBs at two or more time points (e.g. longitudinal design) which is in line with Sintov et al.'s (2017) suggestion (for a discussion of methods see later in this chapter). Third, Nash et al. (2017) suggest that at the motivational level underlying motives should be linked. To assess an underlying link between ESBs, motivational variables such as identity, attitudes, or values could be explored (for a discussion of variables influencing spillover effects, see section below). Fourth, at the impact level the common link between the initial behaviour and the spillover behaviour should be assessable through objective measures. For example, both behaviours could contribute to a reduction of a person's carbon footprint or reduce plastic consumption. While this is a useful approach to assess positive spillover effects, negative spillover effects or a lack of spillover cannot be described by these four characteristics. For instance, when an initial ESB is followed by a decrease in ESBs or an environmentally damaging behaviour it can be assumed that the two behaviours have no shared motive but rather conflicting motives.

#### **2.1.2.1 CONTEXTUAL AND TEMPORAL SPILLOVER**

A further distinction can be made between behavioural spillover, contextual and temporal spillover (e.g. Nilsson et al., 2016). Behavioural spillover describes spillover effects across different behaviour domains; e.g. from purchasing organic products to recycling behaviour (Thøgersen & Ölander, 2003). Contextual spillover, on the other hand, focusses on the effect of an ESB in one context (e.g. recycling at work) to the same or similar ESB in another context (e.g. recycling at home). Temporal spillover describes the time component and considers the effect of an ESB at time point one to the same ESB at a later time (Nilsson et al., 2016). Although a differentiation between behavioural, contextual and temporal spillover can be helpful to determine which aspects of the spillover effect could be studied, most studies combine at least two of these categories. For example, a longitudinal study on the effects of a behaviour change intervention on other ESBs combines temporal and behavioural spillover (e.g. Thøgersen & Ölander, 2003). Nonetheless, a differentiation between behavioural, contextual and temporal spillover can help inform the research design of a study assessing spillover effects and help understand its mechanisms.

#### **2.1.2.2 SPILLOVER PATHWAYS**

The 'integrative pathway model' is another approach for measuring spillover via the 'spillover pathway' (Sintov et al., 2017). In this approach, the spillover pathway is understood as "the psychosocial mechanisms that account for the relationship between seemingly independent behaviors" (Sintov et al., 2017). According to Sintov et al. (2017) spillover is always defined by a temporal component as well as a causal relation between the initial ESB and the secondary behaviour. Sintov et al. (2017) further suggest that this relationship between ESBs may be measured in three ways: (1) by assessing change in the initial 'target' behaviour, (2) a change in the secondary spillover behaviour (3)

or both. In the first pathway, a behaviour change intervention inflicts a change in a target behaviour which subsequently affects spillover effects via the spillover pathway. The second pathway, similar to the first one, describes the change in the target behaviour through an intervention which then has an effect on the spillover behaviour via the spillover pathway. The third pathway describes the effect ‘target behaviour’ has on the change of a spillover behaviour via the spillover pathway, but without a behaviour change intervention.

As shown above, varying definitions and concepts of spillover have different implications on how spillover effects should be assessed and what effects can be interpreted as spillover. While there is some variability in how spillover is conceptualised, in this thesis, a commonly used definition is used by which spillover is defined as the effect that a behaviour change intervention has on behaviours not targeted by the intervention effect an ESB has on a subsequent ESB (Truelove et al., 2014). Reviewing the current literature contributes to a better understanding of the evidence for spillover effects as well as mapping out the knowledge gaps that this thesis aims to address.

### 2.1.3 TERMINOLOGY

In addition to conceptual heterogeneity, a variety of terms have been used to describe spillover effects in the literature. The term spillover has been used in many disciplines to describe a phenomenon when, for example, knowledge (Acs, Audretsch, & Lehmann, 2009), emotional conflicts (Westman, 2002), or health behaviour (Dolan & Galizzi, 2014) ‘overflow’ or ‘spread’ to other areas such as between the work and the home context. More recently, the term has also been used to describe the effect one ESB has on other ESBs (Thøgersen, 1999), which is the area this thesis is focussed on. Although spillover is the most commonly used term, the same or similar effect can also be found under terms such as catalyst behaviour (Austin, Cox, Barnett, & Thomas, 2011), virtuous escalator effect (Thøgersen & Crompton, 2009) foot-in-the-door effect (Thøgersen & Noblet, 2012), carryover effect (Dolan & Galizzi, 2015; Lerner, Small, & Loewenstein, 2013), rebound effect (Peters, Sonnberger, Dütschke, & Deuschle, 2012; Sorrell, Dimitropoulos, & Sommerville, 2009), and single action bias (Dolan & Galizzi, 2015; Truelove et al., 2014) –to name but a few.

The term *catalyst behaviour* is often used to describe behaviours where a discrete action, such as recycling plastic bottles, catalyses more general change to behavioural patterns or lifestyles (Whitmarsh, 2014). Identifying and then systematically promoting catalyst behaviours is an efficient way to create wider behaviour and lifestyle changes towards a more sustainable society (Nash et al., 2017; Quimby & Angelique, 2011). Policy makers in particular have shown interest in identifying catalyst behaviours with the hope that systematic promotion could be an efficient policy tool to reduce people’s environmental impact (Austin et al., 2011). However, some researchers criticise this approach as to date there has been little empirical evidence for catalyst behaviours (Thøgersen & Noblet, 2012).

The term *virtuous escalator* effect has been used to describe the idea that engaging in a ‘simple and painless’ ESB may lead to engage in more difficult ESBs – hence, ‘up’ like an escalator (Thøgersen & Crompton, 2009). Similarly, the *foot-in-the-door-effect* technique, a concept coined by Burger (1999; Burger & Caldwell, 2003) and Freeman and Frase (1966), in a different context, suggests that engaging in an easy and simple ESB makes engaging in a more difficult behaviour more likely by committing an individual to a simple request (i.e. small initial ESB) (Thøgersen & Crompton, 2009). This approach, however, is criticised by Thøgersen and Crompton (2009) who argue that sufficient empirical evidence for the positive impact of simple and easy ESBs on more difficult effects is lacking.

The *rebound effect* is an energy specific spillover concept and describes an increase of energy demand following improvements to energy efficiency (e.g. increase in distances travelled after purchase of a fuel-efficient car), which constitutes evidence for negative spillover effects. Such rebound means that the energy savings that could be achieved are not realised in full (Peters et al., 2012). The rebound effect is a concept specific to energy-efficiency behaviour and often discussed in relation to the introduction of an energy-efficient technology, whilst only addressing energy demand, not ESBs in general. The *single action bias* refers to the phenomenon that people change one – often relatively insignificant – behaviour in response to a persuasive appeal but do not take on any further behaviours (Truelove et al., 2014). While rebound effects are special cases of negative spillover – the initial energy efficient behaviour (e.g. buying a new, more energy efficient fridge) leads to energy intensive behaviours (e.g. buying a larger fridge); the single action bias, on the other hand, is a case when an individual engages in a one-off ESB following a trigger that then fails to spillover to any further action. Weber (2006) for instance, found single action bias in a study with farmers who engaged in actions to adapt to climate change had a lower support for policy interventions for climate change. Single action bias is often explained with a perceived reduced risk people experience when engaging in an initial ESB which leads to not engaging in further, often more significant ESBs.

The common idea behind these terms is that two or more subsequent ESBs are linked through a common factor (e.g. identity, context, or other factors). Thus, spillover effects can be used as an umbrella to describe how one behaviour affects other behaviours. However, some terms specify a particular aspect or direction of the spillover effect. For example, the rebound effect describes a specific case of negative spillover in the area of energy efficient behaviour (for an overview see Sorrell et al., 2009). The foot-in-the-door effect (Burger, 1999; Dolan & Galizzi, 2015), and similarly the virtuous escalator effect (Thøgersen & Crompton, 2009), describes the effect when a rather insignificant and easy behaviour (e.g. recycling plastic bottles) leads to a second, more difficult and significant ESB (e.g. changing to a plant-based diet). While the various terms to describe different aspects of the spillover effect are useful to emphasise certain mechanisms, for the remainder of this thesis, the most commonly used term *spillover* will be used as it is the most commonly used term in the literature (e.g., Galizzi & Whitmarsh, 2019 found 106 studies that researched spillover effects).

## **2.1.4 POSITIVE, NEGATIVE AND LACK OF SPILLOVER**

Spillover effects can be positive or negative, whereas a lack of spillover refers to the absence of positive or negative spillover (Verfuert & Gregory-Smith, 2018). A lack of spillover can have an impact on the effectiveness of policies and behaviour change programmes that aspire to promote environmental conservation through behaviour change. Positive spillover, if prevalent, can have knock-on effects on other ESBs and therefore increase the impact of these approaches whereas the presence of negative spillover can undermine such effects (Carrico, Vandenberg, Stern, & Dietz, 2015). The following section is a brief review of evidence for both positive and negative spillover as well as a lack of spillover.

### **2.1.4.1 POSITIVE SPILLOVER**

Positive spillover has been the focus of several studies; however, empirical evidence for the presence of positive spillover is mixed. While some studies found positive spillover effects, other studies suggest positive spillover might be very subtle and difficult to measure, if it is present (Lacasse, 2017). For instance, Poortinga, Whitmarsh, and Suffolk (2013) found that after the introduction of a carrier bag charge in Wales, environmental identity became more prevalent as a result of self-perception and cognitive dissonance as well as an increase in positive attitudes towards the charge (Poortinga et al., 2013). Similarly, a study by Thøgersen (1999) found that people felt less obligated to act environmentally friendly after initially engaging in an ESB indicating negative spillover. However, they also found a positive relationship between recycling and waste prevention behaviours, which indicates a positive spillover effect.

Other studies found clear evidence for positive spillover effects. For example, van der Werff et al. (2014b) found that past ESB (e.g. driving style) was positively related to other, different ESBs (i.e. intention to reduce meat consumption) which the authors interpreted as an indicator for positive spillover. Similarly, Steinhörst et al. (2015) found empirical evidence for positive spillover effects from electricity saving behaviours to climate-friendly intentions. However, while some studies found evidence for positive behavioural spillover, other evidence is less compelling, with changes only reported in attitudes rather than non-target ESBs. For example, in the workplace context, Manika et al. (2015) found a positive relationship between recycling and energy saving behaviour and a weak relationship between recycling and printing; however, they did not find a correlation between energy saving behaviour and printing. This indicates that the evidence for positive spillover is rather mixed and further research is needed to better understand factors that influence positive spillover.

Thøgersen and Crompton (2009) criticise the tendency of policy makers and other researchers to insist on positive spillover effects. They argue that promoting ‘simple and painless steps’ to reduce individuals ecological impact through campaigns and behaviour change interventions while, explicitly

or implicitly, relying on positive spillover effects to occur is inadequate to achieve climate goals (Thøgersen & Crompton, 2009). Particularly reliance on the foot-in-the-door effect for ESB, which suggests that promoting easy behaviours should lead to more difficult and impactful ESBs, is criticised by Thøgersen and Crompton (2009). They request more drastic changes and argue that focussing on small behaviours hoping for positive spillover effects is not enough. Thus, a better understanding of whether and if when and how positive spillover effects but also negative spillover and a lack of spillover occur is an important area for current research.

#### **2.1.4.1.1 COGNITIVE DISSONANCE AND SELF-PERCEPTION THEORY**

Two psychological theories are recurrently used to explain the positive spillover effect: Cognitive Dissonance Theory (Festinger, 1957) and Self-perception Theory (Bem, 1972). According to cognitive dissonance theory, people experience discomfort when holding two contrasting cognitions and are motivated to reduce cognitive dissonance which can be achieved in a number of ways, including changing attitudes, behaviours, externalising responsibility or reducing the importance of dissonant elements (Festinger, 1957; S. McDonald, Oates, Alevizou, Young, & Hwang, 2012). In the context of ESB this means that if a person holds pro-environmental views, acting unsustainably creates discomfort, which may be reduced by acting in an environmentally friendly way (Thøgersen, 2004). Accordingly, the need for consistency might influence positive spillover between ESBs (Thøgersen, 2004).

Self-perception theory, on the other hand, posits that people infer their identities and attitudes from past behaviours (Bem, 1972). Accordingly, people align their cognitions (e.g. attitudes, values, identity) with their observed past behaviour; particularly in ambiguous situations (Austin et al., 2011). Hence, acting environmentally sustainably leads people to reaffirm their 'green' identity, which subsequently motivates them to act in line with their identity and cognitions in the future. As such, self-perception theory implies that past ESBs lead to more ESBs, which are connected through one's self-perception (van der Werff, Steg, & Keizer, 2014a). These two theories can guide investigations of spillover effects by offering explanations for potential underlying processes. This is further discussed in sections 2.5 and 2.6.

#### **2.1.4.2 NEGATIVE SPILLOVER**

Negative spillover is when an initial ESB is subsequently followed by an environmentally damaging behaviour. While most spillover research focusses on understanding positive spillover effects and how to promote them, only few studies have also investigated negative spillover effects. For instance, in a study investigating spillover from recycling behaviour to supporting a campus green fund, Truelove et al. (2016) found evidence for negative spillover, but only for students that identified as Democrats. In the same study they also found evidence for positive spillover from recycling behaviour to supporting a campus green fund but only for self-identified Republicans. Truelove et al. (2016)



suggest that Democrats, who are considered to be more ‘green’ than Republicans, may have experienced recycling as an easy behaviour, which could have led to negative spillover, as indicated by previous research (Gneezy, Imas, Brown, Nelson, & Norton, 2012). Whereas for participants who identified as Republicans, and therefore less ‘green’, the easy recycling behaviour could have acted as a catalyst, which could explain their increased support of campus green fund; i.e. positive spillover (Truelove et al., 2016).

Negative spillover can also occur as a result of compensatory behaviours; that is, engaging in an ESB compensates for engaging in an environmentally harming behaviour. For example, Midden et al. (2007) found that people perceived the absence of a tumble dryer as a way to compensate for driving to work. Similarly, Klöckner et al. (2013) found negative spillover effects in a study comparing buyers of conventional combustion engine cars with those of electric vehicles and their annual mileage. Klöckner et al. (2013) found evidence of negative behavioural spillover effect on annual mileage amount of electric vehicle owners and that electric car owners had significantly lower pro-environmental motivations (e.g. intentions, norms, attitudes). This was interpreted as an indication for negative spillover, but on the psychological level (motivational level) and the behavioural level (Klöckner et al., 2013).

#### **2.1.4.2.1 MORAL LICENCING AND COMPENSATORY GREEN BELIEFS**

Theories that explain negative spillover effects include *moral licencing* (Truelove et al., 2014) and *compensatory green beliefs* (Hope, Jones, Webb, Watson, & Kaklamanou, 2018; Kaklamanou, Jones, Webb, & Walker, 2013). According to moral licencing theory, people who initially behave morally are later more likely to show immoral behaviours as a result of feeling licensed to do so through their previously moral behaviour or vice versa (Blanken, van de Ven, & Zeelenberg, 2015; Mazar & Zhong, 2010). In support of this, a quasi-experimental field study showed that donating to a charity subsequently led to lower environmental intentions (Meijers, Verlegh, Noordewier, & Smit, 2015). However, a more recent study could not replicate the negative effects of moral licencing on ESBs (Urban, Bahník, & Kohlová, 2019). Similarly, compensatory green beliefs (CGBs) are a person’s belief that a present or past environmentally damaging behaviour can be compensated for in the future; e.g. purchasing organic food as a compensation for flying abroad on holidays (Kaklamanou et al., 2013). The authors argue that CGBs are more likely to occur within people that have failed to internalise the need to be pro-environmental (i.e. they are more responding to extrinsic/social pressures to be pro-environmental).

Overall, self-perception theory and cognitive dissonance theory as well as moral licencing and compensatory green beliefs provide first indications on the dynamics of positive and negative spillover. However, mixed empirical evidence and the frequent occurrence of a lack of spillover highlight that more research is needed in order to understand positive, negative, and a lack of spillover.

### **2.1.4.3 LACK OF SPILLOVER**

Lack of spillover describes instances when either positive or negative spillover was expected, but neither occurred. Empirical evidence for spillover is mixed showing inconsistent findings for the occurrence of both positive and negative spillover effect (Lacasse, 2016; Thomas, Poortinga, & Sautkina, 2016). For example, Poortinga, Whitmarsh, and Suffolk (2013) found that after the introduction of a single use carrier bag charge in Wales, environmental identity became more prevalent, there was no increase in positive attitudes towards the charge nor a behaviour change in other waste related behaviours as consistency and self-perception theory would suggest. Moreover, in a large-scale survey related to the single use carrier bag charge in Wales, Thomas et al. (2016) found that participants from Wales increased the use of re-usable bags when shopping, however, they found only small increases of other ESBs and associated attitudes. Another study by Wells et al. (2016) found positive spillover from environmental attitudes at home and at work, but no spillover between behaviour at home and behaviour at work. Some researchers suggest that the co-occurrence of positive and negative spillover becomes apparent as a lack of spillover. For instance, Lacasse (2016) investigated the effects of identity labelling on spillover behaviours and found that positive and negative spillover occurred at the same time, which led to an apparent lack of spillover. While the pathway between past behaviour to climate change concern was positively influenced by environmental self-identity, guilt had a negative effect which resulted in no spillover altogether (Lacasse, 2016). This shows that a better understanding of the pathways to both positive and negative spillover effect could offer explanations for the occurrence of a lack of spillover.

In recent years, a variety of research has been conducted to investigate spillover effects (for an overview see e.g. Austin et al., 2011; Nash et al., 2017). However, taken together, the evidence for positive and negative spillover effects varies. Mixed findings including positive and negative spillover as well as a lack of spillover indicate that the current understanding of the spillover effect needs further development. While there is some evidence contributing to theoretical assumptions made about positive and negative spillover, more research is needed to better understand the circumstances and predictors of spillover effects. Particularly causality between ESBs, which some argue is a defining element of spillover effects (e.g., Nash et al., 2017), needs to be further investigated. Moreover, future research is needed to better understand when and why a lack of spillover occurs.

## **2.2 FACTORS THAT INFLUENCE SPILLOVER**

Understanding the factors that influence spillover effects promise a better understanding of the spillover phenomenon. As such, several studies have focussed on investigating psychological and contextual factors that might influence both positive and negative spillover, or inhibit spillover effects

(i.e. lack of spillover). The following section provides an overview of the factors that have been found to influence spillover effects, to date.

### **2.2.1 VALUES & NORMS**

Values and norms have been identified as determinants of ESB in previous research – most prominently in the Theory of Planned Behaviour (TPB; Ajzen, 1991) and the Value Belief Norm Model (VBN; Stern, 2000; Stern, Dietz, Abel, Guagnano, & Kalof, 1999). Values are guiding principles in a person's life (Schwartz, 1994), whereas norms are a person's feelings of obligation which can be self-expectations (personal norms) or social expectations (social norms) (Schwartz, 1977; Stern et al., 1999). Both influence behaviour in general (Stern, 2000) and have also been identified as influencing factors for spillover effects. Several studies found that both norms and values were identified as drivers of positive spillover between ESBs; particularly those associated with environmental protection.

The values 'universalism' and 'self-transcendence' (Schwartz, 1994), were found to promote positive spillover effects. For instance, in a three-wave-panel study with Danish consumers, Thøgersen and Ölander (2002) discovered a moderating effect of values and personal norms for positive spillover. They found that the likelihood of positive spillover was higher when people had a high priority for Schwartz's universalism values. In line with these findings, van der Werff et al. (2013b) found that people with strong biospheric values, i.e., people who care for nature and the environment (De Groot & Steg, 2007), are more likely to engage in secondary ESBs (positive spillover). Conversely, a hedonistic value orientation is associated with rebound effects (Peters et al., 2012) – i.e. negative spillover. Further, two experiments conducted by Evans et al. (2012) showed that participants who received environmental information about car-sharing (associated with self-transcendent values) were more likely to engage in recycling (spillover behaviour) than those who received financial information (associated with self-interested values). In the workplace context, shared values between organisations and employees and employees' commitment to 'green' organisational values led to positive spillover, while the lack of shared values and commitment was associated with a lack of or negative spillover (Cox, Higgins, Gloster, Foley, & Darnton, 2012). This suggests that an overlap between the employees' and the organisation's values promotes positive spillover, whereas incongruence could lead to negative spillover.

Strong norms have also been linked with positive spillover. For instance, personal norms were found to mediate positive spillover effects from energy saving behaviour to acceptability of policies. This was shown in a field experiment with clients of a German energy provider, where environmental versus monetary framing of energy saving messages were compared (Steinhorst et al., 2015; Steinhorst & Matthies, 2016). Furthermore, Thøgersen (2004) identified strong personal norm of ESB as a moderator for spillover between similar ESBs (i.e. positive spillover effects). These findings support

previous theoretical considerations in which it is suggested that Cognitive Dissonance Theory (Festinger, 1957) would increase the likelihood for consistency across ESBs (e.g., Thøgersen, 2004). In order to avoid cognitive dissonance, people would aim to align their cognitions (e.g. values or norms) with their behaviour by adjusting either their behaviour or their cognitions (Festinger, 1957). Hence, as supported by the evidence, people with strong environmentalism values (e.g. biospheric, self-transcendent) and/or strong environmental norms are more likely to engage in behaviours that are consistent with their values and norms in order to avoid cognitive dissonance.

In addition to being factors that influence ESBs and spillover effects, values and norms are often used to frame ESBs in behaviour change interventions, by making specific benefits and values of a behaviour salient. For instance, monetary rewards are frequently used to frame the hedonic or materialistic benefits of engaging in the target behaviour (Abrahamse, Steg, Vlek, & Rothengatter, 2005). While environmental and monetary framing of ESBs was found to have similar effects on the promoted ESB, the spillover effects differed (Steinhorst et al., 2015; Steinhorst & Matthies, 2015). Steinhorst and Matthies (2016) compared monetary and environmental framing and only found positive spillover effects in the environmental and not in the monetary framing condition. Evans et al. (2012) found that monetary framing of ESBs increased the salience of self-interest values, while the salience of self-transcendent values was increased in the environmental framing condition. When self-interest was prompted after self-transcendent motives were salient (i.e. through monetary framing), the environmental effect was neutralized, which led to a lack of spillover (Evans et al., 2012).

These studies indicate that values are an important factor for ESB as well as for spillover between ESBs. Furthermore, these studies show that the framing of ESB plays an important role in making certain values salient. Although behaviour change interventions that highlight the monetary benefits of behaving environmentally friendly increased the targeted ESB, financial framing also made self-interest values more salient, which can lead to negative spillover effects. Environmental framing, on the other hand, was more likely to lead to positive spillover by making transcendent values salient. These are considerations that future behaviour change interventions should take into account.

## **2.2.2 PAST BEHAVIOUR & HABITS**

Past ESB and habits have also been found to influence spillover, particularly positive spillover. The notion that both past ESB and habits might play a role for spillover effects is supported by Bem's Self-Perception Theory (1972) and Festinger's Cognitive Dissonance Theory (1957). Accordingly, it is suggested that past behaviours provide cues to norms, values and self-identity. These, in turn, may lead to behaviours that are consistent with the revised norms, values, and self-identity which results in consistency across past and future behaviours (Whitmarsh et al., 2018). The frequency of past behaviour indicates the strengths of a habit and has an effect on future behaviour, while behaviour intention was

found to have a lower impact on future behaviours (Verplanken, Walker, Davis, & Jurasek, 2008). Repetition of behaviours is often triggered by cues an individual receives from their environment (Verplanken & Orbell, 2003), which indicates that past behaviour might be a particularly strong predictor of spillover in the same behavioural context (e.g. at home). As such, habits seem to be a strong predictor for consistency of behaviours over time and across contexts.

Moreover, some researchers suggest that experiences and routines of behaviours are learned in one context turning into habits, which might then spillover to another context leading to positive spillover effects (Klade et al., 2013). For instance, Whitmarsh et al. (2018) found that recycling habits at home and on holidays correlate. Further evidence for the influence of past or existing behaviour on other ESBs, interpreted as spillover, was found in a study on Norwegian car-owners by (Klößner et al., 2013), however, the study found a both positive and negative spillover effects. Owning an electric car reduced a person's intention and perceived moral obligation to reduce car use, which resulted in a higher annual mileage of electric car owners in comparison to combustion engine car owners (Klößner et al., 2013). Moral licencing effects (e.g., Tiefenbeck, Staake, Roth, & Sachs, 2013) could explain why people first engage in an ESB (e.g. buying an electric car) but then feel they have already done their share for the environment. However, more research is needed to better understand the dynamics between habits, past behaviours, and spillover effects. While habits seem to act as drivers for positive spillover effects, moral licencing subsequent to ESBs (i.e. past behaviours or habits) seems to increase the likelihood for the lack of or negative spillover effects that may neutralise any positive spillover effects.

### **2.2.3 EMOTIONS**

In the context of spillover of ESB, emotions have predominantly been linked to negative or a lack of spillover. For instance, Lacasse (2016) found that a reduced feeling of guilt would lead to negative spillover effects as processes similar to moral licencing seem to reduce the perceived obligation to engage in ESBs, which are associated with emotions of guilt. However, Schütte and Gregory-Smith (2015) found that, when acting unsustainably, people would balance their negative emotions by using neutralisation techniques. In a qualitative study on holiday decision making, Schütte and Gregory-Smith (2015) found that people were using neutralisation and mental accounting techniques to justify their unethical behaviour on holidays, while engaging in ESBs at home. Similarly, another qualitative study found that people may use mental accounting techniques to justify their decision to fly by engaging in other ESBs behaviours to reduce their cognitive dissonance and affirm their self-concept as a pro-environmental person (McDonald, Oates, Thyne, Timmis, & Carlile, 2015). As such, it seems that negative spillover and a lack of positive spillover can arise when a person aims to overcome cognitive dissonance and balance associated negative emotions by using neutralisation

techniques including denial and justification (Chatzidakis, Smith, & Hibbert, 2006). Mental accounting and neutralisation techniques can therefore be identified as potential factors influencing negative spillover and the lack of positive spillover.

#### **2.2.4 IDENTITY**

An individual's identity – how they see themselves – has been identified as a predictor for ESBs and linked with consistent ESBs over time and contexts (e.g., Gatersleben, Murtagh, & Abrahamse, 2014; van der Werff et al., 2013b; Whitmarsh & O'Neill, 2010). Identity has been theorised and empirically supported as one of the strongest predictors for positive spillover effects (Lacasse, 2016; Nik Ramli & Naja, 2012; Truelove et al., 2014; van der Werff & Steg, 2018). Some research suggests that identity could be a mediator between ESBs (van der Werff et al., 2014a, 2014b) and, therefore, drive spillover processes. For example, reminding someone about their past ESBs influences future ESBs, which results in positive spillover (van der Werff et al., 2014a, 2014b). Similarly, labelling someone as an environmentalist influences future ESBs, which also links to positive spillover effects (Lacasse, 2016). These findings are in line with Bem's Self-Perception Theory (1972) which states that people align their identity and beliefs based on past behaviour. Hence, being reminded of previous ESBs or being labelled an environmentalist influences one's self-perception, which then leads to more ESBs; i.e. spillover effects (Lacasse, 2016; Whitmarsh & O'Neill, 2010).

While empirical evidence for the link between environmental identity and positive spillover is increasing, less research has investigated the role of identity for a lack of or negative spillover. Furthermore, some research could not confirm the link between ESB, environmental self-identity, and positive spillover effects and instead found a lack of spillover (e.g., Poortinga et al., 2013) or negative spillover effects (e.g., Fanghella, Adda, & Tavoni, 2019; Truelove et al., 2016) associated with an increase in environmental identity. Other studies only found small spillover effects after an increase in environmental identity suggesting that social dynamics (e.g. negative stereotypes of environmentalists) or contextual barriers could reduce the strength of the link between an increased environmental identity and positive spillover effects (e.g., Elf, Gatersleben, & Christie, 2019; Verfuërth, Jones, Gregory-Smith, & Oates, 2019).

As such, a better understanding of the underlying identity processes that are linked to spillover effects is needed. While van der Werff et al. (2014a) suggest that a behaviour change intervention increases the salience of environmental self-identity, other studies suggest that a behaviour change intervention may lead to identity threat and reactance to behaviour (Murtagh, Gatersleben, & Uzzell, 2014), which may result in negative spillover effects.

Overall, the above section provided an overview of factors that influence spillover effects. It was shown that the factors values, norms, habits, and particularly identity seem to mediate positive

spillover effects, while strategies that are used to balance emotions (e.g. neutralisation, moral licencing) seem to predict inconsistent ESBs and negative spillover effects. However, there seems to be a gap in the understanding of the interplay between these factors and particularly in the understanding of underlying identity processes and negative emotions (e.g. identity threat; Murtagh et al., 2014) in relation to spillover. Furthermore, while the evidence highlights the importance of identity as an underlying factor for positive spillover effects, there seems to be a gap in the understanding of the identity-related processes for the emergence of negative spillover and the lack thereof.

## 2.3 CONTEXTUAL SPILLOVER

ESBs take place in a variety of areas of life – so called microenvironments – which include the home, workplace, school, and public places (e.g. cafés or parks) – to name but a few (Cox et al., 2012). Contexts or microenvironments are here understood as both social and physical contexts (e.g. home, workplace). People spend a large amount of their day-to-day time at work and at home which is why these contexts play an important role in promoting ESBs (Cox et al., 2012). Particularly, the workplace constitutes a place for learning and offers the opportunity to promote ESBs that could spillover to the home context (Klade et al., 2013). Spillover between contexts has received little attention and only few studies investigated potential spillover effects between the home and the workplace (e.g., Coan, 2014; Littleford, Ryley, & Firth, 2014; Tudor, Barr, & Gilg, 2007; Wells et al., 2016).

Previous research has largely focussed on understanding behavioural spillover effects. Contextual, on the other hand, describe spillover effects between physical or social contexts (e.g. work and home). Similar to behavioural spillover, contextual occurs when one ESB leads to another; however, ESB1 and ESB2 take place in different contexts (Nilsson et al., 2016). To date, little is known about contextual spillover effects, which is why this thesis aims to contribute to a better understanding of contextual spillover effects. The previous section mostly reviewed evidence on behavioural spillover as the findings are possibly applicable to contextual spillover also. However, the following section focusses specifically on the evidence for contextual spillover effects.

Spillover between contexts can occur in a number of ways. ESB at home can influence behaviour at work or other contexts and vice versa. It could also be an iterative process which means that behaviours in each context are interlinked and interact with each other. Previous research has identified ESBs at home as a relevant predictor for employee sustainable behaviours at work (Lo, Peters, & Kok, 2012; Young et al., 2013). For example, in an employee survey, Tudor et al. (2007) found that employees who engaged in recycling behaviour at home were also more likely to engage in similar activities at work. Research in human resource management argues that employees are both a producer (employee) and consumer as they learn behaviours in the workplace and in their private life (Muster & Schrader, 2011). Thus, Muster and Schrader (2011) suggest that reciprocal occurring interactions

between work and private life can facilitate promoting ESBs in both contexts. This implies that spillover effects between the two contexts can play an important role for promoting environmentally sustainable lifestyles. However, to date, most research focusses on ESB at home as a predictor for behaviour at work, while little research has been done to study effects of environmental policies or behaviour change interventions at work to home behaviour. Moreover, the studies above are correlational and do not have the intervention component of the definition that has been introduced above.

### **2.3.1 CONTEXTUAL SPILLOVER FROM WORK TO HOME: DRIVERS AND BARRIERS**

A number of factors can play a role in promoting or inhibiting both positive and negative spillover effects between the home and the workplace. For example, Nik Ramli and Naja (2011) found that employees' organisational identification had a mediating effect on positive spillover between ESBs at work and outside the workplace. The study also found that perceived management support influences positive spillover effects of energy saving behaviour from work to home, but only when the employees identified with the organisation's environmental ideals (Nik Ramli & Naja, 2011). Exposure to environmental education at work and employees' commitment to the organisation's environmental values were identified as additional key drivers of spillover from the workplace to other areas of life (Cox et al., 2012). An evidence review by the Scottish government explored the impact of behavioural programmes at work on low-carbon behaviours of employees outside the workplace (Cox et al., 2012). The review included ten case studies that were analysed covering three types of behaviour change: a) starting a behaviour, b) stopping a behaviour, and c) replacing a behaviour. Recycling/reducing waste and energy behaviours were the most popular behaviours targeted in the case studies. Some case studies focussed on transport behaviour and a few case studies also targeted food consumption. A lack of spillover was reported when employees complied with the organisation's policies but were not committed to the organisation's values. Cox et al. (2012) suggest that possible explanations could be difficulties to translate abstract organisational values into behaviours or refused participation through one-way communication of values.

Instead of finding behavioural spillover effects between contexts, some studies found a change in environmental attitudes only. For example, in a study investigating water and energy saving behaviour at home and at work, Wells et al. (2016) also found no spillover between behaviour at home and behaviour at work. However, they found positive spillover effects from environmental attitudes at home to attitudes at work (Wells et al., 2016). Wells et al. (2016) suggest that water and energy saving behaviours at work do not have the same financial rewards as they do at home which could be why only attitudes spilled over. Thus, differences between contexts could act as barriers to spillover, for instance differences in monetary rewards for saving energy at work and at home.



### 2.3.1.1 SIMILARITIES AND DIFFERENCES

Similarities between behaviours and contexts have been identified as another factor that influences the strength of spillover effects while dissimilarities act as barriers (Tudor et al., 2007). Particularly in the context of spillover between different contexts such as the work and home context, similarities between behaviours were associated with positive spillover. For instance, a study by Littleford et al. (2014) investigated spillover between the office and household contexts. Although their findings could not support the existence of positive spillover between the work and home context, they found correlations between behaviours that involved similar equipment (i.e. computer) or the same prompts (i.e. leaving the room). They argue that the likelihood of spillover across contexts would be higher when categories such as type of equipment or prompt were similar (Littleford et al., 2014). Lanzini and Thøgersen (2014), for instance, suggest that similarities between behaviours as well as contexts are functional and symbolic similarities, which can lead to positive spillover both between contexts and behaviours. In line with this, Wells et al. (2016) suggest that highlighting similarities between the home and work context in social marketing campaigns increases the likelihood for spillover between the two contexts.

Furthermore, findings by Tudor et al. (2007) suggest that particularly similarities in ESBs in different contexts influenced contextual spillover (e.g. similarities in the types of recyclables). Similarly, Andersson et al. (2012) found positive spillover effects after the implementation of an environmental management system in the workplace to waste behaviours at home; the effect was mediated by environmental concern and environmental identity, which increased self-efficacy and led to recycling behaviour at home (Andersson et al., 2012). Moreover, a study assessing four ESBs across three contexts (i.e. home, school, and friend's home) found variability and inconsistency between the studied ESBs and across the contexts (Maki & Rothman, 2017). The study also found that people would act more consistently in the same behaviour between contexts than engaging in multiple ESBs in the same context. This implies that similarities of behaviours makes positive spillover between contexts more likely (Maki & Rothman, 2017). Maki and Rothman (2017) suggest that variable social dynamics in different contexts could constitute barriers for spillover between contexts and scripts of behaviours could also be triggered in some contexts but not in others. This could explain the variability of behaviour across and between contexts. Similarly, Whitmarsh et al. (2018) found that different waste reduction behaviours correlated less between contexts, which may be due to individual (e.g. identity) and contextual (e.g. facilities) barriers. Overall, it seems that similarities promote and differences inhibit contextual spillover effect.

### 2.3.2 THE IMPORTANCE OF THE CONTEXT AND INDIVIDUAL FACTORS

While the studies described above follow an individual behaviour centred approach, Hargreaves (2011) as well as Uzzell and Rätzel (2013) focus more on the interaction between agency (i.e. individual) and structure (i.e. context) to study contextual spillover. Hargreaves (2011) conducted an ethnographic case study to observe social practices during a behaviour change intervention in the workplace. By using a social practice theory approach, Hargreaves (2011) argues that the environmentally sustainable practices are embedded in the social and organisational context providing a more holistic approach to studying behaviour change processes. In another study, Nye and Hargreaves (2010) evaluated two team-based behaviour change interventions at work and home with the aim to explore the role of context for shaping behavioural outcomes. Their work highlighted the importance of context for the behaviour change process. Although Nye and Hargreaves' (Hargreaves, 2011; 2010) work is not focussed on spillover effects, it emphasises the importance of the social context to environmentally sustainable practices (i.e. ESBs).

Uzzell and Rätzel (2013, 2018) focused on individuals as active agents that “negotiate their relations within and between the different areas in different ways at different times and places” (p. 19). Similar to Hargreaves (2011), Uzzell and Rätzel used practice theory to analyse ESBs at work and home, while criticising the rationalised and individual centred approach. Uzzell and Rätzel propose the term *border crossing* instead of spillover arguing that it reflects the process and the logics of practices both at home and work more adequately. Uzzell and Rätzel (2013, 2018) suggest that certain practices are functional in the workplace but dysfunctional at home. They argue that individuals in their everyday life move between different contexts (e.g. work, home, leisure), which follow different logics and principles (Uzzell & Rätzel, 2013, 2018). While individuals take habits, prejudices and preferences when moving between the home and workplace contexts, Uzzell and Rätzel suggest that, instead, the circumstances under which learned practices are taken into different contexts should be studied. In their case study, Uzzell and Rätzel interviewed employees from the oil industry to investigate border crossing between work and home. They found that border crossing from work to home exists, but merely around safety practices, which emerged from a safety culture in the studied company. While Uzzell and Rätzel could not find border crossing for environmentally sustainable practices, they identified culture in the workplace as an important factor for border crossing to the home context.

Overall, only few studies have investigated spillover effects between the home and workplace. Both contextual and individual variables have been found to influence contextual spillover effects (Whitmarsh et al., 2018). These include culture of the context (Hargreaves, 2011; Uzzell & Rätzel, 2013, 2018), similarities and differences between behaviours and contexts (Tudor et al., 2007), control (Littleford et al., 2014), identity (Whitmarsh et al., 2018), and habits (Klade et al., 2013). However, while the research above points towards relevant factors for spillover between contexts, particularly

positive spillover, more research is needed to better understand the processes that lead to a lack of and negative spillover effects between the work and home setting.

## **2.4 THEORETICAL FRAMEWORKS OF SPILLOVER**

Several conceptual frameworks have been published that incorporate some of the above reviewed theoretical considerations and evidence for spillover effects. While the frameworks differ in their understanding of spillover and pathways to it, the common theme is the aim to explain the mechanisms that underlie positive and negative spillover effects. Most frameworks focus on spillover effects between ESBs, whereas only a few look at spillover between contexts. In the following, the first section provides an overview of some theoretical frameworks that explain the pathways between an initial ESB and a subsequent spillover behaviour, or the lack thereof. The pathway approach is also used in the new theoretical framework for contextual spillover, which is described at the end of this chapter (section 2.6). The second section is focussed on frameworks of contextual spillover effects and highlights that further theoretical understanding of contextual spillover effects is needed.

### **2.4.1 PATHWAYS TO SPILLOVER**

A common approach to spillover frameworks is to explain it through pathways that lead to spillover. For example, Thøgersen (2012) suggests that four pathways lead to positive spillover by linking two subsequent ESBs (see Figure 3). The first pathway is mediated by pro-environmental goals and values. Thøgersen suggests that engaging in an ESB can activate pro-environmental goals or values which can then motivate a person to engage in a second ESB, leading to positive spillover. The second pathway explains positive spillover through environmental identity. According to Thøgersen, engaging in an ESB increases a person's self-perception as a pro-environmental person, which subsequently leads to a second ESB (Thøgersen, 2012). The third and fourth pathways to positive spillover can be explained through learning. By engaging in an ESB, a person learns new skills and knowledge or experiences self-efficacy which then leads to subsequent ESBs; i.e. positive spillover (Thøgersen, 2012). Empirical evidence supports the pathways proposed in Thøgersen's theoretical framework. As shown in the previous section, several studies found evidence for the role of environmental identity (e.g., Lacasse, 2016; van der Werff & Steg, 2018), self-efficacy (e.g., Lauren et al., 2016), values (van der Werff et al., 2013b), and skills (e.g., Thøgersen, 1999). Furthermore, the framework implies that the initial and the secondary ESB occur at different points in time. Thus, in order to assess the pathways for positive spillover as proposed by Thøgersen, ESBs should be assessed at two or more time points.



*Figure 3: Theoretical reasons for positive spillover (Thøgersen, 2012a; p. 25)*

While the framework provides a useful overview of some concepts that have shown to promote positive spillover, it is limited in its ability to explain spillover effects as a whole. For instance, previous research has shown that positive and negative spillover can occur simultaneously, which overall may result in a lack of spillover (Lacasse, 2016). Therefore, a theoretical model that accounts for both positive and negative spillover as well as interactions between the pathways would help understand spillover effects more fully. Nonetheless, the pathway-based framework provides a useful account for positive spillover effects and makes suggestions about how positive spillover could be promoted (i.e. through promoting one or more pathways).

#### **2.4.1.1 PROMOTING, PERMITTING, PURGING**

Dolan and Galizzi (2015) provide a framework based on pathways between an initial ESB and a secondary spillover behaviour. In their framework, they differentiate between three categories of spillover: (1) promoting, (2) permitting, and (3) purging, which are similar to positive, negative, and the lack of spillover. The first category, promoting, describes a positive spillover effect where an initial ESB is in line with a subsequent ESB, or when an environmentally harming behaviour is subsequently followed by another environmentally harming behaviour (Dolan & Galizzi, 2015). Promoting can here be understood as consistency among behaviours, similar to cognitive dissonance theory, foot-in-the-door effect or other carry-over effects (Dolan & Galizzi, 2015). Permitting, on the other hand, leads to a decrease in ESBs (i.e. negative spillover) (Dolan & Galizzi, 2015). Lastly, purging describes the effect when an individual initially engages in an environmentally harming behaviour which is subsequently followed by a positive ESB (Dolan & Galizzi, 2015). Purging spillover includes, for example, moral cleansing and conscience accounting (Dolan & Galizzi, 2015).

Determinants of permitting, promoting, and purging are a person's underlying motives, which Dolan and Galizzi (2015) conceptualise as deep preferences such as identity goals or basic values. Similar to Thøgersen's approach, Dolan and Galizzi (2015) integrate several concepts associated with

spillover. However, unlike most spillover frameworks, their framework is focussed on pathways to consistent and inconsistent behaviours and includes explanations for consistent positive and negative ESBs and inconsistencies between ESBs. Positive ESBs are here understood as behaviours that preserve natural resources (e.g. saving energy), while negative ESBs are understood as behaviours that have damaging effects on natural resources (e.g. wasting energy). Similar to Thøgersen (2012), Dolan and Galizzi's (2015) framework emphasises that underlying motives (i.e. "intended range of factors that drive behavior", Dolan & Galizzi, 2015; p. 3) link two subsequent spillover ESBs. While Dolan and Galizzi's (2015) framework contributes to a better understanding to consistencies and inconsistencies in ESBs – and, as such, spillover effects – it does not account for any of the drivers for spillover that were identified in previous research (see section 2.2). As such, a framework that integrates some of those factors (e.g. identity) and their underlying processes could further develop the understanding of spillover effects.

#### **2.4.1.2 DECISION MODE AND ATTRIBUTION**

The behavioural spillover framework proposed by Truelove et al. (2014) focusses on the decision-making processes that is involved when engaging in ESBs. Truelove et al. (2014) define spillover as the effect of an intervention designed to encourage one type of ESB on subsequent different behaviours. This implies that spillover is tied to a behaviour change intervention rather than occurring organically, as the previous two frameworks suggest. In the framework, two main factors influence spillover: (1) decision mode and (2) attribution of one's behaviour after the decision process (Truelove et al., 2014). Truelove et al. (2014) suggest that three pathways lead to spillover: calculation based, negative affect based, and role based. According to Truelove et al. (2014), the calculation-based mode leads to no net spillover, the negative affect-based mode to negative spillover, and the role-based mode to positive spillover. Furthermore, Truelove et al. (2014) suggest that these decision modes are influenced by a number of attributions that can amplify or weaken the corresponding spillover effect. Accordingly, identity and negative affect play a key role for positive and negative spillover, while calculation based decision making can lead to a lack of spillover (Truelove et al., 2014).

Overall, Truelove et al.'s framework (2014) is a comprehensive approach to understanding the dynamics of spillover effects between ESBs. While most frameworks focus on positive and/or negative spillover, Truelove et al. (2014) also included the lack of spillover. Similar to the previous frameworks by Thøgersen (2012) and Dolan and Galizzi (2015), Truelove et al.'s (2014) framework propose several pathways to spillover effects that still need further empirical assessment. Although, as shown in the previous section (1.2), there is evidence to support the frameworks, more research is needed to better understand the pathways to spillover and particularly the interaction between and overlap of some of the pathways.

## **2.4.2 THEORETICAL FRAMEWORKS ON CONTEXTUAL SPILLOVER**

Spillover between contexts has received less attention in spillover research. Below, two theoretical frameworks are described that illustrate possible mechanisms of contextual spillover effects. These frameworks focus on spillover effects from work to home and contribute to a better understanding of contextual spillover effects, particularly between the home and work life. In the first framework, Nik Ramli and Naja (2012) applied existing theories to explain positive spillover effects of ESBs from the workplace to the home context. In the second framework, Muster and Schrader (2011) describe mechanisms that could lead to a reciprocal effect of increasing ESBs between the work and home life.

### **2.4.2.1 STAGES OF SPILLOVER FROM WORK TO HOME**

Nik Ramli and Naja (2012) developed a framework for positive spillover of ESBs from the workplace to the home context. The framework suggests that positive spillover is the result of a process consisting of several stages including attitude and dissonance formation. Drawing on social identity theory, place attachment theory, and cognitive dissonance theory, Nik Ramli and Naja (2012) suggest that spillover of ESBs consists of three consecutive stages. In the first stage, attitudes and behaviours are formed in the workplace, which is influenced by social identity and can occur through policies or campaigns introduced in the workplace. Nik Ramli and Naja (2012) draw on place attachment theory to explain attitude formation in the workplace. In the second stage, and drawing on Festinger's Cognitive Dissonance Theory (1957), dissonances with existing attitudes and norms may form and influence future behaviour. In the third stage, the individual may engage in further ESBs beyond the workplace, e.g. at home. The authors further suggest that factors such as management support, psychological factors (e.g. identity), and employees' organisational identification influence positive spillover effects from work to home.

While Nik Ramli and Naja's (2012) framework is among the first and few to describe spillover effects between contexts, and particularly from work to home, the framework only proposes an explanation for positive spillover effects. However, as the evidence review for spillover effects above has shown, negative spillover effect as well as a lack of spillover can occur as well. Thus, accounting for pathways of negative and lack of spillover is important in order to understand effects a policy change or behaviour change intervention in the workplace can have on other behaviours outside the workplace.

### **2.4.2.2 INTERACTION BETWEEN THE WORKPLACE AND HOME CONTEXT**

Another framework for contextual spillover was proposed by Muster and Schrader (2011), in which they consider the interaction between the workplace and home context. According to the authors, employees learn behaviours and develop attitudes both at work and at home (Muster & Schrader, 2011). Thus, Muster and Schrader (2011) suggest that the interaction between work and home behaviours can

be utilised to promote positive ESBs both at work and at home. In the ‘green work-life balance concept’ they propose that attitudes and behaviours develop from experiences in both life domains (Muster & Schrader, 2011). According to Muster and Schrader (2011), motivating positive ESBs in the workplace leads to more such behaviours at home; i.e. positive contextual spillover. Likewise, encouraging employees to bring ideas and experiences related to environmental sustainability from home to work encourages positive spillover between the two contexts (Muster & Schrader, 2011). The interaction between spillover from work-to-home and home-to-work has a positive effect on environmental attitudes and behaviours of employees (Muster & Schrader, 2011). Muster and Schrader (2011) propose intervention techniques (e.g. information based, service-based and finance-based instruments) that could encourage positive ESBs at work and facilitate positive spillover effects to the home.

Altogether, the theoretical frameworks concerned with spillover effects from work to home constitute useful guidelines for factors that positively influence positive spillover effects between the two contexts. Nonetheless, both frameworks only focus on positive spillover effect without accounting for negative spillover or a lack thereof. To address this gap, the framework proposed in the next section aims to explain positive, negative, and a lack of spillover. Furthermore, similar to the framework proposed by Nik Ramli and Naja’s (2012) and the behavioural spillover frameworks in the previous section, the framework proposed in this thesis is focussed on identity as the underlying mechanism. However, while the frameworks reviewed in this section include identity in their frameworks, the identity processes that might lead to both behavioural and contextual spillover are still relatively unclear. As such, the proposed framework aims to address such identity processes by drawing on identity theories, in particular Identity Process Theory (IPT; Breakwell, 1986; Jaspal & Breakwell, 2014). IPT seeks to explain how changes in our (social) environment affect the way individuals think about themselves and how, in times of change, individuals may cope with such changes (Amiot and Jaspal, 2014). This focus on identity changes in response to changes in the (social) environment was considered a suitable approach to assess potential identity changes resulting from a behaviour change intervention at work and potential spillover effects to the home.

## 2.5 RESEARCH GAPS

Overall, the reviewed literature above showed that there is some evidence for both positive and negative spillover, although a lack of spillover is often found as well. Although spillover research has received increasing popularity over the past years, several knowledge gaps still remain. For example, while previous research has recognised identity as one of the driving factors for spillover effects (Elf et al., 2019; Whitmarsh & O’Neill, 2010), particularly positive spillover, a better understanding of the underlying identity processes and how these might also result in negative and the lack of spillover is under-investigated. Although the literature review highlighted the importance of several factors for

contextual spillover effects, including context, values, norms, emotions, norms, the aim of the theoretical framework proposed in this thesis is to focus more specifically on underlying identity processes. Identity has been identified as an influential factor for individual's behaviour in the context of ESBs (see e.g. Whitmarsh & O'Neill, 2010; van der Werff et al., 2013) as well as behaviours more generally (e.g. health context; Chatzisarantis et al., 2009). Moreover, factors that were identified as influential on spillover effects, such as values (e.g. Evans et al., 2012) and norms (e.g. Thøgersen & Ölander, 2003) had already been researched extensively while, although more recent research projects focussed on identity, research on the underlying mechanisms of identity (e.g. through Identity Process Theory) are still scarce.

Nonetheless, it should be noted that the other factors are likely to also play a role and the limited focus on identity is acknowledged in the discussion chapter (CH6). For instance, in an upstream process, values are likely to influence the identity formation processes, while social norms could function as contextual factors that could influence the underlying identity processes. However, including all potential factors would exceed the scope of this thesis which is why the focus in the theoretical framework is predominantly on underlying identity processes. Hence, the theoretical framework proposed in this thesis draws on existing an identity theory to explain the underlying identity processes of spillover effects. More specifically, the theoretical framework proposed in the next section draws on Identity Process theory (IPT; Breakwell, 1986), a theory about identity change and processes that lead to identity change (Jaspal & Breakwell, 2014).

While other identity theories such as Social Identity theory (Tajfel & Turner, 1979) and Identity theory (Burke & Stets, 2009) also focus on inter-individual interaction in relation to identity formation (i.e. identity formation derived from group relations and role expectations, respectively), IPT focusses on how changes in our (social) environment affects individuals' identity change through internal identity processes and identity threat (Jaspal & Breakwell, 2014). IPT seemed more appropriate in the context of behaviour change interventions, which may be perceived as a threat to one's identity and well-established habits, while also focussing on identity change processes, which are under researched in the context of spillover effects. Furthermore, IPT is compatible with the mixed methods approach used in this thesis and the pragmatism paradigm (see CH3).

Most evidence of spillover is based on correlational studies or experiments, while little spillover research has been conducted in a real-world setting. Moreover, research into contextual spillover in particular is in its infancy and a number of gaps still exist in the understanding of the barriers. As such, this thesis aims to address some of the identified research gaps in two ways. First, in order to better-understand the role of identity processes, a theoretical framework has been developed (see also Verfuert et al., 2019). Second, a behaviour change intervention designed to explore real world contextual spillover effects (between the work and home setting) is outlined (see CH4).



The first part of the next section briefly introduces IPT and outlines how IPT constitutes a useful framework to understanding spillover effects. The second part explains the theoretical framework of spillover with IPT as a core element of the framework. Finally, this chapter concludes with a discussion of the proposed framework and practical and methodological implications.

### **2.5.1 IDENTITY PROCESS THEORY**

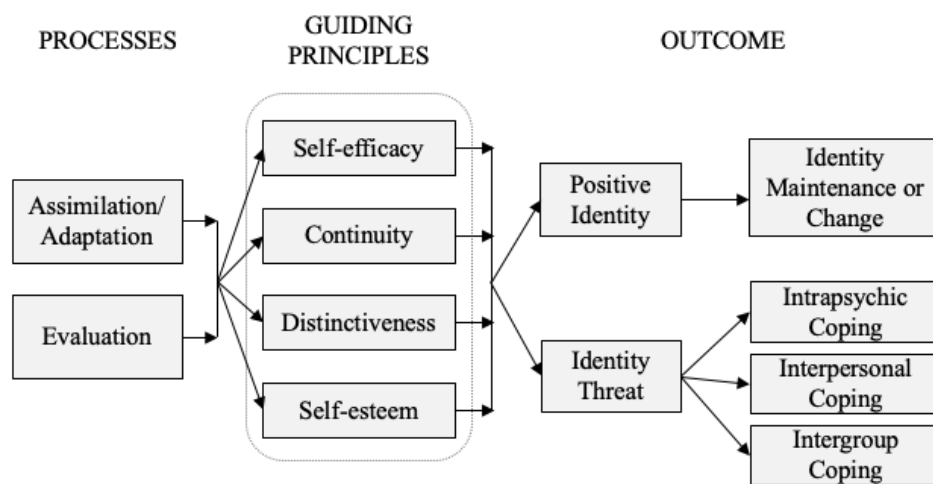
IPT originated from the aspiration to understand the processes that stimulate identity development (Jaspal & Breakwell, 2014). At the core of IPT lies identity threat with a focus on how individuals react when their identity is threatened and how they cope with threatened identity (Jaspal & Breakwell, 2014). The main idea of IPT is that the way individuals respond to identity threat informs both identity change and maintenance of identity. IPT is a comprehensive theory that seeks to analyse the mechanisms of identity threat and change by examining the dynamics of social structure, social relationships and individual identity (Jaspal & Breakwell, 2014). In the effort to understand spillover effects from an initial to a secondary ESB, an analysis of the individual's experience of the first ESB could offer insight into mechanisms that lead to secondary ESB – may it be positive, negative, or a lack of spillover altogether. For instance, a behaviour change intervention or the adoption of an ESB could be experienced as threatening to an individual or their identity. The way the individual copes with a threatened identity or the small changes in identity could in turn lead to future positive ESB or, in the case of negative spillover, to negative ESB (see also section 2.6.2). Thus, IPT can provide a useful framework for understanding identity mechanism and provide insight into spillover effects.

In the IPT framework, identity is a social product resulting from the interaction between the individual, the physical environment and the social world (Breakwell, 1986). The social context of identity has two dimensions: structure and process. The dimension 'structure' consists of entities such as interpersonal networks, gender, class, group membership and intergroup relations (Breakwell, 1986). Breakwell describes structure as the social matrix within which the individual is located and which constitutes belief and value systems. The value and belief systems suggest which behaviours and attitudes are acceptable for the individual within the structure they are located.

According to IPT, identity change as well as maintenance are driven by two processes that determine the change of an individual's identity over time (Breakwell, 1986; Jaspal & Breakwell, 2014). The first process, 'assimilation-accommodation' is further split into two sub-processes, namely identity assimilation and identity accommodation. Identity assimilation has the goal to maintain one's Self by integrating or absorbing new components (e.g. new information or behaviour) into the existing identity structure. These components are compatible with the existing identity. Identity accommodation, on the other hand, is about making changes to the Self by modifying the existing identity structure to incorporate new identity elements (e.g. new information or behaviour). These elements are different to

the existing identity and, therefore, require a change in the identity (i.e. accommodation). The second process, evaluation, has the goal to balance one's identity and maintain a sense of Self while making changes when necessary (Jaspal & Breakwell, 2014). The evaluation process involves assigning a meaning to one's identity (Jaspal & Breakwell, 2014). According to the theory, the two processes interplay leading to change in identity and associated value and meaning over time (Jaspal & Breakwell, 2014). For an illustration, see Figure 4 (Jaspal, Kennedy, & Tariq, 2019, p. 240).

The two identity processes are guided by four principles: (1) continuity, (2) distinctiveness, (3) self-efficacy, and (4) self-esteem. Similar to Festinger's Cognitive Dissonance Theory (1957), the guiding principle of continuity aims for a consistent identity across contexts and time (Breakwell, 2014b). The process distinctiveness guides an individual to feel unique in relation to others, while self-efficacy is about an individual feeling in control of their own life as well as confident. Lastly, the process self-esteem guides a person to feeling worthy and good about themselves. The two identity processes, assimilation-accommodation and evaluation operate in compliance with the four principles (Breakwell, 1986). Consequently, individuals are more likely to engage in behaviours or accept information that are in line with one or more of the four principles. According to IPT, the interplay between the processes of assimilation-accommodation and evaluation, and these four guiding principles can lead to the presence or absence of a change in identity over time (Jaspal and Breakwell, 2014).



**Figure 4: Identity Process Theory (adapted from Jaspal et al., 2019, p. 240)**

Where conflict occurs between the assimilation-accommodation and evaluation processes and the guiding principles a person's identity is threatened. This conflict activates intrapersonal (e.g., denial), interpersonal (e.g., isolation from others), and/or intergroup (e.g., social mobilization) coping strategies which are designed to resolve the threat. For example, identity threat may be experienced when an individual tries to become a vegetarian, but the new behaviour creates a conflict with the other guiding principles (i.e. continuity, distinctiveness, self-efficacy, and self-esteem). For instance, the

individual might feel she is not in control of her choosing vegetarian food and thus experiences a reduction in self-efficacy which can then lead to experienced identity threat. Moreover, a threat can also be experienced through an external change such as a behaviour change intervention. For instance, a campaign that promotes less driving and more cycling might be experienced as a threat to people who generate self-esteem through driving a car (see e.g. Murtagh et al., 2014).

An experienced threat could be resolved in a number of ways. For example, one could seek to deny that there is an environmental issue (or their responsibility for causing the issue); or they might evolve their self-perception in response to the threat and alter their behaviour accordingly (e.g., reduce their car use and/or purchase an attractive, fuel-efficient car to drive). Critically, however, one's self-perception could evolve such that they view themselves as being more pro-environmental and change their behaviours accordingly. As such, IPT offers an explanation of how one's behaviour can be changed in response to an identity threat. According to Jaspal and Breakwell (2014) it is by examining how people respond to identity threat that one gets a sense of the processes that underpin identity construction. Identity threat is one of the main features of IPT as being one of the mechanisms for a change in identity, although Breakwell (2014b) argues that IPT has evolved into being a broader theory of identity processes.

Overall, the focus on identity change and identity threat makes IPT a suitable framework through which to analyse identity processes that might mediate the connection between two ESBs, particularly in the context of a behaviour change intervention. While previous research highlighted the importance of identity for spillover effects, IPT can help to shed light on the internal processes that may lead to identity change and, therefore, to spillover effects. As such, the proposed conceptual framework draws on IPT (Jaspal & Breakwell, 2014; Breakwell, 1986) to explain the identity change process that may be one of the underlying factors of spillover effects. More specifically, the proposed framework focusses on the identity integration processes (i.e. assimilation-adaptation and evaluation) that occur after changes in a person's (social) environment which are described in IPT (Jaspal & Breakwell, 2014; Breakwell, 1986). In IPT these processes are directed by four guiding principles (continuity, distinctiveness, self-efficacy, and self-esteem), however, these are not included in the framework as the focus was more on changes in identity centrality rather than the guiding principles.

## **2.6 INTEGRATED FRAMEWORK OF SPILLOVER**

The theoretical model proposed in this thesis consists of four stages: (1) identity integration process, (2) centrality to the self, (3) behaviour, and (4) type of spillover ESB (i.e. spillover) (see Figure 5 below for an illustration). Furthermore, the framework is based on the definition of spillover as the effect a behaviour change intervention has on subsequent behaviours that were not targeted by the intervention (Truelove et al., 2014), which in the case of this thesis are ESBs in other contexts. The

theoretical framework explains contextual spillover effects from a behaviour change intervention in context A (e.g. workplace) to ESBs in context B (e.g. home setting). Prior to the identity integration stages (1-4), the behaviour change intervention leads to a change in ESB in context A. This assumption is based on another definition of spillover that suggests that spillover occurs when a change in one ESB leads to a change in another ESB (e.g. Nash et al., 2017).

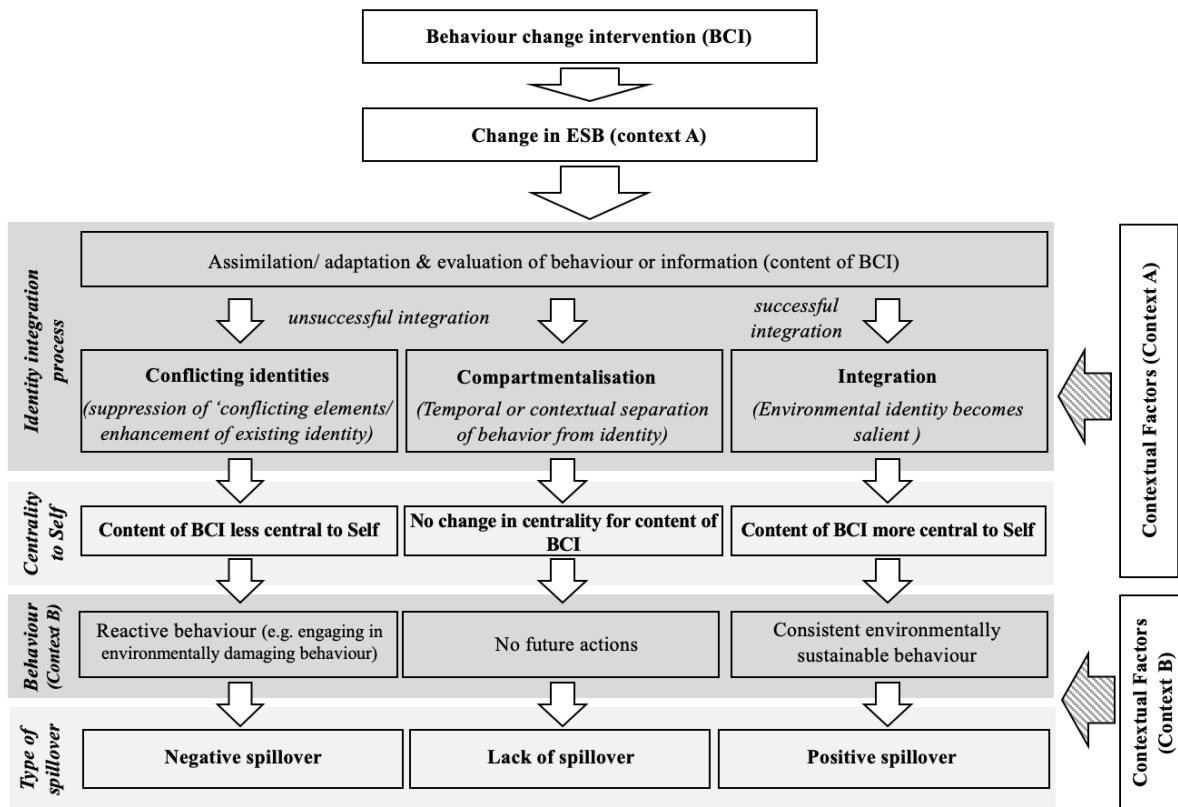


Figure 5: Proposed conceptual framework of spillover.

The identity integration process is likely to be influenced by contextual factors, such as social norms in the environment of context A. For example, a behaviour change intervention in the workplace could be influenced by contextual factors such as work culture that could be in favour of an identity change towards a more environmental identity or in conflict with it. Similarly, the spillover behaviour in context B is likely to be influenced by contextual factors of context B. For example, similarities or differences to the opportunities for executing an ESB (e.g. availability of recycling facilities) or social factors (e.g. social norms for ESB) could influence whether a person engages in ESBs (or reactive behaviours) in context B following the identity integration process.

In the first stage, the individual is exposed to information or a context which, drawing on IPT (Breakwell, 1986, 2014b), constitute elements that are assessed by the individual in the identity integration process (i.e. assimilation-accommodation and evaluation). Elements may be a behaviour change intervention, new information (e.g. from a documentary), or a policy change. It is proposed that

engaging in an ESB (e.g., triggered by a behaviour change intervention) sets in motion a process of integration of the information into one's identity. If successful, such integration can result in a strengthened environmental identity (in the case of identity assimilation) or in identity change through the adoption of environmental identity elements (in the case of accommodation). Consistent with previous literature (see section 2.2.4), this is likely to result in positive spillover effects (for details see section 2.6.1).

However, if unsuccessful, the lack of appropriate identity integration may result in negative spillover effects (or a lack of spillover) (for more details see sections 2.6.2 and 2.6.3). For example, if an employee is exposed to an energy-saving intervention at work (e.g. information about the impact of energy behaviours at work), the person begins the process of integrating (i.e., assimilating or accommodating) the information into their existing identity structures. Moreover, the person assesses (i.e., evaluating) the meaning this information holds for their sense of self. Where the information is considered to fit with the four guiding principles (i.e. continuity, distinctiveness, self-efficacy, and self-esteem), the behaviour change suggestions are likely to be absorbed (i.e., assimilated). This strengthens the importance of the person's environmental identity resulting in a full identity integration. This hypothesis is consistent with previous research that shows how engaging in ESBs can strengthen one's environmental self-identity (e.g., Lacasse, 2016; van der Werff et al., 2014b).

If assimilation of the information is not feasible or desirable (e.g. when the behaviour change intervention is in conflict with the guiding principles), accommodation can occur. This is where one's identity structures is modified in some way in order to fit with the incoming information from the behaviour change intervention (see Figure 5). For example, a person might watch a documentary about environmental and ethical issues of plastic pollution and decides to reduce the use of single use plastics. It is proposed that the assimilation process strengthens one's existing identity, while the adaptation process leads to qualitative changes in the identity structure.

If the adaptation process is not feasible (i.e. unsuccessful integration process), two outcomes are possible: (1) compartmentalisation or (2) conflicting identities (see Figure 5). It is proposed that a compartmentalisation of the identity from the behaviour is likely to result in a lack of contextual spillover (note: the compartmentalisation process is described in more detail in section 2.6.3). Conflicting identities can result if the behaviour change intervention is rejected (for more details see section 2.6.4). It is argued that conflicting identities can lead to a decreased centrality of the conflicting elements to the Self. For instance, where the tenets of a behaviour change intervention are viewed as inconsistent with one's guiding principles, it is proposed that this can result in perceived identity threat. In the presence of conflict identities, coping processes are activated in order to dissolve the experienced conflict (see IPT, Breakwell, 1986).

The identity integration process can lead to three behavioural outcomes (see Figure 5). That is, the individual (1) engages in subsequent positive ESBs (i.e. positive spillover), (2) does not engage in subsequent positive or negative ESBs (i.e. lack of spillover), or (3) engages in negative ESBs (i.e. negative spillover). In the following, these processes are described in more detailed in accordance to each pathway – i.e. positive spillover (2.6.2), negative spillover (2.6.3), and a lack of spillover (2.6.3).. For an illustration of the framework, see Figure 5.

### **2.6.1 PATHWAY TO POSITIVE SPILLOVER**

The first stage of the conceptual framework describes the identity integration process which can diversify in three ways. Firstly, if the assimilation-adaptation and evaluation processes are consistent with the four guiding principles, identity elements (e.g. environmentally-friendly self) are integrated into the identity structure and become more central to the Self of the individual. Identity assimilation absorbs the elements into the existing identity structure while identity adaptation leads to making changes to the existing identity structure (Jaspal & Breakwell, 2014; Breakwell, 1986). Thus, engaging in an ESB or exposure to a behaviour change intervention (e.g. information campaign) can lead to changes in the identity structure. This is where one's identity structures is modified in some way in order to fit with the incoming information through an iterative integration of (assimilation) and adaptation to the information. This is in line with findings from several studies, which showed that engaging in ESBs increases environmental self-identity (e.g. van der Werff, 2014a). For example, it can be expected that when an individual is exposed to an energy saving programme at work, a successful adaptation-assimilation and evaluation process would result in a more salient or more central environmental identity through the identity *integration* process (see Figure 5).

A successful integration of elements from the behaviour change intervention into the identity structure leads to positive spillover due to the individual's desire to act *consistently* with their identity (Festinger, 1957). The proposed pathway to positive spillover draws on IPT (Breakwell, 1986; Jaspal & Breakwell, 2014) and previous spillover research, which suggests that engaging in one ESB leads to subsequent ESBs mediated by environmental self-identity (e.g. Lacasse, 2016; van der Werff et al., 2014b; Whitmarsh & O'Neill, 2010). This research predominantly draws on cognitive dissonance (Festinger, 1957) and self-perception theory (Bem, 1972) by explaining spillover effects with people's desire to be consistent in their behaviours (e.g. Whitmarsh, Haggard, & Thomas, 2018) and affirmed by their self-identity (e.g. van der Werff et al., 2014b). As such, it is proposed, that a successful identity integration leads to an increased centrality of the tenets of the behaviour change intervention, which in turn leads to the performance of positive ESBs in other settings – positive spillover occurs.

## 2.6.2 PATHWAY TO NEGATIVE SPILLOVER

The assimilation/ adaptation and evaluation process may also be unsuccessful, which could lead to conflicting identities which may lead to the experience of identity threat (Jaspal & Breakwell, 2014; Breakwell, 1986). In the case of conflicting identities, the (new) positive ESB or information conflicts with the already existing identity-elements, which occurs when an individual neither processes identity elements (e.g. information, attitudes, behaviours) in line with the four guiding principles, nor avoids threat by compartmentalising the identity elements from the existing identity. A threatened identity is experienced as uncomfortable, which leads to coping processes that seek to dissolve the experienced conflict. Drawing on work by Hirsh and Kang (2016), Amiot et al. (2015; 2007), three strategies to resolve identity conflicts are proposed: suppression of conflicting identity, enhancing a dominant identity, and avoidance and denial of identity conflict.

Hirsh and Kang (2016), propose that one strategy to resolve identity conflicts is to decrease the salience of the conflicting identity by *suppression*. In the context of ESBs this could result in the suppression of the environmental identity, both at home and at work. Suppression of a conflicting identity over time leads to a devaluation of the suppressed identity element (e.g. environmental identity) and reduces the salience of behavioural guidance the suppressed identity provides (Hirsh & Kang, 2016). Thus, the suppression of the environmental identity may explain the lack of spillover effects. For instance, an individual might increase the positive ESB at work as a response to the intervention, but due to the suppression of the conflicting environmental identity she will not increase her ESBs at home or other ESBs at work not targeted by the intervention.

*Enhancing a dominant identity* is another way to cope with conflicting identities (Hirsh & Kang, 2016). Rather than decreasing the salience of the environmental identity, other identity elements become more salient. This process leads to a strengthening of identities that are opposing to the conflicting identity (Hirsh & Kang, 2016). For ESBs, this means that identities opposing to the promoted environmental identity become more salient as a way to cope with the identity conflict. Consequently, it is argued that the enhancement of identities opposing to environmental identity lead to compensatory behaviours (e.g. Murtagh et al., 2014), which may lead to negative spillover effects (e.g., Klöckner et al., 2013).

*Avoidance and denial of identity conflict or threat* is a third strategy to cope with conflicting identities and results in segregation and compartmentalisation of the conflicting identities (Hirsh & Kang, 2016). In line with Boundary Theory (Ashforth, Kreiner, & Fugate, 2000), identity conflicts can be solved by separating or compartmentalising the conflicting identities (Hirsh & Kang, 2016). Accordingly, compartmentalisation constitutes the third stage in the CDMSII model, which is characterised by the recognition of the multiple identities (Amiot et al., 2015). In the context of ESB at work and home, an individual at this stage would recognise her new or enhanced environmental identity

at work. However, the individual would also be aware of her identity at home, which in the case of identity conflict, would be disparate from the enhanced environmental identity at work. Amiot et al. (2015) suggest that the characteristics of the multiple identities are context-dependent and compartmentalised, which means that the workplace and the home identities are separate. As such, it is proposed that the individual does not engage in any ESBs outside the workplace, which results in the lack of contextual spillover.

### 2.6.3 PATHWAY TO THE LACK OF SPILLOVER

As already mentioned above, when the identity assimilation and adaptation process is not successful, the individual may separate the behaviour or information about a behaviour (e.g. driving a car is bad for the environment) from their identity to avoid identity threat, which can be called *compartmentalisation* (Amiot & Jaspal, 2014). In the case of compartmentalisation, it is proposed that elements from the behaviour change intervention would not change in their centrality to the identity; which explains why they might engage in a one-off behaviour, but no further changes to the identity, behaviours or attitudes would be observed. This one-off behaviour is not consistent with the individual's identity and would lead to an identity conflict. However, to prevent the conflict, the individual compartmentalises the behaviour from their identity.

Compartmentalisation is similar to the single-action bias, which suggests that people change one – often relatively insignificant – behaviour but do not engage in any further ESBs (Truelove et al., 2014; Weber, 2006). The compartmentalisation of identities and associated behaviour can occur between different contexts such as the home and workplace. Boundaries are created to simplify and order individual's environment and social world; for instance, 'home' and 'work' can be perceived as two distinct social contexts with clear boundaries (Ashforth et al., 2000). These boundaries are often extended to the individual's self-perception, which means that an individual's perceived self-identity may differ between these contexts (Ashforth et al., 2000). According to Ashforth et al. (2000), these identities can range on a continuum from *segmented*, with a high contrast in identities in each context, to *integrated* with a low contrast between identities in each context. Segmented identities are highly context-dependent, meaning that values, beliefs, goals and behaviours associated with the individual's identity in one context (e.g. work) can differ from those in another context (e.g. home) (Ashforth et al., 2000).

Based on this, the current framework proposes that the separation or compartmentalisation of the environmental identity at work will make ESB context dependent (e.g. behaviour associated with identity might only occur in one context and not the other). Hence, ESBs in the workplace that are associated with a certain environmental identity at work will be separate from identities and behaviours at home. It is therefore proposed that a lack of spillover occurs as ESBs performed at work as part of



an environmental identity at work are separate from other social identities and ESBs at home. In such cases, spillover between ESBs in the workplace and home setting are not likely due to different and potentially conflicting identities. Hence, it is proposed that differences between the work and home identity as well as perceived boundaries between the home and work setting decrease the likelihood for spillover effects between the home and work setting.

#### **2.6.4 SUMMARY**

To conclude, the proposed framework in the above section constitutes a novel approach to understanding spillover effects through the lens of IPT. The current framework suggests that positive, negative, and a lack of spillover are influenced by the perceived identity threat from a behaviour change intervention and identity process mechanisms that individuals use to evaluate the behaviour. It is proposed that a behaviour change intervention may threaten existing identities, which may lead to either (a) integration, (b) compartmentalisation, or (c) conflict between the environmental identity and non-environmental identities. Drawing on previous research that identified identity as a key driver for positive spillover (see section 2.2), it is proposed that a successful identity integration leads to an increase in ESBs in other settings and, therefore, positive spillover. Conflicting identities can lead to a number of coping mechanism of which some are likely to lead to compensatory behaviours; i.e. negative spillover effects. Lastly, drawing on Boundary Theory (Ashforth et al., 2000) and the single action bias (Dolan & Galizzi, 2015; Truelove et al., 2014), a compartmentalisation of the identity from the behaviour change intervention should likely lead to a lack of behavioural spillover.

## 2.7 RESEARCH OBJECTIVES

This thesis built on the knowledge of previous, predominantly quantitative, spillover research and was focused on developing a more in-depth understanding of spillover processes in a real-life context; i.e. the work and home context. A number of individual (e.g. identity) and external factors (e.g. similarities between settings and behaviours) were identified in the literature review above as facilitators and barriers to spillover effects. However, spillover effects between settings (contextual spillover) and the role that identity processes might play in the emergence of such spillover remain under researched. The aim of this thesis is, firstly, to address this research gap by: (1) shedding light on how ESBs spillover from the workplace to the home setting; and (2) seeking to elucidate the role of identity (and identity threat) plays in fostering spillover processes. Accordingly, the following research questions (RQ) and objectives (RO) have been identified:

**RQ1: How does a behaviour change intervention in the workplace affect environmentally sustainable behaviours at home?**

**RQ2: What role does identity play in the emergence of positive and negative contextual spillover effects (or a lack thereof)?**

**RO1: To examine the role that identity plays in explaining spillover in ESBs between contexts (with reference to IPT).**

**RO2: To examine the role of identity in environmentally sustainable behaviour and specifically the spillover process by using identity process theory.**

**RO3: To investigate facilitating and impeding factors that influence positive, negative and lack of contextual spillover.**

The next chapter develops the methodological approach with which the above research questions and objectives are addressed. The chapter gives an overview of the chosen mixed methods approach, the data collection methods and analysis.

### **3 METHODOLOGY**

The focus of this thesis was to assess the proposed theoretical framework (see CH2, section 2.6) and to better understand underlying processes of spillover effects, particularly between the work and home setting. To address associated research questions and objectives, this chapter gives an overview of the methodological approach used in this research. The first section (3.1) introduces the mixed methods approach used in this thesis including epistemology and ontology, the research design, and the sampling. This is followed by an overview of the data collection methods (section 3.2). Section 3.3 consists of a brief overview of the behaviour change interventions which are part of the study design in this thesis. The integration of the quantitative and qualitative data was briefly discussed in section 3.4, followed by a reflexivity section 3.5. Lastly, section 3.6 gives a brief overview of the main findings from the pilot study and implications for the main study. The structure of this chapter is loosely based on guidelines for conducting and reporting mixed methods research (Leech & Onwuegbuzie, 2010). See Figure 6 for an overview of the methodology. Furthermore, a checklist of 20 questions on how to measure spillover published by Galizzi and Whitmarsh (2019, p. 8) provides an overview of the conducted research (see Table 1).

**Table 1: 20-question checklist to measure spillover by Galizzi & Whitmarsh (2019, p. 8)**

| 20 questions of the checklist  | Implementation in this study   |
|--|--|
| (1) What are the setting and population of interest?   | Employees of a private sector company in the North of England.   |
| (2) Is this an experimental or a non-experimental study?   | Experimental (quasi-experimental field study).   |
| (3) If this is a non-experimental quantitative study, what is the empirical identification strategy (e.g., difference-in-difference)   | N/A  |
| (4) If this is a quantitative study, what is the control group?  | The control group were employees of the same company in a different geographical location.   |
| (5) How have the behaviours been selected (e.g., existing literature, qualitative evidence)?   | Based on the impact of the behaviour (i.e. literature) and feasibility (see section 4.2.3.1)   |
| (6) What is the targeted behaviour 1?  | (a) Reduce (red) meat consumption.<br>(b) Increase fruit and vegetable consumption.  |
| (7) What are the outcome variables for behaviour 1 (i.e., how will you measure behaviour 1)? (Please list them and briefly describe each outcome variable, indicating whether this is directly observed or self-reported behaviour.)   | Difference in observed consumption of meat and vegetarian based meals in the workplace (i.e. canteen) before and after the intervention. Unfortunately, the company did not provide this data as previously agreed.                                    |
| (8) How many intervention groups there are?  | One intervention group.  |
| (9) What are the behavioural interventions targeting behaviour 1? (Please list them and briefly describe each of them.)  | Information provision (see section 4.2.3.2).<br>Changes in food availability in the workplace (i.e. reduction of meat availability and increase in plant-based meals, see section 4.2.3.2).  |
| (10) What is the non-targeted behaviour 2?   | A set of 6 types of self-reported ESBs: Red meat consumption at home; Fruit and vegetable consumption at home; Seasonal food consumption at home; Organic food consumption at home; Local food consumption at home; Food avoidance behaviours at home. |
| (11) What are the outcome variables for behaviour 2 (i.e., how will you measure behaviour 2)? (Please list them and briefly describe each outcome variable, indicating whether this is directly observed or self-reported behaviour.). If there are multiple outcome variables for | Please see sections 3.2.1.3 and 4.2.2.1.<br>There is no correction for multiple hypotheses testing.  |

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behaviour 2, does the study correct for multiple hypotheses testing?  
(Please describe which correction is used.)

(12) What is the expected underlying motive linking behaviour 1 and behaviour 2?

Environmental self-identity and prominence of environmental identity (see sections 2.7 and 3.2.1.3)

(13) What are the expected mechanisms moderating and/or mediating the changes in the outcome variables for behaviour 2?

An increase in both environmental self-identity and prominence of environmental identity is expected to moderate positive spillover effects, a decrease in both/either variable is expected to moderate negative spillover effects, and no change in both/either variable is expected to moderate a lack of spillover.

(14) What is the expected time frame during which behavioural spillovers will be tested, and during which the durability of spillover and habit formation will be assessed?

There is no explicit expectation with regards to a time frame, but participants are followed up 4-6 weeks after the intervention.

(15) What is the expected participant attrition between behaviour 1 and behaviour 2?

At the end of the intervention (i.e. 4-6 weeks after), only 82 out of the originally recruited 266 participants remained in the study (for more details see section 5.1.2.1).

(16) What is the expected direction of the changes in the outcome variables for behaviours 1 and 2 between the intervention groups and the control group (i.e., are positive or negative spillovers expected)?

Both positive and negative spillover effects are expected as well as a lack of spillover (see section 2.7)

(17) What are the expected sizes and standard errors of the changes in the outcome variables for behaviours 1 and 2 between the intervention groups and the control group?

No explicit effect sizes or standard errors are discussed of the changes in the outcome variables. This is due to mixed findings reported in the literature and the novelty of the main outcome variable (i.e. red meat consumption), which to my knowledge and at the time of the study design had not been tested in the context of contextual spillover.

(18) What is the minimum expected sample size to test and detect the occurrence of behavioural spillover?

This was not explicitly discussed. However, the aim was to recruit n=100 per group per time-point in order for the data set to be suitable for inferential statistical tests (Field, 2009).

(19) If collecting qualitative data, how will the quality of this data be ensured and assessed (e.g., reflexivity, consistency)?

Qualitative data was collected in the form of interviews and a visualisation method. The interviews were conducted both before and after the intervention. For an assessment of the quality of the data, see section 3.2.2.5.

(20) If using mixed-methods approaches, how will insights from different methods be combined?

The insights from the quantitative and qualitative methods were combined as a review of evidence for the proposed theoretical framework (see section 5.3).

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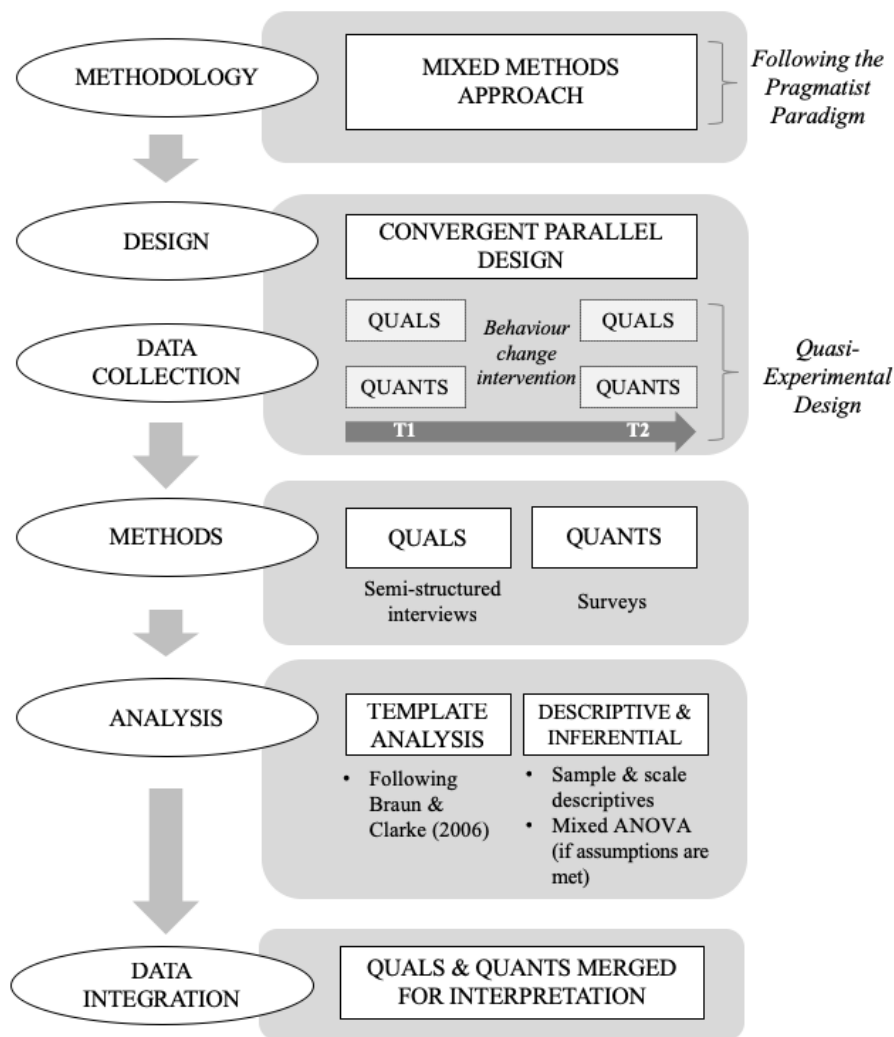


Figure 6: Methodology Overview

### 3.1 MIXED METHODS APPROACH

Previous research has identified several factors that influence spillover effects (see CH 2, section 2.2); however, most studies use a single methods approach with quantitative methods dominating the research area (Verfuerth & Gregory-Smith, 2018). However, mixed methods approaches have recently gained popularity in spillover research as the approach offers a more in-depths perspective on spillover effects (e.g., Elf, Gatersleben, & Christie, 2019; Thomas, Sautkina, Poortinga, Wolstenholme, & Whitmarsh, 2019; Whitmarsh, Haggart, & Thomas, 2018). Mixed methods are particularly suitable when “focusing on research questions that call for real-life contextual understandings, multi-level perspectives, and cultural influences” (Creswell, Klassen, Plano Clark, & Smith, 2011, p. 4). While a quantitative methods approach is a useful approach to test hypotheses, a mixed methods approach allows for a more diverse perspective on the research topic by using both

quantitative and qualitative data (Teddlie & Tashakkori, 2003). Hence, given the proposed research questions and the focus on a 'real-life' context in this research, a mixed methods approach was considered suitable with the aim to gain a more holistic perspective on spillover and underlying processes.

Mixed methods research can be defined as “the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration.” (Johnson, Onwuegbuzie, & Turner, 2007, p. 123). While most researchers differentiate between quantitative and qualitative research, Johnson et al. (2007) suggest that mixed methods research is one of three research paradigms, namely qualitative research, quantitative research, and mixed methods research. Main reasons for mixing methods include aims to gain a better and deeper understanding of the research inquiry and validation of findings through triangulation (Johnson et al., 2007). Thus, to achieve a comprehensive understanding of the research inquiry, mixed methods research involves mixing quantitative and qualitative methods.

### **3.1.1 EPISTEMOLOGY & ONTOLOGY**

Mixed methods are increasingly used in social science research (Bryman, 2009; Bryman & Bell, 2011); nonetheless, the philosophical debate about the compatibility of quantitative and qualitative methods continues. Some argue that, from a philosophical point of view, mixing quantitative and qualitative research methods is contradictory as it involves mixing opposing epistemological and ontological foundations (Bryman, 2008). The main critique of mixed methods approaches is based on the assumption that methods and epistemological and ontological viewpoints are interlinked, that is, methods are rooted in epistemological and ontological assumptions (Teddlie & Tashakkori, 2003). According to this, quantitative methods are linked to positivist/empiricist approaches, whereas qualitative methods are rooted in interpretivist/constructivist paradigms (Teddlie & Tashakkori, 2003); although, more differentiated assumptions can be distinguished within paradigms. While positivism adopts the ontological position that an apprehensible and objective reality exists, constructivists view reality as socially constructed (Guba & Lincoln, 1994). Epistemologically speaking, positivism takes the stance that knowledge is objective, whereas interpretivism takes on a transactional and subjectivist view which suggests that knowledge is subjective (Guba & Lincoln, 1994). Hence, when assuming a link between epistemological and ontological positions and methods, mixing methods can be seen as a mixing of contrasting philosophies and therefore not possible (Bryman, 2008).

This so called *paradigm war* refers to the conflict between epistemological and ontological standpoints based on which a mixing of both quantitative and qualitative methods is perceived as not

viable (Bryman, 2008). To end the paradigm wars, a ‘pragmatic’ approach has been taken by pragmatists who argue that there is no incompatibility of research methods (i.e. mixing quantitative and qualitative methods) and the researcher’s focus should rather be on what methods work for the specific research questions (Howe, 1988). Pragmatism is rooted in the comparability thesis which states that truth is ‘what works’ rather than focussing on metaphysical truths (Tashakkori & Teddlie, 1998). This paradigm relativism proposed by pragmatists has led to an increase in acceptance and popularity of mixed methods approaches (Tashakkori & Teddlie, 1998).

Beyond pragmatism, recent developments have led to the development of several approaches regarding mixed methods research and how paradigms may be used. For example, Shannon-Baker (Shannon-Baker, 2016) discusses four of the major paradigms used in mixed methods research: pragmatism, transformative-emancipation, dialectics, and critical realism. An extensive discussion of the four paradigms would exceed the scope of this thesis; hence, relevant aspects of the four paradigms are illustrated in Table 2 (adapted from Shannon-Baker, 2016, pp. 323–324, Table 1).

**Table 2: Four perspectives for mixed methods research**

| Paradigm                                | Pragmatism   | Transformative-emancipation                        | Critical realism                          | Dialectics   |
|---|--|--|---|--|
| Characteristics                         | Emphasis is on shared meaning making.                      | Attention to power, privilege and voice.           | Highlighting differences.                 | Emphasis on context.   |
| Purpose                                 | Practical solution; useful for intervention based studies. | Addressing social inequities.                      | Useful for studies with conflicting data. | Facilitating comparability between methods. Useful for evaluation-based studies. |
| Inferences from data                    | Discuss transferability, depending on context-specificity. | Discuss context and power dynamics.                | Generate diverse viewpoints.              | Causal inferences when emphasising the context.                                  |
| Implications for mixed methods research | Identifies practical solutions.                            | Provides overarching social justice related goals. | Addresses divergent results.              | Context-based validity.  |

Source: Adapted from Shannon-Baker (2016, pp. 323–324, Table 1)

Although pragmatism is the dominant paradigm in mixed methods research, the three other perspectives (see Table 2) were considered for this research project. The focus of this research project was on understanding spillover processes; hence, the paradigm transformative-emancipation, which focusses on social inequities and power, and the critical realism paradigm, which focusses on diverse viewpoints and differences, were considered as not suitable to address the research questions. The dialectics paradigm, on the other hand, emphasises the study context and was considered a useful approach for evaluation based studies, which would be a suitable perspective on the research questions of this thesis. However, the pragmatist paradigm emphasises shared meaning making as well as practical solutions and was considered particularly suitable for intervention based studies, which was more in



line with the research questions. Hence, pragmatism was chosen as the most suitable paradigm to investigate the proposed research questions of this thesis.

In the context of spillover, the dominant paradigms are positivism and post-positivism. In both paradigms an objective view on epistemology is supported, although post-positivists hold a modified objectivist view on epistemology where findings considered to be probably objectively true (Tashakkori & Teddlie, 1998). In post-positivism the researcher acknowledges the limited understanding of the objective reality as it derives from the researcher's limited conceptual tools (Bryman, 2008). With regards to ontology, positivists support naïve realism, that is the assumption that people can perceive reality objectively, whereas post-positivists believe that people can only achieve a probabilistic and imperfect perception of reality (Tashakkori & Teddlie, 1998). Positivists and post-positivists believe that causal linkages can be identified by the researcher (only imperfectly for post-positivists) which is reflected in the popularity of experimental designs used in spillover research (e.g. Carrico, Raimi, Truelove, & Eby, 2017; Evans et al., 2012; Truelove, Yeung, Carrico, Gillis, & Raimi, 2016). Both positivism and post-positivism follow a primarily deductive research approach which involves hypotheses testing and concerns of causality, generalisability and internal validity (Tashakkori & Teddlie, 1998).

Pragmatism, on the other hand, is characterised by a focus on the research problem with methods being secondary and underpinning worldviews rather insignificant (Tashakkori & Teddlie, 1998). In pragmatism, both objective and subjective views on epistemology are supported with an ontological view that accepts an external reality (Tashakkori & Teddlie, 1998). It is further believed that causal linkages may exist, but the researcher is unable to determine these fully (Tashakkori & Teddlie, 1998). In pragmatism a deductive and inductive approach are combined to investigate research inquires, which allows both the testing of theories and exploring processes inductively (Tashakkori & Teddlie, 1998). In the context of this thesis a combination of a deductive and inductive approach was suitable, as it facilitates testing theoretical considerations as well as exploring underlying dynamics of spillover processes. Furthermore, the pragmatist paradigm supports an outcome-oriented approach and focusses on practical solutions to social problems (Johnson et al., 2007). The focus of this thesis was on explaining and understanding the link between environmentally sustainable behaviours in the workplace and home setting (i.e. spillover effects), which is in line with an outcome-oriented approach while targeting social problems (i.e. finite resources and climate change).

The pragmatist paradigm is also in line with IPT, the theoretical lens through which spillover effects are analysed in this thesis. In IPT, both quantitative and qualitative research approaches are supported (Coyle & Murtagh, 2014; Vignoles, 2014). IPT is embedded in a realist epistemology within the positivist paradigm (Coyle & Murtagh, 2014); however, IPT also emphasises the importance of the context to the theory, to which qualitative approaches can make valuable contribution by assessing people's meaning-making and experiences (Coyle & Murtagh, 2014). While being liberal about

determining the appropriate research paradigm, IPT researchers emphasise that a grounded theory approach or interpretative phenomenological analysis approach would be inappropriate (Coyle & Murtagh, 2014). As such, in IPT research qualitative methods are valued for their potential to contextualise and enrich the research phenomena, while quantitative methods are considered suitable to test specific aspects of the theoretical framework (Coyle & Murtagh, 2014). This pragmatic view on methods is in line with pragmatism and the methodological stance taken in this thesis.

### **3.1.2 ADVANTAGES AND DISADVANTAGES OF QUANTITATIVE, QUALITATIVE, AND MIXED METHODS**

Quantitative data collection aims to test theories and make inferences about correlational or causal relationships of measured constructs while qualitative data collection aims to explore processes and understand phenomena (Creswell et al., 2011). However, it should be noted that mixed methods research is not just the combination of both quantitative and qualitative data, but rather aims at combining the strengths of each method to answer the research questions (Creswell et al., 2011). Mixing methods means that advantages and disadvantages of both quantitative and qualitative approaches are combined. Johnson et al. (2007) even argue that mixed methods research should be considered as its own research paradigm, alongside qualitative and quantitative research. Bearing this in mind, it is important to be aware of the advantages and disadvantages as well as implications of each method of each approach. This will be elaborated in the following section.

Survey data was used to analyse the correlational or causal relationship between two or more environmentally sustainable behaviours or underlying psychological concepts (e.g. Thøgersen & Ölander, 2003). Surveys usually include self-reported behaviour which assesses the frequency or likelihood of ESBs (e.g. recycling behaviour frequency) and scales measuring psychological constructs such as attitudes or environmental identity. Correlational methods allow an initial indication of links between environmentally sustainable behaviours, while experiments allow for causal conclusions. Experimental or quasi-experimental approaches, on the other hand, allow for causal assumptions about the relation of spillover behaviours as well as underlying factors. In experiments, certain factors are manipulated and the effect of that manipulation on spillover effects has been observed in a controlled setting (e.g. framing of messages; Evans et al., 2012). Similarly, quasi-experimental designs have been used to test spillover effects of intervention in real-life settings (e.g. introduction of carrier bag charge; Thomas et al., 2019).

Advantages of quantitative research includes the scope for generalisability of the findings, scope to test hypotheses and models as well as lower cost and time commitments by the research team, in comparison to qualitative methods (Creswell et al., 2011). Disadvantages of quantitative methods include potential problems with operationalising variables, identifying explanatory variables and

understanding processes (Kelle, 2008). For example, problems of measurement and operationalisation can be related to the meaning of words or the phrasing of the questions and answer options (Kelle, 2008). A leeway in the interpretation of the operationalised concepts could lead to measurement errors which may not become apparent. Furthermore, quantitative data is often decontextualized; that is the data is detached from its 'real-world' context (Moghaddam, Walker, & Harre, 2003). However, the research context provides additional information that may be crucial to answer the proposed research questions.

In spillover research, the use of qualitative methods is scarce and often challenges dominant quantitative approaches to studying the phenomenon. For example Uzzell and Rätzzel (2013) propose alternative terminologies and conceptual assumption to study spillover (for a more detailed discussion see CH2, section 2.1.1). However, qualitative methods can make a valuable contribution to understanding spillover effects by contextualising the spillover process and providing more in-depth perspectives. Qualitative research methods investigating spillover include interviews (Schütte & Gregory-Smith, 2015), life-history interviews (Uzzell & Rätzzel, 2013, 2018), and ethnographic observations (Hargreaves, 2008, 2011). In order to address the research questions of this thesis, qualitative data can provide a deeper understanding of individuals' perception of both the behaviour change intervention and spillover processes.

Six assumptions can be made about qualitative research (Atieno, 2009), namely, qualitative research is concerned with (1) processes rather than outcome oriented, (2) individuals' experiences and sense making of the world, (3) data collection through the researcher rather than instruments (e.g. scales), (4) collecting data in the participant's natural setting (e.g. workplace), (5) descriptive data and meaning making through words and pictures, and (6) inductive by making sense of abstractions and concept building from individuals' experiences. These assumptions complement one of the aims of this thesis, that is to better understand the underlying processes of spillover.

Advantages of qualitative research include the depth, detail, and complexity of the data. This allows a contextualisation of the observed processes and experiences of the individuals which may lead to a more comprehensive understanding of the research subject by the researcher. Another advantage of qualitative research methods is that the researcher can ask participants to explain their experiences and perceptions in order to clarify or explore an enquiry further. However, qualitative research also carries disadvantages. It can be rather difficult to assess and demonstrate the rigidity of qualitative data and its analysis (for an attempt see Table 4). Another disadvantage, although views might differ depending on the underlying philosophical assumptions, constitute the difficulty of replicating and validating qualitative data. Other disadvantages may include time and monetary costs of the data collection and analysis in comparison to quantitative methods.

Single use of quantitative and qualitative research methods may be the method of choice for specific research questions and assumptions; however, a mixed methods approach can overcome some

weaknesses of a single methods approach by combining complementary strengths of each method (Kelle, 2008). As Britten and Fisher (1993, p. 271) put it, “quantitative methods are reliable but not valid and that qualitative methods are valid but not reliable”. While quantitative and qualitative methods may be opposing methods, taken together they can provide a comprehensive approach to explore complex research questions (Britten & Fisher, 1993). Some argue that mixing methods can cancel out some of the limitations of single methods while a multi-method approach strengthens a study, particularly when aiming to understand complexities of a social science phenomenon (e.g. spillover of ESBs from work to home) (Creswell, Plano Clark, Gutmann, & Hanson, 2003a). Hence, a mixed methods approach was considered the most suitable to address the research questions of this thesis.

Mixed methods research has many advantages but also disadvantages. Strengths of mixed methods designs include the combination of the advantages of both quantitative and qualitative data (Creswell et al., 2003a). This allows for a more diverse perspective on the research subject. However, a few limitations of mixed methods research should be noted. Firstly, the integration of qualitative and quantitative data can be difficult with little guidance in the existing literature (Creswell et al., 2003a). Secondly, the interpretation of two types of data, potentially involving discrepancies in the findings, can compose difficulties when interpreting the final results (Creswell et al., 2003a). From the practical point of view, disadvantages of mixed methods research include potentially higher monetary and time costs to conduct a mixed methods study. Lastly, the researcher leading a mixed methods study should be proficient in both quantitative and qualitative methods which may constitute another hurdle to implementing a mixed methods study.

### **3.1.3 CONVERGENT PARALLEL DESIGN**

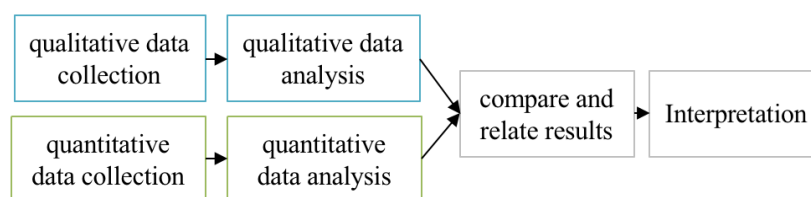
Three ways of mixing methods can be differentiated (Teddlie & Tashakkori, 2003). First, testing hypotheses by using quantitative methods subsequently followed by qualitative methods to gain a deeper understanding of the quantitative results. Second, using qualitative methods to generate hypotheses which can then be tested with quantitative methods. Third, using quantitative and qualitative methods simultaneously to gain a more diverse perspective on the research questions. A further six prototypical designs can be identified which are concerned with the order and integration of quantitative and qualitative methods (Creswell & Plano Clark, 2011a). These include (1) the convergent parallel design, (2) the explanatory sequential design, (3) the exploratory sequential design, (4) the embedded design, (5) the transformative design, and (6) the multiphase design (Creswell et al., 2003a). The convergent parallel design is characterised by concurrent timing of both qualitative and quantitative data collection (Creswell & Plano Clark, 2011a).

In the explanatory and exploratory sequential designs, quantitative or qualitative data is collected followed up with qualitative or quantitative data collection, respectively. In the embedded

design quantitative and qualitative data is collected and analysed simultaneously while in the multiphase design, quantitative, qualitative or mixed methods data is collected in multiple study phases with each phase informing the next subsequently (Creswell & Plano Clark, 2011a). For the main study of thesis (see CH 5 & 6), ‘convergent parallel design’ was considered most suitable as it supports a more complete understanding of a topic (Creswell & Plano Clark, 2011a). The simultaneous data collection was chosen to achieve a comprehensive and in-depth investigation of contextual spillover effects. This means that the findings can be triangulated and validated by using both quantitative and qualitative methods.

The convergent parallel design is the most commonly used approach to mixing methods and both qualitative and quantitative methods have equal priority and, while the data collection and analysis occurs separately, the mixing occurs at the interpretation stage (Creswell & Plano Clark, 2011a). Typically, the convergent design is founded in the pragmatism paradigm as the assumptions of pragmatism allow a combination of quantitative and qualitative methods (Creswell & Plano Clark, 2011b). While mixed methods designs are generally more time consuming than single method studies, the convergent design collects data in parallel which makes it less time intensive than other mixed methods designs. Disadvantages of the convergent design include the need of expertise on both quantitative and qualitative methods, potential difficulties merging two types of data and data sets, and potential difficulties when the results of the quantitative and qualitative data contradict which may impede the interpretation of the results (Creswell & Plano Clark, 2011a). Furthermore, this approach limits the use of the qualitative data to better understand quantitative findings.

Nonetheless, in this thesis, such a convergent parallel design was considered appropriate for use and the integration of the quantitative and qualitative data took place during the interpretation stage. The reasons for this are twofold. First, despite its limitations, the convergent parallel design seemed a suitable approach to gain a holistic understanding of potential spillover effects and, through the pre-intervention data collection, a better understanding of the workplace (see e.g. Östlund et al., 2011). Second, practical limitations made the other design approaches unfeasible. The company only agreed to a short timeframe for the data collection which made sequential designs unworkable (see e.g. Elf et al., 2019). Hence, the convergent parallel design was chosen which means that both quantitative and qualitative data were collected and analysed separately and integrated at the interpretation stage (see Figure 7.)



*Figure 7: Illustration of Convergent Parallel Design (Creswell & Plano Clark, 2011a)*

The quantitative and qualitative data was collected in separate stages and not mixed across stages, except for the sampling of the qualitative data. This means, both quantitative and qualitative data were collected concurrently and mixed at the interpretation stage (see section 3.4 for details of the mixing).

### **3.1.4 SAMPLING AND VALIDITY**

Sampling plays an important role to ensure quality and generalisability/ transferability and ultimately the validity of the study findings. The sampling for the quantitative and qualitative data collection is described in more detail in the next section. However, a few notes on sampling within a mixed methods design should be made. Leech and Onwuegbuzie (2010) suggest that in mixed methods research, three types of generalisation should be considered when deciding on the sampling design: (a) statistical generalisations, (b) analytic generalisations, and (c) case-to-case transfer. The generalisability is determined by the sample and is concerned with the type of conclusion that can be drawn from the research results – i.e. the extent to which the results allow conclusion for the general population (Stenbacka, 2001). Statistical generalisation refers to the representativeness of the sample to the general population which requires large sample sizes (Leech & Onwuegbuzie, 2010). Analytic generalisation and case-to-case transfer, on the other hand, refer to the generalisability of the case study results in relation to the conceptual power (Leech & Onwuegbuzie, 2010). Although statistical generalisability is desirable in many (mostly positivist or post-positivist) research inquiries, in this thesis analytic generalisability or case-to-case transfer were more desirable.

The goal in this thesis was not to achieve generalisability of the results to the general population or a representative sample. Instead, this thesis aimed to understand better the processes of spillover effects from a behaviour change intervention in a real-life setting and its context, in order to inform spillover theory (analytic generalisation) and future behaviour change interventions in the workplace context (case-to-case transfer). Hence, the focus of this research project was on understanding spillover effects of employee behaviour from the work to the home setting; this is why the target population were employees. The aim was to gain an in-depth understanding of spillover processes which is why two case studies were conducted – a pilot study within a university setting (see Appendix A, section 9.1) and the main study within a private sector company (for procedure of data collection see CH 4). The employees of these workplaces constituted the samples for each study.

Within each case study (pilot and main study), participants were invited to take part in the study, which means that the selection was based on self-selection of the participants. Although this approach is prone to self-selection bias (i.e. non-random participation in study), it was chosen as the most realistic

and feasible sampling method within the context of this research project. A power analysis conducted for the main study suggested that a total sample size between  $N = 54$  and  $N = 328$  was required to detect effects sizes of  $f = 0.25$  and  $f = 0.10$ , respectively (for more details see section 5.1.1.5). To my knowledge, at the time of these calculations, no meta analyses were available that calculated effect sizes for spillover effects from interventions. Hence, this study was rather exploratory. As such, it was aimed to achieve a sample between  $N = 150$  and  $N = 200$  in order to be able to detect relatively small effect sizes. This is equivalent to 15-20% of the employees of the organisation. For the qualitative data sample, a purposive sampling method was used (see section 3.1.4).

To conclude, the above section introduced the mixed methods approach and demonstrated why it was considered the most suitable methodological approach to address the research questions of this thesis. Furthermore, the previous section discussed epistemological and ontological considerations that underlie a mixed methods approach with the conclusion that a pragmatist approach was the most suitable paradigm for this thesis. Advantages and disadvantages of quantitative, qualitative, and mixed methods were discussed and the mixed methods research plan, namely the convergent parallel design was outlined. Lastly, aspects on validity and sampling were discussed. In the next section, the quantitative and qualitative data collection methods are discussed.

## 3.2 DATA COLLECTION

For the main study of this thesis, a convergent parallel design was chosen to collect the quantitative and qualitative data. This means that the data collection and analysis for each type of data was conducted separately and the data was then merged at the interpretation stage (see Figure 7 in the previous section). The following section describes the data collection for the quantitative and qualitative data separately. Section 3.2.1 describes the quantitative data collection and 3.2.2 the qualitative data collection including research design, methods, sampling, analytical approaches and assessment for each method. The data collection in this thesis consists of two studies, one pilot study and one main study.

The pilot study was conducted in a university setting and focused on spillover from a behaviour change intervention that promoted recycling behaviour in university offices to recycling and related ESBs in the home setting. The second, main study was conducted in a private sector company and focused on spillover effects from a behaviour change intervention that proposed meat reduction in the workplace to meat consumption in the home setting. Below, Table 3 gives an overview of the methods used in the pilot and main study of this research and aims for each method. More details about the study are described in the next chapter (CH 4). This chapter, and the following section in particular, focus on the methodologies used in each study.

**Table 3: Overview of used methods**

| Method used  | Aim   | Pilot study | Main study   |
|--|---|-------------|--|
| <b>Quantitative methods</b>                          |   |             |  |
| Survey   | Test hypotheses and theoretical framework and better understand spillover effects.  | √           | √  |
| ‘Objective’ behavioural data                         | Measure effectiveness of behaviour change intervention in the workplace.  | √           | Planned but no access to data from company.              |
| <b>Qualitative data</b>                              |   |             |  |
| Semi-structured interviews                           | To generate in-depth data on participants’ experiences about the connectedness of environmentally sustainable behaviours and spillover effects. | ---         | √  |
| Focus groups   | To co-create information about barriers to the target behaviour of the intervention.  | √           | Planned, but not implemented due to practical reasons.   |
| Diary  | To examine behaviour and process of potential behaviour at home.  | ---         | Discarded after not enough participants completed diary. |
| Research diary/ observation                          | To capture dynamics and complexity of the behaviour change as it unfolds in its natural environment.  | ---         | √  |
| <b>Behaviour change intervention</b>                 |   |             |  |
| Information campaign                                 | Increase knowledge and awareness about target behaviour (particular focus on identified barriers).  | √           | √  |
| Changing behavioural context                         | Make target behaviour easier and available to participants.   | ---         | √  |
| Participatory elements (i.e. workshop, focus groups) | To tailor intervention and understand barriers to behaviour change with the aim to increase acceptance of intervention and effectiveness.       | √           | √  |

### 3.2.1 Quantitative methods

For the quantitative part of the mixed methods approach, the survey approach is the main method used in this thesis. Surveys are a useful and popular approach to collect data about self-reported behaviour and psycho-social variables in an effective way. The aim of the quantitative part of the data collection in this thesis, was threefold: (1) to quantify spillover effects from work to home, (2) to test the influence of environmental identity on potential spillover effects, and (3) to quantify potential changes of components associated with the identity integration process.

First, to quantify potential spillover effects, a design using pre- and post- intervention with a control group was chosen (see Figure 8 below). To assess spillover effects, changes in the behaviour promoted by the workplace intervention as well as related behaviours and attitudes at home were measured before and after the intervention. For this, self-reported behaviour and attitude measures were used. The within-between design allows an interpretation of causal relationships between changes in the intervention group in comparison to the control group, although causal relations within the pragmatist paradigm and a quasi-experimental research design can only be drawn with caution. A



change in self-reported behaviours at home from time point 1 (T1) to time point 1 (T2) (while no change in the control group) was interpreted as spillover.

Second, to test influence of environmental identity on potential spillover effects, scales measuring environmental identity are included in the survey (for more details see section 3.2.1.3). Based on previous research, the theoretical framework proposed in this thesis suggests that environmental identity has a positive effect on spillover effect (e.g. Whitmarsh & O'Neill, 2010). More specifically, environmental identity may be a mediator or moderator for positive spillover effects (e.g. Lacasse, 2016). Hence, a mediation and moderation analysis was conducted to analyse the potential influence of environmental identity on spillover effects.

Third, to quantify potential changes of components associated with the identity integration process, constructs associated with the centrality of environmental identity, compartmentalisation as well as guiding principles suggested in the IPT including self-efficacy and self-esteem were measured. Furthermore, 'objective' behavioural data was chosen as an approach to measure the effectiveness of the behaviour change intervention. However, this approach will not be discussed in detail as 'objective' behavioural data was only collected in the pilot study and not the main study due to practical issues (for more details see Appendix A, section 9.1).

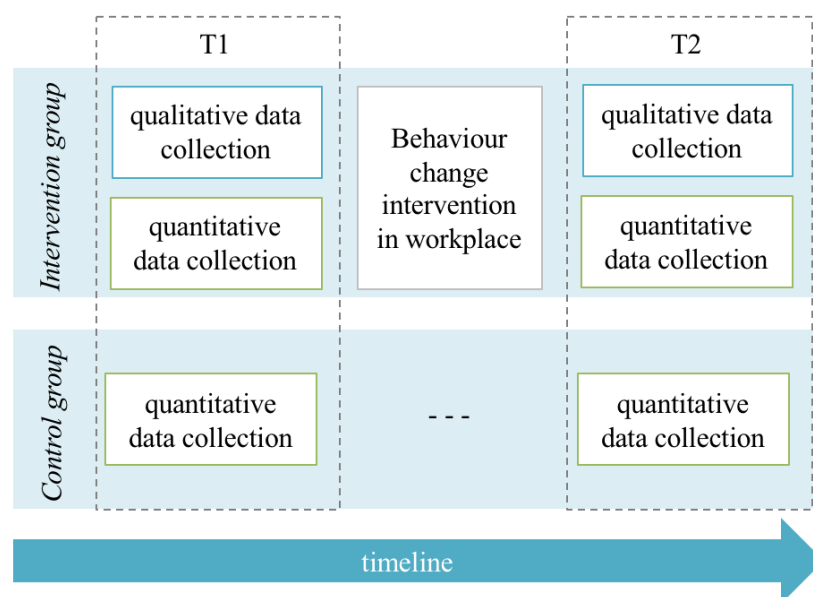
### **3.2.1.1 DESIGN: QUASI-EXPERIMENTAL DESIGN**

Several research designs have been used to assess spillover effects, including correlational surveys, experiments, field experiments and longitudinal data analysis. A characteristic of the spillover effect is that it occurs over time (Nilsson et al., 2016; Verfuert & Gregory-Smith, 2018). This is based on the idea that one environmentally sustainable behaviour subsequently leads to another environmentally sustainable behaviour, in the same or opposite direction, and that these behaviours are linked through an underlying factor (Dolan & Galizzi, 2015). Hence, the nature of the spillover effect requires a design where behaviour is measured at multiple time points rather than a correlational study (Thøgersen & Noblet, 2012). While the mixed methods design informs the approach by which quantitative and qualitative data are collected and merged, the study design is concerned with the specific plan of the study. A quasi-experimental design was chosen for the quantitative data collection in this thesis.

Quasi-experimental field studies are often used to evaluate the effect of an intervention in a real-life setting (e.g. Nilsson et al., 2016; Poortinga et al., 2013). A quasi-experiment is a study in which an intervention is introduced to study its effects; however, in comparison to a randomised experiment, participants are not assigned randomly to the intervention (and control) group(s) (Shadish, Cook, & Campbell, 2002). While an experimental design allows for causal conclusions, a quasi-experimental design requires alternative explanations for the effects of an intervention (Shadish et al., 2002). With

the aim of this thesis to better understand spillover processes of a behaviour change intervention in a real-life setting (i.e. the workplace) on behaviours at home, a quasi-experimental design was chosen as the most suitable design to address the research questions. Furthermore, a quasi-experimental design is in line with the mixed-methods approach and the pragmatist paradigm.

A number of aspects were considered before choosing a quasi-experimental design approach. First, the definition of spillover. In this thesis, spillover effects are defined as secondary effects a behaviour change intervention has on environmentally sustainable behaviours not targeted by the intervention (Truelove et al., 2014). Consequently, the study design includes a behaviour change intervention. Second, a pre- and post-intervention design was chosen to evaluate spillover effects by comparing a baseline (pre-intervention) data with data collected after the behaviour change intervention. This approach has been applied to both the quantitative and qualitative data collection. Accordingly, data for both the quantitative and qualitative parts was collected at two time points – before the intervention (T1) and after the intervention (T2) (see Figure 8). Third, to evaluate the spillover effects of the behaviour change intervention, an intervention-control group design for the quantitative data collection was chosen as this increases the internal validity (Eid, Gollwitzer, & Schmitt, 2013). Overall, these three characteristics suggest a quasi-experimental design approach (for an illustration see Figure 8).



**Figure 8: Study Design**

### 3.2.1.2 SURVEY AS A QUANTITATIVE DATA COLLECTION METHOD

In spillover research, survey data is the most frequently used form of data collection (e.g. Evans et al., 2012; Lacasse, 2016; Littleford et al., 2014; Truelove et al., 2016). Surveys are often used either solely or as part of other methods (e.g. observation, interviews) and usually conducted with the aim to

collect data of self-reported behaviour (e.g. Lacasse, 2016) and psychological variables (e.g. environmental self-identity; Whitmarsh & O'Neill, 2010). In the context of this research study, survey data was used to collect data of participants of the intervention and control group on self-reported behaviour (e.g. food consumption at home) and psychological variables (e.g. environmental self-identity). In combination with qualitative interview data, survey data was considered a suitable approach for this study to address the research questions.

Survey data can be collected by using online or offline questionnaires. Online surveys are conducted by using a survey software (e.g. Qualtrics), that supports the design of an online questionnaire which can then be sent out to participants via email or other online channels. The responses to the online survey can then be retrieved from the survey software and transferred into excel or SPSS for descriptive and inferential data analysis. Offline surveys consist of a printed version of the questionnaire which can then be distributed to participants. After the participant fills out the survey, the copies are collected and entered into the data managing software (e.g. Excel, SPSS) manually.

Survey data has advantages and disadvantages. Advantages of surveys include cost efficiency, participant anonymity, and scalability (Van Selm & Jankowski, 2006). Constructing surveys is cost efficient while it has the potential to collect a large amount of data in a relatively short period of time (Van Selm & Jankowski, 2006). Particularly the scalability and cost efficiency made survey data collection popular amongst social scientists. Large samples of survey data and strategic sampling may allow for generalisability of the survey results (Eid et al., 2013). Anonymity when filling out a survey may increase participants' comfort to take part in the survey; however, a lack of conscientious responses and dishonesty can be a disadvantage of anonymous survey (Van Selm & Jankowski, 2006). Further disadvantages include divergence in the interpretation of the survey questions or misunderstandings, and the potential superficiality of the survey. It is difficult to ensure that the questions and categories are uniformly understood by the participants (Mays & Pope, 1995). The disadvantages may be further catalysed by the non-exploratory nature of quantitative data collection which may result in the researcher overlooking essential aspects that may help to answer the research questions (e.g. contextualisation of information retrieved from survey data). Another disadvantage of surveys is the retrospective bias, that is people's skewed perception of past behaviours, which impairs the validity of survey data (Ohly, Sonnentag, Niessen, & Zapf, 2010).

Overall survey data was considered an appropriate approach for this study in order to assess behavioural and intra-psychological changes that may result from the behaviour change intervention. The surveys conducted in this thesis include operationalised variables based on the conceptual framework for spillover and self-reported environmentally sustainable behaviours at work and at home. The surveys are conducted before and after the behaviour change to account for changes over time and to be able to measure spillover. In the following sub-section, each construct that is being measured in

the surveys is explained. More details about each survey and their execution can be found in the following chapters where each study is described in more detail.

### **3.2.1.3 MEASURES AND OPERATIONALISATION OF CONSTRUCTS**

The aim of this section is to identify and operationalise variables for the quantitative data collection. Based on the literature review and the framework for spillover (see CH2), several constructs can be identified to potentially play an important role in the spillover process. In the following, these constructs and their operationalisation are described. The constructs are divided into predictor and dependent variables. Predictor variables are operationalised constructs that are thought to influence the dependent variables (e.g. behaviours). Dependent variables, on the other hand, are operationalised outcomes variables which are predicted to be influenced by either the predictor variables, the behaviour change intervention or both. The constructs described in the following section were measured in each study before and after the behaviour change intervention to account for any changes that can be related to the intervention (for more details of each study see CH4 and Appendix A, 9.1).

#### **3.2.1.3.1 PREDICTOR VARIABLES**

In the theoretical framework proposed in this thesis (see CH2), several constructs have been identified as influential for the spillover process. Previous studies have used IPT to assess the role of identity threat for resistance to change behaviours (Murtagh et al., 2014). The four guiding principles self-esteem, self-efficacy, continuity and distinctiveness play an important role in identity construction (Vignoles, Regalia, Manzi, Golledge, & Scabini, 2006). However, this study focuses more on the change of identity as a pathway to explain spillover processes and less so on the four guiding principles. Nonetheless, variables to measure self-efficacy and self-esteem have been included in the survey as potential predictors or moderators of spillover effects. Further variables included in the survey to test the change in identity as proposed in the theoretical framework include measures of environmental identity, compartmentalisation of identity, and prominence of environmental identity. In the following these variables are described in more detail.

#### **3.2.1.3.2 PROMINENCE OF ENVIRONMENTAL IDENTITY**

The prominence (i.e. what is seen as central to the self-concept) of environmental identity was used to conceptualise the centrality of identity elements (Ellestad & Stets, 1998; Stets & Biga, 2003). Prominence of identity “represent the self and the strength of the link to the inside—that is, to all of the other identities a person claims by virtue of the many positions he or she occupies.” (Stets & Biga, 2003, p. 420). In other identity literature, this is called psychological centrality (Stryker & Serpe, 1994). As proposed in the theoretical framework (see CH 2), a successful integration of elements from the behaviour change intervention results in a more central environmental identity. While the construct

environmental identity indicates a person's self-perception as an environmentally sustainable person, prominence of environmental identity focusses on the centrality of the identity elements. Previously, prominence of environmental identity has been found to significantly influence pro-environmental behaviours (Stets & Biga, 2003). Hence, it is argued that an increased prominence of environmental identity indicating an increased centrality is an intermediate step to an increased environmental identity. Hence, prominence of environmental identity, in addition to environmental identity, is measured with an adapted scale from Ellestad and Stets' (1998) prominence of identity measure.

#### **3.2.1.3.3 ENVIRONMENTAL SELF-IDENTITY**

Environmental self-identity has been identified as a strong predictor of environmentally sustainable behaviour by several studies (e.g. van der Werff, Steg, & Keizer, 2013a; White & Hyde, 2012; Whitmarsh & O'Neill, 2010). The theoretical lens to assess spillover effects is focussed on environmental identity and identity processes (i.e. IPT). Hence, measuring environmental identity in the quantitative component of the study is appropriate. In the environmental psychology literature the terms environmental identity, green identity, and environmental self-identity are often used interchangeably, although underlying concepts may differ. However, an extensive discussion would exceed the scope of this thesis. Most studies in the field of environmental psychology use the term environmental self-identity which can be understood as how to describe oneself in relation to one's environmental choices and behaviour (Whitmarsh & O'Neill, 2010). The reason for measuring environmental self-identity is twofold. First, previous studies have identified environmental self-identity as a potential mediator or moderator for positive spillover effects (e.g. Lacasse, 2016; van der Werff et al., 2014a), which this study aims to test as well. Second, a change of environmental self-identity between T1 and T2 can help understand effects of a behaviour change intervention on self-perception and provide insights into environmental self-identity as a potential underlying factor of spillover effects.

#### **3.2.1.3.4 DEPENDENT VARIABLES**

In this research project, spillover is understood as the effect of a behaviour change intervention to behaviours not targeted by the intervention (Truelove et al., 2014). More specifically, it is understood as effects of a behaviour change intervention at work to behaviours at home. Hence, to assess spillover effects, changes in behaviours at home were assessed. These included self-reported behaviour scales of the behaviour promoted in the behaviour change intervention at home (i.e. recycling behaviour at home in the pilot study and meat consumption behaviour at home in the main study). To assess subtle changes that may not (yet) lead to behaviour change, attitudes and intentions to change behaviour were also measured. Furthermore, an assessment of the stages of change in line with Bamberg's stages of change model (2013) was included. In the following, these measures are discussed in more detail.

### **3.2.1.3.5 BEHAVIOURS**

A change in behaviours is the main indicator for potential spillover effects – or behavioural spillover. The aim of this research project is to assess potential spillover effects of a behaviour change intervention in the workplace to behaviours in the home setting. Hence, a change of a behaviour at home suggests a spillover effect from the intervention at work to the home setting. Likewise, an increase in the frequency of the behaviour at home is therefore interpreted as positive behavioural spillover while a decrease in the behaviour is interpreted as negative behavioural spillover. Similarly, a change in other environmentally sustainable behaviours at home that may be related to but not the focus of the behaviour change intervention, are also interpreted as behavioural spillover.

Environmentally sustainable behaviours are frequently measured in the context of environmental psychology research (Kollmuss & Agyeman, 2002). Several approaches to measuring environmentally sustainable behaviours are available, ranging from measuring specific behaviours (e.g. recycling; Fielding et al., 2016; energy; Spence, Leygue, Bedwell, & O'Malley, 2014) to general ecological behaviour scales (GEB; e.g. Kaiser & Byrka, 2015). In the context of spillover research, the research focus is often on the link between similar behaviours (e.g. spillover from easy to difficult water-related behaviours; Lauren et al., 2016) or between behaviour domains (e.g. spillover between recycling, consumer, and transport behaviour; Thøgersen & Ölander, 2003). To measure environmentally sustainable behaviours, self-reported behaviour scales are commonly and generally considered an appropriate approach to measure individual environmentally sustainable behaviours and changes in those behaviours (i.e. spillover effects). Self-report of behaviour is also an economical and convenient way to assess individual behaviour. In previous studies, asking participants about their past behaviour (e.g., in the past two weeks) has been shown to be the best self-reported measure for actual behaviour (e.g., Carrus, Passafaro, & Bonnes, 2008). Hence, this study used self-reported behaviour scales asking for past behaviours to measure environmentally sustainable behaviours and to assess spillover effects.

### **3.2.1.4 DATA ANALYSIS: INFERENCE ANALYSIS OF QUANTITATIVE DATA**

To analyse the quantitative data, descriptive and inferential statistical analyses were considered appropriate (Field, 2009). Descriptive data analyses were used to describe the sample and the characteristics of the dependent and independent measures. Descriptive data analysis is limited to the sample and no generalisations can be made to a wider population (Lund & Lund, 2018). Hence, inferential statistical analyses were conducted to make generalisations about the wider population that the sample was drawn from (Lund & Lund, 2018). In the current research the aim was to make generalisations from the quantitative data analysis to the specific company and, with limitations, to similar workplaces in other organisations. The generalisability of the quantitative research is discussed in more detail in the discussion chapter (CH6).

To address the research question ‘RQ1: How does a behaviour change intervention in the workplace affect environmentally sustainable behaviours at home?’ and ‘RQ2: What role does identity play in the emergence of positive and negative contextual spillover effects (or a lack thereof)?’ a comparison of data collected before and after the intervention is appropriate in order to account for the impact of the behaviour change intervention on ESBs at home (see section 3.2.1.1). In accordance with the research design, data collection included an intervention and control group. As such, the quantitative data constituted a 2x2 pre- and post-intervention control group data set. For this type of data, a mixed ANOVA was considered to be the appropriate analysis, if assumptions are met (Eid et al., 2013; Field, 2009). The aim of the ANOVA in this thesis is to assess the direct effects of the behaviour change intervention on the DV (e.g. meat consumption at home) and, to address the second RQ, to assess interaction effects between the IV (e.g. environmental self-identity) and the treatment condition (i.e. intervention vs control). The appropriate software package for a mixed ANOVA is SPSS (IBM Corp., 2013), although other options are available (e.g. R).

### 3.2.1.5 ASSESSING QUANTITATIVE DATA

To assess the quality of the quantitative part of the study, several assessment criteria were comprised including an adapted version of a guide for a critical appraisal assessment for experimental and observational study design data (Collins, Miller, Coughlin, & Kirk, 2015). For a summary, see Table 4.

*Table 4: Assessing quantitative research adapted from Collins et al. (2014)*

| Criteria                           | Description  | Implications for this research  |
|------------------------------------|--|---|
| Generalisability of study          | Representativeness of sample population (e.g. relevant to England/UK) and generalisability of results.                         | This research is a case study; hence the aim is not generalisability of the results but rather the transferability. A description of the context of the case study highlights similarities and differences between the case study and similar settings. |
| Sampling                           | Randomisation of sample and use of control group.  | The sampling is not random (see section 3.2.1). A pre- and post-design with a control group was implemented (see section 3.2.1.1)   |
| Selection of explanatory variables | The selection of explanatory variables is based on a theoretical basis.  | The variable selection is based on a thorough review of the literature.   |
| Operationalisation of constructs   | Eligibility of chosen measures.  | Where possible, established measures have been used or were adapted to fit the context of this study (see section 3.2.1.3).   |
| Reliability of measures            | Were outcome variables/measures reliable?  | An analysis of the reliability of the selected variables and measures is reported in the result section (CH4 and CH5).  |
| Internal validity                  | Can changes in dependents variable be clearly be explained by independent variable? Consideration of alternative explanations. | This is particularly critical in a quasi-experimental design. A control group is used to increase internal validity. Limitations of the internal validity are discussed in CH6.   |
| Analytical methods                 | Were the analytical methods appropriate?   | Multi-level modelling and mixed ANOVAs were chosen to analyse the quantitative data.  |

|                        |  |   |
|------------------------|--|---|
| Effect sizes           | Were the estimates of effect size given or calculable? | Effect sizes are reported in the result section (CH5).  |
| Minimisation of biases | How well was bias minimised by the study.              | As this is a mixed methods study, the aim is not to minimise biases but instead to provide a transparent report of the context and factors that potentially influenced the quantitative data results. |

### 3.2.2 Qualitative methods

Several qualitative methods and methodological approaches are available to assess the context and effects of a behaviour change intervention in the workplace to the home setting. Within the pragmatist framework, most qualitative methods are suitable, depending on the research question. The research questions proposed in this thesis focus mostly on individual behaviour change and spillover effects and, secondarily, on the context of the behaviour (i.e. differences between the home and work setting). Based on this, four methods are chosen to collect qualitative data and to address the research questions; including interviews, visualisations, observation, and focus groups. The interviews and visualisation constitute the main methods and are complemented by observational data to help understand the workplace context. The focus groups are only used in the pilot study (for more details see Table 3 and Appendix A, section 9.1). In the following, the qualitative research design as well as each method and implications for this research project are discussed.

#### 3.2.2.1 DESIGN: CASE STUDY

Case studies are used to explore ‘why’ and ‘how’ aspects of a research question (Baxter & Jack, 2008). The aim of this research project is to understand how behaviours promoted in a behaviour change intervention in the workplace spillover to in the home; hence, a case study is considered appropriate to address these questions. Several types of case studies can be differentiated including explanatory, exploratory, and descriptive case studies (Baxter & Jack, 2008). The aim of an explanatory case study is to explain the link between a behaviour change intervention and its effects (Yin, 2003). Hence, the explanatory case study design is considered most suitable as it focusses on explaining causal links in a real-life intervention (Baxter & Jack, 2008). In line with the mixed-methods approach, multiple data sources are typically used in case studies to contribute to a more holistic understanding of the research topic (Baxter & Jack, 2008). The appropriate qualitative data sources are discussed below.

#### 3.2.2.2 METHODS

Several types of qualitative data collection methods are available in case study research. While interview data is one of the most commonly used method to collect qualitative data, visualisation, observations, diaries, and focus groups are chosen to contribute to a more holistic understanding of the context and in order to address the research questions.



### **3.2.2.2.1 SEMI-STRUCTURED INTERVIEWS**

Interviews are considered an active form of qualitative research “in which both participants create and construct narrative versions of the social world” (Miller & Glassner, 2007, p. 125). Different types of interviews are commonly used, depending on the epistemological and ontological stance of the researcher and the research question (Bryman & Bell, 2015). For this research project, semi-structured interviews are used as they are in line with the inductive-deductive approach addressing both the theoretical framework (see CH 2) and leaving room to explore novel the spillover process. Semi-structured interviews are used to bring out information and viewpoints of the interviewee (Bryman, 2016), which is the appropriate form of data to complement the quantitative survey data. In IPT research, interviews have also been the most commonly used form of qualitative data collection (Coyle & Murtagh, 2014), which supports the choice of interviews as the main qualitative data collection method.

In the context of spillover, interviews have been used to gain a more in depth understanding of connections between environmentally sustainable behaviours (e.g., Elf et al., 2019; Verfuert et al., 2019; Whitmarsh et al., 2018) and internal processes such as mental accounting (Schütte & Gregory-Smith, 2015). An advantage of interview data is that it provides an insight into the individual’s account of identity and behaviour change processes capture participants’ understanding of their own behaviour (Hargreaves, 2008). While passive qualitative methods (e.g. observation, ethnography) provide insight from the researcher’s perspective, interviews give research participants a voice and allow more in-depth insights into internal processes. Hence, interviews are considered an appropriate research method to address the research questions of this thesis. More details about the implementation of the interviews are provided in chapter 4.

### **3.2.2.2.2 VISUAL METHODS**

Visual methods include a vast range of approaches, but are less commonly used in the context of behaviour change and spillover research. Visual representations of the self; however, have been studied through visual methods in the context of connectedness to nature. In a multiple study paper Martin and Czellar (Martin & Czellar, 2016) develop and test the ‘Inclusion of Nature in Self’ scale in which visual measures (overlap, size, distance, centrality) of the self in relation is measured in order to assess individuals’ self-nature connection. In this study, visual methods are chosen as a more implicit measure to assess on identity changes and changes of centrality of identity elements. To assess identity change processes within the IPT framework, Coyle and Murtagh (2014) suggest that visual methods can be additional data sources to provide different insights into identity change and facilitate discussion points in interviews. Based on this, visual methods are used to supplement the interview data in the main study (for more details, see sections 4.2.2.2.3 and 5.2.1.2).

### **3.2.2.3 SAMPLING**

The sampling of the participants for the qualitative data collection is purposeful for the interviews and visual methods and random for the observational data (Baxter & Jack, 2008). Purposeful sampling for the interviews is chosen in order to achieve a heterogeneous sample. The sampling in this thesis is based on self-reported behaviour collected in the surveys with the aim to include employees ranging from frequently to less frequently engaging in environmentally sustainable behaviours. Details about the specific sampling procedure for each study (pilot and main study) are provided in chapter 4.

### **3.2.2.4 DATA ANALYSIS: THEMATIC ANALYSIS OF QUALITATIVE DATA**

The qualitative data is analysed using thematic analysis presented by Braun and Clarke (2006). Thematic analysis is a frequently used approach and is also the suggested approach to analyse qualitative research using IPT (Coyle & Murtagh, 2014). In line with the pragmatism paradigm, Braun and Clarke (2006) state that thematic analysis is a qualitative analytic method which views methods as independent of epistemology and theory. This makes thematic analysis a flexible approach which can be applied across a variety of epistemological and theoretical assumptions. Thematic analysis is a method for identifying and analysing patterns in data sets (Braun & Clarke, 2006). Making assumptions (e.g. epistemology and ontology) and theoretical foundations (e.g. IPT) explicit is an important part of using and reporting thematic analysis (Braun & Clarke, 2006) (for more details see reflexivity section below 3.5).

### **3.2.2.5 ASSESSING QUALITATIVE METHODS**

Assessing the rigour of qualitative data is rather difficult as several epistemological and ontological underpinnings set out different criteria. A methodological checklist to achieve rigour in qualitative research with regards to issues of validity, generalisability, and reliability developed by Mays and Pope (Mays & Pope, 1995) was considered most suitable to discuss and assess rigour of qualitative research in this thesis. According to Mays and Pope (Mays & Pope, 1995), rigorous qualitative research has two aims: (1) to provide transparency of methods and data collection and analysis procedures so that another researcher could analyse the data similarly and reach the same conclusions; and (2) to provide a plausible and consistent explanation of the investigated phenomenon.

Table 5 provides a summary of Mays and Pope's (Mays & Pope, 1995) assessment of qualitative research and implications for this research project. It should be noted, that Mays and Pope (Mays & Pope, 1995) use the terms validity, generalisability, and reliability which implies a philosophical leaning towards a post-positivism. However, the current research project is positioned in the pragmatism paradigm. Hence, rather than generalisability of the findings the focus lies on transferability.

**Table 5: Assessing qualitative research adapted from Mays and Popes (1995)**

| Criteria   | Description   | Implications for this research  |
|--|---|---|
| Theoretical and methodological foundation and justification        | Sufficient explanation of theoretical framework and methods at each research stage.   | The qualitative data collection and analysis should reflect the theoretical framework (see CH2).  |
| Context of the study   | Describing the context of the case study to highlight similarities and differences between the case study and similar settings.   | An extensive description of the of the field experiment context should be provided (see CH 4).  |
| Transparent & theoretically driven sampling strategy               | Description and justification of sampling strategy. Implementation of sampling strategy including theory driven criteria such as a diverse range of individuals and settings to ensure the generalizability of the conceptual analyses. | The sampling procedure should be described in detail. A theory driven sampling strategy should be implemented. In this research study, sampling criteria included gender, age, and ‘stage of sustainable food consumption (see also section 4.2.2). |
| Transparent fieldwork description                                  | How was the fieldwork undertaken? A detailed description of the fieldwork makes the research more transparent.  | A detailed description of the context and the implemented methods should be provided (see CH4).   |
| Transparency of evidence analysis                                  | Reliability of analysis can be achieved by documenting the analysis process. This includes producing interview transcripts, coding frames that can be used by other researchers.  | A detailed description of the data collection, production of the transcript, and analysis process should be provided (see section 0).   |
| Transparency & theoretically justified procedure for data analysis | Description of data analysis procedure (e.g. template development) and clear link to research questions.  | The development of the template for the qualitative data analysis should be driven by the literature and reflect the research questions (see section 5.2.1).  |
| Triangulation of data (where appropriate)                          | Triangulation of data collection from multiple, independent sources (e.g. mixed methods approach) to increase validity of evidence.   | A mixed methods approach is used in this research study including a triangulation of qualitative and quantitative data.   |
| Attention to contradictory findings                                | Demonstrating evidence of pursuing contradictory or modified observations.  | Unexpected results should be discussed (see CH6)  |
| Sufficient original evidence                                       | Presentation of sufficient original evidence to justify interpretation of data.   | Conclusions should be drawn based on data saturation illustrated relevance to the research question   |

### 3.3 BEHAVIOUR CHANGE INTERVENTION

In this thesis, spillover effects are viewed as the effect of a behaviour change intervention on behaviours that are not targeted by the intervention (Truelove et al., 2014). More specifically this thesis is focussed on spillover effects from a behaviour change intervention in the workplace to ESBs in the home setting. Hence, a behaviour change intervention constitutes a part of the methodology in this thesis. This sections gives a brief overview of considerations about behaviour change interventions, and which approaches were used in this thesis. This section is focussed on some broad considerations and

the next chapter gives a more detailed account for the implemented behaviour change intervention of the main study (CH 4).

In a broad way, a behaviour change intervention can be defined as “coordinated sets of activities designed to change specified behaviour patterns” (Michie et al., 2011, p. 1). A number of studies have investigated behaviour change interventions to promote environmentally sustainable behaviour at home (for a review see Abrahamse et al., 2005) and in the workplace (Lo et al., 2012; Staddon, Cycil, Goulden, Leygue, & Spence, 2016; Young et al., 2013). In the context of spillover, a growing body of research investigated spillover effects from behaviour change interventions (e.g., Kaida & Kosuke, 2015; Lanzini & Thøgersen, 2014; Steinhorst et al., 2015; Steinhorst & Matthies, 2016; Thomas et al., 2019). Overall, this research shows that several aspects have to be considered when designing an intervention. For example, both contextual and individual factors play a role in individual behaviour change (e.g., Abrahamse et al., 2005; Young et al., 2013), which was taken into account in this thesis (see CH 4).

Behaviour change in a workplace setting is influenced by a number of factors including individual and contextual factors that should be taken into account for the design of the intervention. In a review of determinants of and interventions for ESBs in organisations, Lo et al. (2012) identified individual and organisational factors. Individual determinants include attitudes, beliefs, personal norms, social norms, self-efficacy, and past behaviour; which are similar to determinants for household green behaviour. The evidence for beliefs, self-efficacy and personal norms was mixed suggesting there might be interactions with other variables; however, generally personal norms showed higher correlations with ESB at work (Lo et al., 2012). Context and organisation related variables were also found to have an effect on employee’s ESB (Lo et al., 2012). Organisational determinants include factors such as physical facilitation of ESB and environment-related involvement of superiors (Lo et al., 2012). Acceptance and likelihood of adopting new programmes (e.g. interventions) and innovations (e.g. new energy technology) was found to be largely influenced by the perceived compatibility with the existing organisational culture (Lo et al., 2012).

### **3.3.1 COMMUNITY-BASED SOCIAL MARKETING**

Based on these findings it was considered appropriate to focus on both contextual and individual factors. Moreover, it was decided to combine several intervention tools as this has been found to be the most effective approach (Steg, Dreijerink, & Abrahamse, 2005). In order to design an intervention appropriate for the workplace, a tailored intervention approach was considered appropriate. For this, two approaches were taken into account. First, for the design of the intervention, the Community-Based Social Marketing approach (CBSM; McKenzie-Mohr, 2000) was used to guide the development process of the main study’s intervention. CBSM is a systematic approach to designing a

behaviour change intervention in a community (i.e. an organisation) by following five steps: (1) behaviour selection, (2) uncovering barriers and benefits, (3) tools of change, (4) pilot testing, and (5) evaluation (McKenzie-Mohr, 2012). In contrast to the ten-step social marketing plan by Lee and Kotler (2015) which targets larger scale audiences, the CBSM approach is a guide to developing a tailored behaviour change approach to a specific community.

### **3.3.2 STAGES OF CHANGE**

Second, in order to choose appropriate tools for the behaviour change intervention, Bamberg's (2013) Stages of Change framework was used for the main study. The self-regulation model of voluntary behaviour change (Bamberg, 2013) is a framework that explains development of new environmentally sustainable habits in four stages. Habits are here seen as behaviours that the individual engages in on a regular basis without much deliberation (Bamberg, 2013). To form such a habit, the model proposes that people go through four stages. In comparison to some other behaviour change models (e.g. theory of planned behaviour, norm activation model), the self-regulation model of voluntary behaviour change (Bamberg, 2013) dissects behaviour change in stages that allow to assess individual behaviour change at all stages. For example, individuals may become more aware of an issue but have not changed their behaviour yet.

In the first stage, precontemplation, the individual is not aware of a problem (e.g. environmental impact of her behaviour) and has not yet developed a goal to change her behaviour. In the precontemplation phase, a number of factors influence the formation of a goal which constitutes the transition point from the first to the second stage. Perceived consequences of own behaviour lead to a perceived responsibility which then leads to a negative effect and perceived obligation to fulfil one's personal standards. Further influential factors are a more salient social norm, perceived goal feasibility and emotions anticipated with the goal progress. At the end of the precontemplation stage, the individual forms a goal intention and enters the second stage, the contemplation stage. In the contemplation stage the individual forms a behavioural intention which is influenced by attitudes towards different behaviour change strategies and perceived behavioural control over the different behaviour change strategies. In the third stage, implementation stage, the individual forms an implementation intention which is influenced by cognitive planning ability and skills to cope with implementation problems. At the end of this stage, the individual has successfully changed her behaviour and enters the maintenance stage. In this stage the new behaviour may form into a new habit, but only if the individual has the skills to resist temptation to relapse and, when relapsing, the individual must have the skills to recover from the relapse in order to maintain the new habit.

### **3.3.3 SUMMARY**

To conclude, the above section highlights several approaches to behaviour change that were joint in this thesis. The main aim was to bring together the important building blocks that enable the design of a tailored behaviour change intervention in collaboration with the practice partner (i.e. partner organisation for the main study). While this approach was a suitable starting point for an effective behaviour change intervention, a few disadvantages should be noted. First, developing a new, although tailored, intervention could be not effective and, therefore, bear the risk to be unsuitable to assess contextual spillover effects. Second, by collaborating with a practice partner, unexpected circumstances were likely to interrupt the planned process. For instance, by working with the chef of the canteen for the main study (for more details, see CH 4), the planned changes of the menu were ultimately in control of the chef and not myself, the researcher. And third, by combining a number of steps and intervention tools, the impact of each component on potential spillover effects was not traceable (see for a discussion, CH 6). In other words, a multi-step and multi-tool approach as used in this thesis is limited in its understanding of what caused the potential spillover effects.

### **3.4 INTEGRATING QUANTITATIVE AND QUALITATIVE DATA**

Three approaches for integrating quantitative and qualitative data are commonly used: (1) merging data, (2) connecting data, and (3) embedding data (Creswell et al., 2011). Merging data consists of an integration process which combines qualitative (text or images) and quantitative (numeric) data. A typical approach for merging data is reporting results together or merging findings in the discussion section; for example, when reporting results the quantitative results are followed by qualitative results that support the quantitative findings (Creswell et al., 2011). The second approach, connecting data, usually goes hand in hand with a sequential design wherein one dataset informs the subsequent data collection (Creswell et al., 2011). For example, interviews could be used to inform a subsequent survey. Thirdly, embedding data aligns with an embedded design where one methods constitutes the primary data source and the other methods contributes additional understanding to the primary data (Creswell et al., 2011). For example, after a behaviour change intervention the collection of interview data may provide an additional in-depth understanding of participants' perception of the intervention.

In this thesis, the first approach was used. This means that the quantitative and qualitative data were analysed separately and then merged together. More specifically, in this thesis, the findings from the main study were integrated and interpreted in accordance with the proposed theoretical framework. The aim was to assess the evidence that was found (or not) from the qualitative and quantitative data analysis in support of the proposed pathways to positive, negative, and the lack of spillover. This approach was chosen with the aim to triangulate the evidence for the theoretical framework.

Furthermore, by combining the quantitative and qualitative data this way, a more comprehensive picture of the evidence could be assessed. For instance, the qualitative data might uncover some nuances that the quantitative data might not detect (e.g. due to low effects and/or sample size). Similarly, the quantitative evidence might provide additional statistical support for the qualitative findings. Moreover, contradictory findings could open up avenues for future research.

### **3.5 REFLEXIVITY**

Reflexivity is a validity procedure in which the researcher discloses biases, assumptions, and beliefs that influenced the research (Creswell & Miller, 2010). The aim of reflexivity is to reach philosophical clarity through critical thinking about the researcher's assumptions throughout the research project (Howes, 2015). Malterud (2001, p. 484) describes reflexivity as “an attitude of attending systematically to the context of knowledge construction, especially to the effect of the researcher, at every step of the research process”. As such, reflexivity is an important tool of qualitative research with the aim to share potential preconceptions of the researcher and to establish meta positions (Malterud, 2001). In this reflexivity section, I draw on an approach by Howes (2015). Drawing on previous research in this area (e.g., Greene, 2006), the author outlines four domains of philosophical issues that should be addressed: (1) Philosophical stances and assumptions (including ontology and epistemology) (2) Inquiry logics (often known as methodology) (3) Guidelines for practice (specific procedures or methods) and (4) Socio-political commitments. The former three were already addressed earlier in this chapter. The latter is addressed on the section below.

#### **3.5.1 SOCIO-POLITICAL COMMITMENTS**

My research aimed to improve the understanding of individual environmentally sustainable lifestyle changes through behaviour change interventions in workplaces (see introduction and literature review for more details). This thesis is positioned within a growing body of spillover effects (see CH 2) that draws from psychology, marketing, sociology, and economics. It predominantly draws on literature from the field of environmental psychology, while the theoretical framework is based within the field of social psychology.

This research project was funded by the University of Sheffield Management School with the reward of a three-year full-time PhD scholarship. As part of this research project, two field studies were conducted with practice partners. However, neither of the studies was industry-funded. The first project, the pilot, was based on a collaboration within the University (i.e. the Estates and Facility Management, EFM). They had asked for help with regards to better understanding waste separation behaviours and

its barriers among occupants of university buildings. In return, the EFM supported the data collection that covered both their inquiry and my research questions (see Appendix A).

The second project, the main study, was conducted in collaboration with a private sector company. I contacted them with a project pitch, in which I highlighted the benefits of a collaborative project in which I would help them to improve their sustainability in return for collecting data for my thesis (see CH 4 for more details). In both projects, the collaborators were stakeholders of my research. They influenced aspects of the design of the research projects (e.g. the interventions) and were involved in the broader selection of the topic (i.e. target behaviours of the behaviour change interventions). However, they had no influence on my research questions and by being funded through the Management School, my research was financially independent from the project partners.

### **3.5.1.1 RESEARCHER VALUE JUDGEMENTS**

I came to both workplaces (i.e. the university offices in the pilot study and the canteen in the main study) as an outsider. In the pilot study I had very limited contact with the research participants (i.e. only via email and during the focus groups). As the pilot study took place in the university, I think that all participants were quite familiar with research in general either through conducting or managing research themselves or by having been involved in other projects. In the main study this was different. I came to the company as the researcher from that university, which could have influenced their judgement on the project and myself as a person. Nonetheless, I anticipated a relationship with the project partner (e.g. the chef of the canteen) and the research participants of mutual respect.

I tried to reflect on my judgements through the use of a research diary (Nadin & Cassell, 2006), which I kept from the initial meetings, throughout the interviews and during the behaviour change intervention. After each interview I wrote down my initial impression of the participant that included any form of judgement. I later reflected on my judgement and how this may have influenced the interviews. To reduce any judgement from the participants, I tried to 'blend in' by dressing professionally, but casual (the dress-coded I observed during my first visits). I refrained from any form of verbal judgement towards any beliefs, behaviours, or attitudes that anyone involved in the research project voiced. I aimed to communicate in a friendly and open way that made the participants comfortable. Nonetheless, my role as a researcher and initiator and co-developer of the behaviour change intervention could have influenced the participants' judgement of myself, particularly those who disagreed with the changes that were made or the cause of the project (i.e. environmental sustainability).

Before and throughout each research project, which aimed at changing people's behaviours, I assumed that some people would like to make changes, while others would reject the interventions. This assumption was based on personal experiences with family members and friends. While I personally value environmental protection and am worried about my personal impact on climate change,



I am aware that other people have different views. I also assumed that some participants, especially those from the industry-partner, could find my involvement of the project as intrusive and top-down. I tried to reduce this by involving the employees in the project.

### **3.5.1.2 RESEARCHER PERSPECTIVE**

I have undertaken an undergraduate and post-graduate degree in psychology, which were predominantly situated in the quantitative research paradigms. As such, before this research project, I had very little experience within the qualitative or mixed methods research paradigms. My supervisors, however, have all conducted qualitative research and most of them have experience in mixed methods research. Throughout the project I have learned more about conducting research within the qualitative and mixed methods approach.

## **3.6 PILOT STUDY – WASTE SEPARATION IN OFFICES**

A pilot study was conducted in the university setting to trial survey questions and the implementation of a behaviour change intervention prior to the main study. The pilot study was conducted in cooperation with the university of Sheffield Estates and Facilities Management (EFM), who wanted to better understand decreasing recycling behaviour and increasing contamination of recyclables with general waste. Discussions with the EFM followed a small-scale intervention study that focussed on employee waste separation behaviour with the aim to better understand the problem from the consumers' point of view (e.g. challenges and barriers to recycling behaviour at work).

For this thesis, the purpose of the pilot study was to gain a better understanding of possible spillover effects from recycling behaviours in the workplace to the home setting with a particular focus on spillover effects from a behaviour change intervention at work. While the pilot study was a helpful exercise to design and implement the main study, its contribution to the research questions was limited. This is mainly due to the small sample size and, associated therewith, the limited suitability for meaningful statistical testing (e.g. mixed ANOVA or similar). Hence, the section below is limited to a brief summary and overview of the main findings from the pilot study (see Table 6) as well as a discussion of implications for the main study (section 3.6.2). More details about the pilot study can be found in Appendix A (section 9.1).

### **3.6.1 SUMMARY AND FINDINGS**

The quasi-experimental field study was conducted with university employees and included a pre- and post-intervention survey. An information-based behaviour change intervention was designed based on three focus groups that were conducted prior to the surveys. The experimental group

participated in the intervention that consisted of an online recyclable and non-recyclable waste sorting task designed to increase recycling behaviour in the workplace. Both the experimental (N=27) and the control (N=18) group completed a pre- and post-intervention survey including measures of environmental self-identity, recycling and energy saving behaviours at home and work. In addition to the survey data, objective data was collected by monitoring the waste bins in the offices of both the control and experimental participants to examine waste sorting behaviour.

**Table 6: Overview Hypotheses Results from Pilot Study**

| Hypothesis  | Outcome                     |
|---|-----------------------------|
| H1: The behaviour change intervention in the workplace has an effect on the targeted behaviours waste separation in the home context. |                             |
| (a) Recycling behaviour at home.  | 1a – Rejected <sup>*)</sup> |
| (b) Intention to recycle at home.   | 1b – Rejected               |
| (c) Attitudes towards recycling at home.  | 1c – Rejected               |
| Non-parametric tests: Sample-related Wilcoxon (compares T1 and T2)  |                             |
| H2: The behaviour change intervention in the workplace has an effect on non-targeted ESBs at home.                                    |                             |
| (a) Energy behaviour at home.   | 2a – Rejected               |
| (b) Reusing behaviour at home.  | 2b – Rejected               |
| (c) Intention to reuse at home.   | 2c – Rejected               |
| Non-parametric tests: Sample-related Wilcoxon (compares T1 and T2)  |                             |
| H3: 'Green' identity has is a cofounding factor in the effect of the intervention on recycling behaviour at home.                     | ---                         |
| Not possible to test with non-parametric tests.   |                             |

<sup>\*)</sup> The recycling scores at T2 were significantly lower than at T1 for the control group.

### 3.6.2 DISCUSSION AND IMPLICATIONS FROM PILOT STUDY

Overall, the pilot study has been a useful learning process for the design and implementation of the main study. It highlighted several key aspects about the design of the surveys and intervention, communication with the project partner, and integration of the recipients of the intervention into the planning process. These were taken into account for the main study and will be described in more detail in the next chapter. The aims of the pilot study were threefold: (1) to explore the designing and implementation process of a tailored behaviour change intervention in a workplace; (2) to investigate potential links between the tailored behaviour change intervention and potential spillover effects from work to home; and (3) to explore survey scales (e.g. identity measures), research designs (e.g. quasi-experimental design), and methods (e.g. focus groups and self-reported surveys) that would subsequently inform the planning and implementation of the main study.

The predominantly non-significant findings suggest that the intervention had no spillover effects to ESBs at home. However, it should be noted that the a power sensitivity analysis with the

G\*Power software (Faul, Erdfelder, Lang, & Buchner, 2009) indicated that the sample was underpowered<sup>1</sup>. This means that potential spillover effects could have stayed undetected. Nonetheless, the findings of a lack of spillover are consistent with previous research (e.g., Thomas et al., 2016; Wells et al., 2016). Two key learning points were taken from this. First, the aim for the main study was to receive a larger sample size. Second, to better understand underlying processes of a lack of qualitative elements in the form of interviews before and after the intervention were implemented. The aim of the additional qualitative data was to get a more in-depth understanding of why a lack of spillover might occur. The scales that were used in the survey showed acceptable reliability values. Unfortunately, H3 could not be tested, which would have included the identity scales. As such, the scale selection for the main study was similar to the pilot study, except for the dependent variables which varied based on a different target behaviour of the intervention in the main study.

Overall, the pre- and post-intervention survey revealed several issues that need to be taken into account for the main study. First, the drop-out rates between T1 and T2 in combination with difficulties to match participants based on codes led to a smaller sample size than initially thought. Similarly high dropout rates were reported in previous research (Bergquist, Nilsson, & Ejelöv, 2019), however, in the main study a number of precautions were planned in order to keep them as low as possible. Second, small samples are prone to include outliers, hence, the outlier was accepted for this sample. Non-parametric Wilcoxon tests were also carried out with the outlier excluded which showed the same results (see appendix A, section 9.1.8.5). Furthermore, the aim of the pilot study was not to provide great, robust results, but rather to test variables and the development and implementation of a behaviour change intervention. The pilot study provided useful methodological insight that informed the study design of the main study. Third, the small sample size and skewed distribution led to the rejection of parametric tests and the need to use non-parametric tests instead. This entails several limitations with regards to the generalisability of the quantitative data. Incorporating more qualitative data could provide more insights into potentially inconclusive quantitative results.

The focus groups highlighted potential key factors for spillover effects between settings, namely similarities and differences between settings. While these findings are consistent with previous literature, the findings suggest that similarities and differences between settings go beyond equipment, as suggested in previous literature (Littleford et al., 2014). The focus group findings suggest that similar policies and information material, rather than equipment alone, facilitated positive spillover effects across settings, whereas confusing messages and policies between settings acted as barriers to positive

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<sup>1</sup> To detect an effect size of 0.5,  $\alpha$  error probability of 0.05, and Power (1- $\beta$  error probability) of 0.8, a sample size of 35 would have been required for each the intervention and the control group.

spillover effects. Hence, in addition to identity, contextual barriers and facilitators beyond the physical environment are explored in the main study. These were included in the qualitative data collection in order to better understand dynamics of contextual factors such as similarities and differences between settings.

Designing and implementing a tailored behaviour change intervention with a project partner was another key learning point from the pilot study. The collaboration with an external partner (i.e. EFM) provided insights about dealing with expectations from research partners. For instance, communicating clearly what data was required for the PhD thesis and equally learning about the issues around waste separation that EFM were facing helped with the process of data collection and the design of the intervention. At the end of the project, the EFM used the findings from the pilot study to improve their waste management strategy. For example, the findings from the focus groups were used to inform the development of a new communication strategy in the form of posters and videos that aims to communicate the waste management strategy of the university more clearly. The monitoring of the bins was used to improve the infrastructure of the bins (e.g. replacing missing bins). The focus groups were a very useful method to better understand barriers to the chosen target behaviour and enabled a more tailored design of the behaviour change intervention. Hence, qualitative elements and the integration of the recipients of the intervention were included in the design of the behaviour change intervention in the main study. Overall, the pilot study showed that communication skills and transparent planning are key to a successful collaboration.

## **4 MAIN STUDY – INTERVENTION & DATA COLLECTION**

This chapter provides an overview of the development and implementation of the behaviour change intervention and the data collection that was conducted as part of the main study. Similar to the pilot study, the main study aimed to assess spillover effects of a behaviour change intervention in the workplace to ESBs in the home setting. More specifically, this study focussed on meat consumption as the target behaviour of the behaviour change intervention in a medium-size private sector company. In the following, each step of the development and the implementation of the behaviour change intervention as well as the data collection are described. The first section (4.1) provides context details about the company, initial meetings and goals of the project. The second sections () describes the development and implementation of the behaviour change intervention in more detail as well as the collection of the pre- and post-intervention data. The next chapter (CH 6) provides the results from the pre- and post-intervention data collection.

### **4.1 THE CONTEXT OF THE COLLABORATIVE PROJECT**

The following section outlines the development of the study including the communication with the company and the development of the behaviour change intervention. The project started with the aim to find a project partner that would collaborate on the development and implementation of a behaviour change intervention in their workplace. An online search for medium size private sector companies based in South Yorkshire was completed and a list of potential project partners compiled. Inclusion criteria included sector, previous engagement in CSR (Corporate Social Responsibility) projects, and number of employees. With the service sector being one of the largest sectors in the UK, accounting for 23,000 firms and 79% of the UK's GDP (Office for National Statistics, 2016), companies from this sector were considered suitable, however, organisations from other sectors were also included in the list. Companies that engaged in non-environmental CSR activities (e.g. social sustainability) were included and given preference as this indicates an openness to CSR programmes both among employees and the companies' decision makers. However, companies that had an extensive environmental sustainability section on their website were excluded as this could have confounding effects on the behaviour change intervention and its potential spillover effects. Overall, the aim was to find an organisation that was relatively new to environmentally sustainable projects in their organisation. With regards to number of employees, companies employing 500 or more people were preferred over smaller companies as this would increase the chances of a larger sample for the quantitative part of the study (i.e. survey).

#### **4.1.1.1.1 INITIAL CONTACT WITH THE COMPANY AND CHOOSING THE TARGET BEHAVIOUR**

Once an initial list of companies was compiled, the first five companies of the list were contacted via email. A brief pitch of the potential project was sent to the companies' CEOs, or, if their email address was not available, the PR team of the company. Of the five initially contacted companies, one company expressed interest in the project and a meeting was set up with the facility manager in September 2016. The initial research proposal comprised of an outline for a behaviour change intervention targeting employee behaviour and a step by step plan of the implementation as well as responsibilities for the company and the researcher (for more details see Appendix B, section 9.2.2). The target behaviour of the intervention, however, was not set and open for negotiation as previous research has shown that interventions tailored to the context within which they are used are more effective in changing behaviour (McKenzie-Mohr, 2000).

Two initial meetings were held, one with the facility manager and one with the facility and the HR manager, in which the project pitch and their involvement and interest in the project were discussed. The facility manager was interested in an overall improvement of environmental sustainability and particularly the canteen while the HR manager was mainly interested in improving employee health and satisfaction. After the two meetings, the partner organisation agreed on the proposed plan including pre- and post-intervention surveys with their employees, interviews with about 20-30 of their employees, and access to objective data (e.g. bin monitoring or sales data from the canteen). Furthermore, they agreed to provide vouchers for the canteen (valued at £2 each) for employees who participated in the project, although, they were not specific in the total amount they were willing to contribute.

This was followed by the development of the goals and expectations of the project in collaboration with the facility and HR managers of the partner organisation. Several behaviours were discussed as potential target behaviours for the intervention, including transport behaviour (reducing driving to work and increasing use of public transport), energy saving behaviour, recycling, and food consumption. Transport behaviour was ruled out as it was considered too difficult to change in the project's timeframe and dependent on further collaborations with the Sheffield transport authorities (e.g. to sponsor tickets). Energy saving behaviours and recycling behaviours were ruled out as they were considered infrastructure-dependent in the workplace context of the partner company. Although particularly energy behaviour is often the focus of behaviour change interventions (e.g. Endrejat, Klonek, & Kauffeld, 2015; Steg et al., 2005), at the partner organisation most energy-related behaviours were automatized and therefore not under the control of staff (e.g. room temperature is regulated and PCs and lights are turned off automatically).

Finally, workplace food consumption was chosen as the target behaviour on the basis that the company has a canteen offering a cold buffet (free of charge for the employees) and warm subsidised meals. The food is provided by the company and could, therefore, be changed as part of the behaviour

change intervention and improved in its environmental sustainability. Furthermore, it was suggested that employees have some control over their food choices (in comparison to other behaviours as discussed above) and additional health benefits that have been associated with sustainable diets (see e.g. Green et al., 2015; Ruini et al., 2015; Willett et al., 2019) were welcomed by the partner organisation. Furthermore, spillover effects from sustainable food consumption interventions are an under researched area compared to other behaviours (e.g. waste behaviour; Sintov et al., 2017; Whitmarsh et al., 2018). On this basis, it was decided that the behaviour change intervention would focus on food consumption in the workplace canteen. The development and implementation of the behaviour change intervention is described in more detail in section 4.2.3. The next section describes the context of the partner organisation in more details.

#### **4.1.1.1.2 THE COMPANY CONTEXT**

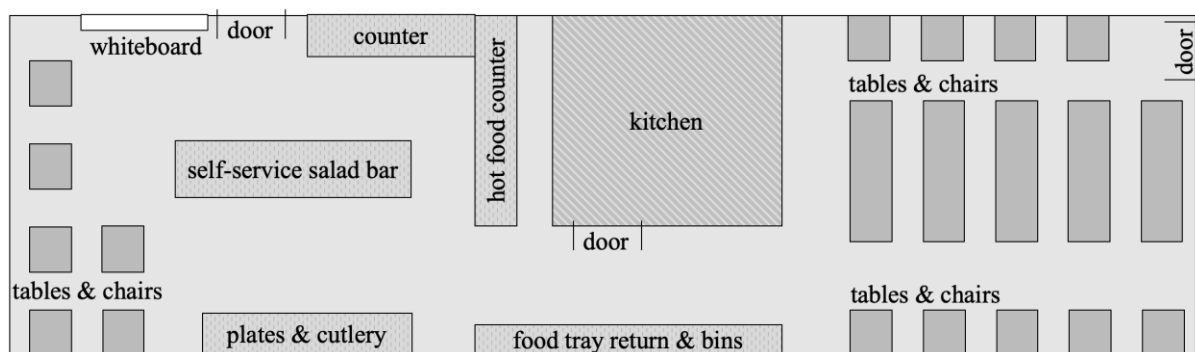
The partner organisation, part of the British Telecom group, is an internet service provider with main headquarters in Sheffield and a second office in Leeds. According to the HR manager, at the time of the study (March – September 2017), the partner organisation had just over 1000 employees. The company is divided into eight departments: the Customer Service Centre, Software Engineering and IT Operations, Commercial and Marketing, Billing, Human Resources, Legal & Compliance, Projects & Business, and Finance, which are all based in Sheffield except for the Customer Service Centre which has a branch in Leeds. The partner organisation had not engaged in any environmental or sustainability related campaigns prior to this project collaboration. However, they have a history of helping with social causes (e.g. volunteering for the Sheffield Children Hospital), but were new to environmental sustainability related projects.

During visits at the partner company, I observed strict timetables but a casual work environment. This seems to be aligned with the organisation's slogan is 'We'll do you proud' ostensibly designed to create a sense of place (i.e. South Yorkshire) and pride for both customers and employees. Employees could often be seen wearing a sweater with the partner organisation's slogan. Most study participants were involved in direct or indirect customer supports including online supports, call centre supports, and software engineering and analysis of the customer support, which, according to the HR manager means strict timetables and scheduled break times for most employees. Break rooms with game consoles and table football as well as free/subsidised canteen food including breakfast and lunch are communicated as perks for working at the partner organisation. Generally, the atmosphere at the partner organisation seemed very casual with an emphasis on team work and an attempt to create a workplace identity linked to the South Yorkshire location.

#### 4.1.1.1.3 THE CANTEENS

There are two canteens at the partner organisation, one in Sheffield and one smaller canteen in Leeds. Both the behaviour change intervention and the majority of the data collection (i.e. interviews) took place in the canteen. The Headquarters in Sheffield was chosen as the venue for delivering the behaviour change intervention, with Leeds serving as a control location for the quantitative leg of the research. The interviews, however, only took place with employees who worked in Sheffield. The main collaborator of this project was the chef of both canteens and, to a lesser extent, the canteen staff members and the company's facility manager. The HR manager was involved in the early stages of the project.

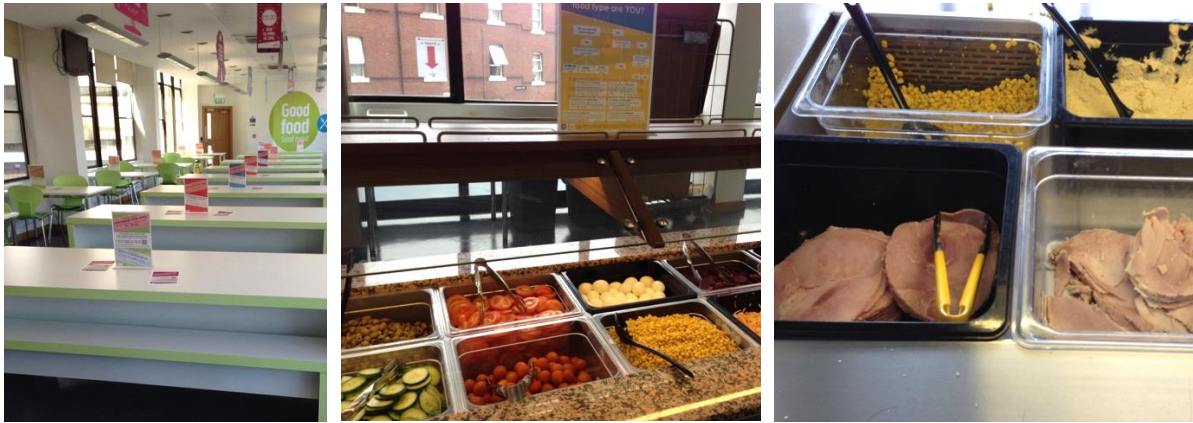
The canteens offer a selection of food for the employees, most of which is free of charge. Free, warm breakfast (i.e. full English breakfast), and a mix of hot and cold meals are provided in both canteens every weekday between 10am and 2pm and employees can consume as many meals as they like. The canteen in Sheffield seats up to 250 people and, according to the chef, serves up to 800 employees a day (see Figure 9 for an outline of the canteen in Sheffield). Numbers in Leeds are lower with around 200 employees. According to the chef of the canteen, most employees consume their food in the canteen (in Sheffield) or the breakout areas (in Leeds and Sheffield), often in small groups; although a few employees reported that they would regularly take their food to their desks.



**Figure 9: Outline of canteen in Sheffield**

The salad bar and cold food options varied between Sheffield and Leeds. Before the intervention, in Sheffield a variety of 12 salad items (e.g. cucumber, sweet corn, grated cheese, onions) were served alongside with baked potatoes, chips, baked beans, bread, mayonnaise, and a choice of 8-10 cold meat cuts (see Figure 10). On most days, a selection of two warm, so called *premium meals*, is available for a small charge (typically £2.50). Pizzas, burgers, fish and chips, and roast dinners are served on a weekly rota (e.g. Wednesday roast, Friday fish and chips) and other hot meals usually consist of meat, chips and, very seldomly, vegetarian or vegan options. In Leeds, *premium meals* are served less regularly and tend to contain chips, meat, and a white bread bun. Sandwiches and salads are pre-made and contain several meat, vegetarian, and halal options, which can be taken from a fridge in the canteen (see Figure 11).





**Figure 10: Pre-intervention canteen in Sheffield. Left: Seating area in the canteen; middle: salad bar; right: cold meat cuts**



**Figure 11: Canteen in Leeds. Left: serving counter; middle: sandwich bar; right: break area**

A general observation I made when visiting the canteens was that the food provided was relatively carbohydrate and meat-heavy, when comparing to the Eatwell Guide and the UK Government’s Dietary Recommendations (HM Government, 2016; Public Health England, 2016). With regards to speciality diets, halal options were provided while other diets such as vegan, vegetarian, or gluten free were only sporadically catered for. All food was served on polystyrene plates, which were disposed in the general waste bin after a meal. Microwaves were provided in the canteen for employees to warm up food, although the polystyrene plates were not suitable for the microwaves. Food was served on weekdays but, due to a lack of staff, *premium meals* were served inconsistently, and most salad bar containers were empty by 1pm – one hour before the canteen closed. Information about the ingredients for each meal and salad bar item were provided, however, the information was often not matching the food.

## 4.2 DEVELOPMENT OF THE INTERVENTION AND DATA COLLECTION

The aim of this section is to give an account for the development and implementation of the behaviour change intervention and the mixed methods data collection. In the following, the Community-Based Social Marketing approach (CBSM; McKenzie-Mohr, 2000), which was chosen as a guideline to the project development, is introduced. Based on the CBSM approach, the development of the intervention and the data collection was divided into five phase which are described in more detail in the section below and in Table 7.

*Table 7: Stages of behaviour change intervention design*

| Phase   | Collected data           | Aim of the phase  | Timeline              | Details in this chapter |
|---|--------------------------|---|-----------------------|-------------------------|
| 1. Pre-intervention survey and interviews       | Survey & interview data. | Identify employees' current food consumption, readiness to change to a more sustainable diet (i.e. stages of change; Bamberg, 2013), and ideas for change employees would like to see in the canteen. Collect baseline data to assess spillover effects after the intervention. | May – June 2017       | Section 4.2.2           |
| 2. Development of behaviour change intervention | /                        | Choose target behaviour; integrate responses from employees and Bamberg's stage specific techniques to develop a new menu and information material for the behaviour change intervention; i.e. sustainable food week.   | June 2017             | Section 4.2.3           |
| 3. Workshops                                    | /                        | Test acceptance of new menu among employees in Sheffield  | Late June 2017        | Section 4.2.4           |
| 4. Behaviour change intervention                | /                        | Sustainable food week: Test new menu for a week in the canteen in Sheffield. Provide information about sustainability & food.   | 10th – 14th July 2017 | Section 4.2.5           |
| 5. Post-intervention survey and interviews      | Survey & interview data. | Assess whether spillover effects occurred.  | July – August 2017    | Section 4.2.6           |

### 4.2.1.1.1 COMMUNITY BASED SOCIAL MARKETING

The CBSM (McKenzie-Mohr, 2000) was chosen to guide a systematic development of the behaviour change intervention. CBSM consists of four steps: (1) uncovering barriers to potential target behaviours and selecting which behaviour to promote, (2) designing behaviour change intervention to overcome the barriers to the target behaviour, (3) piloting the behaviour change intervention; (4) evaluation (McKenzie-Mohr, 2000). While CBSM was developed for larger, population-based behaviour change interventions, the approach was still used for the development of the smaller scale behaviour change intervention in this project. CBSM has been widely used with, according to McKenzie-Mohr's website (McKenzie-Mohr, 2019), over 800 articles on sustainable behaviour change

using CBSM, including energy consumption, alternative transportation, recycling, water consumption, and many more.

Guided by the CBSM approach (McKenzie-Mohr, 2000), a five phase plan was developed in collaboration with the HR, facility, and canteen manager of the partner organisation, which included the data collection stages discussed in the methodology chapter (see also Table 7) and the development and implementation of the behaviour change intervention targeted at the food consumption in the canteen.

The first step of the CBSM approach, uncovering barriers and selecting target behaviour, was addressed in two parts (McKenzie-Mohr, 2000). First, discussions with the HR team, the canteen chef, and the facility manager took place to decide the target behaviour and the details of the implementation of the intervention (as described above). During these meetings, the initial project pitch was discussed (see Appendix B, section 9.2.2). The meetings took place in meetings rooms of the partner organisation. The first meeting was with the facility manager only, followed by a second meeting with the facility manager and the HR manager. In the second meeting it was agreed to focus on sustainable food consumption. A third meeting took place with the chef of the canteen and the facility manager. In this meeting, the possibilities for a behaviour change intervention in the canteen were discussed. Second, survey and interview data were used to identify employees' ideas for sustainable food in the canteen and to identify potential barriers (see Phase 1 in Table 7). The survey data were later used to specify the target behaviour of the behaviour change intervention (see Phase 2, section 4.2.3.1).

The second step, designing the behaviour change intervention, was developed by integrating ideas from employees and by using Bamberg's (2013) stage model of self-regulated behavioural change (see Phase 2 in Table 7). Bamberg (2013) describes four stages an individual has to go through to change behaviour: Precontemplation, Contemplation, Preparation/ Action, and Maintenance (see CH3 for more details about the model). For each stage, Bamberg (2013) suggests a number of techniques that are targeted at progressing the individual to the next stage, which will lead to behaviour change when progressing to the fourth phase, i.e. Maintenance.

The third step, piloting the behaviour change intervention, was addressed with a workshop in which the new menu and the information material was presented to employees (see Phase 3 in Table 7). Phase 4 describes the implementation of the behaviour change intervention. Finally, the fourth step, evaluation, was addressed by conducting interviews and surveys after the behaviour change intervention (see Phase 5 in Table 7). In the following section, each step of the five-step-study-plan is described in more detail.

## **4.2.2 PHASE 1 – SURVEY AND INTERVIEWS**

The purpose of Phase 1 was threefold. First, the aim was to collect baseline data for the quantitative and qualitative data sets. The survey was used to collect pre-intervention (T1) data which was used to compare against the post-intervention survey data for any behaviour changes at home that could indicate contextual spillover effects. Similarly, the interview data from T1 was used to compare for any behaviour changes that participants reported in the post-intervention (T2) interviews. More details about the survey and interview procedures are provided below. Second, open questions in the survey asked employees to anonymously share their ideas on how the canteen food could be improved towards environmental sustainability. The aim was to include the employees' ideas in the intervention design (for more details see Phase 2, section 4.2.3) and to provide general feedback for the canteen and future improvements, which the canteen chef was particularly interested in. Third, the interviews and the survey data were a suitable approach learn more about the partner organisation as a workplace, the food in the canteen, and the work culture. Altogether, this data was used to further specify the target behaviour of the behaviour change intervention (for more details, see Phase 2, section 4.2.3).

### **4.2.2.1 SURVEY**

The samples for both the survey and the interviews before the behaviour change intervention were generated by distributing an online and offline questionnaire to employees of the organisation (for examples of the survey, see Appendix B, 9.2.3). This took place through multiple communication channels including internal websites, leaflets with a survey, and distribution of printed versions of the survey which were distributed in the canteen and the break rooms (for examples of the project advertisement, see Figure 12 and Appendix B, 9.2.3).

Participants were invited to “have their say in changing the food in the canteen” (see Figure 12). The framing around the idea of ‘participatory change’ was aimed to involve and empower employees in the changes that were taking place in their workplace (see e.g. Endrejat et al., 2015). The framing of participatory change also aimed to increase the positive perception of change through empowerment, which is something the employees at the partner company have very little of given the nature of the business and their job roles. While the word change could have attracted participants that were interested in a change as opposed to those who were satisfied with the canteen food, it was considered that the change would still appeal to participants from all spectrums. This means that participants who wanted more healthy and sustainable food as well as those who wanted more fast food type food could have been attracted to taking part in the survey. The aim was to include employees from multiple stages of sustainable food consumption (see stages of change measure) in order to provide a broad while also tailored approach (i.e. addressing multiple people while tailoring the intervention to different stages of change). Conversations with the canteen chef revealed that previous changes in the canteen were welcomed by some employees but rejected by others. For instance, the canteen chef

reported that in the previous year chips were substituted with jacket potatoes for three days of the week, which resulted in complaints by some employees. Equally, some employees had been wanting more healthy food options for a while. Hence, it was hoped that the wording ‘change’ would attract employees with diverse motives that would be interested in a change that would work for a variety of employees. The distribution through the communication channel was supported by the organisation’s communications team, who sent out a newsletter twice a week in which the overall project and a link to the survey featured (see Appendix B, 9.2.3 for examples).



Figure 12: Advertisement for project in canteen as it was displayed in the canteen in Sheffield

Table 8: Measures included in the surveys

| Measured variable  | About Scale  | Included in T1 Survey | Included in T2 Survey |
|--|--|-----------------------|-----------------------|
| <b>Psychological measures</b>                              |  |                       |                       |
| Environmental self-identity                                | 3-item scale adapted from Whitmarsh and O’Neill (2010) | √                     | √                     |
| Prominence of environmental identity                       | 4-item scale adapted from Ellestad and Stets (1998)    | √                     | √                     |
| Stages of change membership ‘sustainable food consumption’ | 1-item measure adapted from Bamberg (2013)             | √                     | √                     |
| <b>Dependent variables</b>                                 |  |                       |                       |
| Red meat consumption at home                               | 1-item measure   | √                     | √                     |
| Fruit and vegetable consumption at home                    | 1-item measure   | √                     | √                     |
| Seasonal food consumption at home                          | 1-item measure   | √                     | √                     |
| Organic food consumption at home                           | 1-item measure   | √                     | √                     |
| Local food consumption at home                             | 1-item measure   | √                     | √                     |
| Food avoidance behaviours at home                          | 4-item scale   | √                     | √                     |
| <b>Demographic variables</b>                               |  |                       |                       |
| Gender   | Male, female, prefer not to say.                       | √                     | -                     |
| Age  | Age brackets (see CH5, Table 19)                       | √                     | -                     |

|                                   |   |             |             |
|-----------------------------------|---|-------------|-------------|
| Education                         | (see CH5, Table 19)   | √           | -           |
| Tenure                            | Months worked at company  | √           | -           |
| <b><i>Other measures</i></b>      |   |             |             |
| Personal Code for follow up study | Made up of birthday, mother's name, and surname   | √           | √           |
| Canteen usage                     | "Are you regularly eating in the canteen? – Yes, No   | √           |             |
| Prize draw                        | Providing e-mail address if interested  | √           | √           |
| Interest in workshop              | Providing e-mail address if interested  | √ (IG only) |             |
| Interest in interview             | Providing e-mail address if interested  | √ (IG only) |             |
| Meat reduction impact             | Experienced impact of eating less meat  |             | √ (IG only) |
| Canteen usage during intervention | "Did you eat in the canteen during the sustainable food week?"                                      |             | √ (IG only) |
| Feedback on intervention          | 5-point measure, 3-items  |             | √ (IG only) |
| <b><i>Open questions</i></b>      |   |             |             |
| Improvement                       | "What could be improved in the canteen?"  | √           |             |
| Sustainable food in canteen       | "What sustainable food choices would you like to see in the canteen?"                               | √           |             |
| Reasons for not eating in canteen | "If you do not eat in the canteen, why?"  | √           |             |
| Future changes in canteen         | "What changes would you like to see in the future in the canteen?"                                  |             | √ (IG only) |
| Retaining from intervention       | "What things would you like to keep the same in the canteen from before the sustainable food week?" |             | √ (IG only) |

IG only = measure was presented to the intervention group only.

#### 4.2.2.1.1 SURVEY MATERIAL

The survey consisted of two parts, T1 and T2, and was conducted four weeks prior to the behaviour change intervention (i.e. May-June) and four weeks after (i.e. August-September). Each survey part took between seven and fifteen minutes and was open for four weeks at each timepoint T1 and T2. The selection of the variables included in this research was already discussed in the methodology chapter (CH3) and the pilot study (Appendix A, section 9.1). An overview of the measures that were included in the surveys at T1 and T2 is provided in Table 8 on previous page. However, more details about items and item characteristics can be found in the findings chapter (CH5, section 5.1.1) and an example of the survey that was used in the main study can be found in the Appendix B, section 9.2.3.

#### 4.2.2.1.2 SURVEY SAMPLE

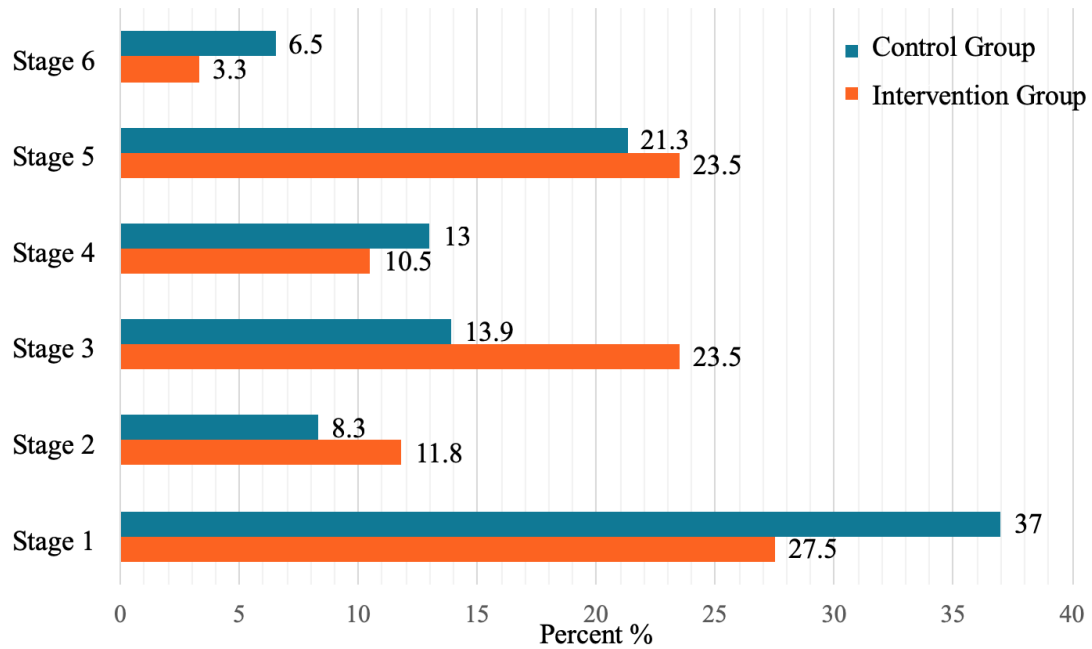
Across Sheffield and Leeds, of the 1000 employees at the partner company, a total of 266 employees took part in the survey – this is an estimated response rate of 26%. Demographics of the sample that was used to inform the development of the intervention is displayed in Table 9. Open survey questions asked participants about sustainable food in the canteen and how they think it could be

improved (e.g. What sustainable food choices would you like to see in the canteen? If you do not eat in the canteen, why is this?). These questions aimed at integrating employees' ideas for the sustainable food week (for more details see Phase 2, section 4.2.3). More details about the sample and the responses at T2 can be found in the next chapter (CH5, section 5.1.2).

To tailor the behaviour change intervention to the employees, the 6-item measure that assessed the stages of change based on Bamberg's stage model of self-regulated behavioural change (2013) was used. According to the model, each stage constitutes different barriers based on which Bamberg (2013) proposes tailored behaviour change techniques to overcome these barriers (for more details about the framework, see CH3). The distribution of the surveyed employees across the stages was used to inform the choice of intervention techniques (see Figure 13 for the distribution of the stages). The items indicating the changes are listed in Table 10 below. It should be noted, that these results are based on the pre-intervention survey that was conducted before the target behaviour for the behaviour change intervention was narrowed down to focus on meat and plant-based food consumption. Nonetheless, these results give an indication about the behaviour change potential.

**Table 9: Sample description T1**

| Frequency in (N)            | T1                 |               |
|-----------------------------|--------------------|---------------|
|                             | Intervention Group | Control Group |
| Total N = 266               | 157                | 109           |
| <b>Gender</b>               |                    |               |
| male                        | 104                | 77            |
| female                      | 49                 | 32            |
| prefer not to say           | 4                  | 0             |
| <b>Age</b>                  |                    |               |
| 18-25                       | 32                 | 37            |
| 26-35                       | 77                 | 51            |
| 36-45                       | 33                 | 14            |
| 46-55                       | 15                 | 6             |
| 56-65                       | 0                  | 1             |
| <b>Regular canteen user</b> |                    |               |
| Yes (No)                    | 138 (19)           | 93 (16)       |



**Figure 13: Stages of change distribution in sample (T1)**



**Table 10: Stages of model of self-regulated behavioural change**

| <b>Stage</b> | <b>Statement</b>  |
|--------------|---|
| Stage 6      | As I already eat sustainable food all the time, increasing my level of sustainable consumption is not currently an issue for me.  |
| Stage 5      | Because I'm aware of many problems associated with unsustainable food consumption, I already try to use sustainable food alternatives as much as possible. I will maintain or even increase my already high level of sustainable food consumption in the next months.                         |
| Stage 4      | At the moment, I don't eat sustainable food for most of my meals, but it is my aim to increase my current level of sustainable food consumption. I already know which meals I will replace and which alternative foodstuff I will use, but, as yet, have not actually put this into practice. |
| Stage 3      | At the moment, I don't eat sustainable food for most of my meals. I'm currently thinking about changing some or all of these meals to be more sustainable, but at the moment I'm unsure how I can do this, or when I should do so.  |
| Stage 2      | At the moment, I still don't eat sustainable food for most of my meals. I would like to increase my sustainable food consumption, but, at the moment, I feel it would be impossible for me to do so.  |
| Stage 1      | At the moment, I don't pay attention to whether my food is sustainable or not. I'm happy with the current food I consume and see no reason why I should change it.  |

*Note: These items were adapted from Bamberg (2013)*

#### **4.2.2.2 INTERVIEWS**

##### **4.2.2.2.1 INTERVIEW SAMPLING**

Participants were recruited via the pre-intervention survey, where they could indicate their interest in taking part in two interviews (see Table 8 and Appendix B, 9.2.3). After the T1 survey, a list of employees that were interested in the interviews were compiled and sorted in accordance to the 'stages of change' scale (Bamberg, 2013; see also CH3 for more details on the framework and CH5 for the items), which was adapted to assess stages of change with regards to their transitions towards more sustainable dietary choice. The aim was to better understand how employees at different sustainable dietary stages would respond to the intervention. Hence, participants were screened based on their responses to the stages of change measure in order to identify a range of prospective interviewees and a heterogeneous sample. Out of total of 31 employees invited, 23 took part in the first round of interviews (T1); see CH5, section 5.2.1, for more details on the interview sample and the distribution across the stages of change. Individuals were informed that participation in the interviews would be optional and that they would receive a £10 Amazon voucher as payment for their contribution to both interviews (see section 4.2.6.3 for details about incentives).

##### **4.2.2.2.2 INTERVIEW PROCESS**

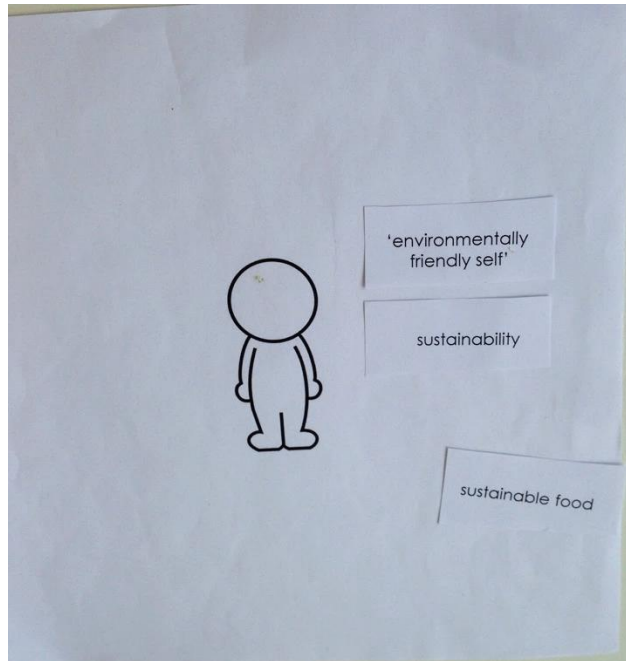
Semi-structured interviews were conducted in the month before and 4-6 weeks after the behaviour change intervention. They took place in the company's canteen or in a café nearby and an interview guide was used to aid the process (see Appendix B, section 9.2.4, for the full interview guide). The interviews lasted between 30 and 60 minutes and took place during the participants work time and had to be agreed on with their supervisor. Before the interviews, participants were provided with an

information sheet about the interviews and signed a consent form (see Appendix B, 9.2.4). Themes of the interviews ranged across a number of topics that were chosen to answer the research questions. In the first interviews (T1), these included perception of sustainable diets, food consumption and diet types, identity in relation to behaviours at work and home. In the second interview (T2) with the same participants, an additional block of questions was added to assess any changes after the behaviour change intervention. For example, participants were asked about their perception of the behaviour change intervention, how their colleagues reacted, and any changes since the last interview that may be affected by the intervention. More detail about the interview analysis process can be found in the next chapter (CH5, section 5.2.1.2)

#### **4.2.2.2.3 VISUAL SORTING**

A visual sorting task was completed by the participants as part of the semi-structured interviews at both T1 and T2. The visual sorting method aimed to assess the relative centrality of three key terms (related to the behavioural intervention) to their self-identity. The term *sustainable food* was chosen as this mapped directly to the target behaviour of the behaviour change intervention. The term *sustainability* was chosen as it was thought to capture the more general concept driving the behaviour change intervention. The term *environmentally friendly self* was chosen to capture the essence of the participants' environmental self-identity. This method was adapted from similar methods previously used in the context of the Inclusion of Nature in Self scale that visually assessed individual environmental self-identity (Martin & Czellar, 2016).

During the visual sorting task, participants were asked what they understood by the terms environmentally friendly self, sustainability and sustainable food. Then, an outline drawing of a person (i.e. manikin, which had been printed on a piece of paper) was given to the participants and they were asked to imagine that the manikin was a representation of their selves. Participants were then asked to position the three terms around or on the manikin based on the perceived centrality of the terms to their selves. Participants were asked to place the terms they considered central to the self on the manikin or close to it and further away from the manikin in accordance with a peripheral centrality to the self. Figure 14 illustrates an example of the three terms and the manikin that participants were asked to sort on a piece of paper.



*Figure 14: Example of sorting task*

Once participants arranged the terms, a photograph was taken, and participants were asked to explain their arrangement as a think-aloud exercise. The think-aloud exercise was done to gain a deeper understanding of the sorting. The visual sorting was completed both before and after the intervention which made it possible to learn about the effects the behaviour change intervention might have had on the relative centrality of the three terms to the self. During the post-intervention sorting task, participants did not see the photograph taken at the first interview. More detail about the analysis approach is provided in the next chapter (CH5, section 5.2.1.1)

### **4.2.3 PHASE 2 – DEVELOPMENT OF BEHAVIOUR CHANGE INTERVENTION**

In Phase two, the behaviour change intervention was developed by drawing on a number of sources. First, the open questions of the T1 surveys were thematically analysed. This was followed by an assessment of existing sustainable food guidelines and how these overlapped with the identified survey themes. Once the target behaviour was defined, the behaviour change intervention techniques and the material were developed in collaboration with the canteen chef. In the following these steps are described in more detail.

#### **4.2.3.1 DEFINING THE TARGET BEHAVIOUR OF THE INTERVENTION**

According to the FAO, healthy and sustainable diet can be defined as “those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and

healthy; while optimizing natural and human resources” (Fischer & Garnett, 2016, p. 10). In order to derive practical implications and more specific behaviours from this definition, the survey responses as well as guidelines for sustainable diets were assessed.

#### 4.2.3.1.1 THEMATIC ANALYSIS OF OPEN SURVEY QUESTIONS

A thematic analysis approach was used to analyse the responses to the open survey questions that asked participant to make suggestions for future improvements of the canteen and sustainable food choices. As mentioned above, the canteens in Sheffield and Leeds varied slightly in their food choices and infrastructure (e.g. space); hence, only suggestions from participants based in Sheffield were used to inform the behaviour change intervention. In total, suggestions of 157 Sheffield based participants were analysed using thematic analysis (Braun & Clarke, 2006).

The survey answers were transferred into NVIVO and coded based on an initial template that included four categories: vegetarian/vegan, local, organic, and seasonal food. These themes have been chosen as they are typically associated with sustainable food consumption (Garnett, 2014a). The initial template was adapted based on the identified codes, in accordance with Braun and Clarke’s approach (2006; more detail in CH5, section 5.2.1.2). Overall, in the thematic analysis seven dominant themes were identified, which included local food, vegan and vegetarian options, seasonal food, fresh food, food source, healthy food, and variety of food. The themes and example quotes are displayed in Table 11. The coding was checked by a fellow PhD student, who agreed on the themes.

**Table 11: Suggestions for sustainable food in canteen**

| Theme                         | Example quotes  |
|-------------------------------|---|
| Local food.                   | “Locally produced Meats, Vegetable and fruit”<br>“More hot, freshly cooked vegetables and locally grown fruit”  |
| Vegan and vegetarian options. | “Healthy vegetarian options that are NEVER there”<br>“More veggie options for meat alternatives”  |
| Seasonal food.                | “season food used more i.e. in winter have casseroles and in summer go for more stir fry options”<br>“local, seasonal vegetables and fruit”                                   |
| Fresh food.                   | “Fresh food would be better, rather than processed food to cater for the hundreds that eat there.”<br>“Fresher meat instead of processed.”                                    |
| Food source.                  | “Meat and fish from sustainable/environmentally friendly sources”<br>“free range eggs, free range meat, fish that advises of its origin & if line caught”                     |
| Healthy food.                 | “here's a lack of truly healthy options, e.g. the potato salad is covered in mayo, full fat coleslaw etc.”<br>“More healthier options instead of chips.”                      |
| Variety of food.              | “Often same food everyday with limited veg choice”<br>“I would prefer more choice of vegetables; I have been eating jacket potato every day since I started here 3 years ago” |

Note: This is based on employees in intervention group (Sheffield) only (N=157)

#### 4.2.3.1.2 ASSESSMENT OF GUIDELINES FOR SUSTAINABLE DIETS

In the next step, the seven themes were compared with international guidelines for sustainable food published by the FAO (Fischer & Garnett, 2016) and the WWF (Macdiarmid et al., 2011). These guidelines were discussed with the canteen chef with regards to their feasibility and measurability. Moreover, the published reports by the FAO (Fischer & Garnett, 2016) and the WWF (Macdiarmid et al., 2011) as well as previous research were used to assess the environmental impact of the guidelines (Garnett, 2014b; Scarborough et al., 2014).

**Table 12: Assessment of Guidelines for a sustainable diet**

| Guidelines for a sustainable diet   | Matching theme from employee survey | Environmental Impact of behaviour           | Feasibility of behaviour | Measurability of behaviour |
|---|-------------------------------------|---|--------------------------|----------------------------|
| Diversity – a wide variety of foods eaten. <sup>1,2</sup>   | Variety of food, fresh food         | MEDIUM                                      | MEDIUM                   | MEDIUM                     |
| <b>Moderate meat consumption.<sup>1,2</sup> (Replace meat with peas, beans and pulses, tofu, nuts, and other plant sources of protein.)</b> | <b>Vegan and vegetarian options</b> | <b>HIGH</b>                                 | <b>HIGH</b>              | <b>HIGH</b>                |
| <b>Increase of plant-based foods.<sup>1,2</sup> (minimally processed tubers and whole grains; legumes; fruits and vegetables)</b>           | <b>Vegan and vegetarian options</b> | <b>HIGH</b>                                 | <b>HIGH</b>              | <b>HIGH</b>                |
| <b>Moderate milk and dairy products included in diet but seek out plant-based alternatives.<sup>2</sup></b>                                 | <b>Vegan and vegetarian options</b> | <b>HIGH</b>                                 | <b>HIGH</b>              | <b>HIGH</b>                |
| Reduce food waste. <sup>1</sup>   | ---                                 | MEDIUM                                      | MEDIUM                   | HIGH                       |
| Eat fewer foods high in fat, sugar and salt. <sup>1,2</sup>   | Healthy food, fresh food            | MEDIUM                                      | MEDIUM                   | MEDIUM                     |
| Certified fish and other foods from sustainable sources. <sup>1,2</sup> (small quantities of fish)  | Food source, local food             | MEDIUM                                      | MEDIUM                   | MEDIUM                     |
| Tap water in preference to other beverages. <sup>2</sup>  | ---                                 | MEDIUM                                      | MEDIUM                   | MEDIUM                     |
| Balance achieved between energy intake and energy needs. <sup>2</sup>   | Healthy food                        | MEDIUM                                      | HIGH                     | MEDIUM                     |
| Oils and fats with a beneficial Omega 3:6 ratio such as rapeseed and olive oil. <sup>2</sup>  | Healthy food                        | <i>Not sufficient information available</i> | MEDIUM                   | LOW                        |

*Note: Bold indicates the outstanding behaviours with regards to high environmental impact, measurability, feasibility, and match with employees' suggestions; <sup>1</sup> WWF Livewell Report (Macdiarmid et al., 2011); <sup>2</sup>FAO Guidelines (Fischer & Garnett, 2016)*

Additionally, the seven identified themes from the employee survey were matched with the sustainable diet guidelines based on how the guidelines would be met if any of the recommendations

from the themes were followed. For example, one guideline recommends a moderate meat consumption, which would be met if the theme 'vegan and vegetarian options' was realised. A summary of the guidelines and the assessment can be found in Table 12 above and more details about the assessment in the section below. Overall, this approach allowed a systematic and inclusive (i.e. inclusion of employees' voices and the canteen's capabilities) decision about the final target behaviour of the intervention.

#### **4.2.3.1.2.1 ASSESSMENT OF THE ENVIRONMENTAL IMPACT**

The environmental impact for each guideline was assessed based on a review of health related diet recommendations in relation to their environmental impact (i.e. Table 1 in Garnett, 2014b) and characterised as either high, medium or low. The assessment presented in Table 12 above, is a simplification of Garnett's (2014b) review and it should be noted that evidence for the environmental impact is more complex than it is illustrated in this thesis (see e.g. Garnett, 2014b, 2016; Notarnicola, Tassielli, Renzulli, Castellani, & Sala, 2017; Scarborough et al., 2014). However, one type of diet change stands out in these research papers and that is the reduction of meat consumption (particularly red meat) and the increase of plant-based foods. Consequently, based on this assessment, changing to moderate meat consumption and an increase in plant-based foods were identified as the most impactful diet choices from an environmental perspective. This is in line with previous research which shows that high meat consumption emits almost three times the CO<sub>2</sub> than a vegan diet (Scarborough et al., 2014; for summary see Table 13). Hence, a combination of reducing the meat consumption while increasing plant-based foods can be considered a high-impact behaviour change from an environmental perspective. It should be noted that since the implementation of this intervention in 2017, further research consolidated the assessment that a reduction in meat and increase in plant-based foods has a high environmental impact (Poore & Nemecek, 2018; Willett et al., 2019).

***Table 13: CO<sub>2</sub> emission for diet types (Source: Scarborough et al., 2014)***

| Diet type                       | Mean dietary GHG emissions per day<br>(kgCO <sub>2</sub> e on a 2000 kcal diet) |
|---------------------------------|---|
| High meat-eater (>100g/day)     | 7.19  |
| Medium meat-eater (50-99 g/day) | 5.63  |
| Low meat-eater (< 50 g/day)     | 4.67  |
| Fish-eaters                     | 3.91  |
| Vegetarian                      | 3.81  |
| Vegan                           | 2.89  |

#### **4.2.3.1.2.2 ASSESSMENT OF THE FEASIBILITY**

The feasibility of a behaviour describes how easy it is to change the behaviour for the employee, which is often context dependent. For instance, a reduction of meat consumption and increase of plant-based foods can only be achieved if these are available for consumption. Hence, the feasibility of a behaviour was assessed based on the information provided by the canteen chef with regards to what

changes could be made in the canteen. The chef suggested that a change of the food provided in the canteen was possible to an extent; however, it would be restricted by factors such as costs, availability by the supplier, and labelling of the products. For example, providing local food was not possible due to a fixed contract with a supplier which did not provide local food. Similarly, providing certified fish or food was difficult due to a lack of product labelling and lack of transparency in the supply chain of the foodstuff.

Discussions with the chef revealed that four behaviours would be relatively easy to change. Namely, the chef deemed that reducing the meat options on offer to staff and reducing the availability of milk and dairy products were feasible to implement. Furthermore, he suggested that an increase in plant-based product would be feasible and so would be the guideline ‘balance achieved between energy intake and energy needs’, which essentially means a reduction in calories. Consequently, these four behaviours were considered as target behaviours for the behaviour change intervention with regards to their feasibility. The other behaviours were assessed as less feasible by the chef. For example, increasing diversity of food intake was evaluated by the chef to be infeasible due to limited space and staff to provide and prepare a wider variety of foods. Similarly, the feasibility of food waste reduction was assessed as ‘medium’ based upon the information provided by the chef, due to the fact that the canteen had very low food waste rates already.

#### **4.2.3.1.2.3 ASSESSMENT OF THE MEASURABILITY**

The measurability of a behaviour plays an important role for the evaluation of the behaviour change intervention and, in the particular context of this thesis, for assessing spillover effects. From a quantitative data perspective, the measurability of a behaviour includes the availability of scales to measure the behaviour and the quality of the behaviour measure. From a qualitative data perspective, the behaviour should be relatively easy for participants to reflect on. For example, in an interview situation it might be easier for participants to reflect on the variety of foods they have eaten rather than the oils and fats with a beneficial omega 3:6 ratio. Four food behaviours were assessed as high with regards to their measurability, namely meat consumption, plant-based food consumption, food waste, and dairy and milk consumption.

Overall, the assessment of the guidelines provided a systematic approach to narrow down the focus of the intervention from the general topic sustainable food consumption to the target behaviours reduction in meat consumption and increase in plant-based foods. More specifically, the meat reduction behaviour was particularly focussed on reducing red meat (i.e. beef, lamb, and pork) for its higher environmental impact (e.g. water, CO<sub>2</sub> emissions) in comparison to white meat and the plant-based food increase focussed particularly on local and seasonal vegetable and fruit consumption (Garnett, 2014b; Garnett, Mathewson, Angelides, & Borthwick, 2015). The next section describes the development of the behaviour change intervention tools and the development of the material in more detail.

#### 4.2.3.2 DEVELOPMENT OF INTERVENTION MATERIAL

##### 4.2.3.2.1 BEHAVIOUR CHANGE INTERVENTION TECHNIQUES

Tailored communication has previously been found to be an effective tool to change sustainable food consumption behaviour (e.g. Klöckner & Ofstad, 2017; Pieniak, Zakowska-Biemans, Kostyra, & Raats, 2016). Hence, a tailored communication approach was developed as part of the implemented intervention in this study. The behaviour change intervention techniques were chosen in accordance with Bamberg's stage model of self-regulated behavioural change (2013). The aim was to tailor the intervention with regards to the employees' current state of sustainable food consumption, which was measured with the 6-item scale adapted from Bamberg (2013).

The distribution of the surveyed employees across the stages was used to inform the choice of intervention techniques (see Figure 13 in section 4.2.2.1 for the distribution of the stages). The majority of participants in both the intervention (Sheffield) and control group (Leeds) were in the precontemplation stage (stage 1 and 2; see Figure 13). About a third of the participants were in the contemplation stage or preparation/action, which indicated that the participants considered changing their food consumption but had not yet made any changes (stages 3 and 4; see Figure 13). One quarter of the participants indicated that they were already eating sustainable food (stages 5 and 6; see Figure 13). Based on the distribution of the participants across the four stages of Bamberg's stage model (2013), the main focus of the behaviour change techniques was on the first three stages (see Table 14).

**Table 14: Behaviour change techniques**

| Stage                            | Recommended behaviour change techniques   |
|----------------------------------|---|
| Stage 1 & 2:<br>Precontemplation | Intervention type I: Making social norm salient<br>Intervention type II: Enhance problem awareness<br>Intervention type III: Enhance goal setting and goal commitment |
| Stage 3: Contemplation           | Intervention type IV: Provide information about the pros and cons of different behavioural alternatives   |
| Stage 4: Preparation/ Action     | Intervention type V: Support behavioural planning   |
| Stage 5 & 6: Maintenance         | Intervention type VI: Provide behavioural feedback<br>Intervention type VII: Prevent the temptation to relapse  |

*Note: The techniques were recommended for each stage of the self-regulated behavioural change (Source: Bamberg, 2013)*

To address all three stages, a mix of intervention techniques was used for the intervention. Mixing intervention techniques has previously been found to be an effective way to promote behaviour change over single technique approaches (Abrahamse et al., 2005). Specifically in the workplace context, it has been highlighted that behaviour change is complex and requires an integration of approaches (Young et al., 2013). However, it should be noted that a mixed intervention technique approach is limited in its accountability for the change (i.e. which specific technique leads to change and which does not) and interaction effects between the techniques. While in an ideal world, single



techniques and combinations of techniques would be implemented, the limitations of the real-world setting meant that only one intervention could be implemented. As such, by drawing on previous research and by tailoring the intervention to its recipients, the aim was to design the most effective intervention within the limitations of the real-world context.

Based on the distribution of the stages among the employees (see Figure 13) and in accordance with Bamberg's suggestions (2013), four intervention types were chosen (see Table 10). These included (1) make social norms salient, (2), enhance problem awareness (3), provide information about the pros and cons of different behavioural alternatives, and (4) support behavioural planning. Furthermore, the four intervention techniques were supported by previous research that assessed the effectiveness of behaviour change interventions techniques. In order to incorporate the intervention techniques, the intervention was divided into two sections. First, the menu was changed and second an information campaign was rolled out.

The first technique 'making social norms salient' was addressed by the information campaign. The use of social norms in behaviour change interventions is supported by previous research. For example, a recent review highlighted the importance of social norms for behaviour change (R. I. McDonald & Crandall, 2015). Moreover, a meta-analysis that investigated the effect of social influence approaches on behaviour change found that the use of social norms in information and feedback was an effective approach to changing ESBs (Abrahamse & Steg, 2013). As such, messages that involve social norms and feedback in information were chosen as elements of the information campaign (for more details, see next section about the information campaign material).

The behaviour change technique 'enhance problem awareness' was addressed with the information campaign (see next section) by contextualising the problem of meat consumption for the natural environment. Information provided during the campaign addresses three themes: CO<sub>2</sub> emissions, water consumption, and land and resource consumption (see also Table 15). Previously, an increased awareness has been associated with behaviour change (e.g. environmental awareness and waste behaviour; Jones, Jackson, Tudor, & Bates, 2012). Hence, this approach was considered suitable for the present study.

The third and fourth intervention techniques 'provide information about the pros and cons of different behavioural alternatives' and 'support behavioural planning' were addressed with both the information campaign and the menu changes in the canteen. Similar to choice architecture approaches (e.g., Thaler, Sunstein, & Balz, 2010), making the wanted choices (i.e. reduced meat consumption, increased fruit and vegetable consumption) more easy, was considered a suitable approach to provide behavioural alternatives. Additionally, environmental benefits of these choices were integrated in the information material (e.g. chart that explains higher CO<sub>2</sub> emissions of red meat in comparison to plant-based alternatives, see Table 15). Consequently, the combination of the changed menu with the

information campaign was considered to be a suitable approach to address the two intervention techniques.

#### **4.2.3.2.2 THE INFORMATION CAMPAIGN MATERIAL**

The behaviour change intervention was planned for one working week (i.e. 5 days). The five days were decided by the canteen chef and the facility manager. Due to staff shortages and financial constraints on the canteen, they argued that menu changes for longer than a week would not be possible. For each day of the behaviour change intervention, different material was provided in the form of ‘table talkers’ and placed on the tables in the canteen’s seating area. During the first two days, the information material was themes around CO<sub>2</sub> emissions, followed by two days with information about water consumption and CO<sub>2</sub> emissions, and for the fifth day some information about land and resource use (see Table 15).

The information material aimed to address three targets: first, to make social norms more salient; second, to increase awareness sustainable food consumption; and third, to provide pros and cons of different behaviour alternatives in relation to dietary choice. To make social norms more salient, a message saying “58% people at the partner organisation aim to increase or already eat sustainable foods”, was distributed in the canteen (see Figure 15). This message was based on the cumulative number of employees in the contemplation, preparation/action, and maintenance stages. Previous research found that norm-based interventions were effective and associated with spillover effects (Bergquist et al., 2019). Bergquist et al. (2019) compared a contest based and a norm-based behaviour change intervention that were targeted at electricity conservation. While both interventions were effective in increasing electricity conservation, only participants from the norm-based intervention showed an increase in water conservation behaviour, which indicates a positive spillover effect (Bergquist et al., 2019). Furthermore, an identification chart was developed which categorised participants into six categories based on their meat and dairy intake (see Figure 15)

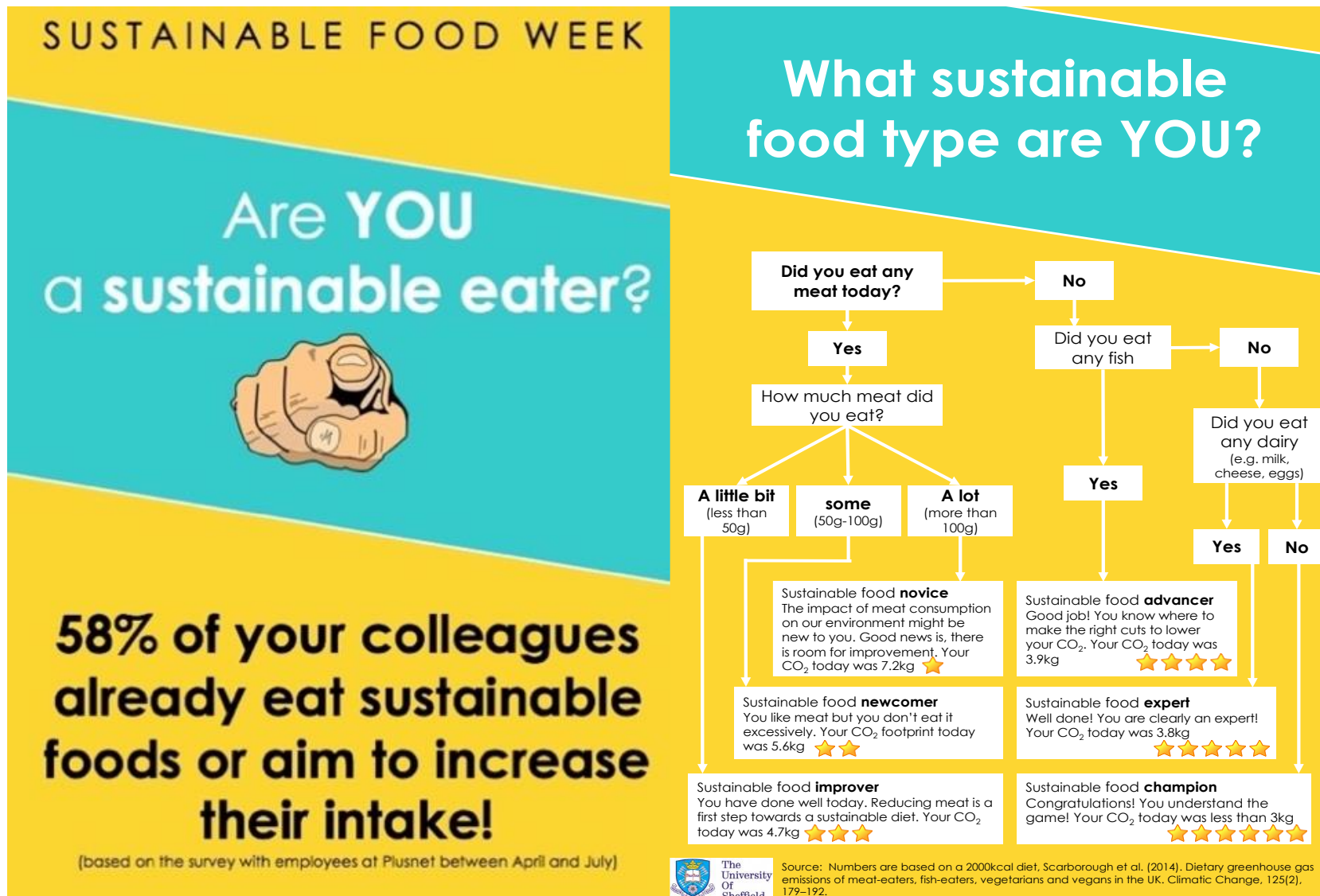


Figure 15: Social norm and self-identity messages (left) and identification chart (right)

The information on the table talkers aimed at increasing awareness of CO<sub>2</sub> emissions, water consumption, and resources (space, energy) needed to produce foodstuff (see examples in Table 15). The presented information was based on previous research findings (Fischer & Garnett, 2016; Giadini, 2016; Green et al., 2015; HM Government, 2016; Scarborough et al., 2014). Moreover, the information material aimed at providing information about the pros and cons of behavioural alternatives (see examples in Table 15).

In addition to the table talkers, a total of nine posters with information about plant-based iron (3x), calcium (3x), and protein sources (3x) were put up on the walls in the canteen’s seating area. The information material developed by Simple Happy Kitchen (“Simple Happy Kitchen,” 2016), which was freely available on their website, was used to address scepticism raised in the interviews and from the chef about the nutritional value of plant-based foods, particularly protein. The wide-spread perception within the interviews seemed to be that meat was the main (and only) protein source and that a reduction of meat would lead to a deficiency in protein. The posters (see Figure 16) showed cartoon drawings of plant-based foods that are rich in iron, protein, or calcium, and included information about the amount of the nutrient below the drawing. The posters not only provided information about plant-based nutrients, they also supported the behavioural planning stage (Intervention type V, see Table 14).

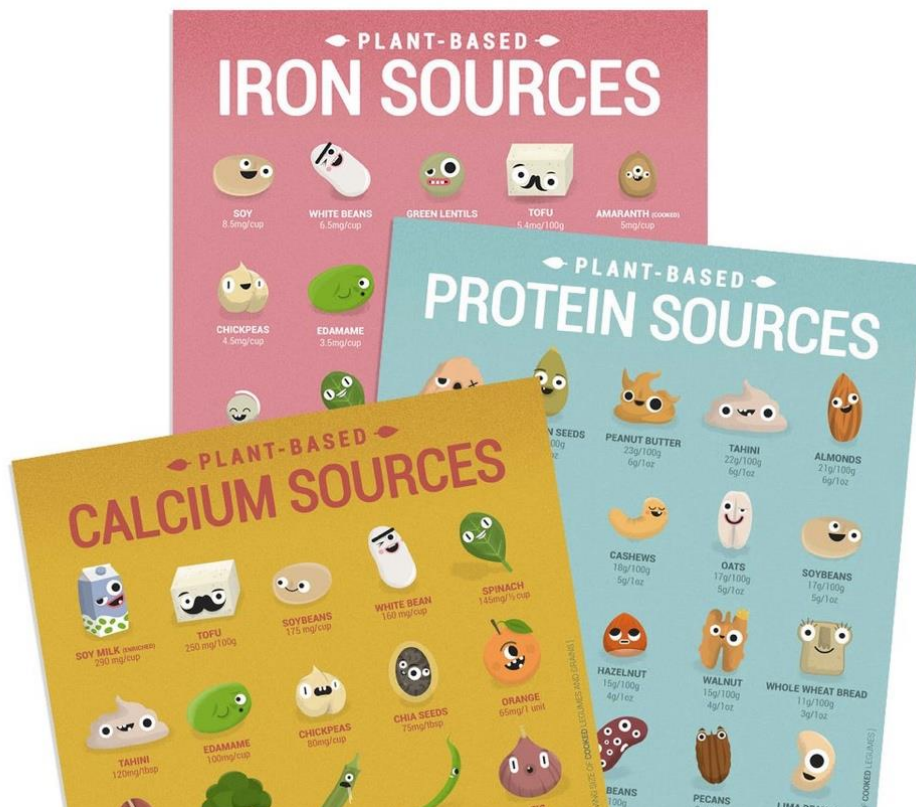


Figure 16: Pictures of posters about calcium, protein, and iron (source: <https://www.simplehappykitchen.com>)

Table 15: Example material sorted by theme and aim

| Theme                                  | Enhancing problem awareness  | Providing information about the pros and cons of behavioural alternatives |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
|--|--|---|-----------------|---------------------------|--------------------|--|--------------------|---------------------------------|--------------------|--|------------|----------|------------|------------------------------|-----------|--|--------|------|------|------|------|--------|-----|-------|-----|----------|-----|------|-----|------|-----|------|-----|---------|-----|--------|------|--------|------|------|------|--|--------|----|----|---------|----|-----|------|----|------|--------------|----|--------|---------|----|--------|------------|----|--------|-------------|-----|---------|------|-----|----------|------|-----|----------|---------|-----|-----------|---------------|-----|------------|---------------|-----|------------|
| CO <sub>2</sub> emissions              | <p><b>What is your CO<sub>2</sub> footprint?</b></p> <p>Calculations of greenhouse gas emissions from the production, processing and transportation of specific food items</p> <p>Main chart compares 110g of food against a journey in a motorized car</p> <p>Number shows kg of carbon dioxide equivalent produced per 1kg of food</p> <table border="1"> <tr> <td>Let's list</td> <td>0.9</td> <td>Milk</td> <td>1.9</td> <td>Tofu</td> <td>2.0</td> <td>Yogurt</td> <td>2.2</td> <td>Peanut butter</td> <td>2.5</td> <td>Potatoes</td> <td>2.9</td> <td>Tuna</td> <td>6.1</td> <td>Turkey</td> <td>10.9</td> <td>Pork</td> <td>12.1</td> <td>Beef</td> <td>27.0</td> </tr> <tr> <td>Tomato</td> <td>1.1</td> <td>Beans</td> <td>2.0</td> <td>Broccoli</td> <td>2.0</td> <td>Nuts</td> <td>2.3</td> <td>Rice</td> <td>2.7</td> <td>Eggs</td> <td>4.8</td> <td>Chicken</td> <td>6.9</td> <td>Salmon</td> <td>11.9</td> <td>Cheese</td> <td>13.5</td> <td>Lamb</td> <td>39.2</td> </tr> </table> <p>Source: <a href="http://www.2000m2.eu/wp-content/uploads/2000m2_Floerchenbuffet.pdf">http://www.2000m2.eu/wp-content/uploads/2000m2_Floerchenbuffet.pdf</a></p> | Let's list  | 0.9             | Milk                      | 1.9                | Tofu                                   | 2.0                | Yogurt                          | 2.2                | Peanut butter  | 2.5        | Potatoes | 2.9        | Tuna                         | 6.1       | Turkey   | 10.9   | Pork | 12.1 | Beef | 27.0 | Tomato | 1.1 | Beans | 2.0 | Broccoli | 2.0 | Nuts | 2.3 | Rice | 2.7 | Eggs | 4.8 | Chicken | 6.9 | Salmon | 11.9 | Cheese | 13.5 | Lamb | 39.2 | <p><b>How do YOU become a low carbon eater?</b></p> <p><b>Eat less meat</b><br/>– particularly red meat</p> <p><b>Eat more vegetables &amp; fruit</b><br/>– particularly seasonal &amp; local</p> <p><b>12 plant based protein heroes you can eat instead of meat</b> (g of Protein per 100g)</p> <table border="1"> <tr> <td>Patato</td> <td>2g</td> <td>●●</td> </tr> <tr> <td>Spinach</td> <td>3g</td> <td>●●●</td> </tr> <tr> <td>Peas</td> <td>5g</td> <td>●●●●</td> </tr> <tr> <td>Kidney Beans</td> <td>9g</td> <td>●●●●●●</td> </tr> <tr> <td>Lentils</td> <td>9g</td> <td>●●●●●●</td> </tr> <tr> <td>Chick peas</td> <td>9g</td> <td>●●●●●●</td> </tr> <tr> <td>Wheat Bread</td> <td>11g</td> <td>●●●●●●●</td> </tr> <tr> <td>Tofu</td> <td>15g</td> <td>●●●●●●●●</td> </tr> <tr> <td>Oats</td> <td>17g</td> <td>●●●●●●●●</td> </tr> <tr> <td>Almonds</td> <td>21g</td> <td>●●●●●●●●●</td> </tr> <tr> <td>Peanut butter</td> <td>23g</td> <td>●●●●●●●●●●</td> </tr> <tr> <td>Pumpkin seeds</td> <td>24g</td> <td>●●●●●●●●●●</td> </tr> </table> | Patato | 2g | ●● | Spinach | 3g | ●●● | Peas | 5g | ●●●● | Kidney Beans | 9g | ●●●●●● | Lentils | 9g | ●●●●●● | Chick peas | 9g | ●●●●●● | Wheat Bread | 11g | ●●●●●●● | Tofu | 15g | ●●●●●●●● | Oats | 17g | ●●●●●●●● | Almonds | 21g | ●●●●●●●●● | Peanut butter | 23g | ●●●●●●●●●● | Pumpkin seeds | 24g | ●●●●●●●●●● |
|  | Let's list   | 0.9   | Milk            | 1.9                       | Tofu               | 2.0                                    | Yogurt             | 2.2                             | Peanut butter      | 2.5  | Potatoes   | 2.9      | Tuna       | 6.1                          | Turkey    | 10.9   | Pork   | 12.1 | Beef | 27.0 |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
|  | Tomato   | 1.1   | Beans           | 2.0                       | Broccoli           | 2.0                                    | Nuts               | 2.3                             | Rice               | 2.7  | Eggs       | 4.8      | Chicken    | 6.9                          | Salmon    | 11.9   | Cheese | 13.5 | Lamb | 39.2 |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| Patato                                 | 2g   | ●●  |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| Spinach                                | 3g   | ●●●   |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| Peas                                   | 5g   | ●●●●  |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| Kidney Beans                           | 9g   | ●●●●●●  |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| Lentils                                | 9g   | ●●●●●●  |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| Chick peas                             | 9g   | ●●●●●●  |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| Wheat Bread                            | 11g  | ●●●●●●●   |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| Tofu                                   | 15g  | ●●●●●●●●  |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| Oats                                   | 17g  | ●●●●●●●●  |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| Almonds                                | 21g  | ●●●●●●●●●   |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| Peanut butter                          | 23g  | ●●●●●●●●●●  |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| Pumpkin seeds                          | 24g  | ●●●●●●●●●●  |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| Water use                              | <p><b>How much water is needed to produce your food?</b></p> <table border="1"> <tr> <td>1 BEEF STEAK (200G)</td> <td>3083 litres</td> </tr> <tr> <td>1 HAMBURGER</td> <td>2400 litres</td> </tr> <tr> <td>1 PIZZA</td> <td>1239 litres</td> </tr> <tr> <td>1 CHICKEN BREAST (100G)</td> <td>433 litres</td> </tr> <tr> <td>1 PORTION OF PASTA</td> <td>185 litres</td> </tr> <tr> <td>1 APPLE</td> <td>125 litres</td> </tr> <tr> <td>1 PORTION OF POTATOES (250G)</td> <td>72 litres</td> </tr> </table>   | 1 BEEF STEAK (200G)   | 3083 litres     | 1 HAMBURGER               | 2400 litres        | 1 PIZZA                                | 1239 litres        | 1 CHICKEN BREAST (100G)         | 433 litres         | 1 PORTION OF PASTA   | 185 litres | 1 APPLE  | 125 litres | 1 PORTION OF POTATOES (250G) | 72 litres | <p><b>How do YOU become a water saver?</b></p> <p><b>Eat less meat</b><br/>– particularly red meat</p> <p><b>Eat more vegetables &amp; fruit</b><br/>– particularly seasonal &amp; local</p> |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
|  | 1 BEEF STEAK (200G)  | 3083 litres   |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| 1 HAMBURGER                            | 2400 litres  |   |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| 1 PIZZA                                | 1239 litres  |   |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| 1 CHICKEN BREAST (100G)                | 433 litres   |   |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| 1 PORTION OF PASTA                     | 185 litres   |   |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| 1 APPLE                                | 125 litres   |   |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| 1 PORTION OF POTATOES (250G)           | 72 litres  |   |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| Land and resource use                  | <p><b>How much land does your food need to grow?</b></p> <p>Space needed to grow one plate (square represents space in relation)</p> <table border="1"> <tr> <td>1 plate of chips with sausage (pork)</td> <td>4m<sup>2</sup></td> </tr> <tr> <td>1 plate of vegetable stew</td> <td>0.5 m<sup>2</sup></td> </tr> <tr> <td>1 plate of spaghetti with tomato sauce</td> <td>0.5 m<sup>2</sup></td> </tr> <tr> <td>Add some parmesan to your meal?</td> <td>0.3 m<sup>2</sup></td> </tr> </table> <p>Source: <a href="http://www.2000m2.eu/wp-content/uploads/2000m2_Floerchenbuffet.pdf">http://www.2000m2.eu/wp-content/uploads/2000m2_Floerchenbuffet.pdf</a></p>   | 1 plate of chips with sausage (pork)                                      | 4m <sup>2</sup> | 1 plate of vegetable stew | 0.5 m <sup>2</sup> | 1 plate of spaghetti with tomato sauce | 0.5 m <sup>2</sup> | Add some parmesan to your meal? | 0.3 m <sup>2</sup> | <p><b>How can YOU become a land saver?</b></p> <p><b>Eat less meat</b><br/>– particularly red meat</p> <p><b>Eat more vegetables &amp; fruit</b><br/>– particularly seasonal &amp; local</p> <p><b>What is sustainable food?</b></p> <ul style="list-style-type: none"> <li>✓ Low <b>environmental impact</b> <ul style="list-style-type: none"> <li>• CO<sub>2</sub>, water use, land use</li> </ul> </li> <li>✓ Contributes to <b>healthy life</b> for present and <b>future generations</b></li> </ul> <p>Source: Adapted definition from the FAO</p> |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| 1 plate of chips with sausage (pork)   | 4m <sup>2</sup>  |   |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| 1 plate of vegetable stew              | 0.5 m <sup>2</sup>   |   |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| 1 plate of spaghetti with tomato sauce | 0.5 m <sup>2</sup>   |   |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |
| Add some parmesan to your meal?        | 0.3 m <sup>2</sup>   |   |                 |                           |                    |  |                    |                                 |                    |  |            |          |            |                              |           |  |        |      |      |      |      |        |     |       |     |          |     |      |     |      |     |      |     |         |     |        |      |        |      |      |      |  |        |    |    |         |    |     |      |    |      |              |    |        |         |    |        |            |    |        |             |     |         |      |     |          |      |     |          |         |     |           |               |     |            |               |     |            |



#### 4.2.3.2.3 THE FOOD CHANGES

Changes to the menu constituted the second part of the behaviour change intervention. The aim was to make changes to the provided food in order to increase the availability of sustainable food choices. Changes in the availability of choices follows the ‘nudge’ or choice architecture approach which has previously been found to support behaviour change (Thaler et al., 2010) and diet changes in the workplace (Geaney, Kelly, et al., 2013; Geaney, Scotto Di Marrazzo, et al., 2013). Furthermore, changes in the menu mapped to the behaviour change intervention type V ‘Support behavioural planning’, as suggested by Bamberg (2013); see also Table 14. The menu changes included a reduction of meat, particularly red meat, and an increase of plant-based alternatives. The cold meat cuts from the salad bar were reduced from 8-10 meat options to 1-3 meat options, while fish, beef, and lamb were banned completely (see Figure 17, for typical salad bar items before the behaviour change intervention). The changes to the menu aimed to support participants in making diet changes as work and to put the information provided in the information material into practice.



*Figure 17: Food options that were provided as part of a cold buffet in the canteen before the intervention*

The new menu was developed in collaboration with the chef of the canteen. At first, the list with the guideline for a more sustainable diet as presented in Table 12 was given to the chef. However, he had no experience in vegan or vegetarian cooking nor did he know the ingredients or where to find suitable recipes. Hence, I developed a menu for the chef based on vegan cookbooks (e.g., Mills, 2017b) and online sources (e.g., Gellatley, 2017; Mills, 2017a). In an iterative process, the chef and I selected recipes that were suitable for the financial and contextual situation in the canteen (e.g. staff, cooking equipment). Finally, a booklet with environmentally sustainable recipes and information was developed based on two vegan and vegetarian cookbooks and online sources. See Figure 18 and Figure 19 below for examples of the recipe booklet pages.

## Kale & sweet potato salad

Serves 4

### NUT-FREE

- 1 large sweet potato, peeled or well scrubbed
- 5 tablespoons olive oil
- salt and pepper
- 200g kale, coarse ribs removed
- 2 tablespoons apple cider vinegar
- juice of ½ lemon
- 100g sun-dried tomatoes in oil (drained weight), finely chopped
- 100g pitted black olives, finely chopped
- 100g pine nuts  
or sunflower seeds



Preheat the oven to 220°C (fan 200°C)

Cut the sweet potato into 1cm cubes, place in a roasting tray, drizzle with 2 tablespoons of the olive oil and add lots of salt and pepper. Roast for 45 minutes or until cooked through and slightly crispy.

Meanwhile, add the kale to a food processor and pulse a few times to break it down into little pieces. Tip it into a large salad bowl with the remaining olive oil, the vinegar, salt and pepper, the lemon juice, sun-dried tomatoes and olives. Toss the salad well so all the ingredients are evenly coated in the dressing.

When the sweet potato chunks are cooked, remove from the oven and stir them through the salad.

Finally, heat a frying pan over a medium heat and dry-fry the pine nuts for a few minutes, or until golden brown (Watch carefully when cooking these, as they burn easily.) Remove from the heat and sprinkle on to the salad.

Note: can be served hot or cold

Source: deliciously ella book

vegetarian

vegan

### Nutritional Summary (per serving):

|                        |                   |                     |                      |                    |
|------------------------|-------------------|---------------------|----------------------|--------------------|
| <b>Calories</b><br>363 | <b>Fat</b><br>32g | <b>Carbs</b><br>18g | <b>Protein</b><br>6g | <b>Sugar</b><br>3g |
|------------------------|-------------------|---------------------|----------------------|--------------------|

**Vitamins:** A 219% - C 131% - Calcium 7% - Iron 21%

## Refried Black Beans and Spicy Salsa

Makes enough for 4 generous quesadillas

### NUT-FREE

#### FOR THE BLACK BEANS

- olive oil
- 4 garlic cloves, crushed
- salt and pepper
- 1 teaspoon ground coriander
- ½ teaspoon smoked paprika
- 2 x 400g cans of black beans, drained and rinsed
- juice of 1 lime

#### FOR THE SALSA

- 5 tomatoes, finely chopped
- 2 red chillies, deseeded and finely chopped
- 1 tablespoon apple cider vinegar
- 2 tablespoons olive oil
- handful of fresh coriander, chopped

Start by making the black beans. Heat a glug of olive oil in a saucepan then add the garlic, salt and pepper and fry over a medium heat for about 1 minute until it starts to turn translucent but doesn't colour.

Add the spices, beans and lime juice. Cook for about 10 minutes over a low heat, until the beans start to soften.

Meanwhile, for the salsa, mix everything together in a bowl. Cover and let it sit for at least 5 minutes before eating, so that all the flavours meld together.

Serve in the quesadillas (for how to cook and assemble these, see page 110).

### MIX IT UP

I've used 2 chillies in the salsa because I love



Source: deliciously ella book

vegetarian

vegan

### Nutritional Summary for Salsa (per serving):

|                       |                    |                      |                        |                    |
|-----------------------|--------------------|----------------------|------------------------|--------------------|
| <b>Calories</b><br>92 | <b>Fat</b><br>7.3g | <b>Carbs</b><br>6.6g | <b>Protein</b><br>1.5g | <b>Sugar</b><br>4g |
|-----------------------|--------------------|----------------------|------------------------|--------------------|

Figure 18: Example pages from the recipe booklet for the salad bar

## Big Puff Pie

Serves 4, 30-35 minutes, Oven 225°C

### INGREDIENTS

Pie filling

- 1 medium-large onion, chopped
- 1 clove garlic, crushed
- 200g/7oz mushrooms, chopped if medium or large, left whole if small button variety. Chestnut are particularly nice but value also work well.
- ½-1 pack of marinated tofu chunks (Cauldron brand). Add these last to the stew.
- 6 tsp vegan gravy granules (eg Bisto red tub) made up with 300g boiling water
- 1 tbsp Dijon or 1 tsp English mustard
- 1 tsp dried mixed herbs OR 1 tbsp fresh
- 1-2 tbsp soya sauce
- 100g/3oz frozen peas
- Black pepper to taste

Pie crust

- 1 pack of vegan puff pastry sheets.
- A little soya or other plant milk to brush the top of the pastry

### INSTRUCTIONS

- Sauté (gently fry) onion and garlic until onion is translucent in saucepan
- Add mushrooms and cook for 3-4 minutes. Make the gravy as above then add the mustard, herbs, soya sauce
- Add all other ingredients to the pie filling (except the pastry and soya milk).
- Stir carefully to mix in well, taste and season if necessary, then turn down heat and leave to simmer.
- Meanwhile, choose an oven-proof dish (or individual oven-proof dishes) that will hold the pie filling.
- Brush top of pastry lid(s) with a little soya milk and bake in the hot oven for approximately 20 minutes, or according to the packet instructions
- Spoon the stew into dish or dishes, place the pastry lid(s) on top and serve immediately.



Source: <https://veganrecipeclub.org.uk/recipes/big-puff-pie>

Note: \*Vegan if vegan pastry and vegan milk is used

vegetarian

Vegan\*

### Nutritional Summary:

|                        |                     |                       |                         |                       |
|------------------------|---------------------|-----------------------|-------------------------|-----------------------|
| <b>Calories</b><br>482 | <b>Fat</b><br>25.7g | <b>Carbs</b><br>54.3g | <b>Protein</b><br>12.1g | <b>Sugar</b><br>26.2g |
|------------------------|---------------------|-----------------------|-------------------------|-----------------------|

**Vitamins:** A 36% - C 11% - Calcium 20% - Iron 24%

## Creamy tomato soup

PREP 30 mins | COOK 45 mins | 8 servings

### INGREDIENTS

- 2 onions, chopped
- 2 celery sticks, chopped
- 300g carrot, chopped
- 500g potato, diced
- 4 bay leaves
- 5 tbsp tomato purée
- 2 tbsp sugar
- 2 tbsp red or white wine vinegar
- 4 x 400g cartons chopped tomatoes
- 500g passata (or chopped tomatoes)
- 3 vegetable stock cubes
- 400ml whole milk

### INSTRUCTIONS

- Put the oil, onions, celery, carrots, potatoes and bay leaves in a big casserole dish, or two saucepans. Fry gently until the onions are softened – about 10-15 mins. Fill the kettle and boil it.
- Stir in the tomato purée, sugar, vinegar, chopped tomatoes and passata, then crumble in the stock cubes. Add 1 litre boiling water and bring to a simmer. Cover and simmer for 15 mins until the potato is tender, then remove the bay leaves. Purée with a stick blender (or ladle into a blender in batches) until very smooth. Season to taste and add a pinch more sugar if it needs it. The soup can now be cooled and chilled for up to 2 days, or frozen for up to 3 months.
- To serve, reheat the soup, stirring in the milk – try not to let it boil.



Source:  
<https://www.bbcgoodfood.com/recipes/2604646/creamy-tomato-soup>

vegetarian

### Nutritional Summary:

|                        |                  |                     |                      |                     |
|------------------------|------------------|---------------------|----------------------|---------------------|
| <b>Calories</b><br>210 | <b>Fat</b><br>7g | <b>Carbs</b><br>31g | <b>Protein</b><br>6g | <b>Sugar</b><br>15g |
|------------------------|------------------|---------------------|----------------------|---------------------|

**Vitamins:** A 189% - C 25% - Calcium 6% - Iron 4%

Figure 19: Example pages from the recipe booklet for the 'premium meals'



In accordance with the new menu, food information charts were created on the request of the chef, which included nutritional value information as well as an ingredients list and a message about the sustainability of the foodstuff (see Figure 20). Indulgent adjectives were added to the food description based on a recent study that found an increase of vegetable consumption in a workplace canteen when indulgent descriptions of vegetables were added (Turnwald, Boles, & Crum, 2017).



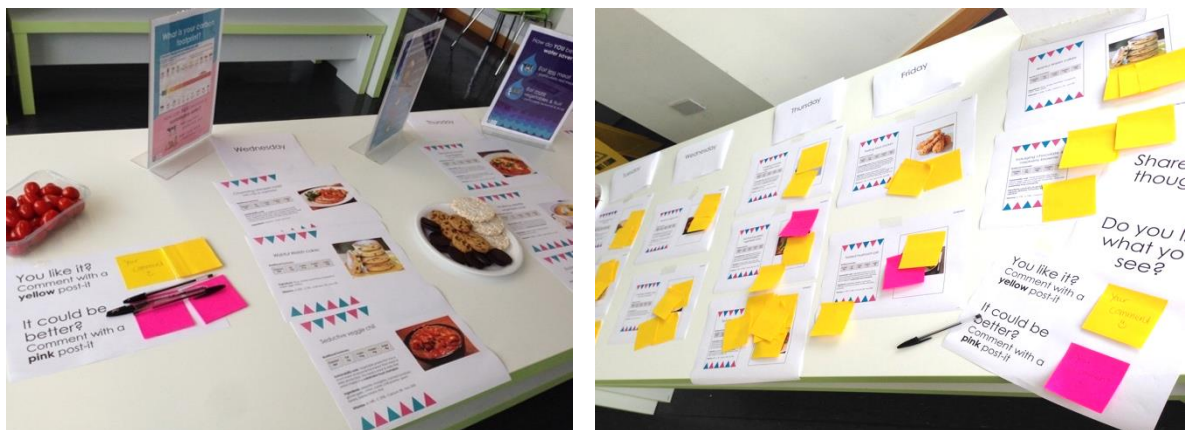
Figure 20: Examples of food information charts provided for the employees

#### 4.2.4 Phase 3 – Workshops

The CBSM approach recommends piloting the behaviour change intervention before rolling it out to the whole community (i.e. the partner organisation canteen in Sheffield) (McKenzie-Mohr, 2000, 2012). However, a pilot study was not possible due to a diminishing interest in the project from the partner organisation representatives<sup>2</sup>. Instead, two open workshops were organised to test the material and the new menu with the employees. During these workshops, the employees were invited to have a look at the new menu and comment on what they (dis)liked. The information material (i.e. table talkers) was also presented in order to test how comprehensible the material was to the employees. The aim of the workshops was to increase acceptance of changes and to include employees' voices in the development of the intervention.

<sup>2</sup> At this point the project was only supported by the chef of the canteen. The facility manager, who had been very keen about the project, left the company and was replaced by a new facility manager who was less supportive. The communications team and the HR team were unresponsive to emails regarding the project.

Two open workshops were held on two days in the afternoon, two weeks before the behaviour change intervention (i.e. on the 22<sup>nd</sup> and 29<sup>th</sup> June 2017), and took place in the canteen. Employees were invited to the workshop via the company internal news feed and an email was sent out to participants of the survey. The information material and new menu choices were presented on tables in the canteen and participants were invited to browse around and vote for food items they liked (yellow post-it) or disliked (pink post-it) (for photos from the workshop, see Figure 21). The workshops lasted one hour each, although participants could drop-on and out as they pleased and spend as little or much time as they liked. People were allowed to leave as the Facility Manager suggested that there was no support to hold one-hour long workshops with full-time participation. As such, this was considered an adequate compromise. In total, 40 people participated in the workshop – 31 in the first workshop and 14 in the second workshop. Most employees spend between five and ten minutes to look through the material. Initially, it was planned to collect demographic information about the participants, but the chef of the canteen advised against it as he thought that it would discourage employees to engage with the material. Hence, no core demographic data was collected.



**Figure 21: Photos from workshop**

Overall, the feedback for the new menu and the information material was positive. Most items from the menu were liked (yellow post-its) and only a few items were disliked (pink post-its) (see Figure 22). The comments made by participants in the workshop were taken into consideration and particularly popular items were taken on the menu while unpopular or disliked items were excluded from the final menu. Based on the voting, the popular dishes were included in the menu (e.g. kale and sweet potato salad, chicken parmigiana, vegetable lasagne; see Figure 22). Similarly, food choices that were less popular or disliked were excluded from the menu (e.g. wraps, mushroom pie; see Figure 22). The feedback list was also given to the canteen chef who used it to make decision about the final menu. It should be noted that the chef made last minute changes to the proposed menu due to staff shortages, workspace, and time issues (i.e. preparation time). These decisions were not run by me.

At the end of this phase, a menu and an information campaign had been developed. The aim was to develop a tailored behaviour change intervention that would promote more sustainable food consumption in the workplace. Overall, the process took a few weeks, but the iterative feedback involving employees and the chef of the canteen were important steps along the way to developing the behaviour change intervention. By integrating employees in the development of the behaviour change intervention and the new menu, it was hoped that the changes would be more accepted by the employees. Furthermore, a tailored intervention is likely to be more successful. As Southerton et al. (2011, p. 4) noted, “attempts to transfer initiatives need to be sensitive to local factors: natural endowments, social norms, existing material infrastructure, and institutional arrangements”. This emphasizes the importance of preliminary research to better understand the research context and potential underlying barriers of the target behaviour.

| Dish                        | likes<br>(yellow post-its) | comments              | dislikes<br>(pink post-its) | comments   | Dish                              | likes<br>(yellow post-its) | comments  | dislikes<br>(pink post-its) | comments  |
|-----------------------------|----------------------------|-----------------------|-----------------------------|--|-----------------------------------|----------------------------|---|-----------------------------|-----------|
| <b>breakfast</b>            |                            |                       |                             |  | <b>salad bar</b>                  |                            |   |                             |           |
| home made porridge          | 5                          |                       | 0                           |  | kale & sweet potato salad         | 8                          |   | 0                           |           |
| bluberry squares            | 7                          |                       | 0                           |  | hummus                            | 7                          | better than tesco!                                | 0                           |           |
| peanut butter flapjack      | 4                          |                       | 0                           |  | free range eggs                   | 6                          |   | 0                           |           |
| date & oats bars            | 0                          |                       | 0                           |  | sweetcorn                         | 4                          |   | 0                           |           |
| <b>premium meals</b>        |                            |                       |                             |  |                                   |                            |   |                             |           |
| <b>Monday</b>               |                            |                       |                             |  |                                   |                            |   |                             |           |
| big puff pie                | 6                          |                       | 0                           |  | tuna                              | 4                          |   | 0                           |           |
| spaghetti bolognese (veg)   | 3                          |                       | 1                           | any other pasta but spaghetti at work  | nutty rice pilaf                  | 6                          |   | 0                           |           |
| <b>Tuesday</b>              |                            |                       |                             |  |                                   |                            |   |                             |           |
| vegetable lasagne           | 6                          |                       | 0                           |  | tortilla chips                    | 4                          |   | 0                           |           |
| chickpea & quinoa curry     | 5                          |                       | 0                           |  | salsa                             | 5                          |   | 0                           |           |
| tomato soup                 | 5                          |                       | 0                           |  | roasted vegetables                | 5                          |   | 0                           |           |
| <b>Wednesday</b>            |                            |                       |                             |  |                                   |                            |   |                             |           |
| chicken roast               | 4                          |                       | 0                           |  | lettuce                           | 4                          |   | 0                           |           |
| veg. chilli                 | 3                          |                       | 0                           |  | rosemary butter beans             | 3                          |   | 0                           |           |
| <b>Thursday</b>             |                            |                       |                             |  |                                   |                            |   |                             |           |
| versatile soup              | 2                          |                       | 0                           |  | beetroot                          | 3                          |   | 0                           |           |
| chicken parmigiana          | 10                         | have a variation with | 0                           |  | mozzarella                        | 4                          |   | 0                           |           |
| wraps                       | 4                          |                       | 1                           | Would love if the courgette & avocados were replaced with something else, e.g. | cucumber                          | 3                          |   | 0                           |           |
| <b>Friday</b>               |                            |                       |                             |  |                                   |                            |   |                             |           |
| Mushroom pie                | 2                          |                       | 1                           | Don't like artichokes  | coronation chicken                | 4                          |   | 1                           | no halal! |
| Fried chicken               | 4                          |                       | 0                           |  | carrot fennel slaw                | 4                          | tasty   yes please!                               | 0                           |           |
| <b>Desserts</b>             |                            |                       |                             |  |                                   |                            |   |                             |           |
| chocolate raspberry brownie | 5                          |                       | 0                           |  | olives                            | 2                          |   | 0                           |           |
| Welsh cakes                 | 3                          |                       | 0                           |  | aubergine dip (smoky babaganoush) | 3                          | I would definitely appreciate this                | 0                           |           |
|                             |                            |                       |                             |  | onions                            | 2                          | any chance of red onions?                         | 0                           |           |
|                             |                            |                       |                             |  | red cheese                        | 1                          |   | 0                           |           |
|                             |                            |                       |                             |  | butter beans                      | 1                          | this would be a great alternative to meat protein | 0                           |           |
|                             |                            |                       |                             |  | tomatoes                          | 0                          |   | 0                           |           |
|                             |                            |                       |                             |  | other comments:                   | more variety, peppers,     |   |                             |           |

Figure 22: Workshop voting summary

#### 4.2.5 Phase 4 – Intervention: Sustainable food week

In phase four, the behaviour change intervention was implemented in the form of a ‘sustainable food week’. The sustainable food week took place in the canteen in Sheffield for a duration of five days and included three major changes: (1) reduction of available meat options from 8-10 to 1-3; (2) information material was provided on tables and posters; (3) polystyrene plates were exchanged for bagasse plates (99% less CO<sub>2</sub>). The first two changes (1-2) were already explained in the previous section. The third change (3), the exchange of polystyrene plates for bagasse plates, was implemented on employees’ requests for a change of plates, which was voiced in both the interviews and the pre-

intervention survey. The argument behind changing the plates was that employees elucidated that any efforts to introduce sustainable food options would only be credible if also the single-use plates were changed.

#### **4.2.5.1.1 INTRODUCTION OF BIODEGRADABLE PLATES**

Prior to the behaviour change intervention, the canteen provided single-use polystyrene plates that were not recycled. These were visible at the end of each lunch time when large bins filled with polystyrene plates piled up next to the seating area. In the T1 survey, 48 participants asked for re-usable or paper places in the open questions section. Hence, although this was not the focus of the behaviour change intervention, it was decided that the plates were changed in addition to the food. According to the chef of the canteen, an introduction of re-usable plates was not possible due to staff shortage (i.e. nobody could wash the plates). After some research into affordable, more environmentally friendly disposable plates, bagasse plates were chosen as the appropriate solution. The bagasse plates are made of sugarcane fibre, a plant-based material that emits less CO<sub>2</sub> than the production of most plastic or paper alternatives, is compostable, and from a renewable source (“Vegware Ltd,” 2017). It should be noted, that the introduction of the biodegradable plates could have had an effect on the latterly observed changes in ESB at home (i.e. spillover effects). As this intervention is a multipronged approach, it is difficult to unravel which aspects of the intervention influenced the observed contextual spillover effects and in what way. The implications of this will be further discussed in CH5.

Discussions with the supplier of the canteen revealed that they collaborated with a brand called *Vegware* that produces bagasse plates for a similar price to the polystyrene plates. Thus, the previously used disposable polystyrene plates were replaced with biodegradable bagasse plates. Additionally, the supplier offered to do a Q&A session in the canteen with the employees to answer any questions they might have about the plates (see Figure 23, top left and right picture).

#### **4.2.5.1.2 INFORMATION MATERIAL**

The material of the information campaign was displayed on the tables in the seating area and the walls of the canteen for two weeks – during the ‘sustainable food week’ and the week after. The aim of this was to increase the exposure of participants to the information material. Every day different ‘table talker’ information was provided and distributed on the tables in the seating area of the canteen (see section 4.2.3.2 for more details). The main message of the information material was about reducing meat and increasing vegetable consumption accompanied by information about resources needed to produce meat (for a photo of the displays, see Figure 23).



*Figure 23: Bagasse plates and information material display during behaviour change intervention*

#### 4.2.5.1.3 FOOD CHANGES

The new menu was rolled out over the course of one week in July 2017 – this was called the ‘sustainable food week’. The kitchen staff prepared the food while the researcher distributed the foodstuff information in accordance with the provided food (for the menu and the salad bar items, see Figure 24). The original menu included breakfast and lunch items; however, due to staff shortage, the breakfast during the sustainable food week was unchanged and continued with full English breakfast items. The food at lunchtime was changed and went ahead as planned (see section 4.2.3).





## SUSTAINABLE FOOD WEEK 10<sup>TH</sup> – 14<sup>TH</sup> JULY

| Day       | Theme           | Main Dish         | Premium Meals      |
|-----------|-----------------|-------------------|--------------------|
| Monday    | CO2 & food      | PASTA BOLOGNESE   | BIG PUFF PIE**     |
| Tuesday   | CO2 & food      | VEGETABLE LASAGNE | QUINOA CURRY**     |
| Wednesday | WATER & food    | CHICKEN ROAST     | VEGGIE CHILI**     |
| Thursday  | WATER & food    | VEGETABLE WRAP**  | CHICKEN PARMIGIANA |
| Friday    | LAND USE & food | TOWER BURGER**    | FRIED CHICKEN      |

\*VEGETARIAN FRIENDLY \*\*VEGAN FRIEND

Figure 24: Food and menu of sustainable food week

### 4.2.6 Phase 5 – Post-intervention survey and interviews

One month after the behaviour change intervention, the post-intervention (T2) interviews and survey were conducted. The one-month waiting period was due to practical reasons. These included staff and employee annual leave in the weeks after the intervention and time needed to prepare the post-intervention data collection (e.g. emailing participants, preparing survey). Moreover, the delay was considered beneficial for the research as it allowed enough time for the intervention message to be absorbed or forgotten, which mimics real-life situations where people are exposed to a lot of communication noise and other interferences. Hence, this time gap allowed an, overall, more realistic real-life situation for the intervention.

The aim of the post-intervention data collection was twofold. First, the survey and interview data were used to assess potential spillover effects from the behaviour change intervention to ESBs at home. Second, the data was used to evaluate the intervention, which was of particular interest for the partner organisation. In the following, the method of the quantitative and qualitative data collection at T2 is described in more detail. The evaluation of the behaviour change intervention is presented in Appendix B (section 9.2.7), while the findings of the contextual spillover assessment are presented in the next chapter (CH5).

#### **4.2.6.1 POST-INTERVENTION SURVEY**

The post-intervention survey (T2) took place two weeks after the intervention and was accessible for four weeks. The HR representative recommended to send out the email soon after the intervention as many employees would go on holidays in August. Participants from the pre-intervention survey (T1), who had agreed to be contacted again, were invited to participate in the second part of the survey (see section 5.2.1.1 in this chapter for the survey overview and more details in Appendix B, section 9.2.3). Via email, participants from the control and intervention group were sent a personalised link, which matched their previous survey response with the T2 survey (this is a function available in Qualtrics). The initial email was sent out on 24<sup>th</sup> July, followed by reminders on 28<sup>th</sup> July, 2<sup>nd</sup> August, and 21<sup>st</sup> August (for details of the invitation, see Appendix B, section 9.2.3.2).

Additionally, a link to the survey was distributed through the internal communication channels (as described in section 4.2.2.1) printed versions of the survey were distributed in the canteens in Sheffield and Leeds, so that employees who had previously filled out an offline survey or not taken part in the T1 survey could participate in the T2 survey. While participants who had not taken part in the T1 survey were not included in the main data analysis (see CH5), their feedback for the sustainable food week was important to the partner organisation. The post-intervention survey included open and closed questions which aimed to collect feedback about the changes made during the sustainable food week (for survey question details see section 4.2.2.1, Table 8). In total, 108 participants provided feedback, which included those who did not participate during the pre-interview (Time 1, T1) survey. More details about the sample and the analyses can be found in the next chapter (CH5, section 5.1). The analysis of the feedback, including open and closed survey questions, can be found in the next section.

#### **4.2.6.2 POST-INTERVENTION INTERVIEWS**

After the behaviour change intervention, the 23 interviewees were re-contacted and invited to take part in the second interview (see Appendix B, section 9.2.4 for details about the invitation text, consent form, and information sheet). Similar to T1, the post-intervention interviews took place in the company's canteen or in a café nearby and an interview guide was used to aid the process (see Appendix B, 9.2.4, for the full interview guide). The interviews took 30 to 60 minutes and took place during the participants work time and had to be agreed on with their supervisor. Before taking part in the interviews, participants were provided with an information sheet about the interviews and signed a consent form (see Appendix B, 9.2.4). More details about the interview procedure were already described in this chapter in section 4.2.1.2. Overall, ten interviewees were not available for a second interview due to a number of reasons (e.g. no reply to invitation, busy, left company, away during sustainable food week). Hence, in total 13 participants took part in the interviews at T2. For a description of the sample and the analysis, see next chapter (CH5, section 5.2).

#### **4.2.6.3 PRIZE DRAW AND INCENTIVES**

Every employee who took part in both surveys received a voucher for a ‘premium meal’ (i.e. a hot meal) for the canteen valued at £2. These vouchers were provided by the partner organisation. After the data collection (September 2017), a list of the email addresses and the codes the interviewees created in the T1 survey was created. This list was given to the canteen chef and the participants on the list were emailed with instructions to collect their vouchers. The interviewees received a £10 Amazon or ‘Love to Shop’ voucher (depending on their preference), after the second interview. Two prize draws took place, one at T1 and one at T2. A list of participants that entered the prize draw was created and random numbers were assigned in an excel sheet. For each prize draw, the participants assigned to the lowest numbers won an Amazon voucher (1x £50 and 1x£25 at T1; 3x £25 at T2).

#### **4.2.6.4 EVALUATION OF THE BEHAVIOUR CHANGE INTERVENTION**

The evaluation of the behaviour change intervention was conducted to assess reactions to the changes that were made during the sustainable food week. The aim was to provide some feedback about the sustainable food week from the employees that were summarised and included in a report that was provided to the partner organisation. It was originally planned to collect objective data (i.e. sales data before, during and after the behaviour change intervention). However, unfortunately, the partner organisation never provided this data. Hence, the actual sales data and potential long-term changes of the food consumption in the canteen was not monitored. This is a limitation of this study and will be further discusses in CH6. Nevertheless, it should be noted that the research question is only focussed on the effects of a behaviour change intervention at work to ESBs at home, which does not focus on whether the intervention in the workplace has worked. Consequently, the effects of the intervention on food consumption at work is not relevant for the research question.

A summary of the feedback that was provided in the report for the organisation can be found in Appendix B, section 9.2.7.1. That section provides a summary of the post-intervention survey questions that constitute a mix of open and closed survey questions (see also Table 8 in this chapter). Section 9.2.7.2 in Appendix B is a summary of a research diary (Nadin & Cassell, 2006), in which I took notes of observations about the reactions of the employees to the food changes and the information campaign. The notes were taken in the canteen’s seating area and the food counter (see Figure 9 in section 4.1 for an illustration of the canteen). These notes are subjective and are therefore not adequate for a systematic analysis. However, in their anecdotal nature, they provide some insight into the implementation of the behaviour change intervention.



## 5 MAIN STUDY FINDINGS

This chapter presents both the quantitative and qualitative results of the main study. The first section presents the quantitative analysis and results followed by the second part of this chapter which presents the findings from the qualitative data analysis. The third section assesses the quantitative and qualitative evidence for the theoretical framework proposed in this thesis. For an illustration of this chapter outline, see Figure 25.

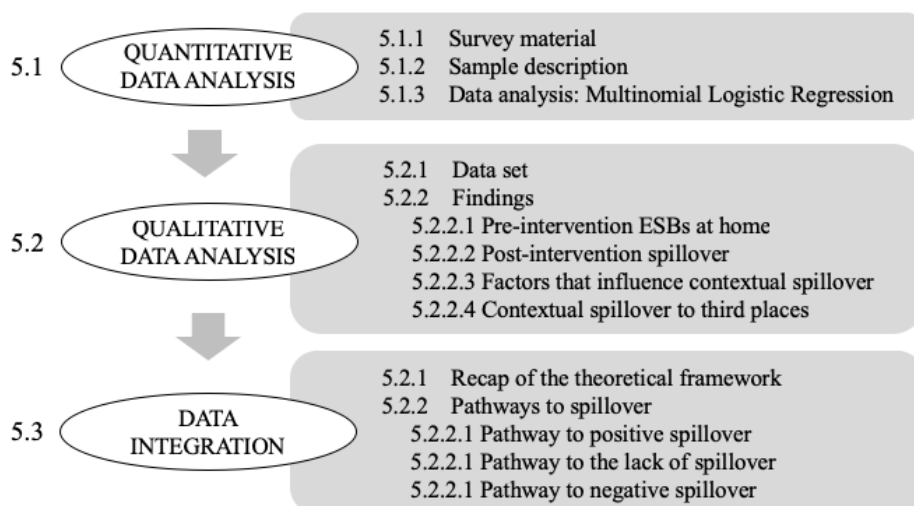


Figure 25: Overview of findings chapter

The interpretation of the data with regards to spillover was based on previous interpretations in the literature (see CH2). A detailed interpretation of the appropriate findings is presented below. However, Figure 26 provides a summary of the key interpretations.

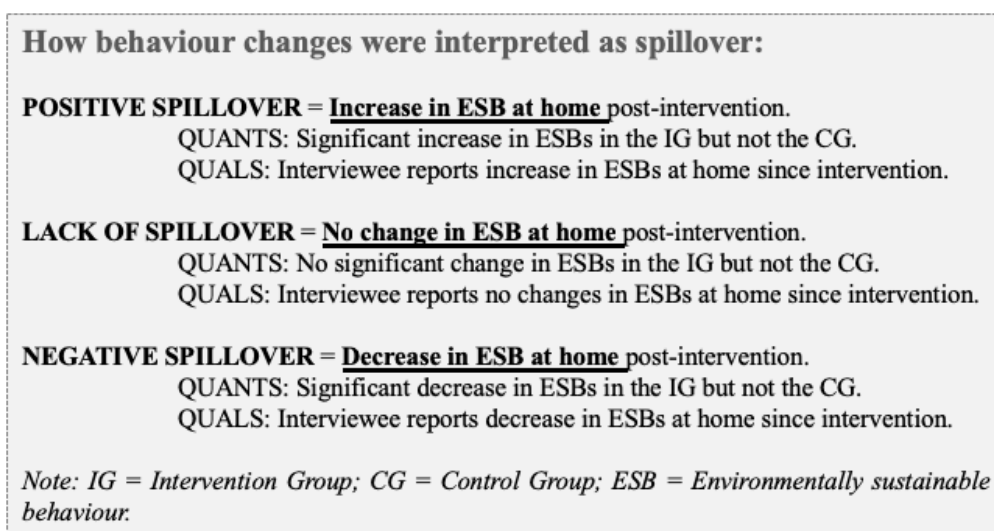


Figure 26: Interpretation of findings with regard to spillover.

## 5.1 QUANTITATIVE DATA ANALYSIS AND RESULTS

In this section the quantitative survey data from the pre- and post-intervention survey (T1 and T2) is presented. This includes the survey material, sample description, and a report of the data analysis and the results. The analysis is focussed on the impacts of the behaviour change intervention in the workplace on environmentally sustainable behaviours (ESBs) in the home setting (i.e. contextual spillover) and psychological variables that may influence post-intervention behaviour change. The measurement characteristics of the scales are provided below, however, more details of the measurement constructs and the procedure of the survey implementation can be found in CH3 and CH4.

### 5.1.1 SURVEY MATERIAL

#### 5.1.1.1 IDENTITY

In total, two identity-related scales were used. Firstly, ‘environmental self-identity’ measures the extent to which an individual would describe themselves as a pro-environmental person and was measured with a three-item scale adapted from Whitmarsh and O’Neill (2010). Item examples include “*I think of myself as someone who is very concerned with environmental issues*” (1 = strongly disagree to 5 = strongly agree). The scales were made by calculating an average score of the items. They showed a low, but acceptable reliability (Kline, 2013) at T1 with standardised  $\alpha = .648$  (M = 3.97, SD = 0.70, N = 81) and an acceptable reliability at T2 with standardised  $\alpha = .706$  (M = 3.83, SD = 0.73, N = 82).

Secondly, ‘prominence of environmental identity’ measures the extent to which being pro-environmental is central to the individual. The four-item scale was adapted from Ellestad and Stets (1998) and items included “*How would you feel if a colleague commented on you being a “poor” environmentally friendly person?*” (1 = indifferent; 2 = slightly upset; 3 = moderately upset; 4 = very upset; 5 = extremely upset) and “*How would you feel if a family member or household member commented on you being a “good” environmentally friendly person?*” (1 = indifferent; 2 = ok; 3 = happy; 4 = very happy; 5 = extremely happy). The overall, the average item score, which constituted the scale, showed an acceptable reliability at T1 with standardised  $\alpha = .771$  (M = 2.61, SD = 0.98, N = 81) and acceptable reliability at T2 with standardised  $\alpha = .816$  (M = 2.61, SD = 1.14, N = 82).

#### 5.1.1.2 STAGE MEMBERSHIP

To assess subtle changes in the stage membership that may not lead to behaviour change, an assessment of the stages of change in eating a sustainable diet adapted from Bamberg’s stages of change model (2013) was included (see CH3 and CH4 for more details). The stage membership was measured with a six-item scale adapted from Bamberg (2013) which indicated the stage membership of one of the four stages of change: Precontemplation, Contemplation, Preparation/ Action, and Maintenance.

The scale measured the advance of an individual with regards to sustainable food consumption and includes items like “*At the moment, I don't eat sustainable food for most of my meals. I'm currently thinking about changing some or all of these meals to be more sustainable, but at the moment I'm unsure how I can do this, or when I should do so.*” (Contemplation stage).

#### **5.1.1.3 FOOD CONSUMPTION BEHAVIOURS**

Participants were asked about how frequently they have consumed seven food groups over the past two weeks. These include red meat (beef, lamb, pork), white meat (e.g. poultry), dairy (e.g. milk, eggs), fruit and vegetables, legumes, processed foods, and seafood. Food consumption was measured with a 7-item scale which evaluated participants' consumption frequency of food at home such as meat, dairy, fruit and vegetables, and processed food (1 = never to 7 = more than once a day).

Two scales were created from the above seven food groups and divided into two scales measuring *high* and *low* CO<sub>2</sub> food consumption. The scale high CO<sub>2</sub> food consumption was created by calculating the mean of the two items about participants' meat consumption (i.e. how frequently they ate (1) red meat and (2) white meat over the past two weeks). A high score would indicate high meat consumption which results in higher CO<sub>2</sub> emissions. The scales showed an acceptable reliability at T1 with standardised  $\alpha = .810$  (M = 4.25, SD = 1.14, N = 82) and good reliability at T2 with standardised  $\alpha = .835$  (M = 4.19, SD = 1.13, N = 81).

The scale low CO<sub>2</sub> food consumption was created by calculating the mean of the two items about participants' plant-based food consumption (i.e. frequency of fruit and vegetable and legumes consumption over the past two weeks). A high score would indicate high plant-based food consumption which results in lower CO<sub>2</sub> emissions. The scales showed an acceptable reliability at T1 with standardised  $\alpha = .601$  (M = 4.73, SD = 1.24, N = 82) and acceptable reliability at T2 with standardised  $\alpha = .690$  (M = 4.79, SD = 1.10, N = 81).

#### **5.1.1.4 OTHER NON-TARGETED BEHAVIOURS**

In addition to the behaviours targeted in the behaviour change intervention, other food-related behaviours were measured to assess potential contextual cross-behavioural spillover effects. These included food source (i.e. local, organic, seasonal) and food waste behaviours. Participants were asked how frequently they engaged in any of these four behaviours at home. A change between T1 and T2 in the intervention group can be interpreted as contextual cross-behavioural spillover.

Food source was measured with three 1-item measure which asked participants about how frequently they had bought organic food, seasonal vegetables, and locally sourced food (1 = never to 5 = always). Food waste was measured with a 4-item scale that asked participants about how frequently they engaged in behaviours that prevent food waste at home. Items included “*I looked up recipes for*

using up the food I already had” (1 = never to 5 = always). The scales showed a low, but acceptable reliability at T1 with standardised  $\alpha = .665$  (M = 3.38, SD = 0.95, N = 82) and an acceptable reliability at T2 with standardised  $\alpha = .677$  (M = 3.60, SD = 0.80, N = 81).

For the further analysis the scales shown in Table 16 have been retained. The high and low  $CO_2$  food scales did not meet the scale statistic criteria (i.e. reliability, normal distribution) for further analysis (see next section); hence, only measures for the target behaviours of the behaviour change intervention (i.e. red meat consumption and fruit and vegetable at home) were included in the analysis.

**Table 16: Summary of scales included in analysis**

| Measured variable  | About Scale  | Used for analysis               |
|--|--|---------------------------------|
| Environmental self-identity                                | 3-item scale adapted from Whitmarsh and O’Neill (2010) | √                               |
| Prominence of environmental identity                       | 4-item scale adapted from Ellestad and Stets (1998)    | √                               |
| Stages of change membership ‘sustainable food consumption’ | 1-item measure adapted from Bamberg (2013)             | For descriptive statistics only |
| Red meat consumption at home                               | 1-item measure   | √                               |
| Fruit and vegetable consumption at home                    | 1-item measure   | √                               |
| Seasonal food consumption at home                          | 1-item measure   | √                               |
| Organic food consumption at home                           | 1-item measure   | √                               |
| Local food consumption at home                             | 1-item measure   | √                               |
| Food avoidance behaviours at home                          | 4-item scale   | √                               |

### 5.1.1.5 POWER ANALYSIS

A pre-data collection power analysis was conducted using the software G\*Power. A mixed ANOVA was planned for the data analysis based on an F-test with the effect size  $f$ . At the time of the data collection an effect sizes for spillover effects was not available. Hence, the power analysis was conducted with the default effect size provided by the programme of  $f = 0.25$ . The results of the power analysis suggested that a total sample size of  $N = 54$  would be suitable to detect an effect size of  $f = 0.25$  with an  $\alpha$  error probability of 0.05 and Power ( $1-\beta$  error probability) = 0.95. For a lower effect size of  $f = 0.10$ , a total sample of  $N = 328$  would be required. As will be discussed in more detail in section 5.1.3, the assumptions for a mixed ANOVA were not met. Instead, a multinomial logistic regression was used to analyse the data (see section 5.1.4), which is based on a  $\chi^2$ -test. A post-hoc power analysis

was conducted with a noncentrality parameter<sup>3</sup>  $\lambda = 22.74$ , with which a critical  $\chi^2$  of 15.51 was calculated for an  $\alpha$  error probability of 0.05 and Power (1- $\beta$  error probability) = 0.95.

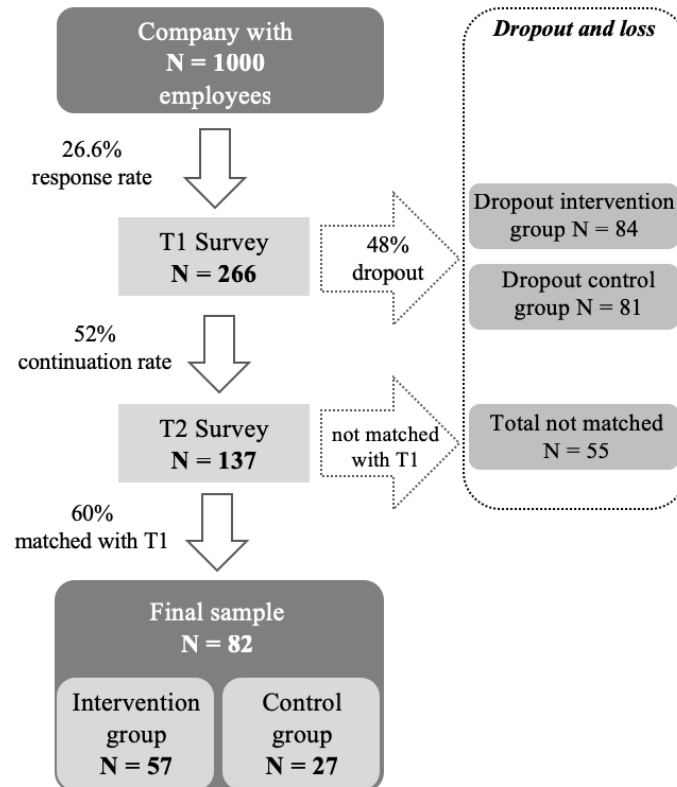
### 5.1.2 SAMPLE FOR QUANTITATIVE DATA ANALYSIS

For the analysis of the survey data, the matched data sets of participants from the pre- and post-intervention surveys were included. In total, the analysis is based on a sample of 82 participants. Of the 82 participants, 57 were in the intervention group and 27 in the control group. Figure 27 illustrates the steps that led to the final sample. Overall, 1000 employees work at the company (in both sites), of which 266 employees took part in the T1 survey (i.e. response rate of 26.6%). In the survey at T2, a total of 137 employees (i.e. continuation rate of 52%), of which 82 were matched with the T1 survey data. It should be noted, that all employees were invited to take part in the T2 survey, however, participants from T1 received emails with a personalised link that matched their response to their T1 survey response. In total, the dropout rate was at 69%, resulting in a total sample of 82. An analysis of dropouts was conducted and is presented below. Potential reasons for the dropout rate are discussed in CH6.

The final sample consisted of an intervention and control group. The two groups were located in different geographical locations (i.e. Leeds and Sheffield), but with comparable office settings in terms of food options and consumption (for a more details, see previous CH4). The final sample was made of the matched data set (T1 and T2 survey) and used for the analysis in this chapter. The intervention group consists of 56 and the control group of 25 participants.

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<sup>3</sup> A sensitivity analysis was calculated with G\*Power to determine the noncentrality parameter  $\lambda$  with  $\alpha$  error probability = 0.05; Power (1- $\beta$  error probability) = 0.95; Df = 8.



*Figure 27: Illustration of sample composition and mortality*

### 5.1.2.1 DROPOUT ANALYSIS

A dropout analysis was conducted in order to assess differences between the participants who completed T1, but did not go on to complete T2 (i.e. ‘dropouts’) and those who completed the survey at both time points (i.e. ‘continued’). The continued sample consists of participants whose two data points were also matched. For this, the dropouts were compared with the continued subsample of participants with regards to demographics and variables used in the further data analysis. First, a Chi<sup>2</sup> analysis was implemented to test for significant differences in key demographics between the dropouts and continued sample (see Table 17). Second, a 2 (dropout vs continued) x 2 (intervention vs control) between subject ANOVA was conducted to test for significant differences and interaction effects the groups with regards to the dependent variables used in the further analysis (see Table 18).

#### 5.1.2.1.1 DROPOUT ANALYSIS: KEY DEMOGRAPHICS

The Chi<sup>2</sup> test of the demographic variables showed no significant difference between the dropouts and the continued samples (see Table 17). It should be noted that the descriptive statistics (see Table 17) indicate a higher dropout rate in the control group (Leeds) than in the intervention group (Sheffield), which could be partially due to limited access (i.e. the difficulties with distributing the surveys) to the control group location in Leeds at T2. Furthermore, the dropout rate was significantly higher for participants who took the survey offline (i.e. paper pencil), (see Table 17). An explanation

for this could be that participants who completed the survey online at T1 did not receive the second survey, potentially due to limited access (i.e. the difficulties with distributing the surveys) to the facilities for the research team, which limited the access to the survey offline at T2.

**Table 17: Demographic of dropouts vs. continued**

| Frequency in N                                       | Dropouts     |             | Continued   |             | Dropout              |                 |
|--|--------------|-------------|-------------|-------------|----------------------|-----------------|
|  | Sheffield    | Leeds       | Sheffield   | Leeds       | Chi <sup>2</sup>     | Sig. (2-tailed) |
| Total  | 84           | 81          | 57          | 25          |                      |                 |
| Gender   |              |             |             |             | 3.96                 | .141            |
| Male   | 60           | 60          | 34          | 17          |                      |                 |
| Female   | 23           | 19          | 20          | 8           |                      |                 |
| prefer not to say                                    | 1            | 0           | 2           | 0           |                      |                 |
| Age  |              |             |             |             | 9.42                 | .093            |
| 18-25  | 17           | 31          | 9           | 4           |                      |                 |
| 26-35  | 37           | 34          | 31          | 15          |                      |                 |
| 36-45  | 19           | 9           | 10          | 4           |                      |                 |
| 46-55  | 8            | 5           | 6           | 1           |                      |                 |
| 56-65  | 0            | 0           | 0           | 1           |                      |                 |
| Prefer not to say                                    | 1            | 0           | 0           | 0           |                      |                 |
| Stages of change for a more sustainable diet (at T1) |              |             |             |             |                      |                 |
| Precontemplation                                     | 38           | 38          | 18          | 11          |                      |                 |
| Contemplation  | 20           | 13          | 15          | 1           |                      |                 |
| Preparation/ action                                  | 7            | 11          | 8           | 3           |                      |                 |
| Maintenance  | 19           | 19          | 16          | 10          |                      |                 |
| Education  |              |             |             |             | 6.94                 | .261            |
| GCSE/ O level (or equivalent)                        | 13           | 19          | 8           | 7           |                      |                 |
| A/AS level (or equivalent)                           | 28           | 30          | 9           | 8           |                      |                 |
| University degree (undergraduate, BSc/ BA)           | 27           | 26          | 27          | 9           |                      |                 |
| Master's degree (or equivalent)                      | 7            | 1           | 6           | 1           |                      |                 |
| Other  | 1            | 1           | 2           | 0           |                      |                 |
| Prefer not to say                                    | 1            | 1           | 4           | 0           |                      |                 |
| Online - Offline                                     |              |             |             |             | 5.99                 | .014*           |
| Online   | 41           | 18          | 36          | 6           |                      |                 |
| Offline  | 44           | 65          | 21          | 19          |                      |                 |
| Tenure (in month)                                    |              |             |             |             | t (CI)               | Sig. (2-tailed) |
| Mean (SD)  | 41.61 (36.6) | 21.0 (15.3) | 43.5 (31.8) | 22.0 (12.1) | -1.29 (-13.13, 2.73) | .202            |

\* p < .05, \*\* p < .01, \*\*\* p < .001

Note: The Chi<sup>2</sup> tests the differences in the respective variable between the dropout and continued groups. Intervention and control group are not differentiated here. Dropouts are those participants that completed the survey at T1 only. Continued includes those participants that took the survey at T1 and T2 and whose data was matched. For the variable 'Tenure', 2-tailed t-test was used to analyse differences.

### 5.1.2.1.2 DROPOUT ANALYSIS: DEPENDENT VARIABLES

The two-way AVOVA for red meat consumption at T1 showed no statistically significant interaction between the effects of dropout and condition on red meat consumption at T1,  $F(1, 243) = .120$ ,  $p = .70$ ,  $\eta^2 = .001$ . Simple main effects analysis showed that the intervention group reported

significantly more red meat consumption at home than the control group<sup>4</sup> ( $p = .027$ ), but this did not significantly differ between dropout and non-dropout group ( $p = .620$ ). There was a no statistically significant interaction between the effects of dropout and condition as shown in Table 18.

**Table 18: Dropout Analysis**

| Variable at T1                          | df | N   | F     | p    | $\eta^2$ | IG vs CG |      |
|---|----|-----|-------|------|----------|----------|------|
|   |    |     |       |      |          | p        | p    |
| Fruit and vegetable consumption at home | 1  | 246 | .619  | .432 | .003     | .811     | .755 |
| Organic food consumption at home        | 1  | 240 | .741  | .390 | .003     | .812     | .265 |
| Local food consumption at home          | 1  | 241 | .618  | .451 | .002     | .719     | .801 |
| Seasonal food consumption at home       | 1  | 240 | 1.023 | .313 | .004     | .399     | .412 |
| Food waste avoidance behaviour at home  | 1  | 245 | .000  | .993 | .000     | .675     | .275 |
| Environmental identity                  | 1  | 246 | 1.419 | .235 | .006     | .625     | .904 |
| Prominence of environmental identity    | 1  | 245 | .007  | .931 | .000     | .160     | .405 |
| Stages of change                        | 1  | 243 | .004  | .952 | .000     | .912     | .057 |

### 5.1.2.2 SAMPLE DESCRIPTION

The final sample consists of 82 participants of which 57 are in the intervention group and 27 in the control group. Table 19 shows key demographics of the survey participants and whether these were statistically significant between the intervention and control group at T1. In the control group, significantly more participants used the offline survey, which may be due to access, as already discussed in the previous section. None of the other demographic variables differed significantly between the intervention and control group at T1. Both the intervention and control group have more male than female participants, which is an accurate representation of the company's gender split (i.e. more male than female employees).

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<sup>4</sup> Note: A t-test analysis of the intervention and control group showed no significant difference in red meat consumption at home at T1 for the intervention ( $M=3.44$ ,  $SD=1.26$ ) and the control group ( $M=3.76$ ,  $SD=1.10$ ) conditions;  $t(80) = -1.13$ ,  $p = .262$ .



**Table 19: Demographics of survey participants at T1**

| Frequency in % (N)                         | T1                 |               | Differences between intervention and control group |                 |
|--|--------------------|---------------|--|-----------------|
|  | Intervention Group | Control Group | Chi <sup>2</sup>                                   | Sig. (2-tailed) |
| Total                                      | 70% (56)           | 30% (26)      | 6.09   | .298            |
| Gender                                     |                    |               | 1.11   | .575            |
| male                                       | 60.7 (34)          | 68.0 (17)     |  |                 |
| female                                     | 35.7 (20)          | 32.0 (8)      |  |                 |
| prefer not to say                          | 3.5 (2)            | 0             |  |                 |
| Age  |                    |               | 3.24   | .518            |
| 18-25                                      | 16.1 (9)           | 16.0 (4)      |  |                 |
| 26-35                                      | 55.4 (31)          | 60.0 (15)     |  |                 |
| 36-45                                      | 17.9 (10)          | 16.0 (4)      |  |                 |
| 46-55                                      | 10.5 (6)           | 4.0 (1)       |  |                 |
| 56-65                                      | 0                  | 4.0 (1)       |  |                 |
| Stage                                      |                    |               |  |                 |
| Precontemplation                           | 31.6 (18)          | 44.0 (11)     |  |                 |
| Contemplation                              | 26.3 (15)          | 4.0 (1)       |  |                 |
| Preparation/ action                        | 14.0 (8)           | 12.0 (3)      |  |                 |
| Maintenance                                | 28.1 (16)          | 40.0 (10)     |  |                 |
| Education                                  |                    |               | 8.00   | .156            |
| GCSE/ O level (or equivalent)              | 14.4 (8)           | 28.0 (7)      |  |                 |
| A/AS level (or equivalent)                 | 16.1 (9)           | 32.0 (8)      |  |                 |
| University degree (undergraduate, BSc/ BA) | 48.2 (27)          | 36.0 (9)      |  |                 |
| Master's degree (or equivalent)            | 10.7 (6)           | 4.0 (1)       |  |                 |
| Other                                      | 3.6 (2)            | 0             |  |                 |
| Prefer not to say                          | 7.1 (4)            | 0             |  |                 |
| Online - Offline                           |                    |               | 10.67  | .001**          |
| Online                                     | 63.2 (35)          | 24.0 (6)      |  |                 |
| Offline                                    | 36.8 (21)          | 76.0 (19)     |  |                 |
| Tenure (in month)                          |                    |               |  |                 |
| Mean (SD)                                  | 43.52 (31.75)      | 22.00 (12.08) |  |                 |

\* p < .05, \*\* p < .01, \*\*\* p < .001

### 5.1.2.3 HIGH AND LOW EXPOSURE INTERVENTION GROUP

During the intervention, eating in the canteen was voluntary and some participants may have chosen to not to eat in the canteen during the intervention. Also, some participants may have been absent from work during the intervention. In that case, they would have experienced a lower exposure to the intervention. Hence, the intervention group can be further split into participants who ate in the canteen during the intervention and those who did not eat in the canteen during the intervention. There are two

considerations for comparing the high and low intervention exposure groups with the control group. First, significant differences between the high and low exposure groups could indicate a reactance to the behaviour change intervention. As such, participants who did not like the intervention could have boycotted it by avoiding the canteen during the intervention.

Second, a lower exposure to the intervention could, overall, have decreased the prevalence of spillover effects. In the survey, participants were asked if they visited the canteen during the intervention week. Of the intervention group, 42 participants were exposed to the full intervention (i.e. changes in food and information campaign), whereas 15 participants were only exposed to parts of the intervention (i.e. information campaign) and 25 in the control group (i.e. in a different city without an intervention). Differences between these three groups were analysed by comparing changes between T1 and T2 with an ANOVA analysis (see Appendix C, section 9.3.2.1.4). The findings of the ANOVA suggest that there was no significant difference in the changes of any of the dependent variables for between the high and low exposure groups. As such, in the following analysis the low and high exposure group are analysed together as the intervention group.

### **5.1.3 DATA ANALYSIS**

The literature reviewed in CH2 suggested that a behaviour change intervention may lead to changes in ESBs at home (i.e. spillover) (e.g., Elf et al., 2019; Steinhorst & Matthies, 2016; Truelove et al., 2014) and that these changes are influenced by one's identity (e.g., Elf et al., 2019; Lacasse, 2016; Whitmarsh & O'Neill, 2010). Based on this evidence and the proposed theoretical framework for spillover (see CH2), a series of hypotheses were formed. The first hypothesis tests contextual spillover effects from the behaviour change intervention in the workplace on the target behaviours (i.e. red meat and fruit and vegetable consumption) at home. The second hypothesis tests the effect of the intervention on other ESBs that were also targeted by the intervention but less the focus. This hypothesis was tested by analysing changes of food waste avoidance behaviour and organic, seasonal, and local food consumption. The third hypothesis tests what influence a change in the identity variables (i.e. environmental identity and prominence of environmental identity) has on spillover effects. The aim of hypotheses 3 (a-f) and 4 (a-f) is to test the pathways to spillover via identity change as proposed in the theoretical framework (CH2).

*H1: The behaviour change intervention in the workplace has an effect<sup>5</sup> on the targeted behaviours in the home context.*

*H1a: The workplace behaviour change intervention will change in a person's red meat consumption at home.*

*H1b: In comparison to the control group, the behaviour change intervention predicts the likelihood of a person from the intervention group changing their fruit and vegetable consumption at home*

*H2: The workplace behaviour change intervention has an effect<sup>6</sup> at home, on ESBs not targeted in the intervention.*

*H2a: The workplace behaviour change intervention will change people's **local food consumption** at home.*

*H2b: The workplace behaviour change intervention will change people's **seasonal food consumption** at home.*

*H2c: The workplace behaviour change intervention will change people's **organic food consumption** at home.*

*H2d: The workplace behaviour change intervention will change people's **food waste behaviour** at home.*

*H3: A change in an individual's environmental identity has an effect on the likelihood for negative, positive or the lack of spillover regarding (a) – (f) below.*

*H4: A change in an individual's environmental identity has an interaction effect on the likelihood for negative, positive or the lack of spillover regarding:*

- (a) red meat consumption at home.*
- (b) fruit and vegetable consumption at home.*
- (c) food waste avoidance behaviour at home.*
- (d) seasonal food consumption at home.*
- (e) local food consumption at home.*
- (f) organic food consumption at home.*

In this study, a 2x2 treatment condition design was used and data from both the intervention and control group before and after the behaviour change intervention were analysed. The typical analysis approach to this type of data would be a mixed ANOVA – an analysis of the variance explained

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<sup>5</sup> Note: Based on the literature and the theoretical framework that was introduced in Chapter 2, all three types of spillover (positive, negative, and a lack thereof) can be expected in the intervention group. As such, no specific direction of the effect is hypothesised.

<sup>6</sup> Note: see previous footnote.

by within and between subject factors. To conduct a mixed ANOVA, several assumptions must be met in order to produce robust results.

### 5.1.3.1 MIXED ANOVA

A mixed ANOVA is a parametric statistical significance test in which the variance within and between subjects is analysed by using the F-test statistic (Field, 2009). For the 2x2 design used in this study, a mixed ANOVA is an appropriate and popular approach (Field, 2009). Although the F-test is considered a robust with regards to violations to assumptions, a number of assumptions must be met in order to avoid Type I and Type II errors. For the data set in this analysis, the assumptions to calculate a mixed ANOVA are not met (for a summary see Table 20). Several types of data transformation with the aim to normalise the dataset were conducted (in accordance with Field, 2009), however, the normalisation did not work. Hence, a mixed ANOVA is not the suitable analysis for the data in this study. Instead, a multinomial logistic regression was used as an alternative approach to analyse the data. For more details and a discussion of the assumption tests of ANOVA, see Appendix C, section 9.3.2.

*Table 20: Assumptions of ANOVA variance analysis*

| Assumption for parametric tests   | Assumption met?  |
|---|--|
| Dependent variable has to be measured at a continuous level                         | Yes.   |
| Within-subject factor has at least two dependent categorical groups                 | Yes. Two time points: pre-and post-intervention measure  |
| Between-subject factor has at least two independent categorical groups              | Yes. Intervention and control group.   |
| There are no significant outliers in both within-subject and between-subject factor | Yes. Outliers were assessed with the Mahalonobis distance test which revealed no significant outliers.   |
| Normality of dependent variables  | No. The Kolmogorov-Smirnov test as well as Shapiro-Wilk test of normality is significant for all variables (see Appendix C, section 9.3.2 for more details).                       |
| Homogeneity of variance for both within and between subject factors                 | No. Levene’s test and the variance ratio were used to analyse homogeneity. Both tests showed no equal variance for several scales (see Appendix C, section 9.3.2 for more details) |

#### 5.1.3.1.1 OUTLIER ANALYSIS

To account for potential outliers, an outlier analysis was conducted. Outliers were analysed by assessing the Stem-leaf and Boxplot diagrams and the Mahalonobis distances test (Field, 2009). The Stem-leaf and Boxplot diagrams indicated that there might be some outliers present in the sample, hence the Mahalonobis distance was calculated. The Mahalonobis distance examines the distance of cases to the mean of the independent variable (Field, 2009) which can be calculated in SPSS and the significance tested with a Chi<sup>2</sup> based significant test. The results showed no significant outliers for this sample across all variables.

#### **5.1.4 MULTINOMIAL LOGISTIC REGRESSION**

Logistic regression is a version of multiple regression with a categorical outcome variable (Field, 2009). Logistic regression can be used as an alternative approach to analyse effects of treatment condition designs on dependent variables (DV). Whereas ANOVA analyses the variance between and within subjects, logistic regression estimates the likelihood of the categories in the outcome variable based on categorical and/or continuous predictor variables. In logistic regression Chi<sup>2</sup> statistics are used to test the significance of the odds ratio predicted by the predictors for the categories of the outcome variable. In the following analysis, multinomial logistic regression analyses were conducted to examine whether changes in the reported ESBs were associated with the behaviour change intervention (i.e. H1a-b, and H2a-d) and with changes in identity (i.e. H3a-f).

For hypotheses H1a-b, and H2a-d, the effects of the behaviour change intervention on the above-mentioned behaviours were tested. For this, the multinomial logistic regression was calculated with the treatment condition (i.e. intervention vs. control group) as the predictor variable and the appropriate behaviour with the three outcome categories (i.e. positive, negative, no change) as DVs. With the logistic regression the statistical likelihood for one of the three outcome categories was calculated and was tested in accordance of the treatment conditions.

To assess the pathways to positive, negative and the lack of spillover, as proposed in the theoretical framework, the influence of changes in identity variables was tested. In the theoretical framework it was suggested that a behaviour change intervention leads to a change in environmental self-identity and the centrality of environmental identity which in turn leads to positive or negative spillover effects; or in the event of no identity change, to a lack of spillover. More specifically, it is proposed that an increase in the centrality of environmental self-identity leads to positive spillover effects and a decrease in centrality to a negative spillover effect, while no change in the centrality of environmental self-identity leads to the lack of spillover. These hypotheses (H3a-f) are tested by including variables measuring the change of identity and environmental identity into the multinomial logistic regression model as predictors.

##### **5.1.4.1 CREATING THE CHANGE SCORE VARIABLES**

To examine whether changes in ESBs were associated with the behaviour change intervention, new ESB change score were created for seven outcome variables (see Table 21). The change scores were created by calculating the difference between T1 and T2 scores. Resulting scores could be negative (a decrease in the behaviour), zero (no change) or positive (an increase in the behaviour). For example, if a participant who had a red meat consumption score of 3 at T1 and a score of 1 at T2, the resulting red meat consumption change score is -2 (i.e.  $1-3=-2$ ). Hence, the negative score indicated a decrease in red meat consumption. Initially, it was considered to calculate a multiple regression with the newly

created change scores. However, the change scores showed no normal distribution and therefore violated an assumption of multiple regression (Field, 2009) (see Appendix C, Table 58). Instead, new outcome categories for the change variables were created based on the direction of the change score. The negative change scores were categorised as ‘negative change’, the positive scores as ‘positive change’, and the zero scores as ‘no change’.

**Table 21: Behaviour change scores**

| Variable                                       | What it measures   | Function in analysis | Measure  |
|--|--|----------------------|--|
| Change in red meat consumption                 | Changes in the self-reported red meat consumption scores (i.e. T2-T1)                | DV                   |  |
| Change in fruit and vegetable consumption      | Changes in the self-reported fruit and vegetable consumption scores (i.e. T2-T1)     | DV                   |  |
| Change in local food consumption               | Changes in the self-reported local food consumption scores (i.e. T2-T1)              | DV                   | Three categories: positive change, negative change, no change.                                 |
| Change in organic food consumption             | Changes in the self-reported organic food consumption scores (i.e. T2-T1)            | DV                   |  |
| Change in seasonal food consumption            | Changes in the self-reported seasonal food consumption scores (i.e. T2-T1)           | DV                   |  |
| Change in food waste avoidance behaviour       | Changes in the self-reported food waste avoidance behaviour scores (i.e. T2-T1)      | DV                   |  |
| Change in environmental identity               | Changes in the self-reported environmental identity scores (i.e. T2-T1)              | Predictor            | Positive values indicate increase, negative values indicate decrease, zero indicates no change |
| Change in prominence of environmental identity | Changes in the self-reported prominence of environmental identity score (i.e. T2-T1) | Predictor            |  |

For the DV change in food waste avoidance behaviour, a range around the zero value was included for the category lack of spillover. The reason for this is that change in food waste avoidance behaviour was measured with a 4-item scale as opposed to 1-item measures, which were used for the other DVs. This means that small changes (e.g. differing value in one of four items), much smaller than in the other DVs, measures would be categorised as spillover effects. To make the DV measures more comparable, the range of  $\pm 0.25$  around zero was included in the category ‘no change’ (i.e. spillover) in order to control for very small changes that, otherwise, would increase the likelihood of positive or negative change for the DV change in food waste avoidance behaviour. This means that change scores of  $\pm 0.25$  were categorised as ‘no change’ as opposed to ‘positive change’ or ‘negative change’. The value of  $\pm 0.25$  was chosen based on the idea that in the 4-item scale, a change in one item at random is more likely than a random change in a 1-item scale. Hence, there is an increased sensitivity for change in the 4-item scale. Adding an interval of  $\pm 0.25$  reduced the sensitivity of that scale (i.e. a change in one of four items was not counted as a change).

To examine whether changes in identity were associated with changes in ESBs, two new identity change score were created (i.e. environmental identity and prominence in environmental identity) by calculating the difference between T1 and T2 scores. Resulting scores could be negative (a reduction), zero (no change) or positive (an increase) (see Table 21). By calculating scales using multiple items and then calculating a change score, changes in the identity variables are continuous; not categorical like the DVs, which are categorical. In multinomial logistic regression the predictor variables can be categorical and/or continuous, hence the variables that measured change in identity were included as predictor variables in the multinomial logistic regression model. To test hypotheses H3a-f, the interaction effect between the treatment condition (i.e. intervention and control group) and the change in the identity variables on the DVs was assessed.

Before conducting the analysis, assumptions for multinomial logistic regression were checked. Multinomial logistic regression has similar assumptions to multiple regression, including linearity, independence of errors, and multicollinearity (Field, 2009). The following section presents the assumption tests for multinomial logistic regression. This is followed by the results of several multinomial logistic regression models which were tested for their significance to examine the proposed hypotheses.

#### **5.1.4.2 ASSUMPTIONS FOR MULTINOMIAL LOGISTIC REGRESSION**

##### **5.1.4.2.1.1 LINEARITY OF THE LOGIT**

Linearity of the logit is the assumption that the relationship between the logit of the outcome variable and the continuous predictor variables. Similar to multiple regression, a linear relationship between the outcome variable and the predictors is assumed. However, with the outcome variable being categorical, this assumption is violated. Hence, instead, a linear relationship with the logit of the outcome variable and the continuous predictors is assumed (Field, 2009). To test the linearity of the logit, the log of the outcome variable was created and analysed in a binary logistic regression as a predictor in the interaction term with the original variable (Field, 2009). A violation of the assumption of linearity of the logit is indicated by a significant interaction term. All variables presented in this section were tested for their linearity of the logit and no significant results were found. Hence, the linearity of the logit can be assumed.

##### **5.1.4.2.1.2 INDEPENDENCE OF ERRORS**

Independence of errors means that cases should not be related. Although the 2x2 intervention-control group design created related data points (i.e. pre- and post-intervention), the transformation in change variables, as explained above, resolved this issue. Hence, the cases are no longer related, and the independence of errors can be assumed.

### 5.1.4.2.1.3 MULTICOLLINEARITY

Multicollinearity is a high correlation between the predictor variables which – when present – results in an inaccurate estimation of the multiple regression equation (Eid et al., 2013; Field, 2009). To assess the degree of multicollinearity, the variance inflation factor (VIF) was evaluated for the continuous variables. A VIF of 1 indicates that all predictors are independent from each other and a value greater than 10 indicates that multicollinearity is biasing the regression model (Eid et al., 2013; Field, 2009). As shown in Table 22, multicollinearity of the continuous predictor variable is low.

**Table 22: Multicollinearity of predictor variables**

|  | Unstandardized Coefficients |     |      | Collinearity Statistics |      |
|--|-----------------------------|-----|------|-------------------------|------|
|  | B                           | SD  | t    | Tolerance               | VIF  |
| Change of prominence of environmental identity | .04                         | .14 | .80  | .95                     | 1.05 |
| Change of environmental self-identity          | -.07                        | .19 | -.37 | .95                     | 1.05 |

\* p < .05, \*\* p < .01, \*\*\* p < .001

Overall, all assumptions for multinomial logistic regression were met. The following section presents the results from the hypotheses testing of the multinomial logistic regression. For this, the Odds ratio statistic is used. When the predictor is binary, as is the case in the present study, Odds ratio is a standardized effect size (Field, 2009). In this study, the odds ratio indicates the strength and direction of the relationship between the condition (i.e. intervention vs control) and the odds that positive, negative, or the lack of behaviour change at home occur. A change in the intervention group was interpreted as contextual spillover effects as a result of the behaviour change intervention.

### 5.1.4.3 HYPOTHESIS TESTING

#### 5.1.4.3.1 CONTROL FOR MULTIPLE TESTS

To control for multiple tests a post-hoc Holm-Bonferroni correction was conducted (Holm, 1979). The Holm-Bonferroni correction can be used to control for family-wise error rate, that is the probability of an increased type I error when performing multiple hypotheses tests (i.e. inflation of the alpha level) (Abdi, 2010). Similar to the Bonferroni correction, the Holm-Bonferroni correction controls for the alpha inflation, however, it is more powerful than the Bonferroni which means that it has a lower probability of making a type II error (Abdi, 2010). In the Holm-Bonferroni correction the p-values of each test are ranked from lowest to greatest and the following formula is applied to each ranked p-value:

$$\frac{\text{target } \alpha \text{ level}}{n (\text{number of tests}) - \text{rank number} + 1}$$

Overall, twelve different multinomial regression models were run (see below) which means that the number of tests is twelve. The  $\alpha$ -level for the p-values started at  $\alpha = p < .05$ . As demonstrated



in the section below, the lowest p-value was  $p = .001$  for the interaction model calculated for H3d and H4d<sup>7</sup> (see Table 29). Hence, the formula for the adjusted p-value is:

$$\frac{.05}{12 - 1 + 1} = .004$$

The p-value for this hypothesis is smaller than the adjusted p-value which means that it is still significant. This means that the null hypothesis must be rejected. The second lowest p-value was  $p = .009$  for H3a and H4a (see Table 28). In accordance with the Holm-Bonferroni correction the formula for the adjusted p-value is:

$$\frac{.05}{11 - 1 + 1} = .0045$$

The p-value for this hypothesis is greater than the adjusted p-value which means that it is no longer significant. This means that the null hypothesis for H3a and H4a is not rejected. With the Holm-Bonferroni correction the testing stops when the first non-reject hypothesis is reached and all subsequent hypotheses are consequently also non-significant (Abdi, 2010).

#### **5.1.4.3.2 HYPOTHESIS 1A-B**

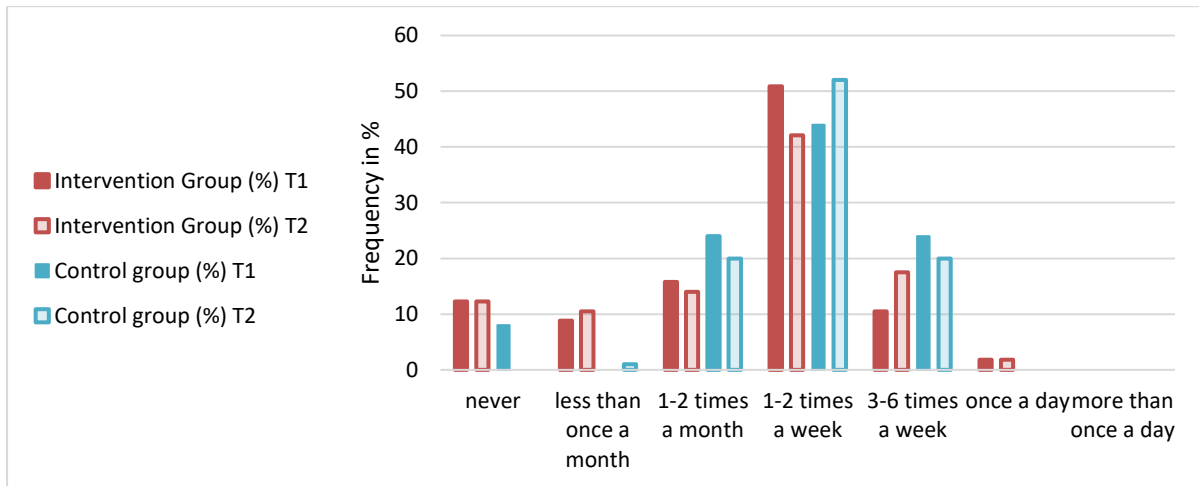
The first hypothesis tests whether the workplace behaviour change intervention will change a person's red meat consumption (H1a) and fruit and vegetable consumption (H1b) at home. In the survey, participants were asked how frequently they had consumed red meat and fruit and vegetables at home in the previous two weeks. Figure 28 and Figure 29 show the frequencies for the intervention (red) and control (blue) group for each behaviour at home at T1 and T2. A change in frequencies between T1 and T2 in the intervention group (and not the control group) is an initial indicator for potential spillover effects from the intervention in the workplace to the targeted behaviours in the home setting (i.e. contextual spillover).

Overall, the intervention and control group have similar frequency distributions for red meat consumption at home. However, changes in red meat consumption from T1 to T2 indicate that the intervention group increased their meat consumption slightly (lower frequency in 1-2 times a week and higher frequency in 3-6 times a week at T2 compared to T1). A slight shift of frequencies can also be seen for the control group with an increase in the red meat consumption frequency of 1-2 times a week while both higher and lower frequencies decreased. For fruit and vegetable consumption, the intervention group shows an increase in the high frequencies of fruit and vegetable consumption at

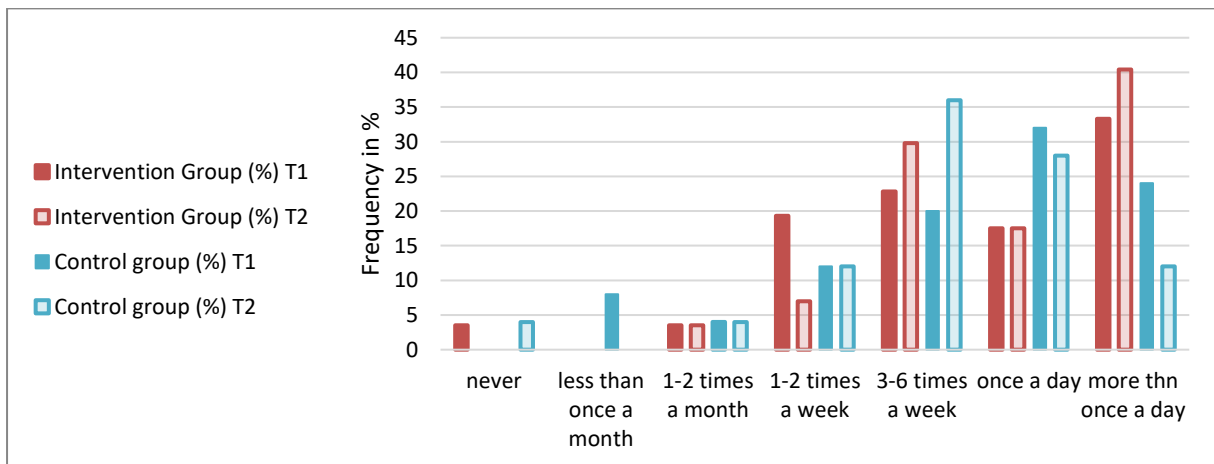
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<sup>7</sup> Please note although H3d and H4d (and all other H3 and H4 hypotheses) were split into two hypotheses, they were tested with just one test and one statistical model.

home at T2 and a slight decrease of the low frequencies. The distribution of the frequencies of the second target behaviour (i.e. fruit and vegetable consumption) is shown in Figure 29. For the control group, changes in fruit and vegetable consumption between T1 and T2 can be observed, however, similar to red meat consumption, the changes in frequencies are balanced with a trend from both extreme ends of the scale towards the middle (3-6 times a week).



**Figure 28: Red meat consumption at T1 and T2**



**Figure 29: Fruit and vegetable consumption at T1 and T2**

A multinomial logistic regression was calculated to test hypothesis H1a and H1b, with the treatment condition as a predictor (i.e. intervention and control) and the change of the behaviours red meat consumption at home and fruit and vegetable consumption at home as the DVs. The crosstab distribution across the target behaviours and the intervention and control group shows the frequencies for each category (see

Table 23). The statistically significant likelihood for positive, negative and a lack of change was calculated in the multinomial logistic regression models below.

In the three-category multinomial logistic regression, one outcome category was chosen as a reference category with which the other two categories were paired for comparison (Field, 2009). In this study, the chosen reference category was no change in behaviour, which was compared with negative change, and positive change. The results show the predicted likelihood that a participant belonged to one of the two paired categories – negative change vs. no change and positive change vs. no change – based on the predictors (e.g. intervention vs. control group). The results are presented below.

**Table 23: Crosstab distribution across groups**

| Group              | Behaviour                       | Positive change N (%) | Negative change N (%) | No change N (%) | Total N  |
|--------------------|---------------------------------|-----------------------|-----------------------|-----------------|----------|
| Intervention Group | Red meat consumption            | 11 (19.5)             | 12 (21.5)             | 33 (59)         | 56 (100) |
| Control Group      | Red meat consumption            | 7 (28)                | 9 (36)                | 9 (36)          | 25 (100) |
| Intervention Group | Fruit and vegetable consumption | 22 (39)               | 10 (18)               | 24 (43)         | 56 (100) |
| Control Group      | Fruit and vegetable consumption | 7 (29)                | 9 (37.5)              | 8 (33.5)        | 24 (100) |

Note: Percentage of groups in relation to total group size, e.g. percentage of intervention group in positive behaviour change category.

To test Hypothesis 1a, the likelihood of changed red meat consumption at home in the intervention group in comparison to the control group was explored. The likelihood of changed red meat consumption at home was categorised into positive behaviour change (i.e. a decrease in red meat consumption at home), negative behaviour change (i.e. an increase in red meat consumption at home), and lack of behaviour change (i.e. no changes in red meat consumption). The overall model was tested in order to assess whether the condition (i.e. intervention vs control group) was a significant predictor for the three outcome groups in comparison to a random model. Overall, the results show that the multinomial regression model with treatment condition was not significant compared to a random model with  $R^2=.05$  (Cox & Snell),  $\chi^2(2) = 3.73$ ,  $p = .16$  (see Table 24). This means, that the behaviour change intervention at work had no significant influence on the likelihood of a person changing their red meat consumption behaviour at home post-intervention. Similarly, Hypothesis 1b tested the likelihood of changed fruit and vegetable consumption at home in the intervention group in comparison to the control group. The results displayed in Table 24 show that the intervention had no significant effect on the change in fruit and vegetable consumption at home with  $R^2=.04$  (Cox & Snell),  $\chi^2(2) = 3.41$ ,  $p = .18$ .

Overall, the multinomial logistic regression showed that the intervention had no significant effect on post-intervention changes in any of the target behaviours in the home setting. Hence, Hypothesis 1 – the behaviour change intervention in the workplace has an effect on the targeted behaviour at home for the intervention group, but not the control group – is rejected. The behaviour change intervention at work did not significantly predict any occurring changes in the target behaviours

at home. Furthermore, the threshold of a critical  $\chi^2$  of 15.51 that was calculated in the power analysis (see section 5.1.1.5) was not met.

**Table 24: Multinomial logistic regression for change red meat and fruit and vegetable consumption**

|   | B (SE)       | 95% CI for Odds Ratio |            |       |
|---|--------------|-----------------------|------------|-------|
|   |              | Lower                 | Odds Ratio | Upper |
| <b>H1a - Change in red meat consumption at home <sup>(a)</sup></b>            |              |                       |            |       |
| Positive behaviour change vs. lack of behaviour change                        |              |                       |            |       |
| Intercept   | -.25 (0.50)  |                       |            |       |
| Intervention  | -.85 (0.61)  | .13                   | .43        | 1.42  |
| Negative behaviour change vs. lack of behaviour change                        |              |                       |            |       |
| Intercept   | .00 (0.47)   |                       |            |       |
| Intervention  | -1.01 (0.58) | .12                   | .36        | 1.13  |
| <b>H1b - Change in fruit and vegetable consumption at home <sup>(b)</sup></b> |              |                       |            |       |
| Positive behaviour change vs. lack of behaviour change                        |              |                       |            |       |
| Intercept   | .12 (0.49)   |                       |            |       |
| Intervention  | -.99 (0.63)  | .11                   | .37        | 1.24  |
| Negative behaviour change vs. lack of behaviour change                        |              |                       |            |       |
| Intercept   | -.13 (0.52)  |                       |            |       |
| Intervention  | .05 (0.60)   | .33                   | 1.05       | 3.37  |

(a)  $R^2=.05$  (Cox & Snell), .05 (Nagelkerke). Model  $\chi^2(2) = 3.73, p = .16$ . \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

(b)  $R^2=.04$  (Cox & Snell), .05 (Nagelkerke). Model  $\chi^2(2) = 3.41, p = .18$ . \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

#### 5.1.4.3.3 HYPOTHESIS 1C-F

The second hypothesis tested whether the behaviour change intervention in the workplace had an effect on post-intervention environmentally sustainable behaviours (ESBs) at home that were not targeted by the intervention. These ESBs included (c) ‘local food consumption’, (d) ‘seasonal food consumption’, (e) ‘organic food consumption’, and (f) ‘avoiding food waste behaviour’. Similar to Hypothesis 1a-b, the multinomial logistic regression used the Odds Ratio statistic to test the influence of the predictors intervention versus control group for the outcome categories positive, negative, and the lack of behaviour change.

**Hypothesis 1c** tested whether the behaviour change intervention in the workplace had an effect on local food consumption at home versus no change in comparison to the control condition. The results show, that the behaviour change intervention had no significant effect on the changes in local food consumption with  $R^2=.01$  (Cox & Snell),  $\chi^2(2) = .77, p = .68$  (see Table 25).

**Hypothesis 1d** tested whether the behaviour change intervention in the workplace had an effect on seasonal food consumption at home versus no change in comparison to the control condition. The results show, that the behaviour change intervention had no significant effect on the changes in seasonal food consumption with  $R^2=.02$  (Cox & Snell),  $\chi^2(2) = 1.46, p = .48$ . (see Table 25).

**Hypothesis 1e** tested whether the behaviour change intervention in the workplace had an effect on organic food consumption at home versus no change in comparison to the control condition. The

results show, that the behaviour change intervention had no significant effect on the changes in seasonal food consumption with  $R^2=.01$  (Cox & Snell),  $\chi^2(2) = 0.75, p = .69$ . (see Table 25).

**Table 25: Multinomial logistic regression to tests hypotheses H2a-H2d**

|   | B (SE)        | 95% CI for Odds Ratio |            |       |
|---|---------------|-----------------------|------------|-------|
|   |               | Lower                 | Odds Ratio | Upper |
| <b>H1c - Change in local food consumption<sup>(a)</sup></b>                     |               |                       |            |       |
| Positive behaviour change vs. lack of behaviour change                          |               |                       |            |       |
| Intercept   | -.49 (0.45)   |                       |            |       |
| Intervention  | -.35 (0.56)   | .24                   | .70        | 2.11  |
| Negative behaviour change vs. lack of behaviour change                          |               |                       |            |       |
| Intercept   | -1.18 (0.57)* |                       |            |       |
| Intervention  | .26 (0.67)    | .35                   | 1.30       | 4.80  |
| <b>H1d - Change in seasonal food consumption at home<sup>(b)</sup></b>          |               |                       |            |       |
| Positive behaviour change vs. lack of behaviour change                          |               |                       |            |       |
| Intercept   | .00 (0.49)    |                       |            |       |
| Intervention  | -.49 (0.59)   | .19                   | .19        | 1.97  |
| Negative behaviour change vs. lack of behaviour change                          |               |                       |            |       |
| Intercept   | -.13 (0.52)   |                       |            |       |
| Intervention  | .05 (0.60)    | .33                   | 1.05       | 3.37  |
| <b>H1e - Change in change in organic food consumption at home<sup>(c)</sup></b> |               |                       |            |       |
| Positive behaviour change vs. lack of behaviour change                          |               |                       |            |       |
| Intercept   | .00 (0.47)    |                       |            |       |
| Intervention  | -.49 (0.57)   | .20                   | .62        | 1.88  |
| Negative behaviour change vs. lack of behaviour change                          |               |                       |            |       |
| Intercept   | -.41 (0.53)   |                       |            |       |
| Intervention  | -.29 (0.63)   | .22                   | .75        | 2.56  |
| <b>H1f - Change in food waste at home<sup>(d)</sup></b>                         |               |                       |            |       |
| Positive behaviour change vs. lack of behaviour change                          |               |                       |            |       |
| Intercept   | -.13 (0.52)   |                       |            |       |
| Intervention  | .42 (0.59)    | .48                   | 1.52       | 4.87  |
| Negative behaviour change vs. lack of behaviour change                          |               |                       |            |       |
| Intercept   | .22 (0.47)    |                       |            |       |
| Intervention  | -1.32 (0.65)* | .08                   | .27        | .94   |

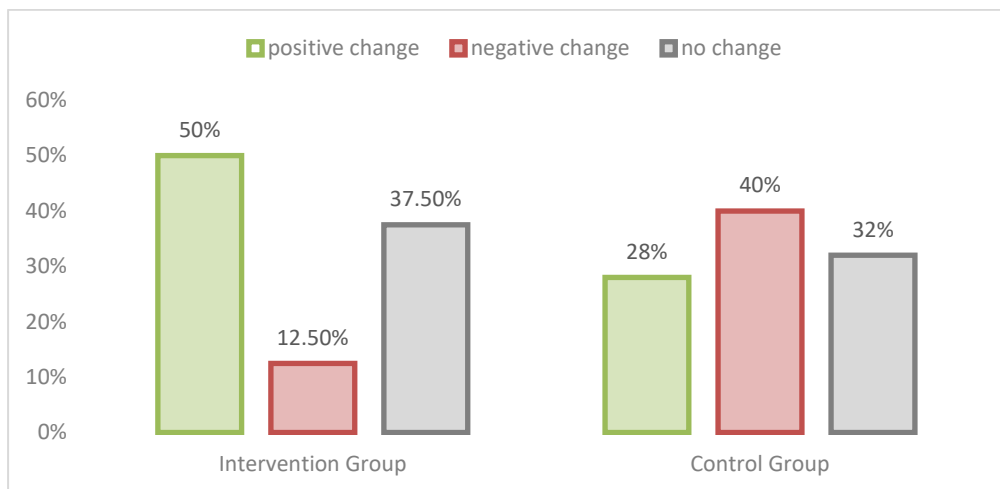
(a)  $R^2=.01$  (Cox & Snell), .01 (Nagelkerke). Model  $\chi^2(2) = .77, p = .68$ . \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

(b)  $R^2=.02$  (Cox & Snell), .02 (Nagelkerke). Model  $\chi^2(2) = 1.46, p = .48$ . \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

(c)  $R^2=.01$  (Cox & Snell), .01 (Nagelkerke). Model  $\chi^2(2) = .75, p = .69$ . \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

(d)  $R^2=.09$  (Cox & Snell), .11 (Nagelkerke). Model  $\chi^2(2) = 7.89, p = .019$ . \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

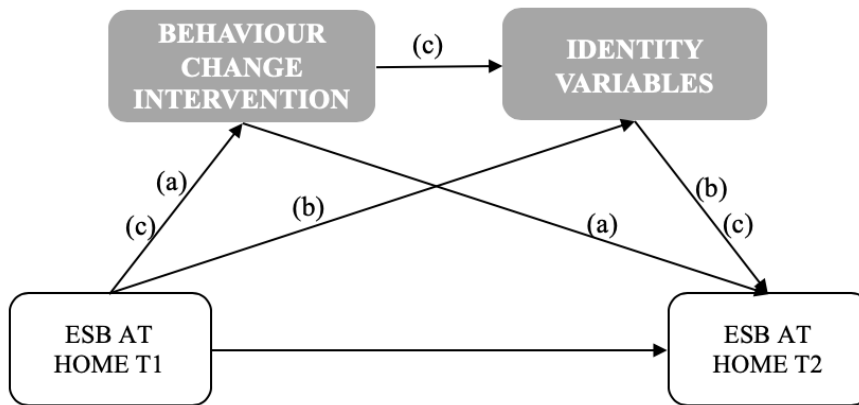
Finally, **Hypothesis 1f** tested whether the behaviour change intervention in the workplace had an effect on food waste behaviour at home versus no change in comparison to the control condition. The results show, that the behaviour change intervention had a significant effect on the changes in food waste behaviour with  $R^2=.09$  (Cox & Snell),  $\chi^2(2) = 7.89, p = .019$  (see Table 25). This means that, after the post-hoc Holm-Bonferroni correction (Holm, 1979) the treatment condition (i.e. intervention versus control group) did not significantly predict changes to food waste behaviour at home. While participants who were in the intervention group were more likely to increase their food waste avoidance behaviour or make no changes than those from the control group (for an illustration see Figure 30), this distribution difference was non-significant.



*Figure 30: Changes in food waste avoidance behaviour in %*

#### **5.1.4.3.4 HYPOTHESIS 2 AND 3**

Hypothesis 2 tested whether changes in environmental identity and prominence of environmental identity significantly predicted positive or negative behaviour change. Hypothesis 3 tested whether an interaction between the treatment condition and changes in environmental identity and prominence in environmental identity significantly predicted positive or negative behaviour change. More specifically, to test H2 and H3, a mediation analysis was conducted. Accordingly, it was firstly tested whether a change in the variables ‘change in environmental identity’ and ‘change in prominence of environmental identity’ influenced the outcome of the DV (H2) and secondly whether these differed in the intervention versus control group (H3). The conceptual model for the mediation is illustrated in Figure 31. The mediation analysis was conducted based on previous research that identified environmental identity as a mediator of ESBs (e.g. van der Werff et al., 2018). Furthermore, environmental identity was hypothesised as a mediator in the theoretical framework (see CH2). More specifically it was hypothesised that an identity change process would lead to a change in behaviour while no change in environmental identity after the intervention was proposed to result in no behaviour changes. Hence, conceptually environmental identity functions as a mediator of the potential change of ESBs between T1 and T2.



**Figure 31: Conceptual Mediation Model**

Hypotheses H1a-f test the conceptual mediation pathway (a)  
 Hypotheses H2a-f test the conceptual mediation pathway (b)  
 Hypotheses H3a-f test the conceptual mediation pathway (c)

In the following, the variables ‘change in environmental identity’ (CH\_ENVID) and ‘change in prominence of environmental identity’ (CH\_PEID) were added as predictors to the multinomial logistic regression analysis. To test H2a-f, treatment condition (i.e. intervention vs control group), change in environmental identity (CH\_ENVID) and change in prominence of environmental identity (CH\_PEID) were used to predict the three categories of the DVs (positive, negative and no behaviour change). To test H3a-f, the interaction between the change in the identity variables and the treatment condition (i.e. intervention vs control group) were included in the regression by adding the multiplication of the treatment condition with each identity variables as a predictor to the multinomial regression term.

**Table 26: Changes of identity variables**

|   | N  | M      | SD    |
|---|----|--------|-------|
| <b>Change in Environmental Identity</b>               |    |        |       |
| Intervention Group                                    | 56 | -0.107 | 0.639 |
| Control Group   | 25 | -0.253 | 0.662 |
| <b>Change in Prominence of Environmental Identity</b> |    |        |       |
| Intervention Group                                    | 56 | 0.054  | 0.899 |
| Control Group   | 25 | -0.010 | 0.903 |

The average scores of the identity variables pre- and post-intervention (T1 and T2) as well as the average change for each variable and the respective standard deviations (SD) are shown in Table 26. A marginal increase in the average score of prominence of environmental identity can be noted in the intervention group, whereas the control group average score is unchanged, although the SD increases for the control group. For the identity variable environmental self-identity, a small decrease

in the average score for the intervention group can be noted, while the control group showed a slightly larger decrease in the average score.

Multinomial logistic regression models were calculated using a mix of forced entry terms and stepwise entry terms model (see Field, 2009) for the DVs (H2a) change in red meat consumption at home, (H2b) fruit and vegetable consumption at home, (H3c) food waste behaviour avoidance behaviour, (H2d) seasonal, (H2e) organic, and (H2f) local food consumption at home. The variables treatment condition, change environmental identity, and change prominence environmental identity were added to the regression model using the forced entry. The interaction terms were added stepwise based on their contribution to the model included in the equation.

**H2a & 3a– A change in an individual's environmental identity has an (interaction) effect on the likelihood for negative, positive or the lack of spillover regarding red meat consumption at home.**

The overall regression model with treatment condition, change in environmental self-identity (CH\_EnvID) and change in prominence of environmental identity (CH\_PEID) significantly predicted the DV change in red meat consumption in comparison to a random model, with  $R^2=.21$  (Cox & Snell),  $\chi^2(8) = 19.12, p < .05$ . However, after the Holm-Bonferroni correction the adjusted p-value was no longer significant. The goodness of fit indicators Pearson and deviance are not significant with  $\chi^2(124) = 141.85, p = .13$ , and  $\chi^2(124) = 126.84, p = .41$ , respectively, which indicates a good fit of the model to the data (Field, 2009). The interaction between the treatment condition and change in environmental self-identity made no significant improvement to the model as did the interaction treatment condition (see Table 27).

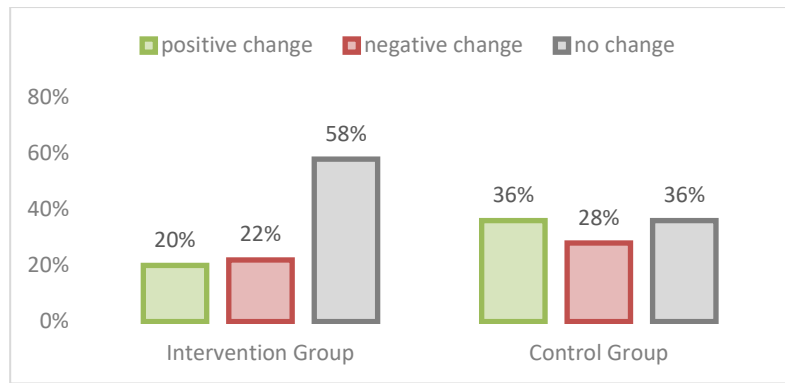
**Table 27: Step Summary (SPSS Output)**

| Model | Action  | Effect(s)  | Model Fitting Criteria | Effect Selection Tests  |    |      |
|-------|---------|--|------------------------|-------------------------|----|------|
|       |         |  | -2 Log Likelihood      | Chi-Square <sup>a</sup> | df | Sig. |
| 0     | Entered | Intercept, Treatment condition , CH_EnvID, CH_PEID | 145.09                 | .                       |    |      |
| 1     | Entered | Treatment condition X CH_PEID                      | 135.63                 | 9.46                    | 2  | .01  |

Stepwise Method: Forward Entry; X = interaction

a. The chi-square for entry is based on the likelihood ratio test.





*Figure 32: Changes in red meat consumption in %*

The variables treatment condition, CH\_EnvID, and CH\_PEID were not significant predictors for the DV change in red meat consumption. Similarly, the interaction term treatment condition X change in prominence of environmental identity did not significantly predicted a change in the DV (see Table 28).

The results show that the intervention condition, in interaction with an increase in prominence of environmental identity, did not increase the likelihood of no change of red meat consumption at home (i.e. lack of behaviour change). Nonetheless, it should be noted that while the control group showed a balanced distribution across all three categories, the intervention group showed the highest frequency in no change with regards to changes in red meat consumption at home (see Figure 32). However no significant effects were found. Hence, hypothesis H2a and H2a were rejected.

**H2b & 3b – A change in an individual's environmental identity has an (interaction) effect on the likelihood for negative, positive or the lack of spillover regarding fruit and vegetable consumption at home.**

The same analysis as above was conducted for the DV change in fruit and vegetable consumption. The overall regression model was not significant with  $R^2=.05$  (Cox & Snell),  $\chi^2(6) = 3.72$ ,  $p = .71$ . The interaction terms change in environmental identity and change in prominence of environmental identity with the treatment condition made no significant contribution to improving the model and were therefore not included in the final regression model. Overall, none of the predictors significantly predicted variance in the DV change in fruit and vegetable consumption (see Table 28). Hence, the hypotheses H3b and H4b must be rejected. Furthermore, the threshold of a critical  $\chi^2$  of 15.51 that was calculated in the power analysis (see section 5.1.1.5) was met not for H2b and H3b.

**Table 28: Multinomial logistic regression to tests hypotheses H2a-2b and H3a-3b**

|   | B (SE)       | 95% CI for Odds Ratio |            |       |
|---|--------------|-----------------------|------------|-------|
|   |              | Lower                 | Odds Ratio | Upper |
| <b>H2a &amp; 3a - Change in in red meat consumption with identity<sup>(a)</sup></b>         |              |                       |            |       |
| Positive behaviour change vs. lack of behaviour change                                      |              |                       |            |       |
| Intercept   | -.35 (0.55)  |                       |            |       |
| Intervention  | -.81 (0.65)  | .12                   | .44        | 1.59  |
| CH_ENVID  | -.83 (0.52)  | .16                   | .44        | 1.21  |
| CH_PEID   | .29 (0.66)   | .37                   | 1.34       | 4.89  |
| Intervention x CH_PEID  | -.32 (0.79)  | .16                   | .73        | 3.43  |
| Negative behaviour change vs. lack of behaviour change                                      |              |                       |            |       |
| Intercept   | -.20 (0.53)  |                       |            |       |
| Intervention  | -1.12 (0.67) | .09                   | .33        | 1.20  |
| CH_ENVID  | -.89 (0.52)  | .15                   | .41        | 1.14  |
| CH_PEID   | 1.13 (0.68)  | .81                   | 3.09       | 11.74 |
| Intervention x CH_PEID  | -2.29 (0.87) | .02                   | .10        | .55   |
| <b>H2b &amp; 3b - Change in fruit and vegetable consumption with identity<sup>(b)</sup></b> |              |                       |            |       |
| Positive behaviour change vs. lack of behaviour change                                      |              |                       |            |       |
| Intercept   | -.17 (0.53)  |                       |            |       |
| Intervention  | .12 (0.60)   | .34                   | 1.11       | 3.61  |
| CH_ENVID  | -.18 (0.42)  | .36                   | .83        | 1.91  |
| CH_PEID   | -.03 (0.31)  | .54                   | .97        | 1.77  |
| Negative behaviour change vs. lack of behaviour change                                      |              |                       |            |       |
| Intercept   | -.05 (0.50)  |                       |            |       |
| Intervention  | -.92 (0.62)  | .12                   | .40        | 1.34  |
| CH_ENVID  | -.28 (0.48)  | .30                   | .75        | 1.92  |
| CH_PEID   | .05 (0.35)   | .54                   | 1.01       | 2.09  |

Note: CH\_PEID = Change of prominence of environmental identity, CH\_ENVID = Change in environmental identity, x = interaction between variables.

(a)  $R^2=.21$  (Cox & Snell), .24 (Nagelkerke). Model  $\chi^2(8) = 19.12, p = .009$ . \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

(b)  $R^2=.19$  (Cox & Snell), .05 (Nagelkerke). Model  $\chi^2(6) = 3.72, p = .71$ . \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

**H2c & 3c – A change in an individual's environmental identity has an (interaction) effect on the likelihood for negative, positive or the lack of spillover regarding food waste avoidance behaviour at home.**

H2c tested the multinomial logistic regression with the predictors change in environmental identity and change in prominence of environmental identity added to the equation (i.e. added to treatment condition as a predictor) for the DV change in food waste avoidance behaviour. After the post-hoc Holm-Bonferroni correction, the overall model is non-significant in comparison to a model without the added predictors with  $R^2=.23$  (Cox & Snell),  $\chi^2(8) = 20.40, p = .024$ . The goodness of fit indicators were not significant with Pearson  $\chi^2(124) = 126.54, p = .42$ , and Deviance  $\chi^2(124) = 127.80, p = .40$ , which indicates a good fit of the model to the data. The predictors treatment condition *change in environmental self-identity* and *change in prominence of environmental identity* are not significant in explaining positive or negative behaviour change effects. H4c tested the interaction between change in prominence of environmental identity and the treatment condition and change in environmental self-identity, which were both not significant (see Table 29). Hence, hypothesis H2c and H3c are rejected.

**H2d & 3d – A change in an individual's environmental identity has an (interaction) effect on the likelihood for negative, positive or the lack of spillover regarding seasonal food consumption at home.**

The multinomial logistic regression model for the DV change in seasonal food consumption model was significant in comparison to a model without the predictors with  $R^2=.19$  (Cox & Snell), Pearson  $\chi^2(8) = 16.98, p = .001$ . The goodness of fit indicators were not significant with  $\chi^2(120) = 123.07, p = .41$ , and Deviance  $\chi^2(120) = 126.50, p = .33$ , which indicates a good fit of the model to the data. The interaction between intervention group and environmental identity made no significant contribution to the improvement of the model, hence it was not included as a predictor. The interaction between the intervention condition and change in prominence of environmental identity, on the other hand, made a significant contribution to predicting both positive and negative behaviour change in the outcome variable in comparison to the no behaviour change category.

An increase of prominence of environmental identity, irrespective of the intervention, was found to be non-significant predictor for negative behaviour change with  $b = 2.29$ , Wald  $\chi^2(1) = 4.35, p = .037$  with the Holm-Bonferroni correction applied. The odds ratio means that a positive change in prominence of environmental identity made negative behaviour change 9.8 times more likely (see Table 29). This means that a person who perceived an increase in the prominent environmental identity from T1 to T2 was 9.8 times more likely to buy less seasonal food, regardless of having received the intervention, however this increased likelihood was not statistically significant.

Furthermore, significant interaction effects were found between a change of prominence of environmental identity and the treatment condition. Participants in the intervention group who increased their prominence of environmental identity were 97% less likely to show negative behaviour change when comparing with the control group with  $b = -3.52$ , Wald  $\chi^2(1) = 8.44, p = .001$ . This was still significant after the Holm-Bonferroni correction was applied. A positive change in prominence of environmental identity in the intervention group made positive behaviour change 90% less likely than no behaviour change with  $b = -2.34$ , Wald  $\chi^2(1) = 4.31, p < .05$ ; however, this p-value was no longer significant after the Holm-Bonferroni correction was applied.

Overall, this means that an increase in prominence of environmental identity in the intervention group stabilised the seasonal food consumption (i.e. no change) in comparison to the control group. A change in prominence of environmental identity was linked with a lack of behaviour change in comparison to a decrease of seasonal food consumption. As such, the interaction between the behaviour change intervention and the identity variable prominence of environmental identity had an effect on seasonal food consumption, which means that hypothesis H3d must be accepted.

**Table 29: Multinomial logistic regression to tests hypotheses H2c-H2f and 34c-3f**

|  | B (SE)                | 95% CI for Odds Ratio |            |            |
|--|-----------------------|-----------------------|------------|------------|
|  |                       | Lower                 | Odds Ratio | Upper      |
| <b>H2c &amp; 3c - Change in change in food waste behaviour with identity<sup>(a)</sup></b>   |                       |                       |            |            |
| Positive behaviour change vs. lack of behaviour change                                       |                       |                       |            |            |
| Intercept  | -.76 (0.71)           |                       |            |            |
| Intervention Group   | 1.22 (0.78)           | .73                   | 3.37       | 15.60      |
| CH_ENVID   | -1.78 (1.04)          | .02                   | .17        | 1.28       |
| CH_PEID  | .26 (0.34)            | .67                   | 1.30       | 2.50       |
| Intervention Group x CH_ENVID  | 2.91 (1.18)*          | 1.82                  | 18.39      | 186.22     |
| Negative behaviour change vs. lack of behaviour change                                       |                       |                       |            |            |
| Intercept  | -.22 (0.48)           |                       |            |            |
| Intervention Group   | -1.20 (0.69)          | .08                   | .30        | 1.15       |
| CH_ENVID   | -.16 (0.81)           | .18                   | .86        | 4.16       |
| CH_PEID  | .57 (0.41)            | .80                   | 1.78       | 3.93       |
| Intervention Group x CH_ENVID  | 1.30 (1.13)           | .40                   | 3.68       | 33.92      |
| <b>H2d &amp; 3d - Change in seasonal food consumption with identity<sup>(b)</sup></b>        |                       |                       |            |            |
| Positive behaviour change vs. lack of behaviour change                                       |                       |                       |            |            |
| Intercept  | .34 (0.62)            |                       |            |            |
| Intervention Group   | -.80 (0.70)           | .11                   | .45        | 1.77       |
| CH_ENVID   | .20 (.49)             | .48                   | 1.22       | 3.18       |
| CH_PEID  | 1.95 (1.05)           | .90                   | 7.01       | 54.77      |
| Intervention Group x CH_PEID   | -2.34 (1.12)*         | .01                   | .10        | .88        |
| Negative behaviour change vs. lack of behaviour change                                       |                       |                       |            |            |
| Intercept  | .27 (0.64)            |                       |            |            |
| Intervention Group   | -.99 (0.74)           | .09                   | .37        | 1.59       |
| CH_ENVID   | .51 (0.52)            | .60                   | 1.66       | 4.62       |
| CH_PEID  | 2.29 (1.10)*          | 1.15                  | 9.84       | 84.49      |
| <b>Intervention Group x CH_PEID</b>  | <b>-3.52 (1.21)**</b> | <b>.00</b>            | <b>.03</b> | <b>.32</b> |
| <b>H2e &amp; 3e - Change in change in local food consumption with identity<sup>(c)</sup></b> |                       |                       |            |            |
| Positive behaviour change vs. lack of behaviour change                                       |                       |                       |            |            |
| Intercept  | -.61 (0.47)           |                       |            |            |
| Intervention Group   | .34 (0.57)            | .23                   | .71        | 2.19       |
| CH_ENVID   | -.54 (0.47)           | .23                   | .59        | 1.48       |
| CH_PEID  | -.06 (0.32)           | .50                   | .95        | 1.78       |
| Negative behaviour change vs. lack of behaviour change                                       |                       |                       |            |            |
| Intercept  | -.53 (0.64)           |                       |            |            |
| Intervention Group   | .45 (0.69)            | .40                   | 1.56       | 6.08       |
| CH_ENVID   | -1.05 (0.55)          | .12                   | .35        | 1.03       |
| CH_PEID  | -.18 (0.36)           | .41                   | .84        | 1.69       |
| <b>H2f &amp; 3f - Change in organic food consumption with identity<sup>(d)</sup></b>         |                       |                       |            |            |
| Positive behaviour change vs. lack of behaviour change                                       |                       |                       |            |            |
| Intercept  | -.06 (0.49)           |                       |            |            |
| Intervention Group   | -.49 (0.58)           | .19                   | .61        | 1.92       |
| CH_ENVID   | .13 (0.45)            | .47                   | 1.13       | 2.71       |
| CH_PEID  | .52 (0.33)            | .89                   | 1.68       | 3.19       |
| Negative behaviour change vs. lack of behaviour change                                       |                       |                       |            |            |
| Intercept  | -.54 (0.55)           |                       |            |            |
| Intervention   | -.22 (0.64)           | .23                   | .80        | 2.78       |
| CH_ENVID   | -.33 (0.50)           | .27                   | .72        | 1.91       |
| CH_PEID  | -.37 (0.38)           | .33                   | .69        | 1.46       |

Note: CH\_PEID = Change of prominence of environmental identity, CH\_ENVID = Change in environmental identity, x = interaction between variables.

(a)  $R^2=.21$  (Cox & Snell), .24 (Nagelkerke). Model  $\chi^2(8) = 19.12, p = .024$ . \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

(b)  $R^2=.19$  (Cox & Snell), .22 (Nagelkerke). Model  $\chi^2(8) = 16.98, p < .001$ . \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

(c)  $R^2=.08$  (Cox & Snell), .05 (Nagelkerke). Model  $\chi^2(6) = 6.40, p = .38$ . \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

(d)  $R^2=.10$  (Cox & Snell), .11 (Nagelkerke). Model  $\chi^2(6) = 7.97, p = .24$ . \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

**H2e & 3e – A change in an individual's environmental identity has an (interaction) effect on the likelihood for negative, positive or the lack of spillover regarding local food consumption at home.**

The overall model for local food consumption was not significant in comparison to a model without the predictors CH\_ENVID and CH\_PEID, with  $R^2=.08$  (Cox & Snell),  $\chi^2(6) = 6.40$ ,  $p = .38$  (see **Error! Reference source not found.**). The goodness of fit indicators Pearson and deviance were not significant with  $\chi^2(124) = 128.35$ ,  $p = .38$ , and  $\chi^2(124) = 130.46$ ,  $p = .33$ , respectively, which indicates a good fit of the model to the data. Hence, hypotheses H2e and 3e were rejected.

**H2f & 3f – A change in an individual's environmental identity has an (interaction) effect on the likelihood for negative, positive or the lack of spillover regarding organic food consumption at home.**

Overall, the model was not significant in comparison to a model without the predictors with  $R^2=.10$  (Cox & Snell),  $\chi^2(6) = 7.97$ ,  $p = .24$  (see Table 29). The goodness of fit indicators Pearson and deviance were not significant with  $\chi^2(122) = 125.18$ ,  $p = .40$ , and  $\chi^2(122) = 134.78$ ,  $p = .20$ , respectively, which indicates an acceptable fit of the model to the data. As such, hypotheses H2f and 3f were rejected.

### **5.1.5 CONCLUSION**

The analysis presented above showed one significant behaviour change that indicates contextual spillover. The results from H1a-b showed that the behaviour change intervention had no significant behaviour change effect on the target behaviours at home (i.e. meat consumption and vegetable consumption), which indicates that no contextual spillover from the intervention was found. Hypotheses 1c-f tested whether After the p-value adjustment using the Holm-Bonferroni method, no behaviour change effect were found from the behaviour change intervention to other ESBs at home (i.e. for the behaviours local, seasonal, and organic food consumption at home).

Hypotheses 2a-2f tested whether a change in the identity variables from T1 to T2 (i.e. prominence of environmental identity and environmental identity) had an effect on spillover and hypotheses 3a-4f whether there was an interaction with the intervention condition. These hypotheses were derived from the theoretical framework (see CH2) in which it is proposed that a behaviour change intervention can lead to an increase, decrease or no change in environmental identity which in turn leads to positive, negative and the lack of behaviour change, respectively. After the p-value adjustment, no significant effects except for one were found. As tested in H3d, a significant interaction between the intervention condition and the identity variable 'prominence of environmental identity' was found. The interaction between the intervention condition and an increase in prominence of environmental identity

made a lack of behaviour change significantly more likely than a decrease in seasonal food consumption.

**Table 30: Hypotheses summary**

| <b>Hypothesis</b>   | <b>Outcome</b>       |
|---|----------------------|
| <b>H1: The behaviour change intervention in the workplace has an effect on the targeted behaviours in the home context.</b>   |                      |
| (a) Change in red meat consumption at home  | 1a – Rejected        |
| (b) Change in fruit and vegetable consumption at home   | 1b – Rejected        |
| (d) Change in local food consumption at home  | 1c – Rejected        |
| (e) Change in seasonal food consumption at home   | 1d – Rejected        |
| (f) Change in organic food consumption at home  | 1e – Rejected        |
| (g) Change in food waste avoidance behaviour at home  | 1f – Rejected        |
| <b>H2: A change in an individual’s environmental identity has an effect on the likelihood for negative, positive or the lack of spillover regarding</b>             |                      |
| (a) red meat consumption at home.   | 2a – Rejected        |
| (b) fruit and vegetable consumption at home.  | 2b – Rejected        |
| (c) food waste avoidance behaviour at home.   | 2c – Rejected        |
| (d) seasonal food consumption at home.  | 2d – Rejected        |
| (e) local food consumption at home.   | 2e – Rejected        |
| (f) organic food consumption at home.   | 2f – Rejected        |
| <b>H3: A change in an individual’s environmental identity has an interaction effect on the likelihood for negative, positive or the lack of spillover regarding</b> |                      |
| (a) red meat consumption at home.   | 3a – Rejected        |
| (b) fruit and vegetable consumption at home.  | 3b – Rejected        |
| (c) food waste avoidance behaviour at home.   | 3c – Rejected        |
| (d) <b>seasonal food consumption at home.</b>   | <b>3d - Accepted</b> |
| (e) local food consumption at home.   | 3e – Rejected        |
| (f) organic food consumption at home  | 3f – Rejected        |

The results and the above considerations are discussed in more detail in the discussion chapter (CH6). After the Holm-Bonferroni correction, overall eleven hypotheses must be rejected, whereas one hypothesis can be accepted (see summary in Table 30). The following section presents the findings from the qualitative data analysis which is followed by a synthesis of the quantitative and qualitative findings to assess the evidence for the theoretical framework.

## 5.2 QUALITATIVE DATA ANALYSIS & RESULTS

The following section presents the findings from the qualitative interviews that were designed to explore whether there was any evidence for contextual spillover effects from the work to the home setting resulting from the behaviour change intervention. In addition to the quantitative data analysis

presented above, this section constitutes the qualitative data analysis component of the mixed methods approach used in this study.

### 5.2.1 DATA SET AND ANALYSIS APPROACH

The data set selected for this analysis was based on interviews that were conducted before (T1) and after (T2) the behaviour change intervention. The complete data corpus (i.e. all interview data collected; Braun & Clarke, 2006) consisted of 21 interviews completed at T1 and 13 interviews completed at T2, as eight participants dropped out between T1 and T2. For the final data analysis, only interviews that were conducted both at T1 and T2 were included. Hence, the final data set consisted of 26 interviews with 13 participants and was based on the completion of the interviews both at T1 and T2 with participants in the behaviour change intervention. The material used for the data analysis consisted of interview transcripts and visual material collected during the interviews.

**Table 31: Participant information**

| ID  | Gender | Age   | Education                  | Job role                 | Months worked at company | Stages of Change   |
|-----|--------|-------|----------------------------|--------------------------|--------------------------|--------------------|
| 104 | Female | 18-25 | N/A                        | Payment Team             | 8                        | Precontemplation   |
| 108 | Female | 26-35 | A/AS level                 | Engineer                 | 72                       | Contemplation      |
| 117 | Male   | 26-35 | University degree (BSc/BA) | n/a                      | 47                       | Contemplation      |
| 107 | Male   | 26-35 | University degree (BSc/BA) | Operations               | 18                       | Contemplation      |
| 110 | Female | 36-45 | University degree (BSc/BA) | Digital manager          | 14                       | Contemplation      |
| 106 | Female | 26-35 | Master's degree            | Analyst                  | 6                        | Contemplation      |
| 129 | Female | 36-45 | University degree (BSc/BA) | Customer Service Analyst | 21                       | Contemplation      |
| 112 | Female | 26-35 | Master's degree            | Analyst                  | 11                       | Preparation/Action |
| 105 | Male   | 26-35 | GCSE/O level               | Technical support        | 48                       | Preparation/Action |
| 126 | Female | 36-45 | A/AS level                 | Team leader              | 72                       | Maintenance        |
| 131 | Male   | 26-35 | University degree (BSc/BA) | Junior Engineer          | 84                       | Maintenance        |
| 102 | Male   | 36-45 | University degree (BSc/BA) | Software Engineer        | 11                       | Maintenance        |
| 132 | Male   | 46-55 | GCSE/O level               | Sales                    | 46                       | Maintenance        |

The participants' demographic information ranged across different age groups, educations, job roles, genders, and tenures (time worked at the company). The interviewees' age ranged from 18 to 55 with 26-35 as the most common age bracket (see Table 31). The gender was balanced across the data set with seven women and six men, although, in proportion to the company's gender distribution, men

were slightly underrepresented in the data set. The tenure in the company ranged from six to 84 months and job roles were mainly administrative in customer service or technical support.

### **5.2.1.1 INTERVIEWS**

Semi-structured interviews were conducted in the month before and 4-6 weeks after the behaviour change intervention. They took place in the company's canteen or in a café nearby and an interview guide was used to aid the process (see Appendix B, section 9.2.4.2 for the full interview guide). Before taking part in the interviews, participants were provided with an information sheet about the interviews and signed a consent form (see Appendix B, section 9.2.4.2). The interviews took between 30 and 60 minutes and were recorded and later were transcribed by me and a professional transcriber from the recordings made during the interview. The interviews were transcribed without accents, pauses and 'err' and other disfluencies. As the analysis focusses on themes rather than semantics, discourse or narratives, this level of detail in the transcripts was considered sufficient (Braun & Clarke, 2006).

Topics within the interview guide ranged across a number of topics that were chosen to answer the research questions. In the first interviews (T1), these included perception of sustainable diets, food consumption and diet types, identity in relation to behaviours at work and home. In the second interview (T2) with the same participants, an additional block of questions was added to assess any changes after the behaviour change intervention. For example, participants were asked about their perception of the behaviour change intervention, how their colleagues reacted, and any changes since the last interview that may be affected by the intervention.

### **5.2.1.2 VISUAL SORTING**

A visual sorting task was completed by the participants as part of the semi-structured interviews at both T1 and T2. The visual sorting method aimed to assess the relative centrality of three key terms (related to the behavioural intervention) to their self-identity. The term *sustainable food* was chosen as this mapped directly to the target behaviour of the behaviour change intervention. The term *sustainability* was chosen as it was thought to capture the more general concept driving the behaviour change intervention. The term *environmentally friendly self* was chosen to capture the essence of the participants' environmental self-identity. This method was adapted from similar methods previously used in the context of the Inclusion of Nature in Self scale that visually assessed individual environmental self-identity (Martin & Czellar, 2016).

During the visual sorting task, participants were asked what they understood by the terms environmentally friendly self, sustainability and sustainable food. Then, an outline drawing of a person (i.e. manikin, which had been printed on a piece of paper) was given to the participants and they were

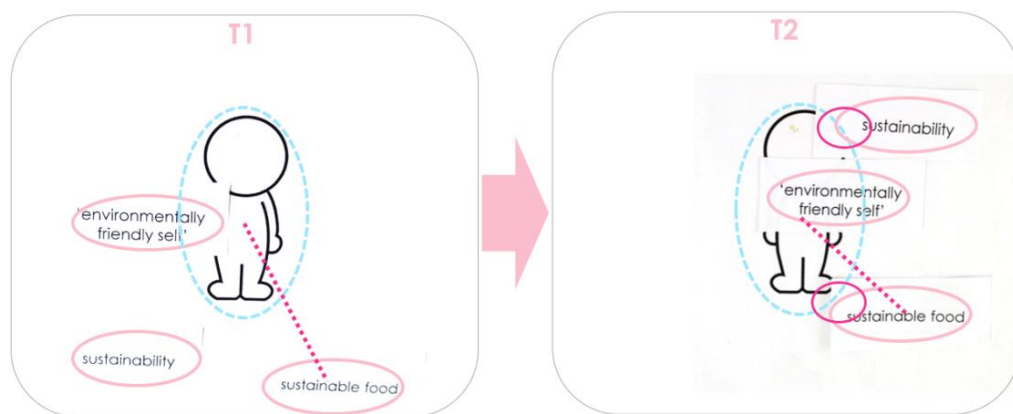


asked to imagine that the manikin was a representation of their selves. Participants were then asked to position the three terms around or on the manikin based on the perceived centrality of the terms to their selves. Participants were asked to place terms they considered central to the self on the manikin or close to it and further away from the manikin in accordance with a peripheral centrality to the self.

Once participants arranged the terms, a photograph was taken, and participants were asked to explain their arrangement as a think-aloud exercise. The think-aloud exercise was done to gain a deeper understanding of the sorting. The visual sorting was completed both before and after the intervention which made it possible to learn about the effects the behaviour change intervention might have had on the relative centrality of the three terms to the self. During the post-intervention sorting task, participants did not see the photograph taken at the first interview as not to bias their judgement at T2 and rather have a more implicit account of any movements of the terms.

### 5.2.1.3 ANALYSIS OF VISUAL SORTING TASK

The visual sorting task was analysed by comparing the arrangement of the three terms before and after the behaviour change intervention. The photographs taken during the visualisation task were used to analyse and interpret a change in centrality of the terms *environmentally friendly self*, *sustainability* and *sustainable food*. As demonstrated in Figure 33, changes in the relative distance of the terms to the manikin at T1 and T2 were visually evaluated.



**Figure 33: Visualisation example**

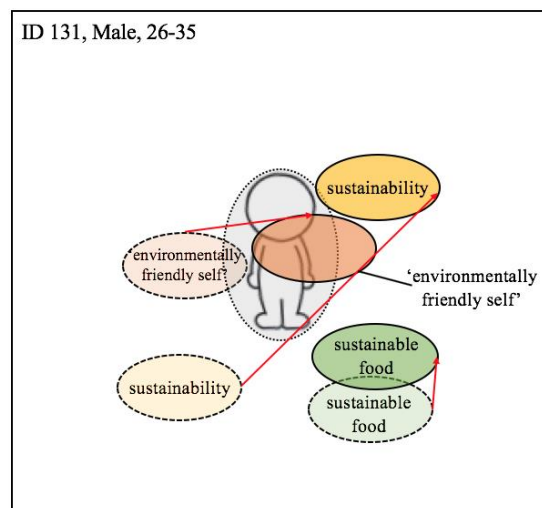
An example of the photographs taken during the interviews and illustration of the analysis approach can be seen in Figure 33. At T1 the term *environmentally-friendly-self* overlapped with the manikin whereas the terms *sustainability* and *sustainable food* were positioned more decentral to the manikin (i.e. the self). At T2, the participants positioned all three terms more closely to the manikin (i.e. more central to the self) with *environmentally-friendly-self* now overlapping more with the manikin than at T1 and the terms *sustainability* and *sustainable food* positioned more closely to the manikin in comparison to T1.

The photographs from the visual sorting at T1 and T2 were overlaid to make the changes of the terms in relation to each other clearer (see Figure 34). In the example, participant 131 positioned the term *environmentally-friendly-self* more centrally on the manikin at T2 (see Figure 33 and Figure 34). This increased centrality of the three terms was interpreted as an integration (i.e. assimilation-adaptation) process which means that the concepts sustainability, sustainable food and especially ‘environmentally friendly self’ can be considered as more central to the participant’s post-intervention self-identity. Additionally, these findings were complemented with interview data. During the interviews, participants were asked to comment on their understanding of the terms and why they sorted the terms the way they did. This data was used to further interpret the movement of the terms between T1 and T2. For example, at T1 participant 131 explains how being environmentally friendly is important to him, but that convenience acts as a barrier to him engaging in ESBs, which is reflected in his sorting of the terms at T1 (see Figure 34):

*“so this one [environmentally friendly self] just like trying to be green. That’s like quite important to me. [...] Sustainability would be like similar to this [environmentally friendly self], so like, where possible, [...] just keep reducing reusing recycling that kind of thing. And then the sustainable food, that is kind of similar to the sustainability, but not quite as close because I do get lazy, I just opt for the convenience options, then you know, try a bit” (131, male, T1)*

During the sorting at T2, participant 131 talks about an ideal self and then how he sees himself, which he reflects in the sorting (see Figure 34):

*“[that is] how you want to be would be, all of these bang on top of here [pointing at manikin]. That would be the aim. How I am, probably I say like that. Environmentally friendly would be closest and then sustainability and sustainable food, a bit further away, sustainable food probably the furthest. That is how I see myself.” (131, male, T2)*



**Figure 34: Overlaid photographs of visualisation**

Note: Visualization of centrality of identity - Reduced meat consumption. Dashed line = T1; solid line and darker coloring = T2; Red arrow indicates change from T1 to T2 (the colors were added after the analysis)

While participant 131 highlights the importance of being green both at T1 and T2, at T2 he formulates an aim and an ideal self.

In addition to relative change in distance to the manikin, which participants were instructed to use as a measure of evaluation, the vertical or horizontal positioning of the terms was analysed. Metaphors on vertical position and spatial distance have been associated with affect and attitudes (Landau, Meier, & Keefer, 2010). For instance, previous research suggests that, in the physical world, people tend to pull desired objects towards the self while pushing undesirable objects away (Elliott, 2008; Williams & Bargh, 2008). Hence, in the visualisation task, a reduced distance of a term can be interpreted as something desirable as well as more central, while an increased distance implies the opposite. Other research found an association between the vertical positions ‘up’ as ‘good’ and ‘down’ as ‘bad’ (e.g., Casasanto, 2009). For example, in three studies, Meier and Robinson (2004) found that when making evaluations, people automatically assumed that objects in higher visual space are ‘good’, while objects in lower visual space are ‘bad’. As such, the interpretation of the vertical change in line with Meier and Robinson (2004) could point to evaluations participants made about the terms. In the example of participant 131, all three terms were placed further up at T2 in comparison to T1. In line with Meier and Robinson (2004), this can be interpreted as a more positive evaluation of all three terms. At T2, the term sustainability was placed rather ‘high up’ in relation to the manikin (i.e. self), whereas the term sustainable food, for instance, was still placed below the manikin (i.e. self). This could indicate that the term sustainability, and the associated concept, could be evaluated as more positive than the term (and concept) sustainable food.

#### **5.2.1.4 TEMPLATE ANALYSIS**

The template analysis approach was used to analyse the interview transcripts aided by the qualitative data analysis software NVivo (NVivo, 2014). Thematic analysis is used to identify and report patterns in qualitative data (Braun & Clarke, 2006). Braun and Clarke (2006) define a theme as something that “captures something important about the data in relation to the research question, and represents some level of patterned response or meaning within the data set.” (p. 82). In the analysis, themes represent dominant overarching patterns, however, instances with low prevalence that were considered relevant to the research questions were also identified and reported as a theme (Braun & Clarke, 2006).

A deductive approach was chosen to analyse the data with the aim to evaluate and assess evidence for the theoretical framework proposed earlier in this thesis (CH2). A “‘theoretical’ thematic analysis would tend to be driven by the researcher’s theoretical or analytic interest in the area, and is thus more explicitly analyst-driven” (Braun & Clarke, 2006, p. 84). As such, the analysis of the qualitative data is driven by the theoretical framework, however, a level of flexibility was used to adapt

the framework and identify new themes. The coding was completed by the researcher and a second coding of an example transcript was conducted by the research team, which confirmed the initial nodes.

**Table 32: Step-by-step template analysis of interview data based on Braun and Clarke (2006)**

| Phase                                  | Procedure in this study  |
|--|--|
| 1. Phase: Familiarising with your data | Interviews were transcribed and transcripts read several times.  |
| 2. Phase: Generating initial codes     | An initial template was constructed based on the theoretical framework (i.e. deductive approach). Interview transcripts were coded systematically in line with the initial template as well as based features relevant for the research question (see appendix |
| 3. Phase: Searching for themes         | The codes were collated into themes within the initial template and, where appropriate, new themes were identified.  |
| 4. Refining themes                     | Themes were checked in relation to the entire data set and the initial template was modified accordingly.  |
| 5. Defining and naming themes          | Themes were refined by an iterative analysis of each code in each theme and each theme was re-evaluated in relation to the theoretical framework. A final template was produced.   |
| 6. Second coding                       | Another researcher second coded two transcript.  |
| 7. Producing the report                | The final themes and examples were reported in the results section (see below) and supported and illustrated by extracted examples.  |

The thematic analysis of the interview data followed a step-by-step guide proposed by Braun and Clarke (2006) (see Table 32). The initial and final templates including a summary of the codes can be find in Appendix C, section 9.3.3.1. Themes and sub-themes were considered dominant if they were considered important for the research question and for the theoretical framework, hence the themes were based on pre-defined categories (i.e. in line with the framework) (Braun & Clarke, 2006). This means that in a first instance, patterns in the interview transcripts were identified by coding sections of the transcript which were considered relevant for the research question and the theoretical framework (e.g. descriptions of ESBs participants engaged in after the behaviour change intervention). In a second step, these were summarised and interpreted in relation to the theoretical framework and the wider literature (Braun & Clarke, 2006).

The presentation of the results was divided into two parts. In the first part (5.2.2), the identified themes spillover effects, work and home context, factors that influence spillover, and the visualisation are presented. In the second part (5.3) the findings presented in part one are interpreted in relation to the theoretical framework and the quantitative findings. Additional themes that were identified, based on the theoretical framework are presented. The aim of presenting the findings in two parts is to provide a clearer narrative of the main findings (i.e. spillover effects from work to home) and the initial evidence for the theoretical framework.

## **5.2.2 FINDINGS - CONTEXTUAL SPILLOVER EFFECTS**

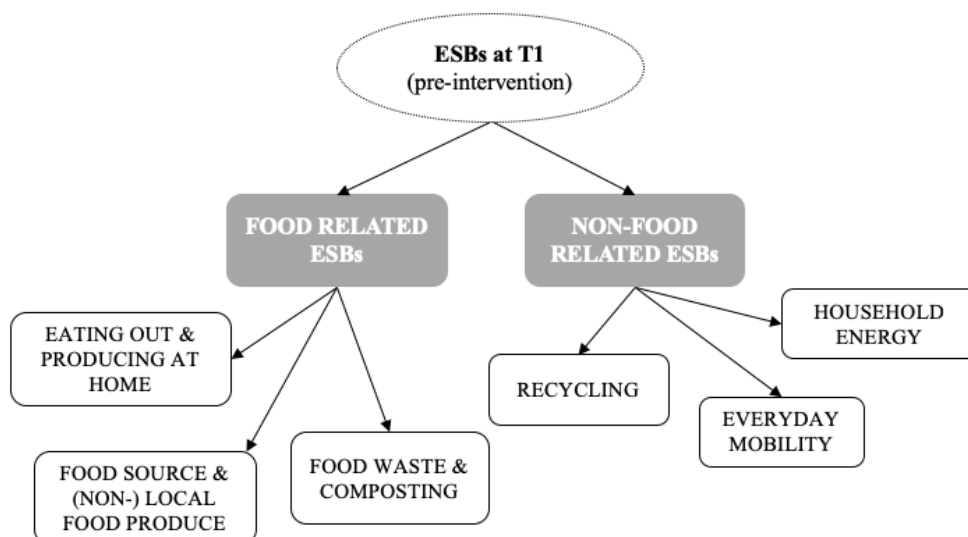
The aim of this section is to present the evidence for contextual spillover effects. First, the themes from the pre-intervention interviews (T1) are presented, followed by a presentation of the findings from the post-intervention interviews. The post-intervention findings present a narrative of the three most dominant themes: (a) spillover effects from the workplace intervention to behaviours outside the workplace, (b) factors that were identified to influence those spillover effects, and (c) the context/setting of the spillover behaviours.

### **5.2.2.1 PRE-INTERVENTION ESBs AT HOME**

This section presents the themes around ESBs at home that were identified in the pre-intervention. The aim of this section is to get a better understanding of the behaviours participants engaged in at home and at work before the intervention. In the T1 interviews, participants were asked what kind of ESBs they engaged in at home. They were also offered a definition of sustainability<sup>8</sup> as piloting the interview guide with other PhD students revealed that this might be necessary. The themes presented below were based on common ESBs participants talked about. It should be noted that participants were not primed with regards to any of these behaviours, however, the definition of sustainability could have influenced participants. The focus is on food and non-food related ESBs that participants were asked about in the pre-intervention interviews. For an illustration of the themes, see Figure 35.

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<sup>8</sup> “For this project we focus on the environmental aspect of sustainability. We define sustainable practices as activities that reduce consumption of natural resources and harm of the natural environment to a minimum. This includes how we buy, what we consume and how we organise our daily lives.”



*Figure 35: Illustration of Themes from Pre-intervention Interviews*

### 5.2.2.1.1 FOOD RELATED ESBs AT HOME BEFORE THE INTERVENTION

In the pre-intervention interviews, participants were asked about the role of sustainable food in their everyday life. Several behaviour patterns were identified, including buying seasonal and organic produce. However, the dominant themes were food source and (non-)local produce, eating out and home production, food waste and composting. Participants’ meat and vegetable consumption was also analysed, as the focus of the intervention was on a reduction of (red) meat and increase in vegetable consumption.

When asked about the diet type they associated themselves with, participants predominantly identified as either meat-eater or flexitarian. Diet type options were meat-eater, flexitarian, pescetarian, vegetarian, and vegan (note: participants were asked if they understood the terms and offered definitions). A meat-eater was here defined as someone who considered meat as a staple to their diet while a flexitarian was someone who ate meat occasionally, but not necessarily every day. Participants’ meat and vegetable consumption at home was mainly focussed around personal preferences and social background (e.g. family or upbringing). For example, 126 talked about her selectiveness with regards to meat, while 107 talked about meat being a staple in his diet because of his working-class background:

*“if I eat meat it’s British or if I can manage it, it will be from my friend’s farm shop” (126)*

*“Not that it is a conscious thing though, it doesn’t mean it is the main thing in the diet, but I suppose, I don’t know if it is kind of the background, because I’ve been working class, northern, like one meat and two veg, that is just how it is usually for you, you have meat in the meal.” (107)*

In terms of sustainability, sustainable fish consumption was identified as a pattern. For example, 106 talked about the fishing methods she preferred for the fish she consumed:

*“I prefer it when it is tuna line-caught and not farmed and things like that.” (106)*

Overall, meat was identified as a staple in participants' diet before the behaviour change intervention. A reduction of meat and increase in vegetable consumption in association with sustainable food was not identified as a dominant theme, as few participants made that association. This suggests a low awareness of the environmental impact of meat consumption. Based on this, meat and vegetable consumption were considered a promising target behaviour for the behaviour change intervention (see CH4 for more details on the development of the intervention).

#### **5.2.2.1.1.1 FOOD SOURCE AND (NON-)LOCAL PRODUCE**

Local and non-local food produce was identified as one of the most dominant patterns in the theme sustainable food consumption at home. The prevailing behaviour that participants reported was their choice and consumption of local produce. This ranged from buying British meat, going to the farmer's market, to buying vegetables labelled with the UK as country of origin. For instance, 108 talked about her preference for local strawberries, if available:

*"when things are locally available, I normally purchase them. Like strawberries for instance." (108)*

131 talked about occasionally buying her food from local farm shop or labelled of British origin:

*"If we can, we tend to buy things that are local, we got some green grocers, small green grocers near our house." (131)*

Buying and consuming non-local produce was identified as another prevailing behaviour within this theme. While participants talked about how they already bought local produce, they also talked about their purchase behaviour of non-local produce. Mostly, participants talked about how they would like to buy local produce, but would find it difficult. For example, 106 who talked about her lack of knowledge about the origin of her food:

*"A lot of food I buy and eat I really still don't know where it's come from. I don't really read the label which country it's come from." (106)*

110 said that she did not go to the farmer's market at all:

*"I don't go to farmer's markets so I can buy things that are completely locally, [...] low carbon or organic or completely package free. I don't do that. I do it as much as I can within Waitrose." (110)*

The checking of labels for foodstuff, or refraining from doing so, was identified as a dominant behaviour participants reported. For example, 108 talked about how she would not look for the source of her food, while 112 made that a focus of her food choices:

*"I just go out and get what I want at the time [...]. Rather than thinking about where it's come from and how it's flown and where it's grown." (108)*

*"I am very aware of things that I eat and where it comes from [...] I tend to read about everything I'm buying and where it came from or just general information." (112)*

What this section shows is that participants associated sustainable food consumption with the question of where food comes from and how far it has travelled. While some participants already engaged in behaviours that involved choosing local produce or accounting for the food source, others refrained from these behaviours, but connected them with the notion of sustainable food.

#### **5.2.2.1.1.2 EATING OUT AND HOME PRODUCTION**

Eating out (e.g. take-away or fast food) and home production of food in the forms of home cooking or growing food at home were identified as another dominant sub-theme. This sub-theme is characterised by behaviours that involve the production of food which may include producing food and, in contrast, getting ready meals and take-aways. Participants perceived take-away food and processed food as less environmentally friendly. For example, when asked about non-sustainable food behaviours 104 talked about getting take-away food:

*“probably getting a take-away. Someone is driving that to my house, and I’m eating that. We do that a couple of times a month.” (104)*

Cooking or growing food at home, on the other hand, was perceived as sustainable. Participants talked about preparing dinner at home, holding chickens to produce eggs or growing vegetables in their gardens:

*“I am quite lucky to be able to finish my shift early to be able to prepare a meal” (105)*

*“Eggs I have got my own hens, so I’ll eat their eggs.” (126)*

*“we have a polytunnel so we grow what we can” (132)*

This section shows that participants associate the life cycle process of food production with sustainability. The consumption of fast foods, ready meals, and take-away foods were considered to be less environmentally friendly, while growing food at home and home making was considered sustainable.

#### **5.2.2.1.1.3 FOOD WASTE AND COMPOSTING**

Food waste reduction and composting was identified as another dominant sub-theme in the theme sustainable food consumption at home. Again, participants talked both about behaviours they engaged in to avoid food waste and those that create food waste. For example, 104 talked about forgetting food in the cupboards that then end up as food waste:

*“I’ve got the worst habit of buying like vegetables like onions. [...] I put them in the back of the cupboard and then I forget about them.” (104)*

Behaviours that aimed at avoiding and ways to dispose of food waste included planning meals, feeding food waste to pets, and composting, as illustrated by quotes from 131, 126, and 105:



*“the other big thing we do, would be plan meals. So, reduce waste that way. We are like, we work out Sunday night what we are having for the rest of the week” (131)*

*“we don’t waste much food. But the dogs, honestly, you know, probably chuck away an apple core, just chuck it to the hens and they’ll eat that.” (126)*

*“We have got a compost pile in my garden” (105)*

Overall, the analysis of food-related ESBs shows that participants’ main focus was on behaviours related to travel distance, waste avoidance and the disposal of food. The common thread across sustainable food related behaviours at home are related to the life-cycle of the food production and disposal. The identified sub-themes covered the source of food (e.g. how far it has travelled, local food), food preparation (e.g. home grown, home-made), and avoidance of food waste and how it is disposed of (e.g. composting). Much less focus seems to be on different diet types that could reduce the environmental impact of food consumption (e.g. vegetarian or vegan diet) and therefore increase the sustainability of one’s food consumption.

#### **5.2.2.1.2 NON-FOOD ESBs AT HOME BEFORE THE INTERVENTION**

During the interviews, participants were also asked about non-food related sustainable behaviours. In the following, the three most dominant patterns are described which include recycling, everyday mobility, and household energy use.

##### **5.2.2.1.2.1 RECYCLING**

Recycling of household waste was identified as a very dominant pattern. Mostly, participants talked about the fact that they recycled and, less dominant, gave examples of the recycling process and how it made them feel. For example, participant 117 described positive emotions about his recycling behaviour and recycling strategies he used, while participant 106 described her experience of facilitating recycling facilities in her home:

*“I like the fact that I recycle. I kind of feel bad when I throw something away that isn’t recyclable. I pay attention to the symbols on packaging. [...] I’m trying not to throw anything away that could be recycled.” (117)*

*“[...] they have made it really easy at home by saying put all your recycling in one bin and everything else in another bin.” (106)*

##### **5.2.2.1.2.2 EVERYDAY MOBILITY**

Another dominant pattern among the non-food related ESBs was everyday mobility which included behaviours such as cycling, driving a car, public transport, and walking to places. This pattern was named everyday mobility as it covers behaviours of everyday transport routines and travels to holiday destinations were not included. In fact, participants did not mention flying or flying less as an (un)sustainable behaviour. Hence, the focus of this pattern is on everyday mobility at home, although

the commute to the workplace was included in this category as a transient behaviour between the home and the work setting.

Mostly, participants evaluated the modes of transport they used, typically considering walking to be the most environmentally friendly option and driving the most unsustainable transport mode. For example, 104 talked about choosing public transport over driving and trying to walk to places while 129 described situations in which she would choose one over the other transport mode:

*“I don’t drive, I take public transport. I try to walk places as well.” (104)*

*“ [...] try to walk cos I have to I drive so far to work and then I park the car and then I try to walk as much as possible the rest of the way.” (129)*

Other participants evaluated their own behaviour more negative by considering that their everyday mobility behaviour could be more sustainable. For example, 110 contemplated about different transport behaviours she engaged with concluding that she could be better:

*“I drive a big car and that is a choice I made. [...] I normally walk from the station. I’m not great from a transport perspective.” (110)*

#### **5.2.2.1.2.3 HOUSEHOLD ENERGY**

Household energy was identified as a dominant pattern which included heating and electricity use related behaviours. Participants predominantly talked about ways in which they saved energy at home, however, behaviours that result in energy waste were also mentioned. For example, 104 talked about how she would not switch devices off when she stopped using them:

*“I use huge amount of technology and electricity all the time. [...]. I have got the radio on in the background or sometimes I have my phone playing music and then I’ll leave that upstairs and I like pick up a tablet and I can leave that on upstairs [...] so I have a lot of things on all the time at home I probably don’t really need” (104)*

To save energy, participants reported behaviours that could be identified as curtailment (i.e. reduction of energy use, e.g. switching off lights) and efficiency (i.e. energy efficient technology use, e.g. using energy efficient light bulbs) behaviours (Gardner & Stern, 2008). For example, 129 improved the windows in her house (i.e. efficiency behaviour) while 107 and 108 talked about behaviours that would reduce their energy consumption at home:

*“I have had new windows in my house bought new windows and I think you know I’ve bought good quality windows that retain the heat but that was with some level [...]” (129)*

*“we have you know the bits and pieces [...] doesn’t leave that on standby using electricity or not [...] stuff plugged in when it doesn’t need to be, or phones and lap tops charging if they don’t need to be stuff like that. Turn all the lights off.” (107)*

*“I always wash clothes at lower temperature” (108)*

The above section showed that participants already engage in several both food and non-food related ESBs at home before the behaviour change intervention. The identified sub-themes and patterns covered a range of EBS around food consumption, mobility, energy use, and recycling at home. It should be noted that participants mentioned other behaviours which were not identified as dominant patterns. These included clothes shopping, reducing packaging, and water use related behaviours. The aim of this section was to identify a sort of baseline of ESBs participants already engaged in at home. The behaviour change intervention was discussed in detail in the previous chapter (CH4) and made a mixed impression on the employees. While some employees appreciated the reduction of meat in the canteen, rejected the changes or others showed reactant behaviours in the form of collective action against the changes (e.g. a petition for a meat week or buying meat that they brought to the canteen). The next section builds presents an analysis of behaviours and potential behaviour change participants talked about in the second, post-intervention, interview.

#### **5.2.2.2 POST-INTERVENTION BEHAVIOUR CHANGE AND SPILLOVER EFFECTS**

The next section presents the template analysis findings from the post-intervention interviews. The previous section constitutes a baseline of ESBs participants already engaged in before the behaviour intervention. This section focusses on the changes in ESBs at home that participants reported in the post-intervention interviews, which were interpreted as spillover effects. In addition to an analysis of behaviour changes, factors that were identified as facilitators and barriers to spillover as well as dominant behavioural contexts were analysed. For an illustration of the key themes, see Figure 36.

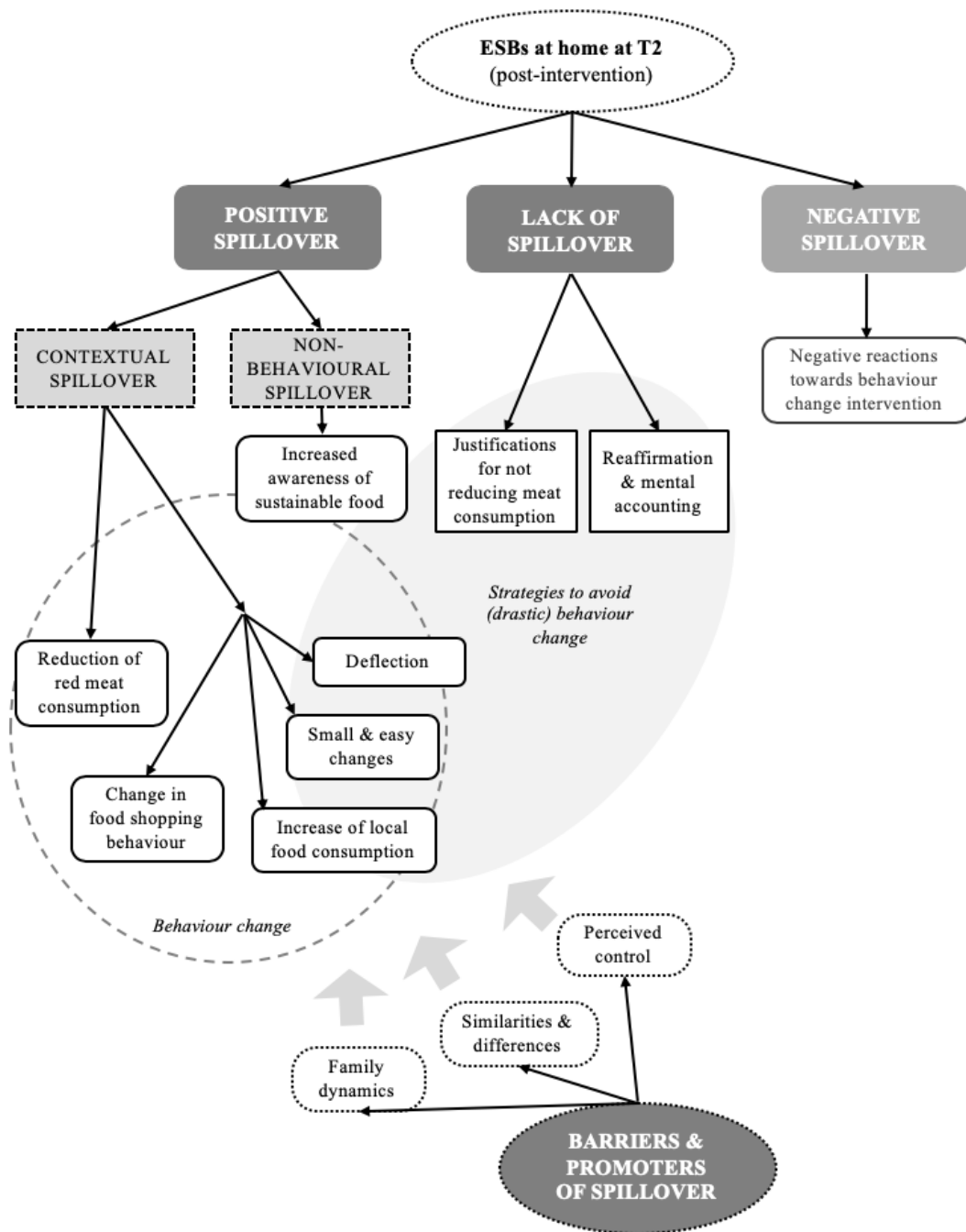


Figure 36: Overview of key themes from post-intervention interviews

#### 5.2.2.2.1 SPILLOVER EFFECTS FROM THE WORKPLACE TO BEHAVIOURS OUTSIDE THE WORKPLACE

The first overarching theme constitutes of the different types of contextual spillover effects that were identified in the interview data. *Contextual spillover* is here understood as changes in ESB at home. More specifically, any changes in ESBs outside the workplace and associated psychological constructs (e.g. awareness, attitudes) that participants attributed to the behaviour change intervention were considered as evidence for contextual spillover effects. The findings presented in this section suggest a positive association between the behaviour change intervention and post-intervention

behaviours, which were interpreted as spillover effects. Limitations to the attribution of impact are discussed in more detail in CH6 (see also e.g., Elf et al., 2019).

Three sub-themes within the theme *contextual spillover effects* were identified, namely positive, negative and the lack of spillover. The three sub-themes were part of the a priori template which was derived from the literature and the theoretical framework (see Figure 37 in section 5.3.3). Within the a priori template, the interview transcripts were coded, and further sub-themes were identified. The three types of spillover (positive, negative, lack of) were used to create the initial template for the analysis which were further refined based on the identified code patterns. Dominant sub-themes (i.e. mentions across five or more participants) include *behavioural* and *non-behavioural* (i.e. psychological) spillover effects. Behavioural spillover includes codes of actual post-intervention behaviour changes. Non-behavioural spillover refers to changes in awareness, intention and general thinking.

#### **5.2.2.2.2 POSITIVE SPILLOVER**

In the following, positive spillover describes an increase or new adoption of ESBs at home as reported by the interviewees. Within the theme *positive spillover*, the sub-themes behavioural and non-behavioural include patterns of behaviour change and changed attitudes, thinking and awareness. Within the sub-theme *positive behavioural spillover*, further sub-themes were identified, including reduced meat consumption, increase in consumption of local produce, changed shopping behaviour, small and easy changes, and deflection from the target behaviour (i.e. reduced meat consumption). The theme non-behavioural positive spillover includes no further subthemes.

##### **5.2.2.2.2.1 POSITIVE CONTEXTUAL SPILLOVER**

###### **5.2.2.2.2.1.1 REDUCED RED MEAT CONSUMPTION**

A reduction of meat in general and red meat consumption in particular was identified as a dominant pattern based on how interviewees seemed to have experienced it as one of the central messages from the behaviour change intervention and how often they talked about it. The behaviour change intervention at work promoted a reduction of meat consumption with a particular focus on red meat, as such a change in meat consumption at home was interpreted as *positive contextual spillover*. Participants talked about a change in their meat consumption which they linked directly to the behaviour change intervention at work. Participants reported setting unspecific meat reduction as well as at home, as a family and in restaurants. The example below illustrates how 126 made her whole family eat less meat after the behaviour change intervention at work:

*“The family [...] not because I sort of laboured a point to them, but because I buy better meat, we eat it less, because I have the same budget.” (126)*

A patterns of several strategies to reduce meat consumption was identified, which ranged from swapping red meat for white meats (e.g. chicken) to a general reduction of meat consumption, for example by trying a vegetarian month or meat free Mondays. The quotes below illustrate these strategies:

*“we’re trying to do the meat free Monday and that will then spillover to either the Tuesday or Wednesday cause we have got leftovers to eat as well” (131)*

*“just replacing the majority of red meat with white meat [...] generally we have meat at most meals and we can get away from that, in fact I don’t necessarily need to have meat in every meal” (107)*

#### **5.2.2.2.1.2 LOCAL PRODUCE (UK)**

Besides reducing meat consumption, participants also reported changes in other ESBs as a result of the behaviour change intervention which were categorised as *positive contextual* spillover effects. Consumption of local produce was identified as a dominant pattern that was not targeted by the behaviour change intervention. However, it should be noted that the information material provided during the behaviour change intervention recommended local and seasonal fruit and vegetable consumption (see CH4 for more details about the behaviour change intervention).

The increase in local produce was particularly characterised by an increase in consumption of supermarket products from the UK. Participant 131 gave an example of buying strawberries from the UK instead of strawberries from Spain, even though the latter were cheaper:

*“It is something I try and keep up with now a bit more instead of just giving it a lip service. [...] I was shopping on Saturday and I went to get some strawberries. And there were like two different punnets. Some somewhat cheaper than the other. The cheaper ones were from Spain whereas the other ones were from the UK. So, I thought, well I get the UK ones because we can grow strawberries, why do I need to get them from Spain. So little things like that, where the origin is in certain things, whereas previously I might not have.” (131)*

A dominant reason for the increased consumption of local produce was a perceived easiness of changing that behaviour over a reduction of meat consumption, as illustrated by a quote from 106:

*“It is easier to get locally produced vegetables than to eat less meat because I get to do the shopping, I get to choose the vegetables I buy where I have to eat meals my partner also likes to eat.” (106)*

#### **5.2.2.2.1.3 FOOD SHOPPING BEHAVIOUR**

Changed food shopping behaviour was identified as another sub-theme of behavioural positive spillover. Similar to purchasing local produce, food shopping behaviour was not targeted by the behaviour change intervention and therefore categorised as an positive contextual spillover effect. This sub-theme is characterised by a pattern of changes to the way participants did their daily shopping that participants related to the behaviour change intervention. For example, 107 talked about how he would pay more attention to sustainability labels of foodstuff:

*“actively looking for a bit more if I’m there doing the shop, I actively look kind of this if there is any indicator of its more sustainable or less sustainable kind of thing” (107)*

While food shopping behaviour was identified as a contextual spillover effect (i.e. spillover to another setting), the behaviours takes place in the supermarket rather than the home setting. The supermarket as a *third place* for behavioural spillover is discussed in section 5.2.2.4.

#### **5.2.2.2.1.4 SMALL AND ‘EASY’ CHANGES**

Small and ‘easy’ changes was identified as a sub-theme that includes reports from participants about behaviours they changed and also perceived as easy or small. There is an overlap between the theme small and easy changes and local food consumption, however, the sub-theme small and easy changes constitutes of more generic behaviour changes which may include an increase in local food consumption. The sub-theme is characterised by small and easy changes participants reported to improve their environmental impact. For example, 105 talked about how experienced making pizza from scratch instead of buying frozen pizza as he previously would have and how he perceived getting local produce as much easier than looking into other environmental impacts. The participant compares different actions and weighted up as how easy or difficult he saw them:

*“So, it’s things like we fancy pizza so it’s making my own instead of getting a frozen pizza. It’s little changes like that that started being influenced. [...] looking where it’s from is as easy as counting from one to ten. Whereas looking at environmental impacts of production and then looking at environmental impacts of the actual preparation is like trying to count from 1 to 60 but in hexadecimal numbers.” (105)*

#### **5.2.2.2.1.5 DEFLECTION**

The sub-theme deflection is characterised by participants deflecting from the target behaviour in the behaviour change intervention (i.e. reduction of meat) to other issues and/or ESBs. There is an overlap with local food consumption and ‘small and easy changes’, however, this sub-theme is characterised by explicit behaviour changes participants did instead of focussing on the environmental impact of meat or reducing their meat consumption. This was often accompanied by perceived restrictions to changing some ESBs as highlighted by a quote from 106:

*“I think the only moment, the only realistic thing that I could really keep tabs on is where my food is coming from.” (106)*

For interviewees that indicated a strong meat preference, there was a tendency to deflect from questions about reducing meat. These deflections would be to talk about other ESBs or issues they felt were important to focus on. For example, 117 focussed on waste instead of meat consumption:

*“Interviewer: And why do you think you thought about waste rather than reducing meat at home?  
Interviewee: Because, I suppose, I eat the meat. So that is not wasted. Whereas the packaging goes into the bin. And yeah. It is normally the plastic packaging that I have to throw away.” (117)*

#### **5.2.2.2.2 NON-BEHAVIOURAL POSITIVE SPILLOVER – INCREASED AWARENESS**

Non-behavioural spillover was identified as a sub-theme that included participants' reports of increased awareness of the environmental impact of food consumption. However, the increased awareness would not necessarily lead to a change in any behaviours. For example, 117 talked about an increased awareness which might lead to further changes in the future:

*“It certainly made me think more about food, I mean, who knows, I might be a vegan in 5 years or something. [...]” (117)*

Overall, several patterns of positive (i.e. pro-environmental) changes in participants' behaviours at home were identified. The identified changes include changes in the target behaviour of the intervention (i.e. reduction in meat consumption), but also go beyond with changes in other food related ESBs. While causal effects between the behaviour change intervention and behaviour changes at home may not be assumed, these findings provide, nonetheless, evidence for potential positive spillover effects between the work and home context.

#### **5.2.2.2.3 LACK OF SPILLOVER**

Patterns of a lack of spillover were identified in the interview data. The theme lack of spillover describes instances when people make no changes to their behaviour after the behaviour change intervention. In the post-intervention interviews, participants were specifically asked if they had changed any of their behaviours after their behaviour change intervention at home. When participants talked about not having changed anything, this was coded as a lack of spillover. Two subthemes were identified, namely *justifications for not reducing meat consumption* and *reaffirmation and mental accounting*.

##### **5.2.2.2.3.1 JUSTIFICATIONS FOR NOT REDUCING MEAT CONSUMPTION**

The sub-theme *justifications for not changing* describes a pattern of arguments for not changing meat consumption. Participants seemed to have been aware of potential changes they could make but bring forward arguments why they are not making those changes (i.e. barriers to spillover). The arguments range from not wanting to give up meat to high costs of changing meat consumption behaviour. For example, 117 talked about an increased awareness, but puts forward perceived high costs as a reason for not having changed his meat consumption:

*“It made me aware of changes I could make, definitely. And, kind of pushed it slightly up the priority list maybe. But not like a huge deal, it's something I'd like to sort at some point. But maybe not now. [...] I suppose because the cost is high. So, you know, taking up recycling is a bit of an extra pfaff but I can't really justify not doing it to myself. But changing you know how much meat and dairy I consume is, like it's a noticeable change” (117)*



110 also reported no changes in her meat consumption. When asked why she did not change her meat consumption she referred to her meat-eater identity:

*“I don’t know. I just think because I’m a meat-eater and that is something that has always been instilled in me that’s going to be the tastier option.” (110)*

#### **5.2.2.2.3.2 REAFFIRMATION AND MENTAL ACCOUNTING**

The sub-theme *reaffirmation* is pattern that is characterised by participants’ reinforcement of behaviours they already engaged in. This reaffirmation or reinforcement of existing ESBs often led participants to not change any further behaviours (i.e. negative spillover effects). For example, 105 re-evaluated a behaviour that he had already engaged in and gave it a new meaning; i.e. being a sustainable behaviour:

*“Like I say, I’ve always bought British produce and I suppose under some false sense of patriotism, it’s British, so it has to be good, we made it. So, I was getting it for that reason and now I realise how good it is to get stuff locally as opposed to the other end of the planet.” (105)*

Similarly, 126 refers to behaviours that she already engaged in and already felt she was doing as much as she could:

*“I think we were already at least half way there anyway. We were already thinking about what we ate and its origin anyway. [...] I feel I do everything I can.” (126)*

Only a few instances of the lack of spillover were identified. Instances of a lack of spillover were often accompanied by excuses and justifications of why no behaviour change occurred.

#### **5.2.2.2.4 NEGATIVE REACTIONS/ SPILLOVER**

Negative spillover is understood as a decrease in an ESB or an increase in an environmentally harming behaviour (e.g. increase in red meat consumption at home after the intervention). There was not sufficient evidence of negative spillover, and no dominant pattern was identified. However, reactant behaviour and rejection towards the changes were noted. For example, anecdotally, there were reports of negative responses to the intervention which included reactant behaviours such as employees going to a shop nearby to buy meat to add to the vegetarian sandwiches (see CH4). This form of reactant behaviour could indicate an experience of identity threat, as proposed in the theoretical framework (see next section for a discussion). Similarly, negative reactions and rejection of the changes were identified in one interviewee, 129. While 129 reported no increase in negative ESBs following the intervention, she reacted negatively to the theme of the intervention by cynical remarks and verbalizing resistance to its aims and benefits:

*“I don’t think people would stop eating meat. And I think it would have far more disastrous consequences in terms of people’s health, in terms of economies, things like that, if people stopped eating meat. [...] It was just a bit biased, the questions were a bit, you couldn’t answer anything other (laughing) oh my, we should all be eating this sustainable food.” (129)*

#### 5.2.2.2.5 SUMMARY

The interview data provides evidence for positive contextual spillover as well as some evidence for a lack of spillover effects from the behaviour change intervention at work to ESBs at home. Evidence was identified for a positive contextual spillover effect from the behaviour change intervention to meat consumption at home. Furthermore, positive contextual spillover effects towards ESBs at home were identified (e.g. increases selection of local foodstuff). An increased awareness of problems related to sustainability and food was also identified, however, while this was recognised as a positive non-behavioural spillover effect, an increase in awareness was often accompanied by no behaviour changes (i.e. lack of spillover). No convincing evidence was identified for negative spillover effects; however, anecdotal evidence hints at potential negative behavioural reactions employees engaged in at work following the behaviour change intervention (for more details, see Appendix B, section 9.2.7.2.3).

When compared to the pre-intervention meat consumption, the reduced post-intervention meat consumption strengthens the evidence for positive contextual spillover from the workplace to the home setting. In the pre-intervention interviews, meat consumption or a reduction of such was not identified as a dominant theme. However, the two dominant diet types flexitarian and meat-eater, with which participants identified, suggest that meat consumption was a staple in participants' diets. Hence, reports of a reduction of meat consumption in the post-intervention interviews was categorised as positive contextual spillover effects from the behaviour change intervention at work to the home context. While these findings provide strong evidence for positive spillover effects, caution is necessary when interpreting these findings with regards to a causal relation between the intervention and changed behaviour (for a more detailed discussion of the findings see CH6).

In the pre-intervention interviews, three patterns of food-related ESBs were identified: local food consumption, eating out and home production, and food waste and composting. In the post-intervention interviews, one of those three themes reoccurred (i.e. local food consumption) and was characterised by participants reporting an increase in local food produce consumption. While at T1 the local food consumption pattern consisted of a mix of non-local as well as local food consumption behaviours, the identified pattern at T2 was more prevalent towards local food consumption. More specifically, a change towards an increase of local food consumption was reported by participants in the post-intervention interviews. Although local food consumption was already a dominant food-related ESB at T1, the identified change and increase at T2 can be identified as a positive spillover effect.

The other (non-)ESB patterns that were identified in the pre-intervention interviews were not dominant in the post-intervention interviews. Although participants mentioned, for example, recycling and household energy related behaviours, these were not identified as dominant patterns, particularly not with regards to changes in these behaviours. This may be due to the focus on sustainability and food during the behaviour change intervention as well as the post-intervention interviews. It is possible that

participants have changed these behaviours (consciously or unconsciously), however, did not mention them in the post-intervention interviews. For a full discussion of these findings, please see the discussion chapter (CH6).

Overall, these findings show that a behaviour change intervention in the work place can have (mostly) positive effects on the promoted and related behaviours in the home setting (i.e. positive contextual spillover effects). Nonetheless, these findings should be treated with caution with regards to their generalisability and causal relationship between intervention and post-intervention behaviour changes. In the next section, factors that may have influenced these spillover effects are presented. The aim of the next section is to get a better understanding of factors that may act as catalysts or barriers to positive and negative contextual spillover effects.

### **5.2.2.3 FACTORS THAT INFLUENCE CONTEXTUAL SPILLOVER EFFECTS**

The overarching theme *factors that influence behaviour change and spillover effects* consists of factors that were identified as facilitators and barriers to spillover effects between the work and home setting (for a theoretical discussion, see CH2). Several factors were identified, including social norms and habits, however, four sub-themes were dominant (i.e. found across five or more interviewees), which are reported below. It should be noted that some of the identified patterns do not refer to the behaviour change intervention, but are nonetheless of interest for this thesis.

#### **5.2.2.3.1 SIMILARITIES AND DIFFERENCES BETWEEN HOME AND WORK**

Similarities and differences between home and work was included in the initial template and of particular interest for this study. Previous research on contextual spillover effects had found that similarities and differences between the home and work setting (e.g. similar equipment) influenced the likelihood of positive spillover between the two settings (Littleford et al., 2014). Although the theme is named *similarities and differences* the codes predominantly include differences between the two settings.

Similar to previous research, similarities and differences in the physical infrastructure (e.g. recycling bins) between the work and home were identified as a dominant pattern. Particularly dominant were the perceived differences, rather than similarities, between the work and home setting with regards to recycling facilities. At home, participants felt the available facilities facilitated their recycling behaviour, whereas at work the recycling facilities were perceived as poorly labelled or not existent. This difference acted as a barrier to spillover effects between the two settings, more specifically from the home to the work context. For example, 102 who pointed out that he recycled at home but could not at work:

*“at home I recycle, I try to recycle as much as I can. But it there doesn't seem to be any recycling at work. That is one difference.” (102)*

The different social settings of the home and work place were identified as another dominant setting within the sub-theme *similarities and differences*. Within this pattern, a dominance was observed with regards to differences in perceived empowerment and influence on other people. Participants perceived a greater influence on others (i.e. family and household members) at home in comparison to others at work (i.e. colleagues). For example, 126 described how she would not try to influence colleagues, however, she would do so at home:

*“at work, I mean, you know, people do what they do and it’s up to them really. I look after other things. At home I can influence my family. Which is okay. Which, they are too lazy to cook, most of the time. I win.” (126)*

### **5.2.2.3.2 PERCEIVED CONTROL**

Perceived control was identified as one of the most dominant sub-themes that seemed to have influenced post-intervention behaviour change (i.e. spillover effects). Within this sub-theme, two patterns were identified: (1) differences in perceived control between the home and work setting, and (2) more generally perceived lack of control over behaviours. The first pattern overlaps with the sub-themes *similarities and differences* and is characterised by a perceived lack of control over certain ESBs at work, which participants felt in control of at home. For example, 106 talked about her perceived feeling of control over her recycling behaviour at home while she felt less in control at work:

*“I guess I try harder at home because at work, even if I do something really well, then someone else can come and ruin it. Whereas at home I’m in control of what happens. If I do recycling correctly, then that’s the way it gets done.” (106)*

Similarly, 131 highlighted the different degrees of perceived control he experienced about certain choices such as choosing an energy supplier:

*“As a person I don’t feel like there is a lot I can do in the company, that I have control of. Like I don’t choose who our energy supplier is, where the data centre options whether it’s a green one or not. Things like switching off my computers and monitors, I can do that. That is easy for me to do.” (131)*

The second pattern within the sub-theme *perceived control* is characterised predominantly by a perceived lack of control over changing certain behaviours. Here, the perceived lack of control was identified as a facilitator as well as barrier to spillover effects from the behaviour change intervention. Overall, five participants talked about control as a factor that influenced their post-intervention behaviour. For example, 110 talked about having changed her meat consumption while not feeling in control to change other behaviours:

*“I have stopped eating as much meat as I used to have. But I don’t think that anything else at work, because I can’t change that. I can’t change the fact that I don’t appear to recycle or make it easier for people to recycle.” (110)*

Overall, the perceived lack of control seems to have acted as a barrier to post-intervention behaviour change or, to put it another way, as a catalyst for the lack of spillover. Similarly, perceived

control seems to have acted as a facilitator for participants' deflection of post-intervention behaviour changes from the target behaviour of the behaviour change intervention (i.e. meat consumption) to other, related ESBs. For instance, 106 talked about feeling to be in control of the origin of her foodstuff, which is also the behaviour she reported to have changed:

*"I think the only moment, the only realistic thing that I could really keep tabs on it where my food is coming from. [...] So, yeah, just where the food comes from is an easily controllable thing where I can choose food by quite easily." (106)*

Perceived control was identified as a very dominant and important factor that influenced participants' post-intervention behaviour (i.e. spillover effects). On the one hand, the perceived difference in control between the home and work setting acted as a barrier to spillover effects between the settings, particularly from home to work. With regards to the behaviour change intervention, a perceived lack of control over certain behaviours (e.g. living situation) may have facilitated a deflection from changing a more 'difficult' behaviour to an easier, more controllable behaviour.

### **5.2.2.3.3 FAMILY DYNAMICS**

Family dynamics were identified as a dominant pattern that had an influence on the changes participants made after the behaviour change intervention. Within this pattern participants described situations at home which facilitated or hindered them to change their post-intervention behaviour. For instance, 106 talked about how she had to negotiate with her partner to change their meat consumption at home and that he made her eat more meat after the behaviour change intervention than she wanted:

*"I have been making an effort to eat less meat, but my partner really doesn't want to eat less meat. [...] So, when we decide what to eat and he says oh I really want a curry, let's make a curry tonight, I'll try to bargain with him and say oh can we have beans in it then. [...] So, I'll try to compromise with him. But yeah, I guess he makes me eat a lot more meat than I would otherwise." (106)*

Similarly, other participants talked about how they had advocated sustainable diets in their families or had discussions about diet changes and sustainable food with family members, see for example participant 112 below. Others reported that the whole family changed their behaviours as a result of the behaviour change intervention in the workplace. For instance, 126 reported that the changes made during the behaviour change intervention triggered a discussion at home with her family which led to them quitting processed pork:

*"I think, especially with home, I kind of am advising people a little bit more now. [...] So, I remember telling my mum about all these different dishes and we were talking about sustainable food week, and sweet potato came up again in conversation." (112)*

*"Definitely, definitely influenced that. [...] Because, we went into details [...], we spoke about stuff. And, we'd only because of that, because it started a thread of conversation that we would not eat processed pork again. So, we will not be having ham for our sandwiches." (126)*

Family dynamics is a contextual factor that differed between participants' home contexts. However, it was identified as an important factor that acted as both a facilitator for change as well as a barrier. When the family context acted as a facilitator to behaviour change, there was a tendency for further knock-on effects of behaviour change, i.e. other family/ household members also changed their behaviour. Similarly, other household members acted as barriers to change which reduced the scope of positive spillover effects from the intervention to ESBs at home.

Overall, the identified factors presented above highlight the importance of the physical but especially social context of spillover behaviours. Perceived similarities and differences between the home and work setting acted as facilitators or barriers to positive spillover effects, respectively. Particularly perceived control and the lack of such seemed to have influenced whether positive or a lack of spillover happened. Of particular relevance for positive spillover effects from the intervention at work to home was also whether the family or household members supported or discouraged behaviour changes (e.g. reduction of meat consumption).

#### **5.2.2.4 CONTEXTUAL SPILLOVER TO OTHER CONTEXTS – THIRD PLACES**

The main focus in the interviews was on the work and home context, however, other settings were identified as important places where post-intervention behaviour change took place. Particularly the supermarket stood out as a context for behaviour change, where participants reported changes in their food purchasing behaviour and increased awareness for labels on food stuff about sustainability. A second place that stood out was *media*, as a place for information consumption. Although a digital environment, *media* or the digital world as a context for spillover behaviour was identified as a relevant theme. These contexts are introduced below.

##### **5.2.2.4.1 SUPERMARKET**

Besides the home, the supermarket was found to be a particularly central setting where participants reported post-intervention behaviour changes (i.e. spillover effects). Mostly, behaviour changes in the supermarket included spending more time in the supermarket and looking for labels that indicate some form of sustainability (e.g. origin). For example, 104 talked about how being in the shop triggered her to think about the sustainability of the food, such as the origin:

*“for me the difference is that when I go to the shop, I think more about what I’m eating, And when I go to buy something I think more about where it came from. [...]And something I noticed is that actually try to look where food is coming from and whereas before I never, you know” (104)*

It seems that the supermarket played an important role in priming participants to think about the information that was communicated during the behaviour change intervention. However, while the promoted behaviour of the intervention was reducing red meat consumption and increasing fruit and vegetable consumption, most participants reported that they increased their search for information about

the food (e.g. produced in the UK). As such, instead of looking for meat alternatives or fruit and vegetable options, the dominant behaviour in the supermarket seemed to have been the search for information about products participants had already been buying. Participant 131, for example, talked about how previously (i.e. before the behaviour change intervention) he would have made a choice based on price, whereas his post-intervention food choices in the supermarket included an evaluation of the sustainability of a product as well. However, the decision was based on the same product (i.e. strawberries), rather than comparing alternative products (e.g. locally grown fruit versus strawberries):

*“I was shopping on Saturday and I went to get some strawberries. And there were like two different punnets. Some somewhat cheaper than the other. The cheaper ones were from Spain whereas the other ones were from the UK.”(131)*

These findings highlights that the effects of a behaviour change intervention at work can spill over to multiple contexts. As such, it seems that the spillover effects followed a decision-making chain, which, in the context of food consumption, led to behaviour change in the supermarket as a place where consumers make decisions about their food consumption. As such, the supermarket was found to be a central place for positive spillover effects in this study. However, participants seemed not to have changed the type of products they bought, but instead within the products they would normally buy they were looking for signs of sustainability (e.g. local produce, organic). Furthermore, the findings presented above highlight how food labels guided participants’ food choices.

#### **5.2.2.4.2 MEDIA**

The media is another spillover context that was identified in the post-intervention interviews. Participants reported being more attentive to sustainability related news and documentaries, which indicates an increased salience. Media or the digital world are characterised by information consumption, which is a rather passive behaviour, and content creation (i.e. social media), a more pro-active behaviour. In the interviews, participants reported that the behaviour change intervention had affected their media consumption behaviour. Most commonly, participants talked about an increased awareness of sustainability as a topic and an increased consumption of content related to sustainability. For example, participant 107 talked about how his general attention and consumption of sustainability related media content had increased since the behaviour change intervention at work:

*“I just saw something on the news about it, whereas before I would just like skipped over it. [...], yes, just paid more attention really to stuff like that and see if there is anything any indicator of that.” (107)*

As such, the behaviour change had an effect on the media consumption related to the topic of the intervention. For some participants the increased passive engagement in media context (e.g. watching a TV programme) led to an active engagement in information seeking. For example, participant 112 talked about watching a programme about vegetable farming which increased her

interest in subscribing to a food delivery scheme that sells non-standard vegetables and after watching the programme, she searched for such a scheme near her :

*“I was watching a show about how different veg get grown a certain way [...]. It is just about kind of like what doesn't get sold, obviously will get sold in some other way, and looking into that, I looked into the whole wonky veg box and I am really interested in some of it.” (112)*

As shown in the example of participant 112, it seems that a ripple effect from the behaviour change intervention to an increased awareness of the topic of sustainability and food in the media space, which can lead to a passive engagement with the media content. However, in some cases the passive engagement can result in active engagement (e.g. actively searching for more information), which could potentially lead to further behaviour change. Hence, it seems that the space media can act as a catalyst to spillover effects.

Overall, the findings discussed in the above section showed how a behaviour change intervention in the workplace can affect ESBs in multiple contexts, including the home, the supermarket, and the media. What is interesting about the different contexts is that they differ in their characteristics. For instance, the home context is private, and the individual has the most control over their behaviours, while the supermarket as well as the media are less private environments and the individual becomes a consumer of goods (supermarket) and contents (media). However, the permeability of ESBs between these contexts indicate that a behaviour change intervention in one of the contexts can have ripple effects on behaviours in the other contexts. However, as shown in section 5.2.2.3, particularly factors such as social dynamics and perceived control can facilitate or act as barriers to spillover effects between these contexts.

### **5.3 INTEGRATION OF THE QUANTITATIVE AND QUALITATIVE FINDINGS**

The aim of this section is to relate the initial findings presented in the previous sections with the proposed theoretical framework and to deepen the analysis of the findings. The theoretical framework is based on similar principles to the IPT and aims to provide a better understanding of spillover. In the context of this study, the framework is used to explain post-intervention behaviour changes in the home setting – i.e. positive, negative, and the lack of spillover. In chapter 2 the grounds of the framework have already been argued, as such, this section focusses on assessing the evidence found in the study to assess the claims of the theoretical framework. For this, the quantitative and qualitative findings were used to assess the theoretical framework.

In the following, the consistency of the findings across the different methods are discussed (5.3.1). This is followed by a summary of the framework followed by a presentation of the evidence that was found in the main study. The first section focusses on the ‘pathway’ to positive spillover and briefly elaborates the identity integration process, the changes of the centrality to the self are assessed



results underpinned with the visualisation method, and how this, according to the framework, leads to spillover. The quantitative and qualitative findings presented above as well as additional themes that were identified in the interviews are used to assess the evidence for the theoretical framework. The second section and third section use a similar approach to assess the evidence for the pathways to a lack of and negative spillover, respectively.

### **5.3.1 THE CONSISTENCY OF THE FINDINGS ACROSS THE DIFFERENT METHODS**

Overall, the findings were somewhat consistent across all three methods (i.e. survey, interviews, visualisation). Table 33 and Table 34 provide an overview of the survey results of the interviewed participants, the visualisation, and relevant interview quotes. As can be seen in Table 34, most participants explained why the terms are not very central to them which overall centred around them still engaging in ‘environmentally unsustainable’ behaviours as well as sustainability not being a core to their lives. Although the centrality of the terms as well as the movement varies between participants, those who tended to increase the centrality of the terms between T1 and T2 tended to talk more about how being environmentally friendly is a central theme in their lives (e.g. ID 105) and that they try their best (e.g. 107, 131) (see Table 34).

With regards to consistencies across the survey, visualisation, and interview data, the picture is somewhat mixed. In the interviews, participants 107, 112, and 131 talked about the most changes at home with regards to their meat consumption reduction (see previous section). This is somewhat reflected in their survey results where all three participants showed an increase in one or more of the ESBs at home (except for participant 107) and all showed an increase in the average score of environmental self-identity and prominence of environmental identity scales (see Table 33, positive changes indicated in green).

Similarly, participants that were the most skeptical about the changes (i.e. 117 and 129) showed a decrease in one of the ESBs at home after the intervention (see Table 33, negative changes indicated in red). Interestingly, both participants showed an increase in the two identity variables, which, according to the proposed framework, indicates an integration or increased salience of environmental identity. This is consistent with the results from the visualisation task, where both participants increased the centrality of the term environmentally friendly self post-intervention. As discussed in sections 5.3.3 and 5.3.4 as well as CH6, this could be an indication of a compartmentalisation of the concept environmental identity from the actual behaviour. Both participants show no or negative changes of ESBs post-intervention in the survey and also report no behaviour changes in the interviews, while reaffirming existing behaviours, such as recycling, as sustainable. In CH6 this will be discussed in more detail.

Participants that predominantly reported no behaviour changes in the interviews were also consistent in the survey. For example, participant 106 and 126 showed no changes in the survey, while also reporting no behaviour changes or changes or ‘small and easy’ changes in the interviews (see section 5.2). In the visualisation task, these participants showed a mixed picture with participant 106 decreasing the centrality of the terms post-intervention while participant 126 shows an increase, decrease and no change for the terms environmentally friendly-self, sustainable food, and sustainability, respectively. However, in the interviews, participant 126 reports a reduction of meat consumption at home. Similar inconsistencies can be observed with participants 105, 102, 104, 108 and 110. For example, participants 105 and 126 report mental accounting and re-affirmation strategies in the interviews which they used to justify no more substantial changes to their diets (e.g. reduction in meat consumption). Similarly, participants 110 and 104 reported a mix of small behaviour changes and no changes to ESBs at home. These inconsistencies in reported behaviour changes are reflected in the visualisation task as well as the participants’ survey results. While these findings are inconsistent in terms of alignment of identity and behaviour change, they are consistent in their inconsistency across all three methods.

Lastly, the stages of change also showed mixed results. Most participants showed no changes in their stages of change indication in the survey (see Table 33 and Table 34). Overall, three participants moved ‘up’ in the stages, which would indicate that these participants are closer to changing their food consumption behaviour. According to the stages of change theory (e.g. Bamberg, 2013), this would indicate behaviour changes; however, the findings from the survey and the interviews suggest that these three participants (104, 110, and 112) did not substantially change their behaviour, except for participant 112, while some of the participants that did not move up in the stages of change measure reported more substantial changes in their ESBs at home, both in the survey and interviews (e.g. participants 107 and 131). Hence, the stages of change measure seems to be inconsistent with the survey and interview findings.

Table 33: Interviewees' survey data on key variables

| ID  | Stages of change |          | Red meat consumption |                               | Fruit & vegetable consumption |                             | Local food consumption |                  | Average scale score food waste avoidance behaviour* |             | Average scale score environmental self-identity** |             | Average scale score prominence of environmental identity** |             |
|-----|------------------|----------|----------------------|-------------------------------|-------------------------------|-----------------------------|------------------------|------------------|---|-------------|---|-------------|--|-------------|
|     | T1               | T2       | T1                   | T2                            | T1                            | T2                          | T1                     | T2               | T1  | T2          | T1  | T2          | T1   | T2          |
| 102 | 5                | 5        | 1-2 times a week     | 1-2 times a week              | more than once a day          | more than once a day        | rarely                 | <b>often</b>     | 3.25  | <b>3.75</b> | 3.75  | 3.75        | 3  | <b>2.5</b>  |
| 104 | 2                | <b>4</b> | 1-2 times a month    | <b>less than once a month</b> | 3-6 times a week              | <b>once a day</b>           | often                  | often            | 4   | <b>3.75</b> | 4.75  | <b>3.5</b>  | 2.5  | <b>3</b>    |
| 105 | 4                | 4        | 1-2 times a week     | 1-2 times a week              | 1-2 times a month             | 1-2 times a month           | always                 | always           | 3.5   | <b>4.75</b> | 4   | 4           | 2.5  | <b>3.25</b> |
| 106 | 3                | n/a      | 1-2 times a month    | n/a                           | once a day                    | n/a                         | often                  | n/a              | 5   | n/a         | 4.5   | n/a         | 2.5  | n/a         |
| 107 | 3                | 3        | 1-2 times a week     | 1-2 times a week              | more than once a day          | more than once a day        | someti mes             | sometimes        | 3   | 3           | 4.5   | <b>4.75</b> | 3  | <b>4.5</b>  |
| 108 | 3                | 3        | 1-2 times a week     | 1-2 times a week              | more than once a day          | <b>3-6 times a week</b>     | often                  | <b>sometimes</b> | 4   | 4           | 3.25  | <b>3.5</b>  | 3  | 3           |
| 110 | 3                | <b>5</b> | 1-2 times a week     | 1-2 times a week              | more than once a day          | more than once a day        | always                 | <b>sometimes</b> | 3.25  | <b>4</b>    | 4.75  | <b>4.5</b>  | 2  | 2           |
| 112 | 4                | <b>5</b> | never                | never                         | once a day                    | <b>more than once a day</b> | often                  | often            | 4.5   | 4.5         | 4.75  | <b>5</b>    | 3.5  | <b>4</b>    |
| 117 | 3                | 3        | 1-2 times a month    | <b>1-2 times a week</b>       | once a day                    | <b>more than once a day</b> | rarely                 | <b>often</b>     | 4.33  | <b>5</b>    | 4.5   | <b>4.75</b> | 2.5  | <b>3.5</b>  |
| 126 | 5                | 5        | 1-2 times a month    | 1-2 times a month             | more than once a day          | more than once a day        | always                 | always           | 5   | <b>4.75</b> | 5   | <b>4.5</b>  | 3.25   | <b>4.75</b> |
| 129 | 3                | 3        | 1-2 times a week     | 1-2 times a week              | 3-6 times a week              | 3-6 times a week            | often                  | <b>sometimes</b> | 3.5   | <b>3.75</b> | 3.75  | <b>3.5</b>  | 2  | <b>2.25</b> |
| 131 | 5                | 5        | 1-2 times a week     | <b>1-2 times a month</b>      | 1-2 times a month             | <b>3-6 times a week</b>     | often                  | often            | 3   | <b>4.5</b>  | 5   | 5           | 4.75   | <b>5</b>    |
| 132 | 6                | <b>5</b> | never                | never                         | once a day                    | once a day                  | often                  | often            | 3.75  | <b>4.5</b>  | 4   | <b>4.75</b> | 2.5  | <b>3</b>    |

Notes: \*1 = never to 5 = always; \*\*1 = strongly disagree to 5 = strongly agree; **bold** indicates a change between T1 and T2, **green** indicates positive change from T1 to T2 (i.e. increase in direction with intervention), **red** indicates negative change from T1 to T2 (i.e. reduction in opposite direction of intervention); n/a = no data available

Table 34: Overview Visualisation Changes and Stages of Change

| ID  | Stages of change |    | Visualisation   | Change environmentally friendly self T1-T2 | Change sustainability T1-T2               | Change sustainable food T1-T2             |
|---|------------------|----|---|--|---|---|
|   | T1               | T2 |   |  |   |   |
| 102   | 5                | 5  | <p>ID 102, Male, 36-45</p>  | centrality:<br>→ ←<br><br>direction:<br>↑  | centrality:<br>← →<br><br>direction:<br>↑ | centrality:<br>← →<br><br>direction:<br>↓ |
| <b>ID 102 comments on visualization at T2</b> |                  |    | “I’m definitely interested in eating sustainable food. But at the same time it is not, it wouldn’t necessarily stop me eating food that is unsustainable if it is something I really want, I suppose. Environmentally friendly self, yeah, that is definitely an aspect, but it is not, I wouldn’t say it is central. I like to think that my day to day life is sustainable.”              |  |   |   |
| 104   | 2                | 4  | <p>ID 104, Female, 26-35</p>  | centrality:<br>==<br><br>direction:<br>↘   | centrality:<br>==<br><br>direction:<br>↗  | centrality:<br>==<br><br>direction:<br>←  |
| <b>ID 104 comments on visualization at T2</b> |                  |    | “So the things are like around me. Things that are important, but they are not the main focus of my entire life. It’s something that comes up now more so when I’m choosing what I eat, also the way I travel, I car share and little things like that. Trying to make things easier. [...] I would say it’s in the realm of it, but it’s not my main focus of everything I do”             |  |   |   |
| 105   | 4                | 4  | <p>ID 105, Male, 26-35</p>  | centrality:<br>→ ←<br><br>direction:<br>↓  | centrality:<br>==<br><br>direction:<br>== | centrality:<br>→ ←<br><br>direction:<br>↑ |
| <b>ID 105 comments on visualization at T2</b> |                  |    | “I have always got that core of being wanting to be environmentally friendly. [...] sustainable foods, it’s one of those things, it’s always been, not quite central, but something I have always done without even realising. It’s not quite central to who I am to be sustainable, it’s more about being local and about whether or not it is sustainable. So that is not quite central.” |  |   |   |

| ID  | Stages of change |     | Visualisation   | Change environmentally friendly self T1-T2   | Change sustainability T1-T2   | Change sustainable food T1-T2   |
|---|------------------|-----|---|--|---|---|
|   | T1               | T2  |   |  |   |   |
| 106   | 3                | n/a | <p>ID 106, Female, 26-35</p>  | centrality:<br>$\leftrightarrow$<br><br>direction:<br>$\rightarrow$  | centrality:<br>$\leftrightarrow$<br><br>direction:<br>$\uparrow$          | centrality:<br>$\leftrightarrow$<br><br>direction:<br>$\uparrow$          |
| <b>ID 106 comments on visualization at T2</b> |                  |     | <p>“Sustainability in life is the furthest. [...] And environmentally friendly Self. So, I guess that would also be, that would be equidistant, no further away. It would be equidistant to sustainability. [...] sustainable food I’m trying but it is still not on the top of my head because I’m not doing it very well.”</p>  |  |   |   |
| 107   | 3                | 3   | <p>ID 107, Male, 26-35</p>  | centrality:<br>$\rightarrow \leftarrow$<br><br>direction:<br>$\leftarrow$  | centrality:<br>$\rightarrow \leftarrow$<br><br>direction:<br>$\leftarrow$ | centrality:<br>$\rightarrow \leftarrow$<br><br>direction:<br>$\leftarrow$ |
| <b>ID 107 comments on visualization at T2</b> |                  |     | <p>“they are all kind of close but not I mean, I wouldn’t it’s not an overarching thing that I do with something that you know I do try to make improvements, but it’s not like making wholesale changes or anything like that so I guess just fairly close not a central thing. [...] obviously at home you can do more, whereas in the office you can kind of bound by the office environment a bit more, whereas at home just do, you do what you think is the correct thing to do.”</p> |  |   |   |
| 108   | 3                | 3   |   | (home)<br>centrality:<br>$\rightarrow \leftarrow$<br>direction:<br>$\downarrow$<br><br>(work)<br>centrality:<br>$\rightarrow \leftarrow$<br>direction:<br>$\downarrow$ | centrality:<br>$\rightarrow \leftarrow$<br><br>direction:<br>$\uparrow$   | centrality:<br>$\leftrightarrow$<br><br>direction:<br>$\leftarrow$        |
| <b>ID 108 comments on visualization at T2</b> |                  |     | <p>“They are not completely central, but they are on my radar, I guess. [...] I think it’s come inwards more since we spoke last. I don’t think it was as important to me previously. I think it was stuff that I thought about but I didn’t really understand it. Although my understanding has grown a bit I’m still not 100% but I have more of an understanding now than I had before.”</p>   |  |   |   |

| ID   | Stages of change |    | Visualisation   | Change environmentally friendly self T1-T2                 | Change sustainability T1-T2                                | Change sustainable food T1-T2                              |
|--|------------------|----|---|--|--|--|
|  | T1               | T2 |   |  |  |  |
| 110  | 3                | 5  | <p>ID 110, Female, 36-45<br/>(T2 work only)</p>   | <p>(work)<br/>centrality:<br/>→ ←<br/>direction:<br/>↑</p> | <p>(work)<br/>centrality:<br/>← →<br/>direction:<br/>↓</p> | <p>(work)<br/>centrality:<br/>← →<br/>direction:<br/>↓</p> |
|  |                  |    | <p>ID 110, Female, 36-45<br/>(T2 home only)</p>   | <p>(home)<br/>centrality:<br/>→ ←<br/>direction:<br/>←</p> | <p>(home)<br/>centrality:<br/>→ ←<br/>direction:<br/>←</p> | <p>(home)<br/>centrality:<br/>==<br/>direction:<br/>↓</p>  |
| <p><b>ID 110 comments on visualization at T2</b></p> |                  |    | <p>“I would like to think that I’m quite environmentally friendly and I like to do things that are environmentally friendly. [...] Sustainable food has become more, I’m quite conscious about that so I try to do it, but I wouldn’t, so I try to do it eating sustainable food, but I wouldn’t massively go out of my way. [...] So I do as much as I can, but I’m not going to massively go out of my way to only buy organic food or only eat meat twice a week and stuff like that. So I do feel like I do as much as I can and some of it is out of my, not out of my control, because I guess everything is within your control, but I’m not going to change that [...] I do me bit there, dip my toe in it [...] I don’t feel like we have any influence over the sustainability of the food here [workplace]. Sustainability in general I don’t feel it and environmental I try to, but I don’t feel like we help”</p> |  |  |  |
| 112  | 4                | 5  |   | <p>centrality:<br/>==</p> <p>direction:<br/>==</p>         | <p>centrality:<br/>→ ←</p> <p>direction:<br/>↓</p>         | <p>centrality:<br/>← →</p> <p>direction:<br/>↓</p>         |
| <p><b>ID 112 comments on visualization at T2</b></p> |                  |    | <p>“being sustainable with my choices and also buying sustainable foods. So that is kind of like key.”</p>  |  |  |  |
| 117  | 3                | 3  | <p>ID 117, Male, 26-35</p>  | <p>centrality:<br/>→ ←</p> <p>direction:<br/>←</p>         | <p>centrality:<br/>→ ←</p> <p>direction:<br/>←</p>         | <p>centrality:<br/>==</p> <p>direction:<br/>↗</p>          |

| ID  | Stages of change |    | Visualisation                | Change environmentally friendly self T1-T2 | Change sustainability T1-T2                | Change sustainable food T1-T2              |
|---|------------------|----|------------------------------|--|--|--|
|   | T1               | T2 |                              |  |  |  |
| <p>“It is not one of my core concerns. But it is still quite close. Environmentally friendly. Sustainability, obviously, I think it’s kind of the same. Yeah, I’d say it’s the same, the same level. And then sustainable food that would be a little bit further away but definitely in my sphere of awareness and concern. Yeah, but they are not core values or worries.”</p>  |                  |    |                              |  |  |  |
| ID 117 comments on visualization at T2  |                  |    |                              |  |  |  |
| 126   | 5                | 5  | <p>ID 126, Female, 36-45</p> | <p>centrality: → ←</p> <p>direction: →</p> | <p>centrality: ==</p> <p>direction: →</p>  | <p>centrality: ← →</p> <p>direction: →</p> |
| <p>“So that one [environmentally friendly self], so I feel I do everything I can. Not everything I do as much as I can. The sustainable food I do as much as I can, but I have to also buy other stuff for my family and so, apart from cooking convenience meals, which I haven’t got enough hours in the day to do it, I can’t fully influence that one I don’t think. Sustainability, I’m guilty of putting half a load of washing on. I’m guilty of that.”</p>  |                  |    |                              |  |  |  |
| ID 126 comments on visualization at T2  |                  |    |                              |  |  |  |
| 129   | 3                | 3  | <p>ID 129, Female, 36-45</p> | <p>centrality: → ←</p> <p>direction: ↑</p> | <p>centrality: ← →</p> <p>direction: ←</p> | <p>centrality: ==</p> <p>direction: ↓</p>  |
| <p>“Well, just as the premise that I try to do what I can in terms of recycling and things like that, reusing. I don’t throw out food and stuff like that. Even here, I go and ask for a cat bag, so if I don’t eat all the meat I’ll take it home. Feed it the cat if I can [...] it is not that close to the forefront of my mind in the general lifestyle. I don’t think I have a massive impact”</p>  |                  |    |                              |  |  |  |
| ID 129 comments on visualization at T2  |                  |    |                              |  |  |  |
| 131   | 5                | 5  | <p>ID 131, Male, 26-35</p>   | <p>centrality: → ←</p> <p>direction: →</p> | <p>centrality: → ←</p> <p>direction: ↗</p> | <p>centrality: → ←</p> <p>direction: ↑</p> |
| <p>“I guess like how you want to be would be all of these bang on top of here [most central]. That would be the aim. How I am, probably I say like that. Environmentally friendly would be closest and then sustainability and sustainable food, a bit further away, sustainable food probably the furthest. That is how I see myself.</p> <p>C: Why do you think it [sustainable food] is a bit further away?<br/> 131_T2: Just because it is so convenient to get things that aren’t sustainable. Like, when you just look at here, if you didn’t want to eat in the canteen, between here and Tesco you have got maybe three sandwich shops, I have no idea what they put in there.”</p> |                  |    |                              |  |  |  |
| ID 131 comments on visualization at T2  |                  |    |                              |  |  |  |

| ID  | Stages of change |    | Visualisation  | Change environmentally friendly self T1-T2 | Change sustainability T1-T2               | Change sustainable food T1-T2             |
|---|------------------|----|--|--|---|---|
|   | T1               | T2 |  |  |   |   |
| 132   | 6                | 5  |  | centrality:<br>→ ←<br><br>direction:<br>↓  | centrality:<br>→ ←<br><br>direction:<br>← | centrality:<br>→ ←<br><br>direction:<br>↑ |
| <b>ID 132 comments on visualization at T2</b> |                  |    | <p>“I mean that’s very central to myself and I suppose that would be little bit further away and err, that would-be kind of in the middle so all fairly close. [...] sustainability I mean I’m going to be as honest as I possibly can I think you know you look at different things and do buy things off season. So that is the only factor I’m using to say that’s not as central, you know, but obviously it’s key.”</p> |  |   |   |

### 5.3.2 RECAP OF THE THEORETICAL FRAMEWORK

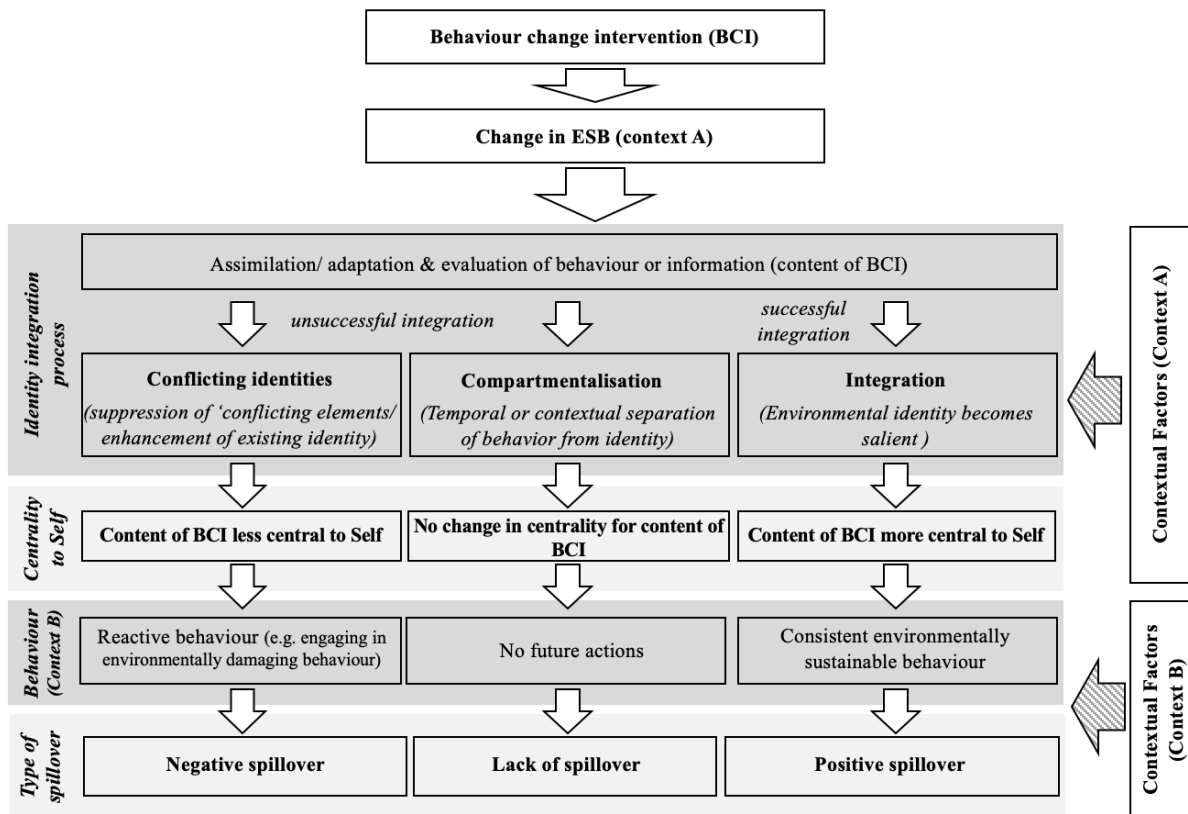
The conceptual framework is based on the principles of IPT (Breakwell, 1986), and aims to explain spillover effects from a behaviour change intervention in the workplace to ESBs at home. This may include subsequent behaviours different to the behaviour promoted in the intervention or behaviours in settings other than where the behaviour change intervention took place. It is proposed that a behaviour change intervention sets in motion an identity integration process in which information from the intervention is integrated into one’s identity structure. If successful, the integration can lead to positive spillover effects, however, if unsuccessful, negative or the lack of spillover may occur.

Two processes drive the integration of the information. The first process constitutes of the two sub-processes; identity assimilation and identity accommodation. Identity assimilation maintains the self-identity by integrating new components (e.g. new information from the intervention) into the identity structure without making any changes to the identity. The accommodation process, on the other hand, makes changes to the self-identity by modifying the existing identity structure in order to adapt the self-identity to the information. The second process, evaluation, is guided by four principles (i.e. continuity, distinctiveness, self-efficacy, self-esteem) and aims to balance the self-identity by giving meaning to the self-identity while making changes when necessary (Jaspal & Breakwell, 2014).

In the framework it is proposed, that successful adaptation/assimilation and evaluation process can lead to (small) identity changes by integrating elements associated with the intervention which then become more central to the self-identity. Similarly, the assimilation/ adaptation and evaluation process may also be unsuccessful which, as proposed in the framework, can result in two pathways. It is proposed that an unsuccessful identity integration may lead to a *compartmentalisation* of identities or



*conflicting identities*. In the case of compartmentalisation of identities, the individual separates the elements that triggered the identity integration process (e.g. behaviours or information promoted in behaviour change intervention) from their identity. The individual separates elements of their identity either temporarily into an identity unrelated behaviour or more permanently into different ‘context’ identities (e.g. home identity vs work identity). If the identity integration process leads to *conflicting identities*, identity threat may be experienced which can be dissolved through coping strategies and the individual may suppress conflicting elements or enhance elements that are central to the individual.



**Figure 37: Overview of theoretical framework**

To conclude, a successful integration of elements from a behaviour change intervention leads to an increased centrality of the elements associated with the intervention (e.g. environmentally sustainable behaviour). Similarly, an unsuccessful integration that leads to a compartmentalisation results in compartmentalised identities, which may be context dependent (e.g. identity at work vs at home). Conflicting identities result in a rejection of the identity elements associated with the behaviour change intervention which lead to a decreased centrality of those elements to the self. The identity integration process can lead to three behavioural outcomes, that is the individual (1) engages in subsequent environmentally sustainable behaviours (i.e. positive spillover), (2) does not engage in subsequent environmentally sustainable behaviours (i.e. lack of spillover), or (3) engages in an environmentally harming behaviour (i.e. negative spillover). Figure 37 illustrates the proposed outline of the theoretical framework.

### **5.3.3 PATHWAYS TO SPILLOVER**

In the following, the evidence from the study presented in this chapter is used to assess the theoretical claims of the proposed framework and further evidence from the interviews is added to underpin the argument. In section 5.2.2.2 initial evidence for positive contextual spillover from the work to the home setting as well as some evidence of negative and the lack of spillover has already been presented. In the following, each pathway (i.e. to positive, negative, and lack of spillover) is assessed in relation to the relative change in the centrality of the terms used within the visualisation method. Furthermore, the survey results and findings from the interviews are used to assess the framework's claims about spillover effects as well as the identity integration process.

#### **5.3.3.1 PATHWAY TO POSITIVE SPILLOVER**

In the theoretical framework it is proposed that positive contextual spillover is the results of a successful integration process of the tenets of the behaviour change intervention into the self-identity. In the interviews, participant reported post-intervention behaviour changes at home that were identified as verbal evidence for contextual spillover effects. In the following, first the evidence for the contextual spillover effects to meat and fruit and vegetable consumption and then the evidence for the related ESBs (e.g. local food consumption) spillover effects are analysed.

##### **5.3.3.1.1 EVIDENCE FOR POSITIVE CONTEXTUAL SPILLOVER EFFECTS AND IDENTITY INTEGRATION**

Mixed evidence was found for positive contextual spillover effects from the behaviour change intervention in the workplace to the home. Positive contextual spillover here means that participants engaged in the target behaviour promoted in the intervention at home; i.e. increased fruit and vegetable consumption and/or (red) reduced meat consumption. As already presented in the previous section, evidence was found for positive contextual spillover effects to the behaviour meat consumption at home, however, no changes in the behaviour fruit and vegetable consumption was noticed. In the following, the evidence from the quantitative data analysis is evaluated followed by evidence from the interviews and visualisation task, first for the behaviour meat consumption and second for the behaviour fruit and vegetable consumption.

###### **5.3.3.1.1.1 REDUCTION IN (RED) MEAT CONSUMPTION**

The results of the survey data analysis showed no significant effect of the intervention on red meat consumption at home (see H1a, section 5.1.3). To test the influence of identity change on spillover effects, as proposed in the theoretical framework, the change of the variables environmental identity and prominence of environmental identity were included in the equation (see H2a & H3a). The aim of this analysis was to show whether participants from the intervention group, that changed their prominence of environmental identity and/or environmental identity, responded with spillover

behaviours in comparison to the control group. The results showed no significant effects after the post-hoc Holm-Bonferroni correction was applied.

While in the theoretical framework it is proposed that an increased prominence of environmental identity would lead to positive spillover effects, the quantitative results cannot provide evidence for this hypothesis. These results partially overlap with findings from the interview analyses, where some participants report changes in ESBs, but not in red meat consumption. However, while some participants in the interviews also explicitly reported no changes in their meat consumption behaviour, which is an indicator of a lack of spillover, a reduction of meat consumption was identified as a dominant pattern.

Although efforts to reduce red meat consumption were reported by some participants in the interviews and identified as a dominant theme, the survey data of the same participants is less conclusive showing mostly no change in post-intervention red meat consumption at home (see Table 33). Overall, only two participants reduced their red meat consumption according to the self-report scale used in the survey, while one participant reported an increase. The two participants who decreased their red meat consumption (104 and 131) both also reported a reduction in red meat consumption at home, particularly in the interview with participant 131 this was a dominant theme. The participant who showed an increase in red meat consumption in the survey (i.e. participant 117) talked about his focus on other ESBs (e.g. waste reduction) instead of meat consumption in the interview. The remaining participants neither increased nor decreased their red meat consumption in the survey, which is inconsistent for those who reported a reduction in red meat consumption at home in the interviews. For an overview of some key variables from the survey for the interview participants see Table 33.

To assess, whether verbal reports of a reduction in meat consumption at home (i.e. positive contextual spillover) in the interviews also reflected in identity integration, the relative changes in the centrality of the terms used within the visualisation task were assessed. Participants that reported a reduced meat consumption at home subsequent to the behaviour change intervention at work also showed changes in the centrality of terms used in the visualisation task. More specifically, these participants were found to place the three terms closer to the manikin (i.e. self) after the behaviour change intervention (T2) in comparison to T1. For example, participant 131, who reported that he and his family had introduced meat free Mondays after the behaviour change intervention, places the term *environmentally-friendly self* considerably more central to the manikin (note, participants were instructed to place term on manikin if term was considered very central to their self) and the terms *sustainability* and *sustainable food* somewhat closer (see Figure 38). Similarly, participant 107, who reported to have replaced red with white meat after the behaviour change intervention, placed all three terms somewhat closer to the manikin (see Figure 38). Consistent with their changes in meat consumption, participants 107 and 131 explained how the terms differed in closeness to the manikin:

*“it’s not an overarching thing that I do [...] so I guess just fairly close not a central thing” (107, male, T2)*

*“I guess like how you want to be would be all of these bang on top of here [meaning most central]. That would be the aim. How I am, probably I say like that. Environmentally friendly would be closest and then sustainability and sustainable food, a bit further away, sustainable food probably the furthest. That is how I see myself. [...] Just because it is so convenient to get things that aren’t sustainable” (131, male, T2)*

Based on previous research (Elliott, 2008; Williams & Bargh, 2008) and per the instructions during the interviews, an increased centrality of the terms in relation to the manikin was interpreted as an increased centrality to the self. As such, the increased centrality of the three terms used in the visualisation task in co-occurrence with a reduced (red) meat consumption can be taken as an indicator for an integration to the self, as proposed in the theoretical framework. In the theoretical framework it is proposed, that the integration of elements associated with the behaviour change intervention would lead to positive spillover effects. Furthermore, participants who showed an increased centrality of the three key terms tended to also show an increased average score of the variables environmental identity and prominence of environmental identity (see Table 33).

Metaphors on vertical position and special distance have been associated with affect and attitudes (Landau et al., 2010). On the basis of previous research that found an association between affect (i.e. good and bad) and vertical position (up and down) (e.g., Casasanto, 2009; Meier & Robinson, 2004), the vertical change of the terms was assessed. For example, Meier and Robinson (2004) found that when making evaluations, people assumed that objects in higher visual space are ‘good’, while objects in lower visual space are ‘bad’. This pattern was recognised in the visualisation task, although the connection between vertical change and spillover was not always prevalent. In the case of the two examples in Figure 38 participant 131 placed all three terms further up at T2 in comparison to T1. According to previous research (Casasanto, 2009; Meier & Robinson, 2004), this indicates that participant 131 evaluated all three terms as more ‘good’ at T2 than at T1. The changes in placement of the three terms for participant 107, on the other hand, are less conclusive. The term sustainability was moved further down at T2 in relation to T1, which indicates a rather negative evaluation of the term. Similarly, the term sustainable food was moved further up (from being below the manikin down at T1) and environmentally-friendly-self moved slightly further down. This observation aligns with the relative strength of reduced meat reduction. While participant 107 replaced red meat with white meat in some meals, 131 introduced meat free days after the intervention, which is arguably more difficult than replacing red for white meat.

Overall, evidence from both the quantitative and qualitative data (i.e. visualisation) suggest that an integration process of elements from the behaviour change intervention have taken place. However, the evidence is less conclusive about whether an integration leads to positive spillover effects for the behaviour red meat consumption. While the interview data indicates that a successful identity

integration coincides with a reduction of meat consumption (i.e. positive contextual spillover), the quantitative results are less conclusive indicating that positive spillover effects are not significant and a lack of spillover is more likely.

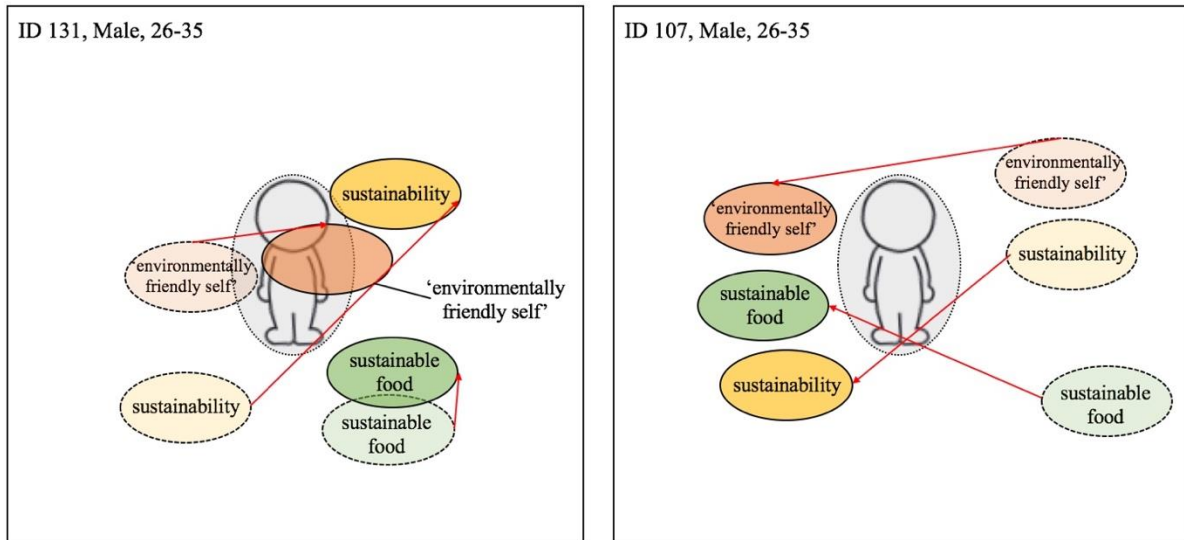


Figure 38: Visualisation task illustrating increased centrality of terms

### 5.3.3.1.1.2 INCREASE IN FRUIT AND VEGETABLE CONSUMPTION AT HOME

In this study, no evidence was found for an increase in fruit and vegetable consumption at home, neither in the survey nor in the interviews. Although, when comparing the survey data at T1 and T2, an increase in fruit and vegetable consumption was noted in the intervention group in comparison to the control group, this difference was not significant (see H1b and H2b). The survey data of the interview participants shows similar results (see Table 33), however, in the interviews fruit and vegetable consumption was not identified as a dominant theme. It should be noted, however, that some participants mentioned that they had increased their vegetable intake, which tended to coincide with a reduction in red meat consumption. Overall, no sufficient evidence was found for a positive contextual spillover effects from the promoted fruit and vegetable consumption in the behaviour change intervention to the home setting.

### 5.3.3.2 EVIDENCE FOR OTHER POSITIVE CONTEXTUAL SPILLOVER EFFECTS AND IDENTITY INTEGRATION

In addition to the positive contextual spillover described above, evidence for other positive contextual spillover effects to ESBs that were also targeted in the behaviour change intervention were assessed. Other positive contextual spillover effects describe an increase of ESBs post-intervention at home that were more subtly targeted by the behaviour change intervention (e.g. local food consumption). Evidence for this was found both in the quantitative and qualitative data.

#### 5.3.3.2.1 EVIDENCE FROM THE QUANTITATIVE SURVEY DATA

In the survey, the change from T1 to T2 in local, seasonal, and organic food consumption as well as food waste avoidance behaviours were tested. Two analyses were conducted to assess the evidence for contextual spillover effects. First, the influence of the behaviour change intervention on each behaviour in comparison to the control condition was tested (see H1). The results showed no significant influence of the intervention condition in comparison to the control condition on changes in local, seasonal, and organic food consumption, as well as food waste avoidance behaviour (see H1c-f). The second analysis tested whether a change of the variables environmental identity and prominence of environmental identity had an influence on the spillover effects. The results showed no significant effects from a change in an identity variable on post-intervention ESBs at home (see H2a-f).

The third analysis tested whether a change of the variables environmental identity and prominence of environmental identity had an influence on the spillover effects, in interaction with the intervention condition. The aim of this analysis was to show whether participants that changed their prominence of environmental identity and/or environmental identity responded with spillover behaviours after the intervention in comparison to the control group. More specifically, this analysis aimed to test the pathways to spillover proposed in the theoretical framework; i.e. an increase in prominence of environmental identity or environmental identity increased the likelihood for positive spillover in the intervention group, but not the control group (see H3c-f). The quantitative data analysis found significant results for seasonal food consumption (H3d), but not for local (H3e) and organic food (H3f) consumption nor food waste avoidance behaviour (H3c).

The results showed that an increase in prominence of environmental identity for participants in the intervention group, significantly decreased negative change in seasonal food consumption at home. These results are somewhat in line with the theoretical framework where it is proposed that, through identity integration, the environmental identity becomes more salient (if assimilation happens) or increases (if adaptation happens), which in turn leads to ESBs (i.e. positive spillover). However, instead of increasing local food consumption at home, as it would be assumed based on the framework, the likelihood for negative change decreased. It could be argued that this is an indicator for positive spillover. Particularly together with the qualitative data, these findings suggest that both a lack of as well as positive spillover behaviour occurred after the behaviour change intervention. While these results allow no assessment of the actual integration process, they provide evidence for the existence of a pathway from the behaviour change intervention to identity change to a lack of spillover and positive spillover. (for a discussion and re-assessment of the pathway see CH6).

Overall, the quantitative data provides weak evidence for contextual spillover, and more specifically, for a link between a change in environmental identity and positive spillover. Moreover, no further evidence for contextual positive spillover effects were found for other behaviours. Hence, the quantitative data provides some evidence for the pathway proposed in the theoretical framework, but more clarity is needed to fully assess the proposed link. In the next section, the evidence for other

contextual positive spillover from the interview and visualisation task will be assessed. In comparison to the survey, where potential contextual spillover behaviours were anticipated and tested, the qualitative data analysis identified dominant patterns of behaviour change that participants reported after the behaviour change intervention. In particular, not only specific behaviours (i.e. increase in consumption of British produce), but also types of behaviours (i.e. easy and small changes), as well as an overall increased awareness (i.e. non-behavioural positive spillover) were identified in the interviews. The verbal account for spillover effects is enriched by an analysis of the visualisation task in order to assess the pathway proposed in the theoretical framework.

### **5.3.3.2.2 EVIDENCE FROM THE INTERVIEWS AND VISUALISATION**

Two ESBs were identified in the interview data, namely an increased consumption of local produce (i.e. British produce) and a change in food shopping behaviour. These behaviours were not targeted by the behaviour change intervention and therefore categorised as a contextual spillover effect. While some participants reduced both their meat consumption and increased their consumption of local produce and/or shopping behaviour, others only increased their consumption of British produce and/or shopping behaviour at home. Interestingly, the survey data of the interview participants shows a different picture and indicates overall a lack of spillover for local food consumption (see Table 33).

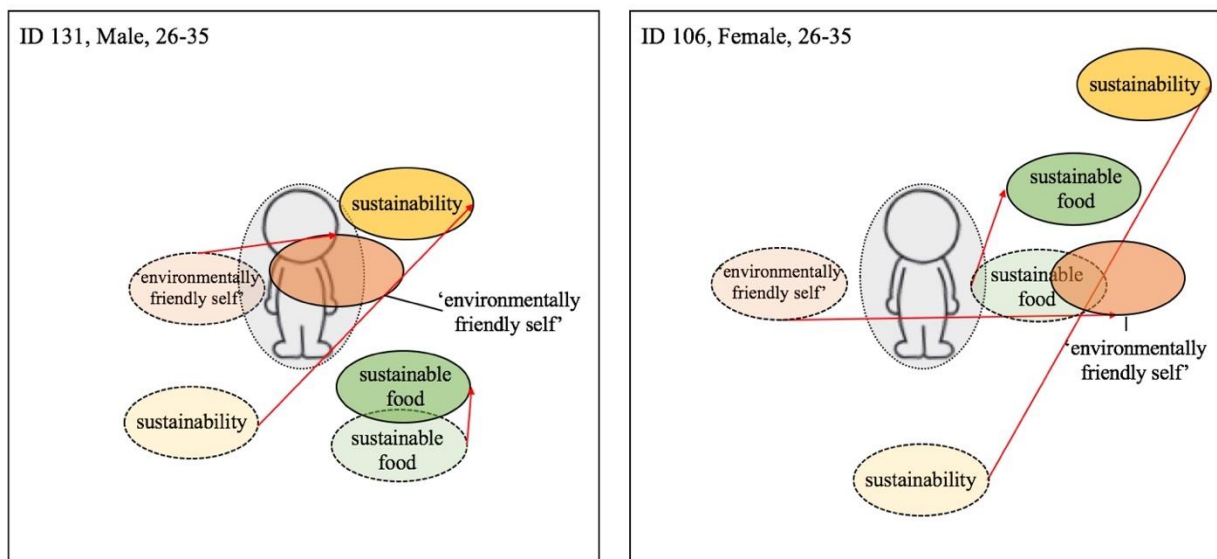
Participants who reduced both their meat consumption and increased their consumption of local produce typically increased the centrality of all three terms post-intervention considerably. The shift in centrality was less evident for participants that only increased their consumption of local food while a slight outward movement occurred for some of the terms. For example, at T2 participant 131 placed all three terms closer to the manikin (i.e. self) at T2 (see Figure 39), whereas participant 106 placed the term *sustainable food* slightly more central, while also placing the terms sustainability and sustainable food less central than at T2 (see Figure 39). For participant 131 this could be an indication for an increased centrality of the three terms into the self, as it is proposed in the theoretical framework. As such, this suggests that a successful identity integration occurred, which is reflected in his reported behaviour change (i.e. reduction of red meat and other ESBs). These findings provide initial evidence for the proposed pathway to positive spillover as proposed in the framework. Similarly, for participants that increased their consumption of local produce while not reducing their meat consumption, the shift in centrality was less apparent (see e.g. participant 105; Figure 40). This indicates that the identity integration was weaker, which is also reflected in the weaker behaviour change.

The slight outward movement of the terms, most dominantly of the term *sustainable food*, in cooccurrence with an increase in centrality of the term *environmentally friendly self*, could indicate a compartmentalisation of the terms within the identity (see e.g. participants 106, Figure 39 and 117, Figure 40). Typically, such signs of compartmentalisation coincided with an increase of ESBs such as an increase in British food consumption, while the meat consumption was not reduced. For instance,

participant 106 talked about her perceived lack of control over reducing meat consumption (see section 5.2.2.3), while participant 117 talked about the high costs he put forward as a reason for not reducing his meat consumption (see section 5.2.2.2.1). The signs of non-integration of the terms are supported by the participants comment during the visualisation task. While, for example, participant 106 explained that the non-centrality of sustainable food is related to her weak execution of eating more sustainably, participant 117 suggested that he is aware, but it is not central to him:

*“then sustainable food I’m trying, but it is still not on the top of my head because I’m not doing it very well.” (106, female)*

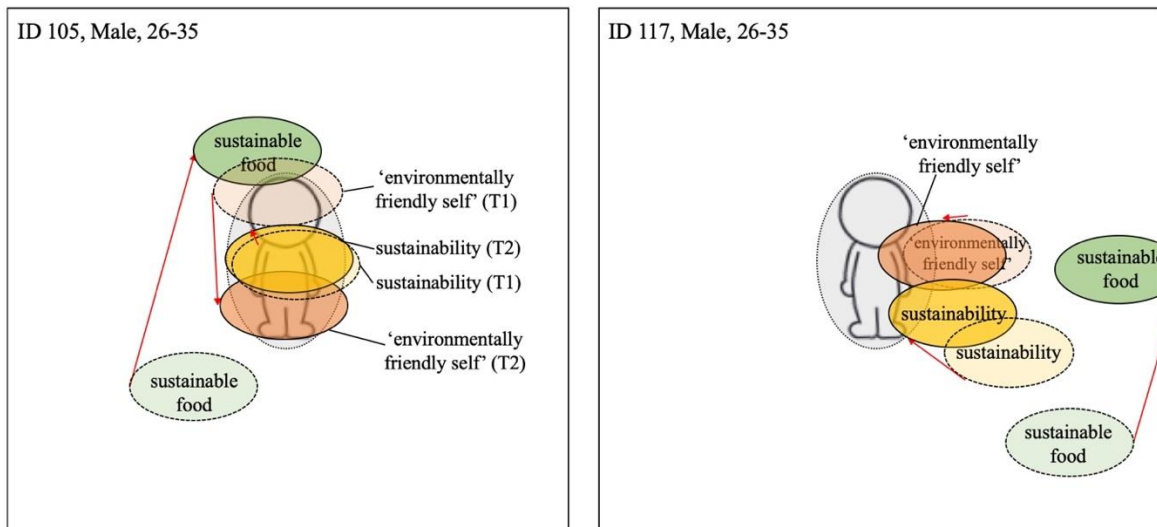
*“sustainable food that would be a little bit further away but definitely in my sphere of awareness and concern. [...] but they are not core values or worries.” (117, male)*



**Figure 39: Visualisation associated with increased British food consumption and changed food shopping**

The theme ‘easy and small changes’ was identified as the second type of contextual positive spillover effects. Participants who reported easy and small behaviour changes after the workplace intervention also placed all three terms more central to the manikin at T2 in comparison to T1. As shown in Figure 40, the terms *environmentally-friendly-self* and *sustainability* became more centralized post-intervention, in comparison to pre-intervention. For both participants, the term *sustainable food* also became more central, but was placed rather peripheral to the other terms. In comparison to participants who showed a post-intervention shift in meat consumption at home (see Figure 39), a change in centrality of the term *sustainable food* was less prevalent. In terms of vertical direction of change, the picture is also mixed showing a simultaneous upward and downward movement of terms.





**Figure 40: Visualisation task illustrating changed centrality of terms**

With regards to the vertical direction of change, an upward movement from T1 to T2 can be noted for all (i.e. participant 131) or some (i.e. participant 106) of the terms. Participant 106 placed the terms sustainable food and sustainability further up at T2 than at T1 which could be an indicator of an increased positive evaluation of the terms sustainability and sustainable food. The simultaneous outward and upward move of the two terms could be a sign of compartmentalisation of the concepts from the self. In the theoretical framework it was proposed that a decentral shift of the key terms would be indicative of a compartmentalisation or emerging conflict of identity, which could lead to a lack of or negative spillover. As such, the verbal account of contextual positive spillover in the form of increased consumption of British produce would contradict the shift pattern of the three key terms. However, barriers that were identified in section 5.2.2.3 could also play a role.

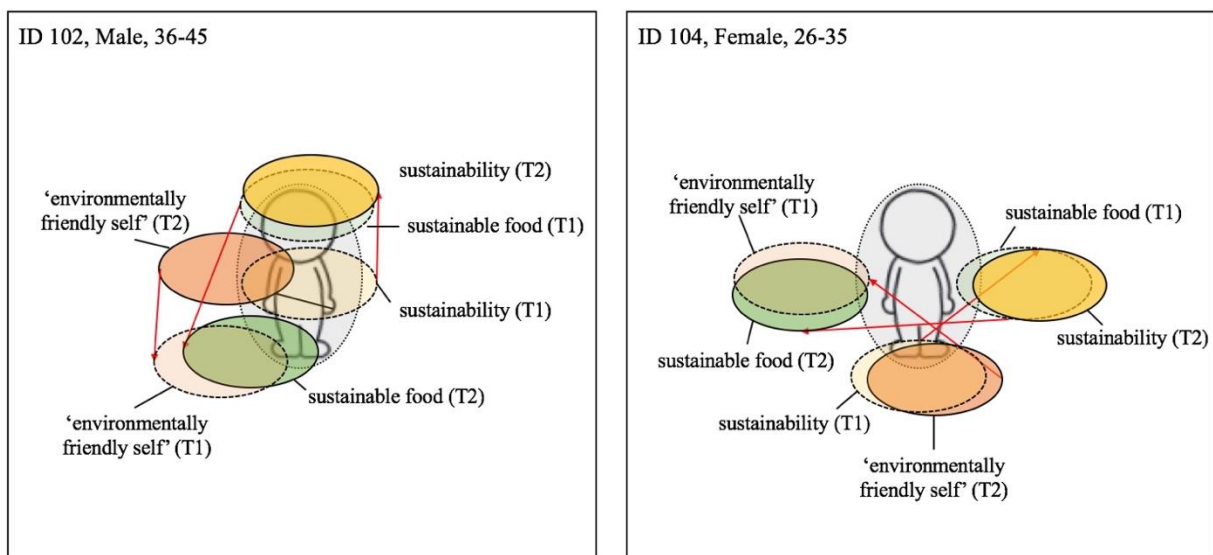
For example, while moving the term sustainability and sustainable food both outward and upwards, participant 106 also reported to have experienced several barriers to changing her behaviour, especially meat consumption. For instance, she reported an experienced lack of control over changing her meat consumption at home (i.e. she negotiated with her partner to reduce meat consumption, see section 5.2.2.3). At the same time, participant 106 reported that the only behaviour she felt in control of was the food source (i.e. British produce), which she reported to have changed. The outward movement of the terms sustainability and sustainable food could be explained by the experienced lack of control to change her meat consumption, while the upward of the same terms could indicate that, post-intervention, participant 106 evaluated the associated concepts as more ‘good’. This analysis is built on thin evidence, but nonetheless indicative of potential internal processes (e.g. conflicts and compartmentalisation) and the role of external barriers.

### 5.3.3.2.2.1 INCREASED AWARENESS AND DEFLECTION

An increased awareness, but no reported behaviour change was identified as the third dominant theme in the category ‘other’ contextual positive spillover. Participants that only reported an increase in awareness and no behaviour change, also showed no noticeable change in centrality of the three terms. As can be seen in Figure 41, almost all of the terms were already placed fairly close to the manikin pre-intervention and remained close in comparison to participants with spillover effect. For example, participants 102 and 104 placed the three terms relatively close to the manikin both at T1 and T2 with any changes in centrality between the time-points being minimal (see Figure 42).

The change in vertical direction of the terms was mixed. While some terms changed vertical position in the upward direction (e.g. sustainability in participant 102), other terms were moved downward (e.g. environmentally-friendly-self and sustainable food in participant 102). However, overall the changes in vertical direction were marginal and could reflect slight attitude changes towards the concepts associated with the terms. For instance, while both participants reported an increased awareness and recognition of the importance of sustainability (note: here referred to concept not the term used in visualisation task), both also indicated that nothing had really changed for them in response to the behaviour change intervention; see e.g. 104:

*“it has not really changed anything the way I think. And perhaps it’s because I’m kind of open minded about vegetarian and vegan food already. So yeah, it’s not really changed anything for me.” (104)*



**Figure 41: Visualisation awareness**

Overall, the above section shows some evidence for positive contextual spillover effects. Of particular note are the different degrees to which spillover seems to occur. While there is some evidence for ‘direct’ contextual spillover effects, that is participants reducing their red meat consumption, other ESBs that were not targeted in the behaviour change intervention also change or changes instead of the

targeted behaviour. Typically, contextual positive spillover effects were reflected in the visualisation task with a more dominant increase in centrality for participants that reduced their meat consumption. Moreover, non-behavioural positive spillover effects were identified, such as an increase in awareness. Explanations for these differences and a more in-depth discussion is provided in the next chapter (CH6).

### **5.3.4 PATHWAY TO THE LACK OF SPILLOVER**

In the theoretical framework it is proposed that a lack of contextual spillover is the result of an unsuccessful integration process which has led to either a temporal or contextual compartmentalisation of elements promoted in the intervention into the identity. A temporal compartmentalisation means that people restrict a behaviour change in response to the intervention to a particular time point and potentially limit it to a single or temporal behaviour. This means that a person compartmentalises a single or temporal action from their identity which allows them to engage in temporal behaviour changes without experiencing inconsistencies with their identity. Contextual compartmentalisation indicates that a person compartmentalises their identity into two or more context dependent identities (e.g. work and home identity). These may differ and therefore allow for inconsistent behaviours in the different contexts.

While finding evidence for a lack of spillover might be relatively easy (i.e. the absence of positive or negative spillover is evidence for the lack of spillover), searching and evaluating the evidence for the reasons and processes behind the lack of spillover might be more complex. The following sections aims to evaluate the evidence for the pathway proposed in the theoretical framework for the occurrence of a lack of spillover from the quantitative and qualitative data.

#### **5.3.4.1 EVIDENCE FROM THE QUANTITATIVE SURVEY DATA**

The quantitative data analysis showed that for most post-intervention behaviours, no difference was found in the intervention group in comparison to the control group which indicates a lack of spillover effects. More specifically, no spillover effects were found for red meat consumption at home, fruit and vegetable consumption at home, and local, seasonal, and organic food consumption at home, although an interaction effect between the intervention and a change in prominence environmental identity of environmental identity was found for seasonal food consumption. For this behaviour, the significant interaction of identity change variables with the intervention condition, in turn suggests that no change in the identity variables led to the lack of spillover.

While it might be tempting to interpret these results as evidence for the pathway for the lack of spillover as proposed in the theoretical framework, this conclusion would be based on inverse evidence (i.e. significant results showing the interaction between change in identity variables and positive spillover effects). However, this inverse evidence, that is the verification of no effects (i.e. falsifying

the alternative hypothesis) is a difficult matter, and does in fact not serve as sufficient evidence for the proposed pathway (this will be further discussed in the discussion chapter). Instead, the conclusion must be drawn that the quantitative is not sufficient to test the pathway for the lack of spillover.

#### **5.3.4.2 EVIDENCE FROM THE QUALITATIVE INTERVIEWS AND VISUALISATION DATA**

Only a few instances of the lack of spillover were identified in the interview data. Instances of a lack of spillover were often accompanied by excuses and justifications of why no behaviour change occurred. Reports of the lack of spillover were dominated by two subthemes: (1) justifications for not reducing meat consumption and (2) reaffirmation and mental accounting. These subthemes are more strategies to justify inaction rather than accounts of a lack of spillover. However, the survey data of the interview participants is mixed and mostly indicates a lack of spillover for most measured behaviours (see Table 33).

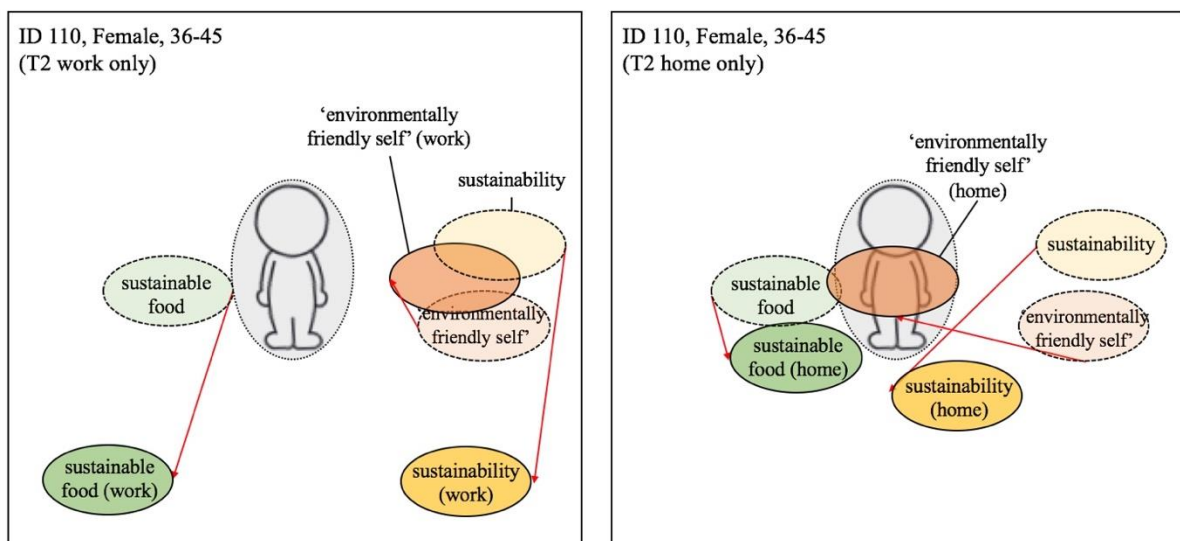
In the visualisation task, mixed changes in centrality of the three terms dominated the lack of spillover. In line with the theoretical framework, it can be argued that this is indicative of an unsuccessful integration of the concepts associated with the intervention and therefore a failure of substantive change to participants' environmental identity. As proposed in the framework, this could suggest that a participant experienced a conflict in response to the intervention which could have led to a temporal or contextual compartmentalisation.

In support of this argument, there was evidence of one participant that appeared to have resolved the conflict triggered by the intervention by fully compartmentalising their work and home identities (see participant 110; Figure 42) and another participant who showed partial compartmentalisation (see participant 108; Figure 43). Other conflict management strategies were evident in the interaction between the three terms, that is a pattern increase in centrality of some terms and of simultaneous decrease in centrality of other terms was observed. This could be indicative of suppression of identity elements, as proposed in the theoretical framework. However, contrasting to the suppression of environmental identity as a whole, the suppression indicated in the visualisation task seemed to unfold within one's identity. For example, participant 126 showed an increase in the centrality of environmentally-friendly-self while also showing a decrease in centrality of the term sustainable food (see Figure 43).

These two conflict management strategies can be interpreted as an illustration of the conflict that the participant may have experienced following the behaviour change intervention (e.g. increased awareness of the need to act sustainably while simultaneously the desire to keep eating meat). According to the framework, a temporal or contextual compartmentalisation of the identity from the behaviour could solve this conflict, which is illustrated in the visualisation of participant 110. Participant 110 compartmentalised between the home and work setting and moved the terms

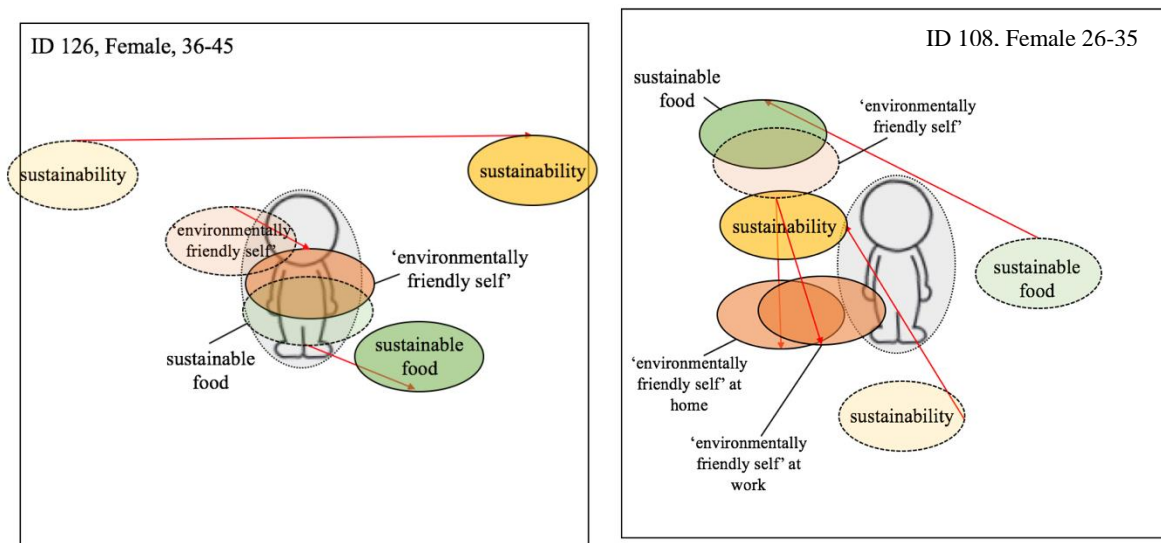
environmentally friendly and sustainability at home considerably closer to the manikin at T2 while she moved the term environmentally friendly self at work only slightly closer and the term sustainability at work even further away from the manikin (see Figure 42). She commented her sorting at T2 as follows:

*“I would like to think that I’m quite environmentally friendly and I like to do things that are environmentally friendly. [...] Sustainable food has become more, I’m quite conscious about that so I try to do it, but I wouldn’t, so I try to do it eating sustainable food, but I wouldn’t massively go out of my way. [...] that’s at home, so here I would say, yeah, I would say it is like that. Because I don’t feel like we have any influence over the sustainability of the food here. Sustainability in general I don’t feel it and environmental I try to, but I don’t feel like we help” (110, female, T2)*



**Figure 42: Compartmentalisation and suppression visualisation**

An increase in centrality in the term environmentally-friendly self with a simultaneous decrease in centrality of the term sustainable food was noted as a dominant pattern among some of the participants. For instance, participant 110 not only compartmentalised between the work and home context, but she also moved the term environmentally-friendly self closer to the manikin at T2 while moving the term sustainable food further away (see Figure 42). A similar movement pattern was observed in participants 126 and 108 (see Figure 43). This could be an indication of an internal conflict which participants may have resolved by compartmentalising their desire to be more environmentally friendly (more central) from the desire to not change their diet choices (i.e. change their meat consumption; sustainable food less central). This strategy may enable participants to maintain a perception of themselves as environmentally friendly while licensing their continued wish to eat meat.



**Figure 43: Compartmentalisation visualisation**

This argument is supported by two themes that were identified in the interview analysis, namely justifications for not reducing meat consumption, and reaffirmation and mental accounting. What both themes have in common is that participants found arguments to not change their behaviour. Findings justifications for not reducing meat consumption is mirrored by a peripheral move of the term sustainable food (e.g. participants 110, 126, and 108). The theme reaffirmation and mental accounting aligns with an inwards movement of the term environmentally-friendly self and simultaneous outward movement of other terms and the lack of reported behaviour change (i.e. lack of spillover). By reaffirming existing behaviours, participants justify no change in ESBs while perceiving themselves as pro-environmental. This will be further discussed in the next chapter.

Another explanation could be that rather than processing the intervention through adaptation (i.e. making changes to the identity structure), the assimilation process could have led to a reaffirmation of the existing identity structure and a confirmation of behaviours participants already engage in (see section 5.2.2.1). This resolution appears particularly plausible for participants that reaffirm their existing ESBs in the eponymous subtheme that was identified in the post-intervention interviews. However, the visual methods offer no conclusive evidence for this argument.

In addition to the self-affirmation strategies above, contextual and psychological barriers could explain a lack of spillover. One of the most dominant barriers that participants talked about in the interviews was control and the perceived lack of it. Particularly with regards to spillover effects between the work and home context, where perceived control was identified as the most dominant difference between the two settings. For instance, participants 106 and 108 talked about wanting to reduce their meat consumption at home, but her partner would not comply. Participant 106 reported that she started buying local food instead as she felt it was the only behaviour she could control at home. As such, the

behaviour change intervention had the potential to lead to positive contextual spillover (i.e. a reduction in meat consumption), but the contextual factors (i.e. perceived lack of control at home), prevented that behaviour change.

Overall, the evidence for the pathway for the lack of spillover is mixed. While there is evidence for a lack of spillover (i.e. the absence of positive or negative spillover), there is only partial evidence for the suggested pathway. Internal conflict that may lead to a compartmentalisation between contexts (i.e. work and home), or within the identity structure (see e.g. Figure 43) was identified as potential explanation for the lack of spillover. Barriers such as a perceived lack of control, particularly when different at home than at work, could also play a role in explaining the lack of spillover.

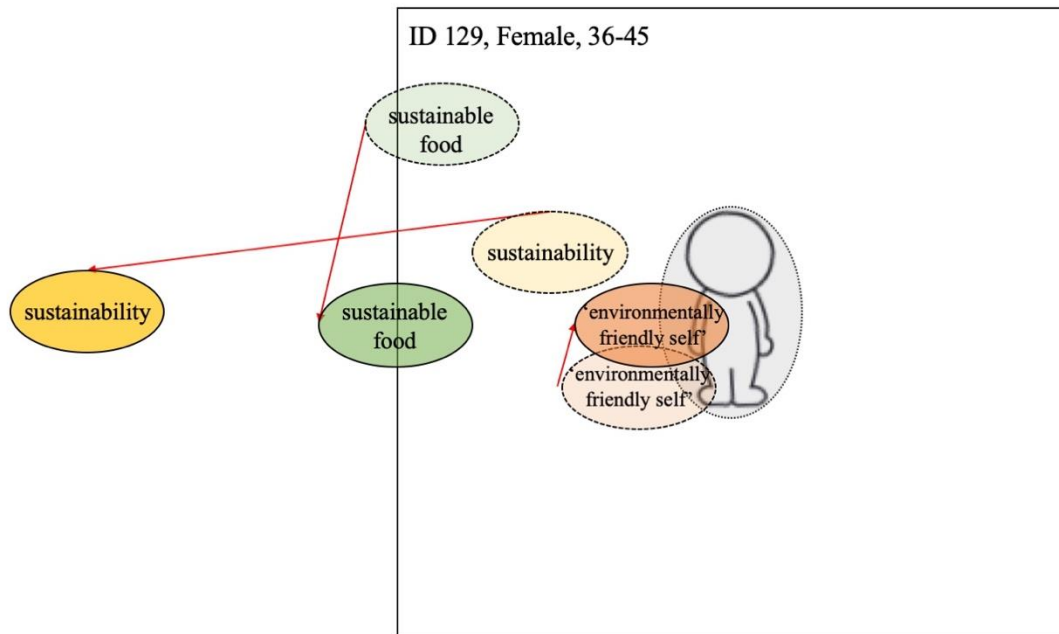
### 5.3.5 PATHWAY TO NEGATIVE SPILLOVER

Both the quantitative and qualitative data analysis showed no sufficient evidence for negative spillover effects. However, negative and reactant reactions towards the behaviour change intervention were identified by one of the interviewees (participant 129) and observed during the behaviour change intervention (see Appendix B, section 9.2.7.2). While participant 129 did not report to have engaged in any environmentally harming behaviours at home after the intervention, she reported a clear resistance to the invention, however, this seem to have resulted in a lack of spillover. The negative attitudes and reactance that was identified in the interviews is more clearly in the visualisation task, where participant 129 moved the terms sustainable food and sustainability on the border of the paper the manikin was printed on or off the paper. Interestingly, the term environmentally-friendly self did was not move much and remained relatively central. Participant 129 commented her movement of the terms at T2 with the argument that she was already doing what she could but also commented that she did not think of behaviour having a great impact:

*“Well, just as the premise that I try to do what I can in terms of recycling and things like that, reusing. [...] it is not that close to the forefront of my mind in the general lifestyle. I don’t think I have a massive impact” (129, female, T2)*

In the interview, participant 129 made it apparent that she perceived herself as a pro-environmental person which she evidenced with reports of meticulous recycling behaviour. Similarly, she caricatured a future without meat consumption as likely causing “*disastrous consequences in terms of people’s health, in terms of economies, things like that, if people stopped eating meat.*” (129). This is reflected in the distinct outward movement of the term sustainable food and sustainability. At the same time, participant 129 perceived herself as a ‘recycler’ and pro-environmental person which is reflected in the central position of the term environmentally-friendly self. Similar to the examples above, and maybe even more apparent, this is indicative for an internal conflict between the self-perception of being a pro-environmental person that recycles, and the rejection of the meat reduction as

promoted in the behaviour change intervention. A compartmentalisation of the three terms, as can be seen in the visual task (Figure 44), and a suppression of the notion of sustainability, which promoted meat reduced diets, could be strategies that the participant used to solve an experienced conflict triggered by the behaviour change intervention.



*Figure 44: Visualisation showing negative spillover*

While sufficient evidence for negative spillover was lacking, these findings provide initial evidence of the intervention having threatened an important part of the participants' self-image, which may have led to conflicting identities (i.e. meat eater vs. sustainable person). Strategies such as compartmentalisation which is indicated in the visualisation task, and suppression of meat reduced diets (i.e. through dooming meat free futures) are possible indicators that the participant sought to resolve this conflict.

### **5.3.5.1 ADAPTATION - ASSIMILATION AND EVALUATION**

Changes in centrality of the term differ between positive contextual spillover effects. As noted earlier, participants that changed their meat consumption at home in response to the behaviour change intervention at work also showed more noticeable changes in the centrality of the three terms sustainability, environmentally-friendly-self, and especially, sustainable food. Similarly, participants that engaged in behaviour changes that were categorised as 'other' contextual spillover effects, also showed less notable changes in centrality among the three terms. Furthermore, it can be noted that the behaviours in the 'other' contextual spillover category are considered as easier, smaller, and more controllable by the participants, than changing meat consumption, which can be considered as a rather difficult behaviour change (Henson, Blandon, & Cranfield, 2010). In line with the framework, these



differences could indicate that participants that engaged only in ‘other’ contextual spillover behaviours and showed small changes in the centrality of the terms may have assimilated with the key concepts of the behaviour change intervention, but made no changes to their identity. Similarly, the visualisation task indicates that participants who engaged in more difficult positive spillover behaviours, may have undergone an adaptation process (i.e. changes to the identity structure). The assimilation-adaptation process as well as the role of barriers will be discussed in more detail in the next chapter.

## 5.4 CONCLUSION

Overall, both in the quantitative and qualitative data some evidence for spillover effects from the behaviour change intervention at work to the home context were identified. The evidence predominantly points at positive spillover or a lack thereof. No sufficient evidence was found for negative spillover effect. However, anecdotal evidence in the form of negative reactions during the behaviour change intervention (see Appendix B, section 9.2.7.2) as well as the resistance to the invention of one interviewee (ID 129, see previous section) could indicate identity threat could have occurred. Reactance to behaviour change was previously linked with identity threat (Murtagh et al., 2014). Noteworthy are the seemingly gradual types of positive spillover that were identified in the qualitative data. While some participants reduced their red meat consumption (i.e. the target behaviour of the intervention), others increased other food related ESBs instead (e.g. buying local food). Several factors were identified that influenced the positive contextual spillover effects, particularly the perceived differences in control over behaviours in different social settings and the different dynamics of these social settings seemed to play an important role. Furthermore, the supermarket and media were identified as other places that the intervention spilled over to. These findings and their implications are further discussed in the next chapter.

Moreover, the data analysis revealed that also a lack of spillover occurred simultaneously with positive spillover. These inconsistencies in behaviour change are further discussed in the next chapter. However, particularly noteworthy are the strategies that were identified in the interviews that suggest some explanations for the lack of spillover effects. For instance, reaffirmation of existing behaviours as environmentally friendly or other justifications were identified as common strategies that participants used to explain why they did not change their behaviours. A perceived lack of control, that was identified as a barrier, also seems to play an important role in explaining the lack of spillover, which was indicated by participants pointing to their lack of control as a reason for why they could not change their behaviours, even though they wanted to. These findings will also be addressed further in the next chapter.

Lastly, with regards to the role of identity for spillover, both the quantitative and qualitative data indicate that identity plays a key role in positive spillover effects. In the quantitative data,

interaction effects between the intervention condition and a change in prominence of environmental identity showed the importance of identity for positive spillover effects. The qualitative data further added to this by indicating that an increased centrality of identity, which was assessed with the visualisation task, resonated with an increase of ESBs at home. Particularly notable here is that participants who were inconsistent in their reports of behaviour changes, meaning that they reported both a behaviour change (i.e. spillover) as well as no changes (i.e. a lack of spillover), were also more inconsistent in their visualisation task. More specifically, it was found that some participants seemed to compartmentalise some of the terms as they increased the centrality of some terms (typically environmentally friendly self), while decreasing the centrality of other terms (e.g. sustainable food). This seems to be particularly prevalent among participants that did not change their meat consumption. Overall, this could be an indicator for identity threat that was solved with compartmentalisation, however, these findings will be further discussed in the next chapter.

## 6 DISCUSSION

Spillover theory offers an avenue for promoting sustainable lifestyles by studying the links between environmentally sustainable behaviours (ESBs) (Nash et al., 2017). Research on spillover effects is an emerging topic, however, to date, most spillover research focussed on spillover effects between behaviours, while spillover effects between contexts (e.g. home, work) remained relatively understudied. Yet, most people spend a large amount of their time within different contexts (e.g. work, home), hence understanding the potential for spillover between these is a promising avenue for promoting sustainable lifestyles (Klade et al., 2013). This thesis' pursuit was to contribute to the understanding of spillover effects and particularly to the understanding of contextual spillover effects. More specifically, this thesis aimed to assess potential spillover effects from a behaviour change intervention in the workplace to the home setting, through the following research question:

**RQ1: How does a behaviour change intervention in the workplace affect environmentally sustainable behaviours at home?**

**RQ2: What role does identity play in the emergence of positive and negative contextual spillover effects (or a lack thereof)?**

The presented findings in CH5 provide initial answers to the two research questions. There was evidence from the workplace intervention study of a mix of positive behavioural spillover effects and a lack of any overt spillover effects. The qualitative and quantitative analysis revealed that the relationships between identity (particularly the centrality of environmental identity) and the presence of contextual spillover (or lack thereof) is complex.

In the following chapter, the implications of the findings for the conceptual framework and proposed routes to positive, negative and no spillover are discussed in more detail. First, the initial conceptual framework is revised in the light of the main findings from the main study (section 6.1). The findings are also discussed in relation to their contribution to the wider literature on spillover and contextual spillover in particular (section 6.2). Third, the findings of this thesis are discussed with regards to their implications for practitioners and policy makers (section 6.3). Lastly, the limitations of the findings (section 0) and future research avenues (section **Error! Reference source not found.**) are discussed.

### 6.1 REASSESSMENT OF THE CONCEPTUAL FRAMEWORK

The aim of this section is to show how the findings presented in the previous chapter answer the research questions of this thesis. 'How does a behaviour change intervention in the workplace affect environmentally sustainable behaviours at home?' and 'What influence does identity have on contextual

spillover effects?’ To answer these questions in more detail, each pathway to spillover is discussed and reassessed in the light of the findings presented in the previous chapter. This section joins the previous chapter with the aim to reassess the original conceptual framework. Based on IPT (Jaspal & Breakwell, 2014), the proposed theoretical framework aims to shed light on underlying identity processes that might lead to positive, negative, and a lack of spillover.

### **6.1.1 PATHWAY TO POSITIVE SPILLOVER**

The proposed pathway to positive spillover draws on IPT (Breakwell, 1986; Jaspal & Breakwell, 2014) and previous spillover research, which suggests that engaging in one ESB leads to subsequent ESBs, with the effect being mediated by environmental self-identity (e.g. Lacasse, 2016; van der Werff et al., 2014b; Whitmarsh & O’Neill, 2010). This research predominantly draws on Cognitive Dissonance (Festinger, 1957) and Self-perception Theory (Bem, 1972) by explaining spillover effects with people’s desire to be consistent in their behaviours (e.g. Whitmarsh, Haggard, & Thomas, 2018) and affirmed by their self-identity (e.g. van der Werff et al., 2014b). The original framework (see CH2), followed a similar line of argument for the pathway to spillover effects. The original framework proposed that through the identity integration process environmental self-identity would become more central to the self. Drawing on previous research (Festinger, 1957; Whitmarsh et al., 2018) it was further suggested that the desire to be consistent with one’s identity and past actions, subsequently would lead to consistent ESBs across behaviours and settings. Additionally, drawing on IPT (Breakwell, 1986; Jaspal & Breakwell, 2014) it was proposed that positive contextual spillover is the result of a successful integration process of the tenets of the behaviour change intervention into the self-identity. It was further suggested that this integration process was led by the adaptation and assimilation process and guided by the four guiding principles, as proposed in the IPT (Breakwell, 1986; Jaspal & Breakwell, 2014). This proposed positive spillover pathway to (contextual) spillover was assessed by interpreting quantitative and qualitative data from the main study (i.e. meat focussed behaviour change intervention at work). Figure 45 illustrates the positive pathway as per the original conceptual framework.

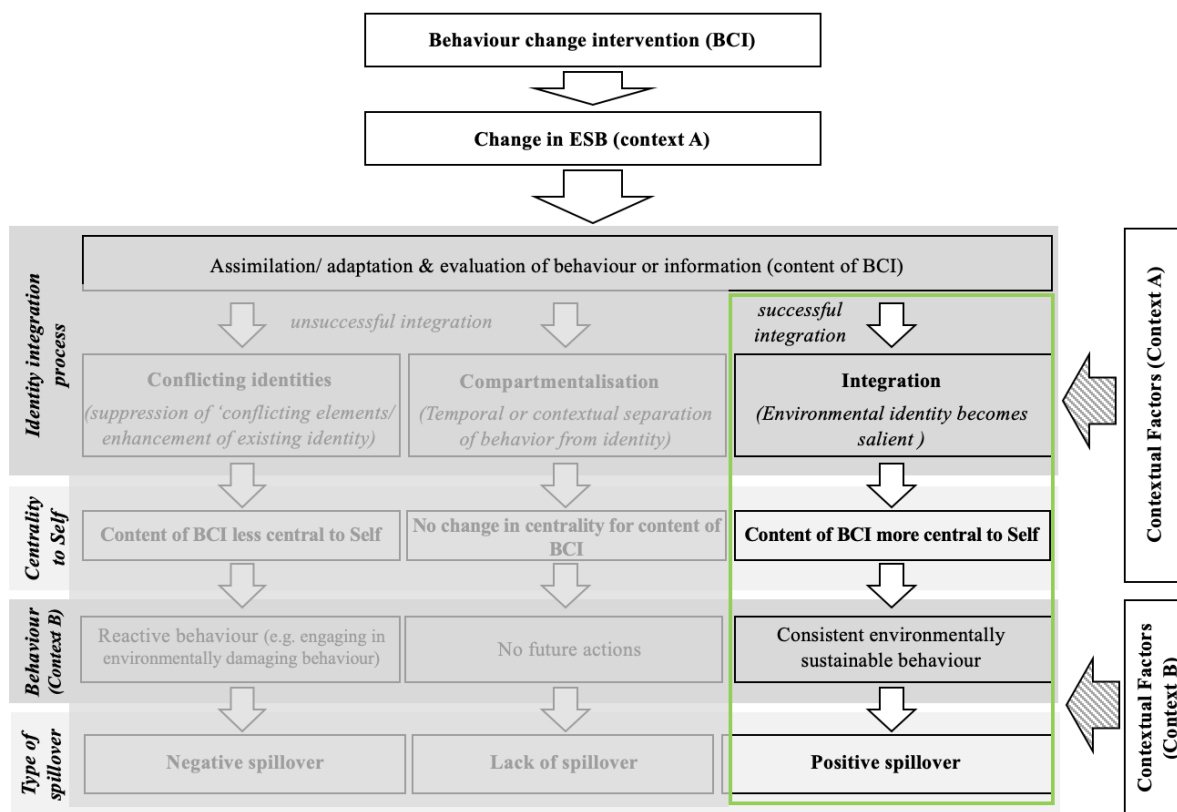


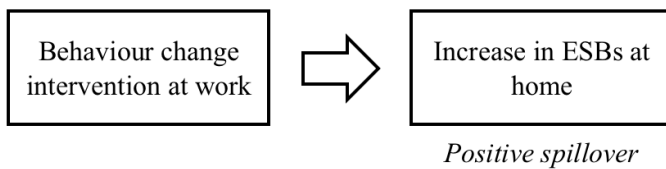
Figure 45: Pathway to positive spillover

#### 6.1.1.1 EVIDENCE FOR POSITIVE CONTEXTUAL SPILLOVER

Overall, both the quantitative and qualitative data provided some evidence for positive, contextual spillover, and more specifically, for the proposed link between a change in environmental identity and positive spillover. Some evidence was found for a decrease of meat consumption among the participants at home, which was interpreted as an indicator for positive contextual spillover from the behaviour change intervention at work to the home setting. However, overall, the findings predominantly point at ‘other’ positive contextual spillover effects, that is an increase of positive ESBs at home other than the reduction of meat consumption (in the presence of change to the targeted behaviour within the workplace context). These ‘other’ ESBs included an increase of seasonal food consumption and purchase of local produce (see CH5 for more details). Hence, largely, the proposed link between the behaviour change intervention and an increase of ESBs in the home setting can be confirmed (see next section for limitations of the evidence). These findings are in line with previous studies, which established a positive relationship between a behaviour change intervention and positive spillover effects (e.g. Baca-Motes, Brown, Gneezy, Keenan, & Nelson, 2012; Evans et al., 2012; Kaida & Kosuke, 2015; Lanzini & Thøgersen, 2014; Steinhorst & Matthies, 2016).

An explanation for the positive contextual spillover effects to ‘other’ ESBs could be that the spillover effects were small and predominantly influenced easier ESBs rather than the more difficult change in meat consumption. Meat consumption could be difficult to change as meat consumption

might carry social importance (e.g. Sunday roast) and, additionally, that in a social context (e.g. family), people do not feel that they can impose their views on others (see also section 6.1.1.2 and 6.1.1.4). Furthermore, the behaviour change intervention targeted multiple ESBs (e.g. food waste reduction through the introduction of the bagasse plates; see CH4), which is likely to have affected a multitude of ESBs at home. The small spillover effects found in previous studies (Lacasse, 2017; Lanzini & Thøgersen, 2014; Thomas et al., 2016) mirrored the findings of contextual spillover effects in the present study. As such, these explanations are consistent with previous research, which suggests that spillover effects from behaviour change interventions may be inconsistent and small (Lacasse, 2017; Lanzini & Thøgersen, 2014; Thomas et al., 2016). Overall, the present study provides evidence for positive spillover effects, which is a first step towards providing evidence for the proposed pathway to positive spillover, as illustrated in Figure 46.



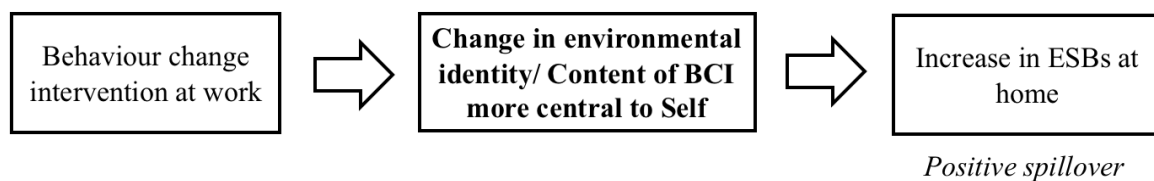
**Figure 46: Pathway between Behaviour Change intervention at Work and Increase of ESBs at Home**

### 6.1.1.2 EVIDENCE FOR A LINK BETWEEN IDENTITY AND POSITIVE SPILLOVER

Second, findings from my research suggest that there is a link between a change in environmental self-identity and positive spillover effects. The quantitative findings showed that an increase in prominence of environmental identity decreased the likelihood for negative behaviour change, although it should be noted that significant results were only found for seasonal food consumption while all other ESBs were non-significant. Furthermore, the visualisation task, which was implemented during the interviews, indicated that an increase in ESBs at home coincided with an increase in the relative centrality of the terms that were used in the visualisation task (see CH5 for more details). This evidence endorses previous studies, which suggest that environmental self-identity is an important underlying factor for positive spillover effects (Lacasse, 2016; Truelove et al., 2014; Whitmarsh & O’Neill, 2010) and that behaviour change interventions can increase the salience of environmental self-identity (van der Werff et al., 2014b). As such, the findings appear to confirm the importance of environmental self-identity for positive spillover effects. However, it remains unclear whether the behaviour change intervention increased people’s environmental self-identity leading to ESBs or whether the intervention affected ESBs which increased people’s environmental self-identity. Although previous research points to the former relation (e.g. Lacasse, 2016; Whitmarsh & O’Neill, 2010), future research should further investigate whether environmental self-identity acts as a mediator

to spillover effects or a moderating factor. Ideally, this would be assessed in a time sensitive design (e.g. longitudinal field studies or experiments) to allow for causal inferences.

The assimilation and accommodation processes proposed by IPT seem to explain the link between the behaviour change intervention and a change in environmental self-identity, as proposed in the original conceptual framework. The evidence from the visualisation task suggests that an integration of concepts promoted in the behaviour change intervention may were integrated into the self-identity or made more salient. The assimilation and accommodation of new information in response to a persuasive appeal (e.g. a behaviour change intervention) has previously been suggested by Eiser (1982). Similarly, the assimilation and accommodation of new information into one's identity has been suggested by Jaspal and Breakwell (Breakwell, 1986; Jaspal & Breakwell, 2014) as an underlying process of identity integration and identity change. These findings are consistent with previous suggestions about information integration and contribute to the understanding of identity and information processes and positive spillover effects. Figure 47 illustrates the pathway that was evidenced in the presented findings.



**Figure 47: Integration of Information into Self**

In the original contextual framework (see Figure 37 in section 5.3.2), it was suggested that an increased salience and centrality of environmental sustainability to the self would lead to consistent behaviours across settings (i.e. from work to home). Evidence was found for the link between a change in environmental self-identity and positive spillover effects to the home setting, which is in line with the consistency principle as an underlying factor for positive spillover effects (e.g. Nik Ramli & Naja, 2011; Steinhorst & Matthies, 2016; Whitmarsh et al., 2018). However, the findings presented in this thesis also suggest that the contextual spillover effects tend to be to ‘easier’ ESBs rather than a reduction in meat consumption. This could be due to a number of reasons. One of which is that the promoted behaviour ‘reduction of red meat consumption’ can be considered as a rather complex and culturally embedded behaviour which can make the communication of meat reduction difficult (Laestadius, Neff, Barry, & Frattaroli, 2016). Hence, it is likely that participants found it difficult to change their meat consumption at home. Previous research suggests that engaging in difficult ESB requires a high motivation towards the behaviour (e.g. norm, attitude, environmental self-identity) (Kaiser, 1998), which could explain why only a few participants, potentially highly motivated ones, reduced their meat consumption at home.

Participants seemed to engage in ‘other, easier’ ESBs more frequently than the promoted ESB of (red) meat consumption reduction. These other ESBs included an increase in local food consumption and food waste avoidance behaviour (for more details see CH5). In fact, positive contextual spillover effects from the behaviour change intervention in the workplace to small and ‘easy’ behaviours was one of the dominant findings from the main study, particularly the qualitative data. These findings are in line with Truelove et al.’s suggestions that a difficult behaviour is more likely to lead to (easy) positive spillover effects than an easy ESBs (see e.g. Truelove et al, 2016; 2014). While previous research has often focused on spillover effects from ‘easy’ and simple behaviours (e.g. recycling) to more difficult and impactful behaviours – which is often related to the foot-in-the-door effect (Austin et al., 2011; Lauren et al., 2016; Thøgersen & Crompton, 2009), the findings of positive spillover effects from ‘difficult’ to ‘easy and convenient’ ESBs, supports Truelove et al’s framework (2014). Hence, the findings of positive spillover effects across settings (i.e. work and home) from a difficult to easier ESBs empirically supports previous findings and predictions, particularly those of Truelove’s work.

The empirical findings from this thesis suggest that there was evidence that people were using small and/or easier behaviours as a means of justifying the continued consumption of meat at home. For example, evidence was found for positive spillover effects from a difficult ESB (i.e. reducing meat consumption), to smaller and easier ESBs (e.g. buying local food). In support of these findings, a number of strategies were identified in the interviews, in which participants explained why they did not reduce their meat consumption, including re-affirmation and mental accounting. Furthermore, this evidence is consistent with previous studies, which found positive spillover effects from a green purchase behaviour intervention to low-cost ESBs (e.g. switching off lights; Lanzini & Thøgersen, 2014).

### **6.1.1.3 RE-AFFIRMATION AND MENTAL ACCOUNTING**

The re-affirmation of past ESBs and mental accounting strategies were identified as a dominant strategy among the interviewees in the main study and were found to blur the line between positive spillover effects and the lack of spillover. This contradicts the suggestions made in the original conceptual framework, which suggests a clear distinction between the pathways to both positive spillover and the lack of spillover (for more details see section 6.1.2). Previous research offers limited explanations for mixed findings and simultaneous occurrence of different types of spillover effects. While Lacasse (2016) suggests that multiple underlying factors could play a role in explaining a lack of spillover (i.e. identity and guilt), the findings from this thesis offer a different explanation. It seems that participants use re-affirmation of past ESBs and mental accounting strategies to justify no post-intervention behaviour or small and easy changes. It seems, that these strategies balance the occurrence of behaviour change in some ESBs and no change in others. This would explain the simultaneous occurrence of positive and the lack of contextual spillover effects in the form of easy ESB changes.



The re-affirmation strategy was used by participants to talk about past behaviours that, subsequent to the intervention, they re-assessed as environmentally sustainable (e.g. buying UK produce, eating white instead of red meat). This strategy is consistent with the self-affirmation theory (Steele, 1988) and previous research that investigated green consumer rationales for unsustainable behaviours (McDonald et al., 2015). Self-affirmation is a strategy people use to reduce the effect of a threat to their self-concept by affirming their selves in a different area (Steele, 1988). For example, people may justify their decision to fly by engaging in other ESBs behaviours to reduce their cognitive dissonance and affirm their self-concept as a pro-environmental person (McDonald et al., 2015). While previously, self-affirmation strategies were identified as ‘trade-offs’ for balancing past and future ESBs (Hope et al., 2018; Kaklamanou et al., 2013; McDonald et al., 2015), the current study identified it as a strategy that explains the lack of spillover effects after a behaviour change intervention. As such, it seems that participants used self-affirmation as a strategy to affirm their past self as pro-environmental in order to justify no post-intervention behaviour change or only engaging in small and ‘easy’ behaviours. The movement in the visualisation task, where participants would increase the centrality of the term ‘environmentally friendly self’, while reporting no or small behaviour changes, further supports this argument. Thus, the use of self-affirmation strategies would allow participants to increase their self-perception as a pro-environmental person while not making changes or only small changes to their current lifestyle.

Another strategy that was identified in the interview data was mental accounting. Participants referred to ESBs they already engaged in which they used as an excuse to not make any further changes. As such, these findings are consistent with previous research that identified mental accounting as a strategy to explain a lack of spillover effects between the home and holiday related behaviours (Schütte & Gregory-Smith, 2015). In the interviews, the strategies re-affirmation and mental accounting were found to overlap, which was evident in participants reporting both behaviour changes and no changes. This indicates that both strategies may occur at the same time. However, re-affirmation strategies tended to focus more on behaviours that were previously not regarded as environmentally friendly and, post-intervention, re-assessed as environmentally sustainable which re-affirmed the participants’ self-concept of being a pro-environmental person. When using mental accounting strategies, participants referred to behaviour changes they already made in the past with the purpose of being more environmentally sustainable, which was then used as an excuse to not engage in further changes as they were already “halfway there anyway” (see participant 126, CH5). Such approaches to justify and neutralise behaviours that are inconsistent with people’s self-perception and principles, have previously been found to help people balance their negative emotions (Schütte & Gregory-Smith, 2015) and irrational decision making (Thaler, 1985).

As such, the present findings align with previous research while also contributing to the spillover literature. The findings expand the existing spillover literature by providing empirical

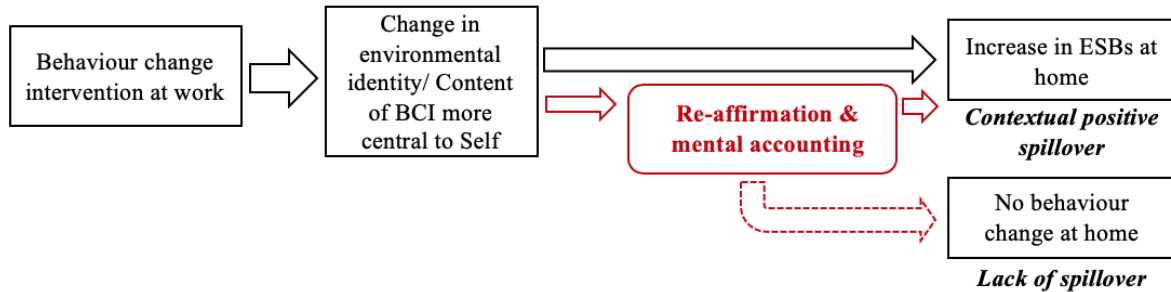
evidence for the use of self-affirmation strategies to explain a lack of spillover and/or engagement in small behavioural changes (i.e. positive contextual spillover effects). Furthermore, the findings add to the empirical evidence of mental accounting which suggests that it is used as a strategy to compensate between environmentally sustainable and unsustainable behaviours, or to justify not engaging in environmentally sustainable behaviours (Hope et al., 2018; Schütte & Gregory-Smith, 2015) or even engaging in wasteful behaviours (Lin & Chang, 2017). Consistent with previous research, mental accounting was identified as a strategy that could explain a lack of spillover. With regards to the theoretical framework, these findings suggest that though people might increase the salience and centrality of environmental self-identity, the use of re-affirmation and mental accounting strategies could lead to adoption of small and easy behaviours (i.e. contextual spillover effects), or even no behaviour change (i.e. a lack of spillover). These permeable pathways between the positive and lack of spillover pathways are illustrated in Figure 50 at the end of this section.

#### **6.1.1.4 LOW-COST HYPOTHESIS**

The low-cost hypothesis provides another explanation for the findings of spillover effects from difficult to easy ESBs. The low cost hypothesis proposes people's tendency to engage in easy and low-cost ESBs over more difficult and costly ESBs (Diekmann & Preisendörfer, 2003). Thøgersen and Crompton (2009) argue that the low-cost hypothesis could also be applied to spillover behaviours. They argue that positive spillover effects, if they occur, are more likely to occur for easy and small behaviours – which have a tendency to be less meaningful from an environmental perspective (Thøgersen & Crompton, 2009). Consistent with this argument, the findings of this thesis suggest that positive spillover effects predominantly occur to ESBs that participants considered to be easier to change and less costly (from both an economic and behavioural standpoint). The qualitative findings showed, that participants often found alternative ESBs to the promoted behaviour meat consumption, since a reduction of meat was often seen as too difficult or not feasible. Similarly, behaviours that participants adopted instead, included an increased focus on local food products (i.e. produced in the UK), recycling, and other small behaviours. The quantitative findings of this study were less conclusive with mostly non-significant changes in ESBs at home. Overall, the findings somewhat support the low-cost hypothesis for spillover behaviours and support the argument made by Thøgersen and Crompton (2009).

Overall, as discussed above, the evidence suggests that positive spillover effects can be the result of a behaviour change intervention at work. However, particularly in the case of difficult ESBs such as the reduction of meat consumption, participants might engage in easier ESBs at home. As such, the findings presented in this thesis make a novel contribution to understanding the spillover link between difficult and easy behaviours from difficult to easier behaviours. It seems, that re-affirmation and mental accounting strategies are used to divert the behaviour that was promoted in the behaviour change intervention at work, to easier ESBs or no engagement of ESBs at home. It was found that

positive and a lack of spillover can occur simultaneously, which can be partially explained by the application of re-affirmation and mental accounting strategies. This link is illustrated in Figure 48. As such, the findings presented in this study contribute to a gap in the literature by shedding light on types of spillover effects from a difficult ESB like reducing meat consumption.



*Figure 48: Self-affirmation and Mental Accounting Strategies*

#### 6.1.1.5 FACILITATORS AND BARRIERS TO POSITIVE SPILLOVER EFFECTS

In addition to decision making strategies, a number of facilitators and barriers to post-intervention behaviour change were identified that affected positive spillover effects. These were predominantly identified in the qualitative data and include similarities and differences between the home and work setting, perceived behavioural control (PBC), and family dynamics in the home setting. All three factors were identified to be both facilitating and inhibiting, depending on their manifestation.

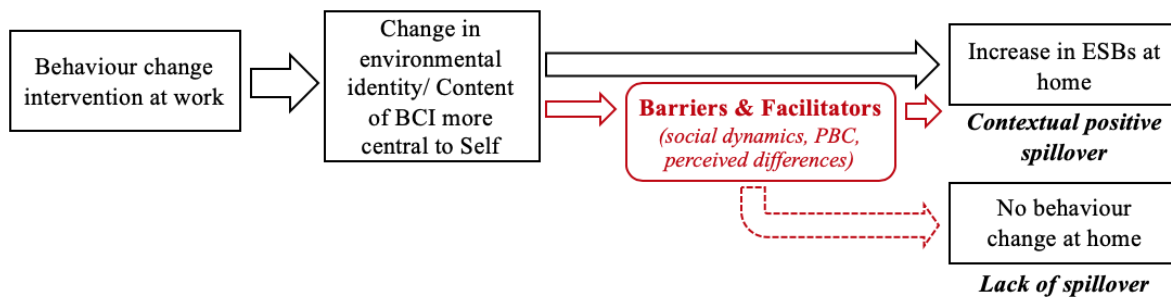
Perceived similarities and differences in the work and the home settings, particularly with regards to perceived differences in the levels of control, were identified as a dominant factor in the interviews. For instance, participants reported that differences in the recycling infrastructure at work and home made them not recycle in the workplace. Furthermore, participants reported that they felt less in control at work or at home which led them to not engage in ESBs in the respective context. These findings join established research, which suggests that PBC influences ESBs (Greaves, Zibarras, & Stride, 2013); most prominently shown in the theory of planned behaviour and its associated research (Ajzen, 1991). Moreover, these findings replicate previous research on contextual spillover, which identified similarities between the home and workplace, for example in the form of similar equipment, as a predictor of positive contextual spillover (Littleford et al., 2014). Littleford et al. (2014) also suggest that a higher behavioural control in the workplace increases the likelihood of consistent behaviours across the home and work setting (i.e. contextual spillover). Equally, in this thesis it was found that a difference in perceived control between the work and home settings acted as a barrier to consistent behaviours across settings.

Similarly, a higher PBC at home over ESBs as well as perceived social support were identified as facilitators to positive contextual spillover effects. More specifically, family dynamics was revealed to be an important factor that influenced positive spillover effects to the home context. Participants that

reported a higher control over and social support of behaviour changes at home, such as the reduction of meat consumption, were more likely to report an increase in ESBs at home. Equally, a lower perceived influence over behaviour changes at home, such as less influence on the family meals, was associated with a lack of spillover or small, positive contextual spillover effects. Moreover, a lower control over the family meals or even resistance of household members towards the reduction of meat consumption, tended to results in a diversion to other ESBs with higher PBC (e.g. buying local food). Whether similarities and differences and PBC acted as mediators or moderators remains unclear.

The findings from this study suggest, consistent with previous research (Scott, Oates, & Young, 2015), that the social context of ESBs needs to be taken into account in order to better understand spillover effects, particularly between relatively different social contexts such as the home and work setting. The findings from this study join previous research, which found that family dynamics play an important role in the ‘ecological resocialisation’ where different family members can act as catalysts to ESBs in the household (Grønhøj, 2006; Grønhøj & Thøgersen, 2011). For example, adolescents were found to play a key role in promoting as well as inhibiting the uptake of ESBs in families (Gentina & Singh, 2015), which is consistent with reports of some participants on the influence of their children on the household’s behaviour. Similarly, participants reported conflicts with other family members that led them to negotiate the household behaviour, which resulted in either an increase or decrease in meat consumption; depending on the individual’s influence on other household members. These findings are consistent with previous research which found that conflicts can be part of the resocialisation process of ESBs in households (Grønhøj, 2006). The strategies that participants used to influence other household members mirror previous research (Kwai - Choi Lee & Collins, 2000), and included ‘bargaining’ (i.e. a household members gets their ways and in return gives in at another occasion) and ‘legitimate’ (i.e. the use of a stereotypical role such as food provider for the family who has influence over the food consumption).

Overall, the findings presented in this thesis contribute to a better understanding of the spillover effects between settings and uncover barriers that may lead to the weaker or stronger spillover effects between settings. Consistent with previous research (Littleford et al., 2014; Whitmarsh et al., 2018), the current findings suggest that the contextual factors similarities and differences, social dynamics, as well as PBC can act as barriers and facilitators to spillover between settings. The barriers identified in this thesis provide explanations for the weaker link of ESBs between different settings that were found in previous research (e.g. waste behaviours at home, work, and on holidays; Whitmarsh et al., 2018). As such, the pathways to positive spillover proposed in the original framework should be complemented by the influence of contextual barriers. Figure 49 illustrates the influence of barriers and facilitators to positive spillover and the lack thereof.



**Figure 49: Barriers and Facilitators to Positive Spillover Effects**

### 6.1.1.6 CONSISTENCY AND HABITS

Lastly, in the original framework it was proposed that, in line with the IPT’s consistency principle (Breakwell, 1986; Jaspal & Breakwell, 2014) and previous research (Whitmarsh et al., 2018), the drive for consistency would lead to positive spillover effects across settings. Expanding on these findings, the evidence presented in this thesis suggest that a reflection on past behaviours seems to be associated with no behaviour change (i.e. a lack of spillover) and small, contextual behaviour change (i.e. small positive contextual spillover effects). People seem to be acting consistently with their identity, however, the people tended to engage in smaller behaviour change rather than changing the main targeted behaviour of the intervention (i.e. meat consumption). It seems that perceived difficulty of behaviour change on a target behaviour in a spillover context acts to moderate the chance of the spillover occurring. Where it is considered too personally (or socially) difficult, this seems to lead to attempts to generate a sense of consistency in other ways (e.g. by delving into the past or by engaging in easier substitute action). As such, these findings expand on previous research, which found evidence for the importance of the consistency for positive spillover effects (e.g. Nik Ramli & Naja, 2011; Steinhorst & Matthies, 2016; Whitmarsh et al., 2018). Three explanations can be identified for this finding.

First, in the present research, the use of the re-affirmation and mental accounting strategies tended to lead to a reflection of pre-intervention behaviours, in which case the consistency principle seemed to result in behaviours consistent with pre-intervention behaviours. This tended to lead to either no behaviour change (i.e. lack of spillover) or a reinforcement of pre-intervention ESBs, which seemed to be small behaviours and not a reduction in meat consumption. Second, there could be the difference between familiar ESBs (e.g. habits) and the adoption of a new ESB (e.g. reducing meat consumption). Previously, it was suggested that experiences and routines of behaviours are learned in one setting (e.g. the workplace), turning into habits, which might then spillover to another setting (e.g. the home) leading to positive spillover effects (Klade et al., 2013). Nevertheless, it takes on average 66 days for a new behaviour to become habitual (Lally, van Jaarsveld, Potts, & Wardle, 2010). The present behaviour change intervention could have been too short to establish a new habit which could have weakened

potential spillover effects. Third, previous research suggests that the adoption of new behaviours tends to result in very small spillover effects and would not lead to dramatic changes (Lacasse, 2017). Therefore, the findings of predominantly small spillover effects to ESBs other than the new ESB, a reduction of meat consumption, is consistent with Lacasse's findings (2017). In this case, the consistency principle could explain the small spillover effects, however other factors could weaken the consistency effect.

The spillover literature does not typically distinguish between habitual and new ESBs, although previous research shows that adopting a new behaviour is more difficult than continuing established behaviours (Verplanken & Aarts, 1999; Verplanken & Wood, 2006). Hence, it could be argued that bolstering existing well practiced (habitual) behaviours becomes a way of ensuring behavioural consistency in the absence of having to introduce a new (more difficult) behaviour. While past ESBs may lead to subsequent ESBs (Cornelissen, Pandelaere, Warlop, & Dewitte, 2008; Ha & Kwon, 2016; van der Werff et al., 2014a), a short behaviour change intervention may only promote existing ESBs (and habits) rather than the adoption of new ESBs. This could explain why participants of the intervention seemed to engage in past behaviours (e.g. buying local produce) rather than new ESBs (e.g. reducing red meat consumption). However, further research is needed to investigate the interplay between the consistency principle, habits, and other factors. For example, future research could assess potential differences between non-intervention studies and intervention studies and the roles of the consistency principle, habits, and past behaviours for spillover effects.

#### **6.1.1.7 CONCLUSION**

Overall, the findings presented in this thesis contribute to growing evidence for positive spillover effects and its underlying mechanisms. The evidence suggests that a short behaviour change intervention in the workplace can affect ESBs beyond the workplace, although long-term effects should be further investigated. The findings are consistent with several studies that found positive spillover effects from a behaviour change intervention (Carrico et al., 2017; Lanzini & Thøgersen, 2014; Margetts & Kashima, 2017; Steinhorst & Matthies, 2016; Thomas et al., 2016). For example, the findings are in line with a six-week intervention study with Danish consumers by Lanzini and Thøgersen (2014), where the authors suggest that a short term field intervention can act as a catalyst to low-cost behaviours. Consistent with Lanzini and Thøgersen's (2014) presumption, the findings of this thesis showed that in addition to the exposure to a behaviour change intervention, psychological factors (i.e. identity) can explain the uptake of ESBs at home (i.e. positive spillover effects). While the dominating behaviour changes found in this research tended to be easier and less impactful (e.g. buying local food), these findings are particularly encouraging, as other field studies did not find evidence for behavioural spillover effects (e.g. Poortinga et al., 2013).

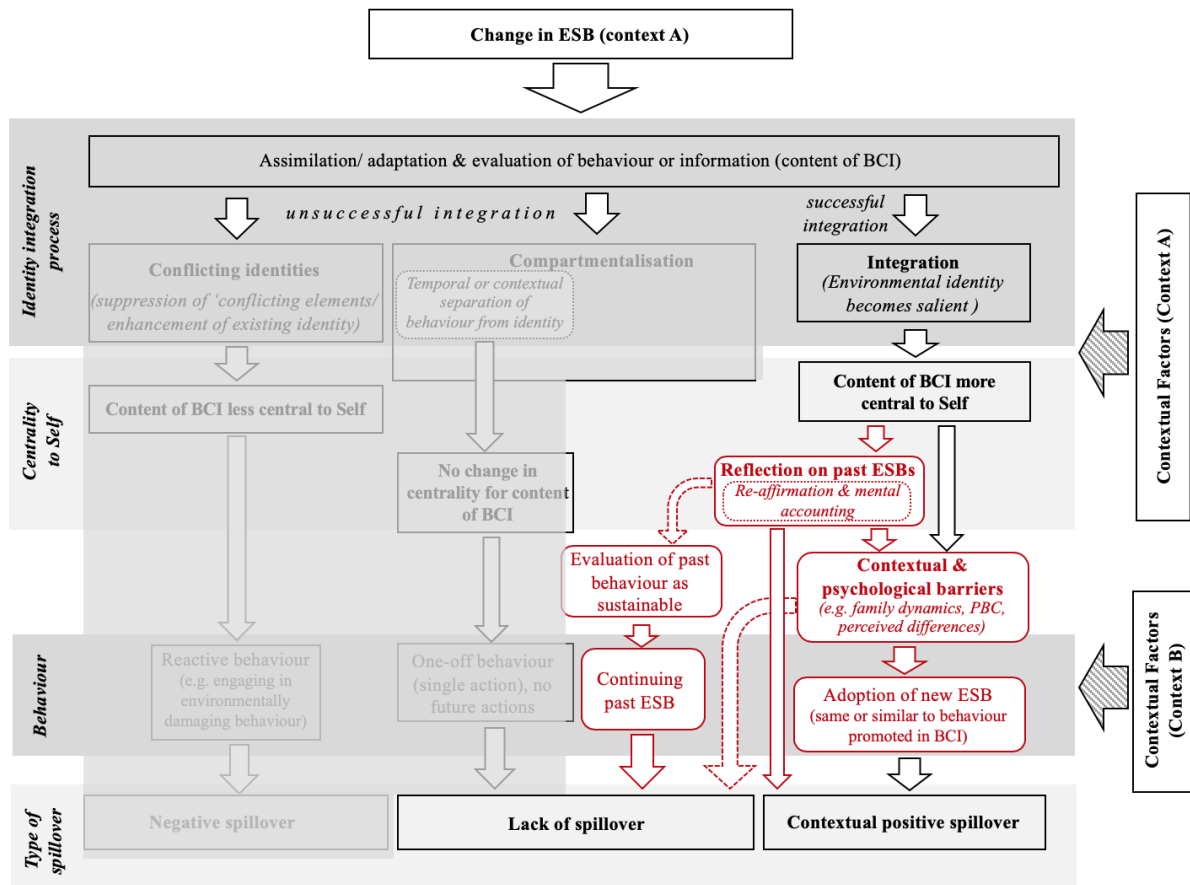


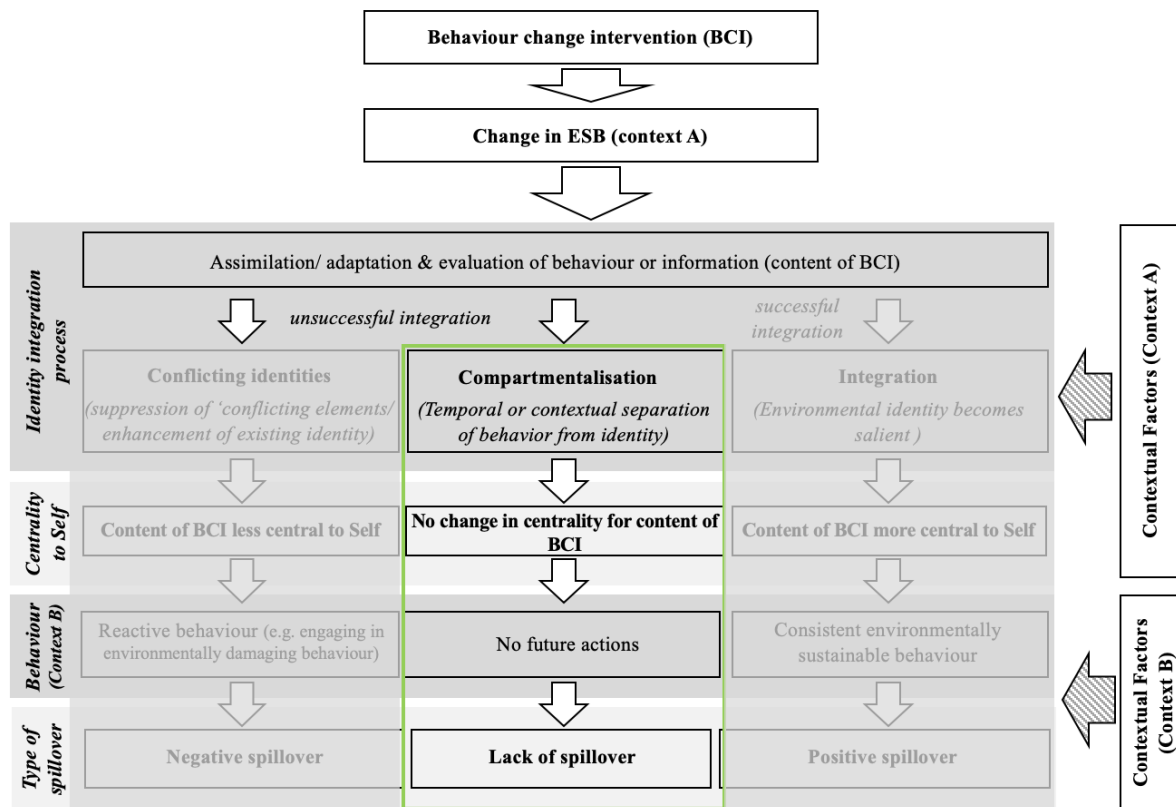
Figure 50: Adapted Pathway to Positive Spillover

Moreover, the findings partially support the pathway to positive spillover that was proposed in the original conceptual framework. The findings support the notion that a behaviour change intervention can lead to an assimilation/adaptation and evaluation process. As proposed in the original framework, a successful integration process (i.e. without conflict) can lead to an integration of the content of the behaviour change intervention, which seems to make the content more central to the self. However, it was not always the case that the strengthened environmental identity resulted in contextual spillover. Instead, people tended to contend with the strengthened identity by casting back and relabelling (i.e. re-affirmation) or recalling past behaviour (i.e. mental accounting) or prospectively acting but on smaller, easier behaviours (producing small contextual spillover). The key finding here seemed that the difficulty of the behaviour (e.g. personal or social difficulty or barriers) seemed to be a key moderator of the likelihood for contextual or no spillover. These dynamics are illustrated in Figure 50.

### 6.1.2 PATHWAY TO LACK OF SPILLOVER

In the theoretical framework, the pathway to a lack of spillover is linked to an unsuccessful integration process of tenets from the intervention into the identity structure. If the integration process was unsuccessful, a compartmentalisation of the identity from the behaviour can occur. It was proposed

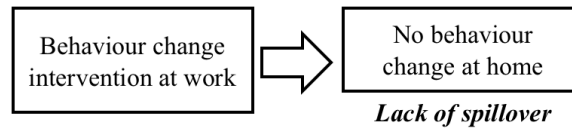
that, when a compartmentalisation occurs, spillover is not likely (i.e., a lack of spillover). A lack of spillover is particularly likely, where the compartmentalisation of identity is achieved on temporal grounds, as people are likely to respond to the tenets of a persuasive appeal (i.e. an intervention) only as they are received. In the case of contextual compartmentalisation, it is anticipated that spillover between behaviours could occur, while spillover between contexts would be unlikely. In the following, the evidence for the proposed pathway is assessed and discussed in relation to previous literature. The pathway to the lack of spillover as proposed in the original framework is illustrated in Figure 51.



**Figure 51: Pathway to the Lack of Spillover as Proposed in the Original Framework**

The lack of spillover was evident both in the quantitative and qualitative data. In the quantitative data analysis, evidence was found for the lack of spillover – or more specifically for the absence of positive or negative spillover effects. The qualitative data analysis showed a similar picture, where the lack of spillover was identified as a dominant pattern in the post-intervention interviews. Thereby, these findings join a number of studies that found a lack of (positive) behavioural spillover or where positive spillover occurred to attitudes and identity without any behaviour changes (e.g. Poortinga et al., 2013; Wells et al., 2016). In line with this research, an increased awareness of environmental sustainability in the context of food was identified in the interviews which was associated with no behaviour changes. With regards to the proposed pathway to a lack of spillover, the evidence in this thesis suggests that, in addition to positive spillover, the behaviour change intervention resulted in a lack of spillover effects among some participants – illustrated in Figure 52.





*Figure 52: Lack of Spillover*

### 6.1.2.1 LIMITED EVIDENCE FOR COMPARTMENTALISATION HYPOTHESIS

The second step of the pathway of the original framework suggests that individuals compartmentalise their identities in response to a behaviour change intervention in order to avoid identity conflict. As discussed in CH5 (see section 5.3), limited evidence was found to support this argument. The findings from the visualisation task suggest that contextual compartmentalisation occurred, which was evident in the compartmentalisation of the identity between the home and work place in some participants can take place and can be associated with a lack of spillover; however, these findings were based on the outputs of just two participants. These findings are consistent with previous research which suggests that compartmentalisation between the home and workplace is commonly used to cope with a moral threat, and that compartmentalisation prevents a person from subscribing personal responsibility to their action (e.g. engaging in ESBs) (Rozuel, 2011). In line with this research, the behaviour change intervention could have been experienced as a moral threat to some participants and compartmentalisation could have been used as a strategy to cope with the moral threat by unsubscribing from responsibility of changing ESBs at home. This suggestions is supported by a study on alcohol consumption, in which Gregory-Smith and Manika (2017) found that drinking identities were defined by the social context, compensation with other identities, and risk perception, among others. Hence, the evidence of contextual compartmentalisation found in two people in the present study is consistent with prior research, but would warrant some further investigation.

On the other hand, the findings from the visualisation task indicate a compartmentalisation within the identity rather than between contexts. In these findings, a dominant pattern of simultaneous increase and decrease in some of the key terms (e.g. environmental identity, sustainable food) was identified, which tended to coincide with a lack of spillover. These preliminary findings are consistent with previous research, which found that compartmentalisation strategies are mechanisms that are frequently used by people in relation to not adopting ESBs that would otherwise threaten social norms (Bartiaux, 2008). More specifically, Bartiaux suggests that compartmentalisation between behaviours can explain the gap between information about a behaviour and the often observed inaction (Bartiaux, 2008), which in the present research is referred to as a lack of spillover. However, overall, in the present study there was little evidence of compartmentalisation and it was found that the defence mechanism most affiliated with a lack of spillover was re-affirmation and/or retrospective licensing.

Although the pathway through identity compartmentalisation was hypothesised in the original framework, the findings from the interviews suggest that re-affirmation and justification strategies offer a better explanation for the lack of spillover effects in this research. As discussed in the previous section (section 6.1.1), participants used re-affirmation and justification strategies to change or reaffirm their self-perception as a pro-environmental person while not engaging in behaviour changes. These findings are consistent with previous research, which found that, for example, the introduction of a carrier bag charge increased people's environmental self-identity without resulting in any behaviour changes; i.e. lack of behavioural spillover effects (Poortinga et al., 2013). While the relationship between compartmentalisation of identity and the lack of spillover could not be fully confirmed, this link constitutes a promising avenue for future research. As such, future research could explore the mechanisms of compartmentalisation in relation to inconsistent ESBs in more depth and take factors into account that define identities in different contexts (Gregory-Smith & Manika, 2017). This would contribute to a better understanding of why and when people act (in)consistently with regards to ESBs and in accordance with their self-identity.

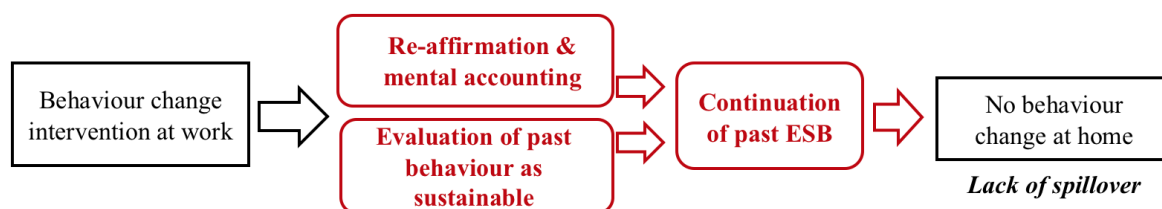
#### **6.1.2.2 AFFIRMATION AND JUSTIFICATION STRATEGIES TO EXPLAIN THE LACK OF SPILLOVER**

In the context of the presented theoretical framework, which draws on identity process theory, the justification, re-affirmation, and mental accounting strategies could indicate identity threat. In the psychology literature, self-justification is a widely studied strategy to resolve inconsistencies between behaviours and beliefs and is often associated with bolstering self-esteem to counteract experienced self-threats (Holland, Meertens, & Van Vugt, 2002). Previous research found, that, when receiving a self-threatening message, particularly people with low self-esteem used self-affirmation strategies to increase their positive self-image in order to cope with self-threats (Holland et al., 2002). The behaviour change intervention in the workplace could have presented a self-threat to some participants (Murtagh et al., 2014). However, rather than solving the experienced conflict by engaging in unsustainable behaviours as a compensatory action (as suggested in the framework), participants used re-affirmation strategies to perceive themselves as pro-environmental without making changes to their behaviour. These findings are consistent with previous research, which found that people would use affirmation strategies to rationalise meat-consumption (Dowsett, Semmler, Bray, Ankeny, & Chur-Hansen, 2018).

As already discussed above, justification was identified as another dominant strategy participants used to explain their continued meat consumption at home (i.e. lack of spillover). The arguments participants used to justify no changes in their meat consumption ranged from not wanting to give up meat to perceived high costs of changing meat consumption behaviour. This replicates findings from a qualitative study on reducing flying, which, similar to reducing meat consumption, is a rather difficult ESB (McDonald et al., 2015). McDonald et al. (2015) identified justification as a strategy that participants used to explain no behaviour change. McDonald et al. (2015) suggest that justification

strategies were used to solve cognitive dissonance between personal norms, ideals, guilt, external forces (e.g. no feasible alternative to flying), and engaging in unsustainable behaviours (i.e. flying). The findings of this thesis contribute to these findings by expanding to another behavioural domain, namely meat consumption, as well as providing evidence for the use of justification strategies for a lack of spillover after a behaviour change intervention.

Re-affirmation and justification strategies could help explain the lack of spillover effects, particularly after behaviour change interventions (see also section 6.1.1.3). While overall, the use of re-affirmation and justification strategies are consistent with previous qualitative research on ethical consumption (McDonald et al., 2012; Schütte & Gregory-Smith, 2015), this contradicts previous spillover research (van der Werff et al., 2014a). A reason for this discrepancy could be that previous research predominantly focussed on spillover effects without behaviour change interventions that focussed on the adaption of new behaviours (Lacasse, 2017). In such studies, positive spillover effects based on consistency principles (Bem, 1972; Festinger, 1957) would appear to explain consistent ESBs across settings and between similar behaviours (Whitmarsh et al., 2018). However, this thesis focussed on spillover effects subsequent to a behaviour change intervention, which means that a consistent behaviour is interrupted and, potentially new, ESBs are promoted. What the findings of the present research suggest is that through self-affirmation and justification strategies people preserved their consistency by not engaging in the behaviour that was promoted in the intervention (i.e. meat reduction). As such, reflecting on past behaviours and acting consistently across behaviours and settings, may inhibit positive spillover effects from a behaviour change intervention, which explains the lack of spillover. This revised pathway is illustrated below in Figure 53.



**Figure 53: Lack of spillover**

Inconsistent with the findings discussed above, the quantitative and qualitative data also indicate that people who increased their environmental identity as a result of the behaviour change intervention were more likely to also engage in positive ESBs, although the evidence from the quantitative data is not conclusive. As such, the latter were more likely to show no behaviour change which indicates a lack of spillover. These findings could be explained by the contribution ethics hypothesis (Thøgersen & Crompton, 2009), which suggests that people feel they have already contributed their part (e.g. by taking part in the behaviour change intervention) and, therefore, see no need to engage in further ESBs. The contribution ethics hypothesis is similar to the single action bias (Weber, 2006) and could also be explained with the self-justification strategy (Holland et al., 2002).

However, it is also possible that participants did not change their self-perception nor their behaviour, which could be due to the participants' perception that no changes in addition to the behaviour change intervention were needed. At this point, though, these explanations are speculative and further research is needed to uncover the underlying mechanisms to the lack of spillover. In this thesis, as well as in previous research (Gregory-Smith, Smith, & Winklhofer, 2013; McDonald et al., 2015; Schütte & Gregory-Smith, 2015) qualitative data seems to be more conclusive with regards to finding explanations for the lack of spillover. As such, future research that aims to get a better understanding for the lack of spillover effects should particularly focus on qualitative research approaches or integrate qualitative methods with other research approaches.

### **6.1.2.3 POSITIVE SPILLOVER AND A LACK OF SPILLOVER OCCUR SIMULTANEOUSLY**

In contrast to the predictions of the original theoretical framework, the quantitative and qualitative results suggest that a lack of spillover and positive spillover might occur simultaneously. For instance, interviewees that reported changes in their ESBs at home (e.g. purchasing local food, reducing red meat) also talked about how they did not make changes to some behaviours. It seemed that participants would cognitively justify inaction in some ESBs while still changing other ESBs. Furthermore, these inconsistencies in ESBs are supported by previous research which found that people would use compensatory green beliefs (e.g. justification of environmentally damaging behaviours) when they perceived their pro-environmental credentials threatened (Hope et al., 2018).

### **6.1.2.4 THERE ARE SEVERAL AVENUES THAT LEAD TO A LACK OF SPILLOVER**

To conclude, the findings from this study suggest that there are several explanations for the lack of spillover and avenues that link the pathways between positive spillover and the lack of spillover (for an illustration, see Figure 54). First, contextual barriers may inhibit consistency driven ESBs that would potentially be subsequent to a successful identity integration (i.e. positive spillover effects). Second, as proposed in the original framework, an unsuccessful assimilation/ adaptation and evaluation process may lead to a compartmentalisation of key concepts within the individual, which was indicated by a simultaneous increase and decrease of key terms used in the visualisation task. This was found to result in a separation of identity elements (e.g. indicated by an increased centrality of the term environmentally friendly self in the visualisation task) from behaviours (e.g. no change in ESBs at home). Third, mental accounting and self-affirmation strategies were used to re-affirm past behaviour as environmentally-friendly and justify not engaging in behaviour changes at home post-intervention. This mechanism could potentially explain the higher likelihood for a lack of spillover in the intervention group in comparison to the control group in the quantitative results (see CH5, section 5.1.4.3).

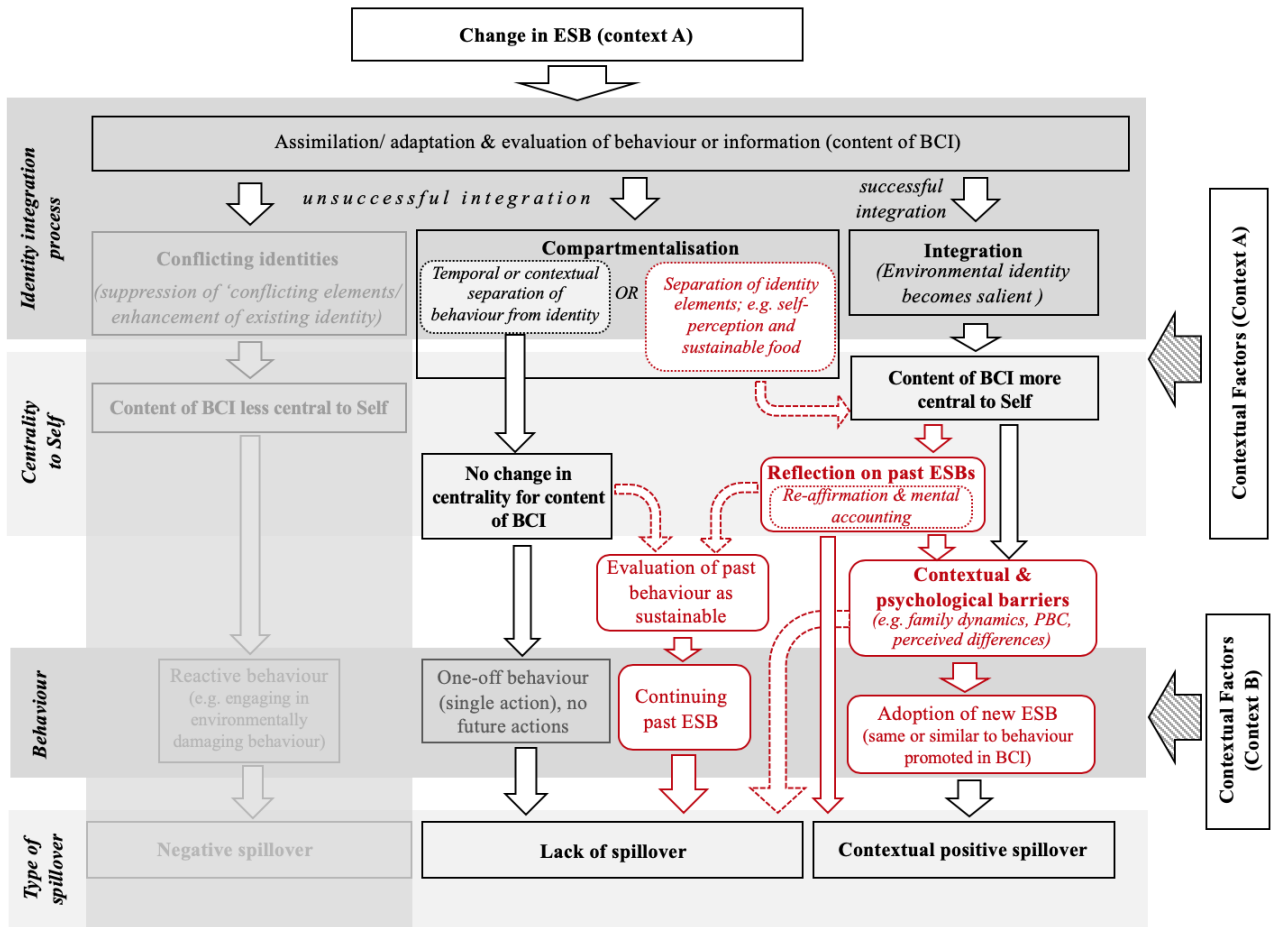
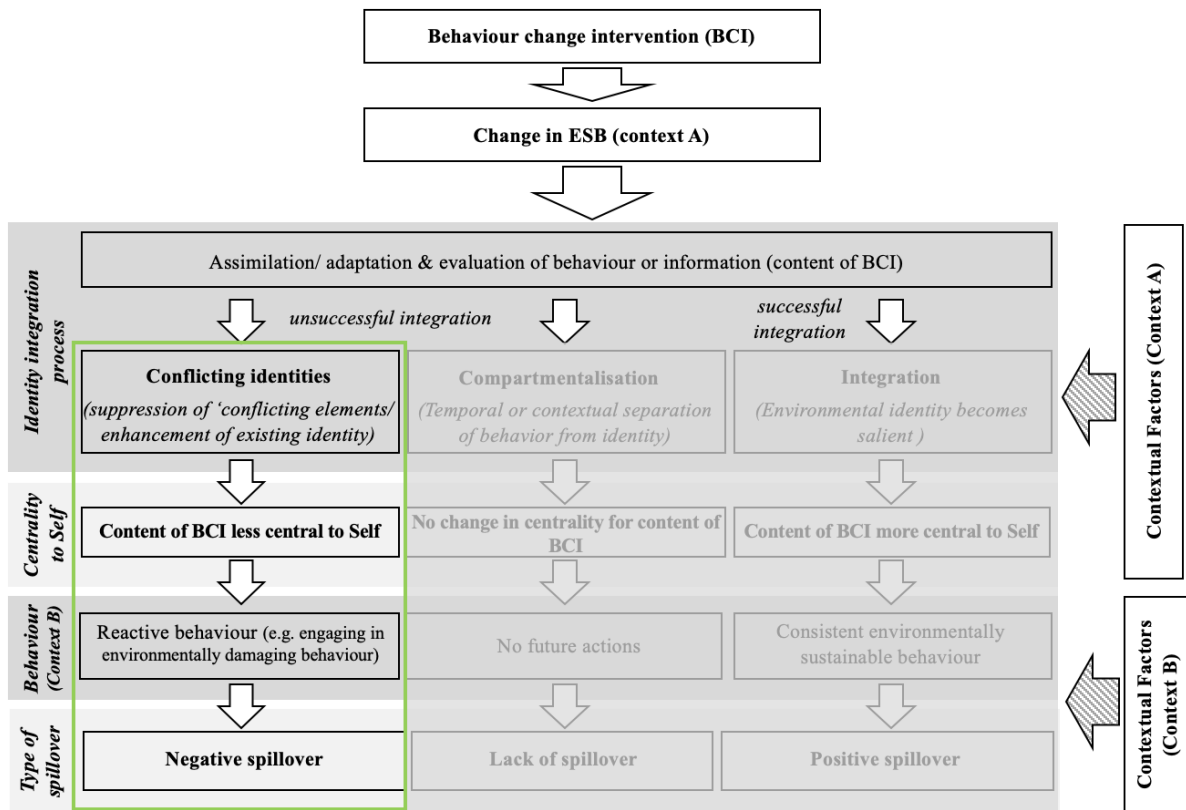


Figure 54: Positive and the lack of Spillover

### 6.1.3 PATHWAY TO NEGATIVE SPILLOVER

The pathway to negative spillover was theorised to result from experienced identity conflicts caused by the behaviour change intervention. It was proposed, that people would aim to solve the experienced conflict either by suppressing the conflicting elements of the intervention or enhancing existing identities (Verfuerth et al., 2019). As illustrated in Figure 55 below, it was proposed that in order to resolve the conflict associated with an environmental behaviour change manipulation, that environmental self-identity would become less central. Further, it was suggested that this could lead to an increase in environmentally damaging behaviour (e.g. increased meat consumption, increased energy use); i.e. negative spillover.



**Figure 55: Pathway to negative spillover as per the original framework**

Overall, there was indicative evidence for potential negative spillover effects in the form of negative reactions to the behaviour change intervention in one interview. Only one instance among the interviewees indicated negative spillover. While several participants reported how their colleagues reacted negatively to the behaviour change intervention in the form of vocal rejection, only one interviewee (ID129) reacted negatively herself. However, while she talked negatively about the promoted behaviour of reducing meat consumption, she did not report any behavioural consequences. Instead, negative reactions were prevalent in the form of denial, cynicism, and disbelief of the message of the behaviour change intervention, which were identified as strategies to overcome dissonance among meat eaters in previous research (Rothgerber, 2014). This illustrates reactance and resistance to the intervention, which indicates that the theorised identity conflict may have been present. This was further supported by the findings from the visualisation task, in which participant ID129 showed a decentralisation of the terms sustainability and sustainable food, with the decentralisation of the term sustainable food being so extreme that she removed the term from the table where the visualisation was presented to her. The participant could have tried to resolve this potential conflict by compartmentalising the discussion of meat consumption from the wider discussions about the necessity to be more environmentally sustainable. However, care should be taken when basing evidence on a single case and further research is needed to validate these findings.

### **6.1.3.1 REACTANCE TO BEHAVIOUR CHANGE INTERVENTION**

Anecdotal evidence from observations during the behaviour change intervention and interviewees suggest that resistance to the promoted change in meat consumption was apparent. This was visible, for example, in protests of small groups of employees, who demonstratively went out to buy meat to add to the food provided in the canteen and verbally commented on the need for meat, particularly for men (see Appendix B, section 9.2.7.2 for more details). This is consistent with previous research, which found that challenging an existing meat-centred discourse with an alternative discourse only served to strengthen the centrality of meat (Bohm, Lindblom, Åbacka, Bengs, & Hörnell, 2015). Moreover, Bohm et al. suggest that “if the reduction of meat does not harmonize with a student's identity, an explicit deconstruction of the centrality discourse which makes social norms salient may strengthen their resistance.” (Bohm et al., 2015, p. 110).

The observed reactance behaviour to the behaviour change intervention can also be linked to psychological Reactance Theory (Brehm, 1966), which suggests that a perceived threat to people's freedom can evoke resistance behaviour (i.e. negative spillover). In the present study, the perceived threat of freedom was commented on by interviewees in the post-intervention interview and employees during the behaviour change intervention (see CH5 and Appendix B, section 9.2.7.2 for more details). Future research should further investigate the relationship between behaviour change interventions, identity threat, and changes in centrality of key concepts. For instance, resistance to change under identity threat and neutral conditions could be tested in experiments, which has been previously been done by Murtagh et al. (2014) in the context of car driving behaviours. Furthermore, the influence of guilt, which has previously been found to mediate negative spillover (Lacasse, 2016; Truelove et al., 2016), could be integrated into future research.

### **6.1.3.2 LIMITED EVIDENCE FOR NEGATIVE SPILLOVER**

No compelling evidence was found for an actual decrease in ESBs or increase in environmentally damaging behaviours at home. Interestingly, both qualitative and quantitative data indicated a relation between changes in identity and lower scores on ESBs scales. For instance, it was found that an increase in the variable prominence of environmental identity was a significant predictor for a decrease in positive ESB, irrespective of the intervention condition. These findings could be explained with the single action bias (Weber, 2006) and moral licencing theory (Brañas-Garza, Bucheli, Paz Espinosa, & García-Muñoz, 2013; Tiefenbeck et al., 2013). While the single action bias was used above to explain a lack of spillover, previous literature has used it to explain negative spillover effects

(Truelove et al., 2014). The increased perception of prominence of environmental identity could also indicate a methodological effect, for example by taking part in the survey<sup>9</sup>.

Consistent with the above argument, previous research found that engaging in a ‘costless’ prosocial behaviour (e.g. completing a survey), can lead to reductions in subsequent prosocial behaviours which the authors associated with moral licencing (Gneezy et al., 2012). Hence, participants could have gained the perception that by taking part in the survey about environmental sustainability, participants could have felt licenced to disengage in subsequent ESBs (i.e. moral licencing theory; Brañas-Garza et al., 2013; Tiefenbeck et al., 2013). This could explain why an increase in prominence of environmental identity and decrease of ESBs affected both the intervention and control group.

Future research could investigate the effects of taking part in a voluntary survey and subsequent unethical behaviours such as decreasing ESBs. For instance, an experimental design with a disguise and non-disguise treatment group with regards to the purpose of the study and a control group could test the effect partaking in a sustainability study has on subsequent ESBs. If there was an effect, in the context of this study it could explain why a decrease in some ESBs was found in the control group and, similarly, the intervention group had a higher likelihood for a lack of spillover effects than the control group (see chapter 5 for more details on the results).

Lastly, the limited evidence for negative behavioural spillover (i.e. an increase in environmentally harming behaviours or decrease in positive ESBs) could be explained with the immediate resolution of the identity threat. Breakwell (1986, 2014a) argues that people aim to resolve an experienced identity threat immediately which makes it difficult to measure. This is supported by the observations made during the behaviour change intervention, where the negative reactions of some employees during the behaviour change intervention indicate the occurrence of identity threat and, in some cases, reactive behaviours. Supported by Breakwell (1986, 2014a), this could indicate that the identity conflict has already been resolved by the time of the survey or interview a few weeks after the behaviour change intervention. As such, it is possible that negative spillover was present, however, the methodological approach failed to capture negative spillover effects. Future research could assess ESBs immediately after a behaviour change intervention in order to assess the occurrence of both identity threat and associated negative behavioural spillover effects.

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<sup>9</sup> Note: Participants were invited to make suggestions for sustainability related changes in the canteen. Participants of the control group were told that their ideas for a sustainable menu will be tested in Sheffield (i.e. intervention group) and that by the end of the year a new, more sustainable menu will be implemented in Leeds as well. This was promised by the HR team and the chef of the canteen and therefore communicated to the participants of the study.



A few potential reexplanations for not findings evidence of negative spillover effects should be mentioned. First, it is possible that the people who engaged in negative spillover effects (e.g. increased their meat consumption at home following the intervention) did not participate in the interviews (or the survey for that matter). Second, people in the interviews could have been not entirely truthful as they could have perceived the promoted ESBs as a socially desirable behaviour. Hence, it could be that people were less likely to report having acted in an environmentally ‘bad’ way. Further limitations including attribution of impact and methodological issues are discussed in section 6.4.

#### **6.1.4 SUMMARY**

Based on the discussion above, the original framework was adjusted as shown below in Figure 56. The new additions to the framework are shown in red. The evidence for the single action bias was not sufficient, which is why that box has been turned grey. While previous research has focused predominantly on understanding positive spillover effect, and to a lesser extent the lack of spillover or negative spillover effects, the presented research aimed to take on a more holistic view by assessing positive, negative, and the lack of spillover together.

Overall, the revised theoretical framework provides a useful account for contextual spillover effects through identity processes. In the framework it is suggested that a behaviour change intervention, for example in the workplace, results in an assimilation/adaptation and evaluation process of the information in relation to the person’s identity. A successful adaptation can lead to an integration of tenets from the intervention into the identity structure, which may lead to an increased centrality of the associated content to the self. This may lead to the adoption of ESBs in other contexts (e.g. the home setting). Contextual and psychological barriers, such as perceived behavioural control, differences between the workplace and other settings, and social dynamics in the settings (e.g. family dynamics at home), influence the adoption of ESBs at home and may lead to small contextual or a lack of spillover. If a person reflects on past behaviours during the integration process, re-affirmation and mental accounting strategies may lead to a continuation or increase of past ESBs, however, if the promoted ESB is new or perceived as difficult, there is no increase in the promoted ESB. Similarly, an evaluation of past behaviours as pro-environmental can also lead to a lack of spillover, as the person engages in no behaviour change.

The lack of spillover in this framework can be explained through a number of pathways. In addition to the aforementioned, a compartmentalisation process, resulting from the behaviour change intervention, can occur. A temporal or contextual separation of the behaviours promoted in the intervention from the identity may lead to no changes in centrality nor behaviours (i.e. lack of spillover). Although the latter assumption is not supported by evidence from this research and, therefore, needs further evidence. Similarly, a person may compartmentalise specific aspects from the intervention. For

example, a person may strengthen their environmental identity, while simultaneously decreasing the centrality of concepts associated with the intervention (e.g. sustainable food). An increased centrality of environmental identity can lead to positive contextual spillover effect or a lack of spillover, as already discussed above. Yet, it is likely that a separation of identity elements leads to a lack of spillover or positive contextual spillover effects. Similarly, if elements become less central (e.g. sustainable food), this could also potentially lead to the pathway to negative spillover; however, the current research provides no sufficient evidence for the occurrence of negative spillover following this pathway.

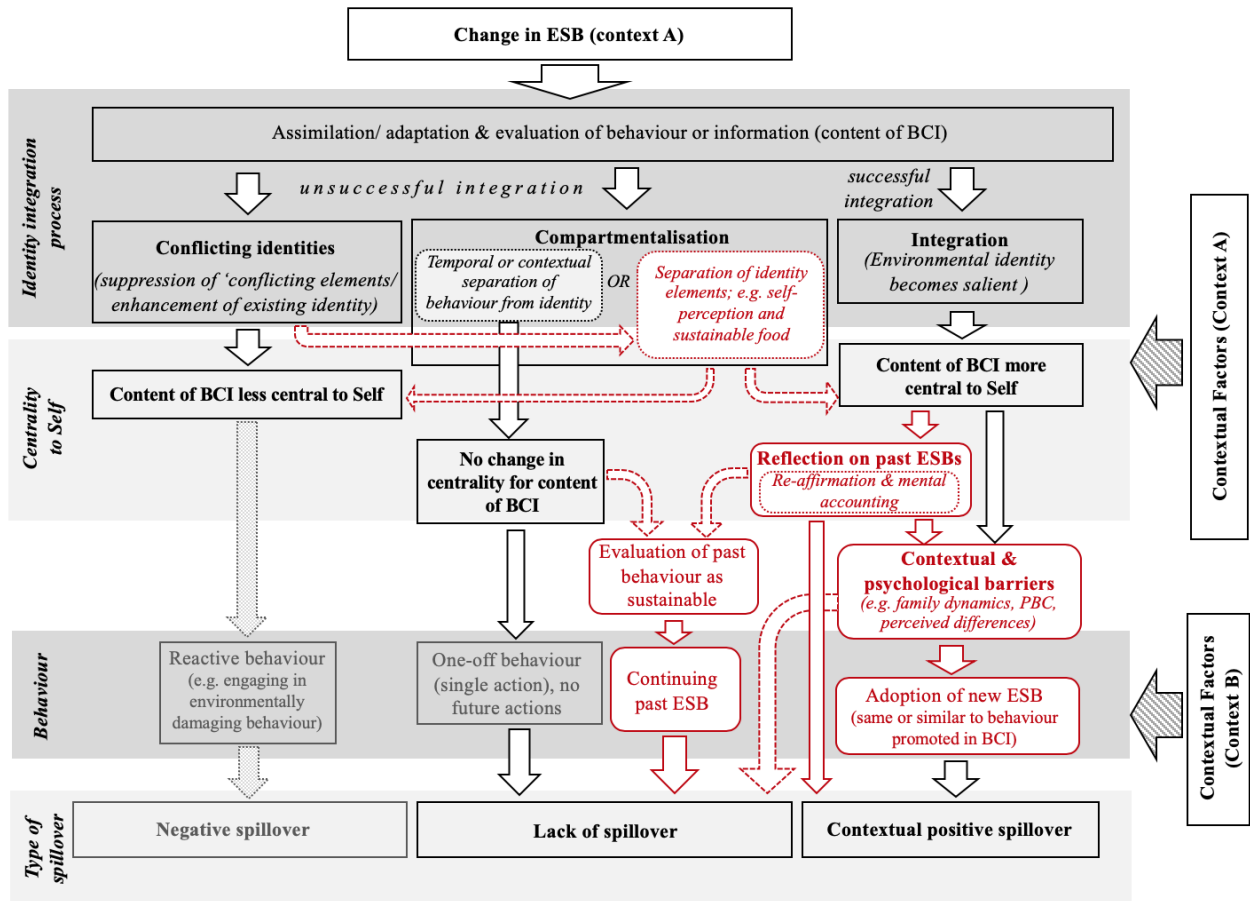


Figure 56: Revised conceptual framework for contextual spillover effects

Lastly, it is suggested that where the identity integration process is unsuccessful following an intervention, this can lead to identity conflicts. The conflict can be resolved by decreasing the centrality of the target of the intervention from the self or, as found in this research, by cognitively justify inaction through self-affirmation, justification, and metal accounting strategies. Nevertheless, the evidence for the pathways to negative spillover is not sufficient within the current studies (indicated in greyed out areas in the framework, Figure 56). Hence, future research should further investigate this pathway to provide conclusive evidence for the proposed pathway to negative spillover.

With regards to the research question '*RQ1: How does a behaviour change intervention in the workplace affect environmentally sustainable behaviours at home?*' and '*RQ2: What role does identity play in the emergence of positive and negative contextual spillover effects (or a lack thereof)?*', the revised framework and the evidence discussed in this thesis provide some answers. It was shown that a behaviour change intervention in the workplace leads to behaviour changes in ESBs among some people, which seems to be influenced by social and contextual factors (see section 5.2.2.3). For example, participants that lived with household/family members who supported changes in meat consumption or lived alone seemed to be more likely to show positive spillover effects. Similarly, participants with a less supportive home environment and seemed to be more likely to report small, contextual spillover effects or a lack of spillover.

The evidence suggests that, overall, the reported behaviour changes can be mostly categorised as positive contextual spillover. Negative behavioural spillover effects were only observed as an immediate reaction to the behaviour change intervention (see Appendix B) by some employees in the form of protests (i.e. buying meat from shops and bringing it to the canteen) and verbal rejection of the intervention. As such, the answer to the question around the occurrence of negative spillover is limited. The behaviour change intervention also resulted in a lack of spillover among some people. This research identified a several explanations that lead to a lack of spillover, including re-affirmation strategies and mental accounting, which were previously associated with negative spillover effects (Gregory-Smith et al., 2013). Furthermore, it was found that positive and a lack of spillover occurred simultaneously among participants. The next section discusses further contributions to the spillover literature.

## **6.2 CONTRIBUTIONS TO THE SPILLOVER LITERATURE**

The previous section already touched on a few contributions that this thesis makes to the spillover literature. Building on this, the following section discusses contributions to the spillover literature beyond the theoretical framework. This section is divided in five parts, reflecting the five main areas of contribution. First, this thesis contributes to the literature by providing a better understanding of contextual spillover effects, particularly to 'third places'. Second, contributions are made to a better understanding of the role of identity for spillover effects and the underlying identity process in particular. Third, the theoretical framework above extends the existing theoretical frameworks in the spillover literature, especially by focussing on underlying identity processes. Fourth, by focussing on meat consumption, this research contributes to a better understanding of a relatively under-researched, but nonetheless impactful ESB. Fifth, the application of a mixed methods approach and the development of a visual measure for identity change also make a methodological contribution.

## 6.2.1 CONTEXTUAL SPILLOVER

The main aim of this research was to gain a better understanding of spillover effects from a workplace behaviour change intervention to the home setting. The findings of this study provide evidence for positive and a lack of spillover from the work to the home setting, which is in line with previously studies (Littleford et al., 2014; e.g. Manika et al., 2015; Poortinga et al., 2013; Whitmarsh et al., 2018). As such, this research contributes to a growing body of evidence for spillover effects between different contexts. In the following, the findings and their contributions to the contextual spillover literature are discussed in more detail.

First, the identified facilitators and barriers to contextual spillover effects, namely contextual similarities and differences, PBC, and social setting highlight the importance of a setting (e.g. work, home) on different ESBs. These findings join previous research (Maki & Rothman, 2017), in suggesting that settings should be considered more fully when designing, implementing, and evaluating behaviour change interventions. In particular, the *role of perceived similarities and differences across settings* for spillover effects between the work and home are highlighted. As discussed in the previous section, these findings are consistent with previous research, which found that perceived behavioural control (Maki & Rothman, 2017) and similarities between settings (Littleford, 2013; Littleford et al., 2014; Whitmarsh et al., 2018) are important factors for spillover effects between settings. Moreover, the presented study provides evidence from an intervention based study (including quantitative and qualitative data sets) of *spillover effects from real-world workplace interventions* (Hargreaves, 2011; Nye & Hargreaves, 2010). The findings of this thesis support the call for a more holistic rather than setting specific sustainability policies (Tudor et al., 2007) in order to facilitate spillover effects of ESBs between settings (for further discussion see section 6.2).

Second, the findings suggest that contextual spillover effects occurred to the same ‘family’ of ESBs as they were all food related, while no evidence was found for behavioural spillover (e.g. to energy related behaviours). This adds to the evidence of previous research, which found that similarities between behaviours influenced contextual spillover effects (e.g., Margetts & Kashima, 2017; Tudor et al., 2007). These findings contribute to a better understanding of the role that spillover effects between settings can play for promoting environmentally sustainable lifestyles. Whereas previous research found spillover effects from the home to the work setting (Tudor et al., 2007), this research contributes to a better understanding of spillover effects from work to home. This supports the notion that reciprocal occurring interactions between work and private life can facilitate promoting environmentally sustainable behaviours in both settings (Muster & Schrader, 2011).

Third, this thesis makes a novel contribution by identifying *third places* as further contexts of spillover. Previous contextual spillover research was predominantly focussed on spillover effects between the work and home setting and to a lesser extent, the holiday context. This thesis contributes

to the contextual spillover literature by providing initial evidence to other ‘third places’. These include the supermarket, and less evidently, media consumption (see CH5, section 5.2.2.4). Particularly the supermarket constitutes an interesting setting as it is a place for consumption and decision making that is somewhat influenced by policies (for more details see section 6.3.1). It was shown, that the behaviour change intervention in the workplace influenced the decision-making process in the supermarket for some participants (i.e. evident in the interview data). Future research should further investigate the link between food-related behaviour change interventions in the workplace and decision-making processes in the supermarket (for a discussion, see section 6.3.1).

Fourth, this thesis contributes to a methodological triangulation of the exploration of contextual spillover effects. Previously, this has predominantly been assessed through the application of quantitative, correlational studies (Littleford et al., 2014; Tudor et al., 2007) and, to a lesser extent, mixed methods (Whitmarsh et al., 2018) and qualitative approaches (Uzzell & Rätzl, 2018). As such, the research presented in this thesis joins previous research by using a mixed methods approach. Moreover, while previous research findings in the area of contextual spillover predominantly relied on non-intervention based studies (e.g. Maki & Rothman, 2017; Whitmarsh et al., 2018), the presented research findings are based on a quasi-experimental multi-method field study. As such, this research extends the evidence and validity of previous research on contextual spillover effects by providing more comprehensive evidence in a number of ways. For example, the mixed methods approach exposed contextual spillover (e.g. decision making processes in the supermarket) and underlying mechanism that could explain inconsistencies in ESB change. Furthermore, it was found that a real-world intervention at work could go beyond changing behaviours at home, but also affect ESB in the supermarket.

## **6.2.2 THEORETICAL CONTRIBUTION**

This thesis provides a theoretical approach to understanding pathways to positive, negative, and the lack of spillover. This ties in with previous research that developed a conceptual framework to explain spillover effects (e.g. Dolan & Galizzi, 2015; Nik Ramli & Naja, 2012; Truelove et al., 2014). IPT is based in social psychology and has been used to explain identity change and adaptation to a changing social world (Breakwell, 1986; Jaspal & Breakwell, 2014), and to a lesser extent in the context of ESBs (Murtagh et al., 2014). The conceptual framework presented in this study draws on IPT to explain three ways of spillover: positive, negative and the lack of. While previous research has included identity theories (e.g. Nik Ramli & Naja, 2012) and different types of spillover effects (Dolan & Galizzi, 2015; Truelove et al., 2014) (i.e. positive, negative, lack of), the present framework integrates IPT with pathways to positive, negative, and a lack of spillover by focussing on the underlying identity integration process. Furthermore, to date only a few researchers have put forward theoretical

frameworks that specifically aimed at explaining the spillover effects between the home and workplace (Klade et al., 2013; Nik Ramli & Naja, 2012).

Furthermore, this research contributes to previous research that aimed at understanding the pathways to spillover effects (Grønhøj & Thøgersen, 2011; e.g., Lacasse, 2016). For example, Thøgersen (2012), Truelove et al. (2014), Dolan and Galizzi's (2015) frameworks on spillover emphasise that underlying motives link two subsequent spillover behaviours. The conceptual framework that was developed throughout this thesis contributes to these considerations by providing insights into the underlying processes. More specifically, by integrating the IPT and drawing on spillover research, the conceptual framework contributes to a better understanding of the identity processes that underlie spillover effects. While previous research and theoretical frameworks have highlighted the importance of identity for spillover processes (e.g., Dolan & Galizzi, 2015; Nik Ramli & Naja, 2012; Truelove et al., 2014; Whitmarsh et al., 2018) the presented framework adds to the literature, both theoretically and empirically. Moreover, the theoretical contribution through the conceptual framework aims to fill the gap between theoretical considerations on spillover and the mixed empirical evidence.

Future research should further assess the pathways proposed in the framework. The strongest evidence in this study was found for positive spillover effects. However, expanding on previous research (e.g. Lauren et al., 2016), the findings showed that positive spillover effects from difficult behaviours (e.g. reducing red meat consumption) tended to spillover to easier ESBs. These findings highlight what might constitute 'difficult' in the context of spillover. For instance changing dietary choices (i.e. meat consumption) can affect other people and may vary between social contexts (e.g. work, home, restaurant). This could, perhaps, explain why some people see themselves as having less PBC over changing certain behaviours (e.g. reducing meat consumption), resulting in people opting for alternative routes to satisfy their strengthened/changed environmental identity. Future research should further investigate this link and the role of contextual factors. For instance, future research could study the cues and heuristics that might help explain the pathways to the easy behaviours as well as the barriers that might hinder spillover effects to more difficult behaviours. Furthermore, the findings of this research are based on a relatively short behaviour change intervention, which could have impacted the magnitude of the positive spillover effects. As such, future research should assess the effects of longer term behaviour change interventions, for instance, by assessing canteens that change their menu for good (e.g. public canteens in Portugal; Cardoso, Augusto, Nunes, & Graça, 2018).

While the present research sheds some light on the pathways to a lack of spillover and, to a lesser extent to negative spillover effects, future research should further investigate these pathways. Particularly the pathway to a lack of spillover seems understudied. This could be due to a publication bias that overrepresents significant findings and could, therefore, underrepresent studies that found a lack of spillover. Nonetheless, a better understanding of the underlying mechanism that lead to a lack

of spillover would make a valuable contribution to the spillover literature. This study provides some initial findings, particularly by joining literature on strategies for ethical consumption (McDonald et al., 2012; Schütte & Gregory-Smith, 2015) and the concept of compensatory beliefs (Hope et al., 2018; Kaklamanou et al., 2013). However, more research is needed to better understand the lack of spillover.

## **SPILOVER AND IDENTITY**

Another main contribution is made towards the understanding of identity and spillover. In line with previous research (Thøgersen, 2012), the findings presented in this thesis suggest that identity is an important underlying factor for spillover effects. Both quantitative and qualitative findings presented identity and particularly post-intervention changes in identity as predictors for spillover. As discussed in section 6.1.1.2 and consistent with previous research (e.g. Lacasse, 2016), an increase in centrality of environmental self-identity was associated with positive spillover effects. These findings are broadly in line with previous research in highlighting the importance identity plays in understanding positive spillover effects (e.g. van der Werff et al., 2014b; Whitmarsh & O'Neill, 2010). In particular, a number of contributions are made towards the understanding of identity processes that are underlying spillover effects.

First, the findings suggest that a behaviour change intervention not only makes one's environmental identity more salient, as proposed by previous research (van der Werff et al., 2014b), but also indicates that tenets of a behaviour change intervention can be integrated into one's identity structure. This is consistent with IPT (Breakwell, 1986; Jaspal & Breakwell, 2014), which suggests that accommodation processes can lead to an adaptation of the self-identity to the information (e.g. from the intervention), while the assimilation process results to an integration of the information into the existing identity structure (Verfuerth et al., 2019). Moreover, this research shows that an increased centrality of such tenets can be associated with positive spillover effects. It is argued, that accommodation of these tenets into the identity structure is the underlying process for identity change (Breakwell, 1986; Jaspal & Breakwell, 2014), which leads to these positive spillover effects. Similarly, it is argued that the assimilation process leads to an increased salience of one's environmental identity (van der Werff et al., 2014b), which is associated with small spillover effects as well as a lack of spillover. As such, this research makes a novel contribution to the understanding of the role of identity in positive spillover processes by differentiating between an adaptation of the self to information from a behaviour change intervention (i.e. accommodation) and integration of the same into existing identity structures (i.e. assimilation) (see also Verfuerth et al., 2019). However, these conclusions are speculative and further research is needed to compile sufficient evidence for these processes (see section 6.5).

Second, while previous research predominantly focussed on the connection between environmental identity and positive spillover (e.g. van der Werff & Steg, 2018; van der Werff et al., 2014a), the findings presented in this thesis shed light on the connection between identity and a lack of

spillover and contextual spillover effects. Although previous research recognised that positive spillover effects often tend to be small and limited (Lacasse, 2017), explanations for these findings and the role of identity are scarce. Previously, the positive spillover pathway was explained with psychological theories, including Self-perception Theory (Bem, 1972), Consistency Theory (Cialdini, Trost, & Newsom, 1995), and Cognitive Dissonance Theory (Festinger, 1957), based on the notion that identity-consistent behaviours (or avoidance of dissonance) would subsequently lead to positive spillover effects. Evidence from this study suggests, however, that the same theories would explain a lack of spillover and small behaviour changes instead of positive spillover effects resulting from a behaviour change intervention. Moreover, and as discussed in sections 5.3.3 and 5.3.4, the present research suggests that the use of self-affirmation and mental accounting strategies can account for small, contextual spillover effects and an apparent lack of spillover.

These findings are consistent with previous research that identified justification and mental accounting strategies in the context of unethical consumer behaviour, including environmentally damaging behaviours (McDonald et al., 2015; Schütte & Gregory-Smith, 2015). A novel contribution is made by adding to the understanding of the processes that lead to a lack of spillover and contextual positive spillover effects. While self-affirmation and mental accounting strategies were previously associated with negative spillover effects, it seems that in the context of behaviour change interventions, the same strategies might lead to a lack of spillover or small spillover effects. Future research should further investigate the role of self-affirmation and mental accounting strategies in the context of behaviour change interventions. For instance, future research could test the difference between spillover effects from behaviour change interventions and spillover as a long-term development of behaviour transitions. Qualitative research could further investigate the role of identity in relation to self-affirmation and mental accounting strategies and lack of spillover. This would be especially of interest as understandings of underlying mechanisms for the lack of spillover to date have been predominantly theoretical (e.g. Dolan & Gallizzi, 2015; Truelove, 2014).

Lastly, this research sheds light on the role of identity for negative spillover effects. Although the evidence for this association remains speculative, this research makes a valuable contribution towards a better understanding of negative spillover effects and underlying identity mechanisms. The promotion of meat reduction was apparently experienced by some as a threat to their existing identity, which could have led to the denial of the information promoted during the behaviour change intervention. This can lead to negative reactions (i.e. negative spillover or reactant behaviour as observed during the sustainable food week) or again no change in behaviour if the defence against the information/experience is dealt with at a non-behavioural level. This study is consistent with a small array of research that associated identity threat with resistance to changing ESBs (Murtagh et al., 2014). As such, future research should further assess the relationship between identity threat, resistance to change, and spillover effects. While the present research fails to provide evidence for negative spillover



effects as a direct result of identity threat, future research should investigate this pathway. As people try to solve experienced identity threat quickly, it is difficult to observe identity threat (Breakwell, 1986; Jaspal & Breakwell, 2014). As such, experiments that manipulate identity threat and directly test for negative spillover effects could be an avenue to test this pathway.

Overall, this research aimed to contribute to a better understanding of the role of identity for spillover processes. Previous research has identified identity as one of the main underlying factors of spillover processes, particularly positive spillover. The findings from this thesis contribute to the existing evidence for the influence of identity on spillover processes (Elf et al., 2019; Lacasse, 2016; Whitmarsh & O'Neill, 2010). In particular, this research sheds light on the underlying identity processes that may lead to positive spillover. Moreover, this research contributes to a better understanding of the role of identity and affiliated theories (Self-perception, Bem, 1972; IPT, Breakwell, 1986; Consistency Cialdini et al., 1995; Cognitive Dissonance Festinger, 1957; Self-affirmation; Steele, 1988) for a lack of spillover and negative spillover effects. Future research should expand on the findings from this thesis, particularly on aspects that remain speculative due to limited evidence from this research, such as the role of identity threat for negative spillover (see section 6.1.3).

### **6.2.3 THEORETICAL CONTRIBUTIONS**

### **6.2.4 SPILLOVER EFFECTS AND MEAT CONSUMPTION**

The research presented in this thesis contributes to a better understanding of spillover effects of meat consumption – a consumption behaviour with a high negative environmental impact, but an understudied behaviour (Bailey, Froggatt, & Wellesley, 2014). Previous spillover research predominantly focussed on spillover effects in the behaviour domains energy (Hope et al., 2018; Sintov et al., 2017; Wells et al., 2016), waste (e.g. Ek & Miliute-Plepiene, 2018; Littleford et al., 2014; Maki & Rothman, 2016; Tudor et al., 2007; Whitmarsh et al., 2018), water consumption (e.g. Lauren et al., 2016), and, to a lesser extent, mobility (Barr, Shaw, Coles, & Prillwitz, 2010; Klöckner et al., 2013). Previous research found a mixed picture for spillover effects of sustainable diets. For example, in an experimental study, Carrico et al. (2017) tested the effects of environmental versus health framing of red meat consumption on donation behaviour; however, they found no evidence for spillover effects. On the contrary, a correlational study by Mørk et al. (2017) found evidence for spillover effects between the promotion of organic food in public kitchens and private consumption of organic food. This thesis contributes to a clearer picture of spillover effects from a food-related behaviour change intervention. In particular, the findings show how spillover effects occur to other settings and are often influenced by contextual factors.

#### 6.2.4.1 STRATEGIES TO OVERCOME DISSONANCE AMONG MEAT-EATERS

As already touched on above, several strategies were identified that lead to a lack of spillover or small positive spillover effects (see section 6.1.1 and 6.1.2). It should be noted that the reduction of meat consumption might be say a difficult target behaviour for environmental behaviour change interventions due to its strong links to culture, identity, and people's attachment to meat, which is suggested to act a barrier to the adoption of a more plant-based diet (Graça, Calheiros, & Oliveira, 2015). It seems that people who eat meat and are exposed to a behaviour change intervention that challenges this behaviour, can experience inconsistencies and conflicts within their selves (e.g. "I like to be an environmentally friendly person; I eat meat"), and/or threats to their self-perception ("compassionate people care about the environment; I eat meat"), which can result in experienced dissonance (Rothgerber, 2014).

Previous research identified several strategies that 'meat eaters' use to reduce this dissonance, including perceived behavioural change, avoidance, denial, pro-meat justifications, reducing perceived choice, and actual behavioural change (Rothgerber, 2014). Perceived behavioural change refers to as a substitute to actual behaviour change where the individual perceives to have changed their behaviour when they actually have not made any significant changes. The strategies avoidance and denial aims to reduce dissonance by avoiding unpleasant thoughts associated with meat consumption or denying any negative associations and facts, respectively (Rothgerber, 2014). Pro-meat justification describes a strategy in which individuals put forward reasons for why they eat meat (e.g., "God intended for us to eat animals"; Rothgerber, 2014, p. 34), while the strategy reduced perceived choice describes when individuals perceive that they have no choice but to eat meat (i.e. no control over the choice between eating and not eating meat). Lastly, the strategy actual behaviour change reduces dissonance by actually changing behaviour (e.g. reducing meat or adopting a vegetarian diet; Rothgerber, 2014).

Some of these strategies were also identified in the present research and support some of the findings. For instance, the perceived lack of control over meat consumption in conjunction with small behaviour changes in other ESBs resonates with the strategies *reducing perceived choice* and *perceived and actual behaviour change* (Rothgerber, 2014). These strategies were predominantly found among participants that showed a mixture of reduced meat consumption (i.e. actual behaviour change) and engagement in other positive ESBs (i.e. actual behaviour change and perceived behavioural change). Similarly, participants that justified their meat consumption (i.e. pro-meat justification) and reported barriers to change, such as PBC, which seems similar to the strategy of reducing perceived choice, showed less behaviour change (i.e. small changes or lack of spillover). Particularly the aforementioned strategies and actual behaviour change could explain some of the inconsistencies between the interview and the survey data.

Similarly, the strategies denial and dissociation of meat from the environmental impact (Rothgerber, 2014) could explain some of the findings from the visualisation task. For instance, the compartmentalisation between some of the key terms in the visualisation task (i.e. sustainability, environmentally-friendly self from sustainable food; see CH5) could indicate a dissociation of the meat-consumption behaviour from the concept of the self as environmentally friendly. These strategies tended to occur with small and easy behaviour changes, or no behaviour change at all (i.e. lack of spillover). Rothgerber (2014) identified these strategies in the context of moral implication of meat consumption. Hence, future research should assess the relevance of these strategies with a pro-environmental framing. Furthermore, future research should investigate the association between these strategies and spillover effects from meat-related behaviour change interventions.

Overall, this thesis contributes to a better understanding of spillover of sustainable diets, particularly meat consumption, in two ways. First, it demonstrates that increasing vegan and vegetarian options while decreasing the availability of red meat in a workplace canteen has an effect on private food related behaviours (i.e. at home and in the supermarket). These findings expand on the existing literature on spillover effects related to sustainable food consumption by focussing on meat consumption – an impactful ESB which to date had little empirical investigation (Notarnicola et al., 2017; Scarborough et al., 2014; Westhoek et al., 2014). Second, particularly the qualitative findings of this study provide an insight into strategies people use to ‘redirect’ their subsequent behaviour (i.e. spillover behaviours) from the behaviour that was initially promoted in the intervention. This insight can help identify strategies that could help people to engage in the promoted behaviours while also providing empirical support for more realistic assessments of food-related behaviour change interventions

## **6.2.5 METHODOLOGICAL CONTRIBUTIONS**

### **6.2.5.1 VISUAL METHOD**

The development of a visual method (i.e. the manikin method) for assessing the centrality of concepts to the Self constitutes a methodological contribution of this thesis. While based upon previous research (e.g., Martin and Czellar, 2016), the visualisation method makes a novel contribution to researching identity change, particularly in the context of spillover. Future research should further validate this approach, for example by integrating the visualisation task into different types of research designs (e.g. experiments). Another approach could be to integrate the visualisation into a “think aloud” exercise; where participants talk through their decisions regarding the positioning of the terms (Kaklamanou et al., 2013; Hope et al., 2018). This would likely lead to a verbal account of the reasoning behind placement decisions; e.g., the extent to which the terms are considered as de/central for the self. Furthermore, the inclusion of further terms relating to sustainable food, identity, and diet choices could

further improve the method. Nonetheless, the visual methods makes a valuable contribution to understanding (implicit) changes in identity.

#### **6.2.5.2 MIXED METHODS APPROACH**

Furthermore, by applying a mixed methods approach, this research joins a growing array of methods that are commonly used to assess spillover effects (Elf et al., 2019; Whitmarsh et al., 2018). Mixed methods approaches allow for a more diverse perspective and can be particularly insightful when knowledge about the research subject (i.e. spillover effects) is still relatively unclear. As previous research produced mixed evidence with regards to the understanding when and how spillover effects might occur, the mixed methods approach used in this thesis provides a more in-depth perspective while also being contextually grounded (Creswell, Plano Clark, Gutmann, & Hanson, 2003b). Furthermore, the pre- and post-intervention quantitative data collection constitutes less frequently used example of longitudinal research (e.g. Poortinga et al., 2013; Thøgersen & Ölander, 2003; Thomas et al., 2016). As such, this approach addresses suggestions made in the literature where it is argued that spillover is characterised by two or more subsequent behaviours (Nash et al., 2017). While this research aimed at addressing some methodological issues raised in previous literature (e.g., longitudinal intervention-based field studies), the collection of follow up data at a later timepoint after the behaviour change intervention could have much improved the methodological contribution of this study. As such, in order to confirm long-term effects of behaviour change intervention on subsequent ESBs, future research should implement longitudinal studies to assess the long-term spillover effects of behaviour change interventions.

The qualitative data provided an in-depth insight into processes that could explain spillover effects and particularly the lack thereof. Therefore, this research contributes to a growing number of studies that used qualitative approaches to investigate spillover effects (e.g. Uzzell & Räthzel, 2018; Whitmarsh et al., 2018). Particularly the visualisation task, which was implemented as part of the qualitative data collection, constitutes a novel approach to assess change in centrality of identity. Future research could further validate this approach, for example, by applying a ‘think aloud’ visualisation task, where participants would talk through their decisions during the exercise (Verfuert et al., 2019). A unique approach of the qualitative method in this thesis is the application of a pre- and post-intervention design. This approach enabled an analysis of qualitative data from before and after the behaviour change intervention which provided a more in-depth account for changes that occurred between the two points in time.

#### **6.2.5.3 INTERVENTION BASED IN REAL-WORLD SETTING**

Furthermore, the findings presented in this thesis join a small number of studies that investigated spillover effects of a real-world intervention (e.g. Bergquist et al., 2019; Poortinga et al.,

2013). As such, this research addresses previous calls for more detailed case studies (Hargreaves, 2011; Nye & Hargreaves, 2010) and experimental field research to assess the effects of behaviour change interventions on subsequent ESBs (Truelove et al., 2014). While previous research predominantly used correlational (e.g., Lauren et al., 2016; Littleford et al., 2014; Whitmarsh et al., 2018) or experimental designs (e.g., Evans et al., 2012; Fanghella et al., 2019), often based on student samples, the implementation of a real-world intervention study in the work setting increases the validity of the found spillover effects. Sintov et al. (2017) argue, that intervention based studies are advantageous to study spillover effects as they help to build a case for causality due to their temporal nature. By contextualising spillover effects of real-world settings, concrete implications and recommendations can be made for practitioners and policy makers (for a more detailed discussion see section 6.3). Accordingly, future research should test and expand on previous findings of spillover effects in real-world settings.

The focus on spillover effects between behaviours and between settings can promote a transition to a more sustainable lifestyle. Nonetheless, future research should assess the actual impact of such spillover effects. The ecological footprint measure is a frequently used method to assess the environmental impact of people's lifestyles (Mostafa, 2010). The question about the environmental impact of spillover effects is particularly relevant as previous research found that the correlation between people's self-assessment of ESBs and their ecological footprint is small, which could result in an underestimation of the environmental impact of spillover effects that studies have found to date (Bleys, Defloor, Van Ootegem, & Verhofstadt, 2018). As such, the inclusion of behaviour measures that reflect the environmental impact of spillover effects would advance the implications that can be made from spillover research. Furthermore, the inclusion of impact measures such as the ecological footprint would contribute to the methodological advancement of both behaviour change interventions and the potential spillover effects.

### **6.3 IMPLICATIONS**

The aim of this section is to elaborate on how this thesis has implications for practitioners and policy makers. In their 25 Year Environment Plan, the UK Department for Environment, Food and Rural Affairs (Defra, 2018) emphasises the role of behaviour change and the need for a better understanding of what public engagement strategies work to take their plan into action. Behaviour change interventions are popular tools to promote positive ESBs at an individual, community, and organisational level (Cox et al., 2012). This thesis shows that evaluating the links between different ESBs and settings can contribute to a better understanding of wider effects of behaviour change programmes. Moreover, practitioners and policy makers are particularly interested in the expected spillover or 'catalyst' effects from behaviour change intervention (Defra, 2008). Building on this, the presented research demonstrates the findings of the spillover effects from a 'real world' intervention in

a workplace to other contexts (i.e. the home). Overall, the findings of this thesis suggest that there is a need for policy makers and practitioners to think beyond single setting interventions and indicate opportunities to link behaviour change programmes to potentially make them more impactful. This research shows that evaluating the links between different ESBs and settings can contribute to a better understanding of wider effects of behaviour change programmes. For example, food label policies in supermarkets could be linked with sustainable food programmes in workplaces. This could provide better guidance for consumers to make sustainable choices across settings. In the following, a few ideas and implications for practitioners and policy makers are explored.

### **6.3.1 IMPLICATIONS FOR PRACTITIONERS**

One of the most relevant finding for practitioners is that the supermarket was identified as an important ‘third’ place (or extension of the home) for spillover in this research. Although participants reported changes in their diet behaviour at home (e.g. replacing red with white meats), the most dominant positive spillover effect identified in the qualitative data was the increase in local food consumption, which participants predominantly reported to take place in the supermarket. Overall, the supermarket was identified as the place where people would look for sustainability indicators such as origin of the food in food labels. These findings link well with research on sustainable food labelling (e.g. Feucht & Zander, 2018) and highlight potential avenues to facilitate spillover effects between settings – at least in the context of diet behaviours. For instance, a survey of 428 UK supermarket shoppers found that the majority experiences confusion in interpreting and understanding labels (Gadema & Oglethorpe, 2011). Similarly, the same study found that carbon labelling food alone would not drive behaviour change (Gadema & Oglethorpe, 2011). Results from another European study confirm these findings by suggesting that labels alone do not play an important role in consumers’ food choices (Grunert, Hieke, & Wills, 2014). Future research could investigate the avenue to linking behaviour change interventions in the workplace with the labelling literature and policies on labelling through contextual spillover effects.

For practitioners the findings of this thesis suggest that behaviour change interventions in the workplace can ensure both greener and healthier workplaces. As outlined in the thesis, reducing meat consumption in employees is a key behaviour for lowering the environmental impact of workplaces (see e.g. WWF Livewell Report: Macdiarmid et al., 2011; FAO Guidelines: Fischer & Garnett, 2016). The findings of this thesis indicate that involving employees and the company in the development of the behaviour change programme is important for its acceptance among employees and success of the behaviour change intervention. In this thesis, a tailored approach was chosen that addressed the different stages of change of participants. For instance, health worries by employees about protein intake with a reduction of meat consumption was addressed with information provision about plant-based protein

sources (see intervention material in CH4 and Appendix B). Similarly, an evaluation of the employee's pre-intervention stages of change allowed for a more targeted intervention approach, for example, the provision of information about the issue of meat consumption for the environment (i.e. for people in the pre-contemplation phase). Practitioners should also use tailored approaches (e.g. based on the stages of change and/or values) when designing behaviour change interventions in order to improve the effectiveness and acceptance of the behaviour change interventions among employees.

Moreover, the findings showed that some employees also reduced their meat consumption and other green behaviours (e.g. buying local produce) at home, which suggests that wider lifestyle changes might result from such a behaviour change intervention (i.e. spillover effects). As such, a behaviour change intervention in the workplace is a promising approach to achieve an increase in ESBs both at work and at home. Policy makers are in a great position to facilitate this process by implementing policies for labels and other guidelines that can lead people to more sustainable behaviours across settings. For example, new policies could make vegan and vegetarian options mandatory in (public) canteen; similar to Portugal, which introduced mandatory plant-based food options in public institutions (e.g. Cardoso et al., 2018). However, it is most important to include staff and/or staff representatives in how these changes are chosen and implemented, as well the discourse chosen to communicate these, as otherwise employees might reject the changes. This could help people overcome difficulties in making decisions across different settings and, potentially, facilitate positive spillover effects across settings.

#### **6.3.1.1 RECOMMENDATIONS FOR TAILORED INTERVENTIONS AND PARTICIPATORY APPROACHES**

In line with previous research (e.g. Markey, McIvor, & Wright, 2016; Matthies & Krömker, 2000; VanYperen & van den Berg, 1999), the pilot study highlighted that considerations of the employees and the company context should be included more in the planning phase of the behaviour change intervention. This was taken into account in the development phase of the intervention for the main study in four ways. First, the pre-intervention survey included open questions where employees were asked to put forward their suggestions for a more sustainable canteen (for more details see CH4). Second, in the pre-intervention interviews the interviewees were filled in about the initial planned intervention and asked about their suggestions. Third, the menu changes of the canteen's lunch menu were developed in collaboration with the canteen's chef. Fourth, the new menu and the information campaign were presented in drop-in workshops open to all employees where they were invited to comment and make suggestions.

While this approach addressed some of the implications from the pilot study, aimed to implement a more tailored community-based marketing inspired approach (McKenzie-Mohr, 2000), and used participatory elements (Endrejat et al., 2015), a number of recommendations can be made for future research. For instance, Lang et al. (2012) synthesise a number of principles to guide transdisciplinary research projects that aims to bridge the gap between academic innovation and

expectations of problem oriented practitioners. In their article, they provide design principles that can be used to develop a transdisciplinary research project and integrates practitioners and stakeholders of the research project (Lang et al., 2012). Findings from a workplace change project suggests a strong relationship between employee participation and goal achievement and a strong negative relationship with resistance to change (Lines, 2004). The intervention of the main study was resisted by a minority of the employees, which may have affected the effectiveness of the intervention. For example, negative reactions of this group could have affected the overall perception of the changes for other employees and potentially also reduced their support for the changes. Furthermore, the lack of support by senior management for the project could have contributed to a disengagement of the employees in the study (see also high drop-out rates) and potentially the effectiveness of the behaviour change intervention (Hejjas, Miller, & Scarles, 2018). For instance, low support of the senior management could signalled that these changes were not taken seriously. Based on these experiences, future projects should aim to get the full support of the partner organisation and, if possible, involve the employees in the development of the behaviour change intervention.

Overall, the behaviour change intervention resulted in a mixture of outcomes including positive contextual spillover effects (e.g. decrease of red meat consumption at home), and a lack of spillover and reactance/rejection. These findings contribute to a better understanding of what types of behaviour change interventions can increase the likelihood of positive spillover effects. The analysis of the survey and interview data suggests that the sustainable food week did cause some vocal dissatisfaction. However, this appeared to be from a minority of people. While some people opposed the meat reduction; vegetarian and vegan options were very welcomed by some employees (see CH5 and Appendix B, section 9.2.7 for more details). General recommendations that were made for the company in a final project report included (a) employees should be involved in changes that affect them, (b) changes should be communicated transparently, and (c) employees would like to see fresh, local, and seasonal food with meat, vegetarian, and vegan options. Overall, it seemed that most people would support the introduction of vegetarian and vegan friendly meals, as long as meat options were still available. The employees seemed interested in exploring sustainable food options as long as they could make their own choices (see Appendix B, section 9.2.7). Based on this, the introduction of a ‘climate-friendly’ (e.g. plant-based, locally sourced) premium meal (i.e. hot meal that can be purchased in the canteen) could be a possible pursuit to take the intervention from the present research further in the partner company. Another idea could be a carbon footprint account for all food items offered in the canteen.

At an international level, policies that regulate the availability of vegetarian and vegan friendly meals could play a role in the forward development of sustainable food availability at a national level. For example, in 2017, in Portugal a law was implemented that made vegetarian options mandatory in all public canteens within six months after the law was passed (Cardoso et al., 2018). The findings



presented in this thesis suggest, that such a policy can affect a lower meat intake at home as well as other, related behaviours, such as seasonal food consumption behaviour, local food consumption, and generally an increased awareness of environmental sustainability related issues. Hence, similar policies in the UK could support a transition towards more sustainable diets, which would have both environmental and health benefits (Macdiarmid, Douglas, & Campbell, 2016; Van Dooren et al., 2014). For instance, similar to the example in Portugal, the introduction of mandatory plant-based food options in public institutions (e.g. NHS, Universities, etc.) could be implemented to promote more environmentally sustainable diets at a policy level.

Furthermore, a general inclusion of sustainable food guidelines (e.g., Fischer & Garnett, 2016; Macdiarmid et al., 2011) into national policies for supermarkets, restaurants, and public places could make valuable contribution to both health and environmental sustainability goals (e.g., Van Dooren et al., 2014). For example, although potentially expensive to implement, a policy could be developed that required carbon emission information on food items sold in supermarkets and restaurant. Another option could be to introduce a ‘climate traffic light’, similar to what has been introduced for nutritional values. A third option could be the introduction of a nutrition and ‘sustainable diet’ focussed module at schools that could be integrated as part of the curriculum. Based on the findings presented in this thesis, it seems that such policies would have ripple effects to the behaviours of private consumers – not only at home, but also in other places such as the supermarket. Moreover, such policies could feed into an iterative process of systematic change towards more sustainable diets.

## 6.4 LIMITATIONS

The aim of this section is to discuss the limitations of the findings presented in this thesis and the implications of these limitations for answering the research question. Before discussing the limitations resulting from the research design, a number of problems during the data collection are discussed. This intends to address some of the problems that occurred during the implementation of the behaviour change intervention and the data collection which are further discussed in the respective limitations section. This is followed by a discussion of the limitations, which is divided into four sections. First, the quantitative and, second, the qualitative findings are discussed in order to acknowledge the methodological limitations for each method. This is followed by third, a discussion of the mixed methods approach used in this thesis. Fourth, the limitations of the implemented behaviour change intervention and the real-world setting are discussed. Overall, the discussion is focussed on the main study, unless otherwise stated. The pilot study and its implications and limitations have already been discussed in Chapter 4 and will therefore not be the focus of this discussion.

## 6.4.1 LIMITATIONS OF A REAL-WORLD INTERVENTION BASED APPROACH

A number of limitations of the behaviour change intervention have to be noted. This study provides evidence for spillover effects from a behaviour change intervention in a ‘real-world’ setting, which has been limited in the pre-existing literature (Verfuert and Gregory-Smith, 2018). However, working with practice partners in ‘real-world’ settings has its disadvantages. While the presented findings provide relevant implications for practitioners and policy makers, compromises had to be made in the development and implementation of both the behaviour change intervention and data collection. For instance, in the early stages of the main study, one of the main supporters left the company which resulted in restricted access to the company and reduced promotional support for the project (i.e. participation in surveys and interviews). The replacement for this ‘gatekeeper’ voiced his support, but was not much involved in the development nor execution of the project nor did he support the project internally (e.g. no response to email). Moreover, a shortage of canteen staff and limited support of the same resulted in a reduced quantity and quality of the changes made to the menu (e.g. negative comments by staff members when serving meat-free lunch options). The chef of the canteen was supportive in the beginning, but did not follow through with some of the recommendations made (e.g. I developed a breakfast menu that he just did not integrate without commenting). These factors were difficult to control and may have affected the overall impact of the intervention, internal support for the project and, therefore, potential spillover effects. For instance, the negative comments of the canteen staff about the food changes could have negatively influenced the perception of the overall project for the employees.

### 6.4.1.1 ATTRIBUTION OF IMPACT

A limitation of the research conducted in this thesis is the attribution of the impact from the intervention to the observed spillover effects. By using a tailored intervention approach consisting of several intervention techniques in a real-world setting, it is difficult if not impossible to determine which part of the intervention can be associated with the spillover effects. The two main components of the intervention were the information material and the changes to the menu in the form of reduced meat availability (see CH4, section **Error! Reference source not found.**). It is likely that both components contributed to the changes at home and potential interaction effects between the intervention techniques could have also made a contribution, as suggested by previous research (see e.g., Abrahamse et al., 2005). More experimental research (e.g., Evans et al., 2012) is needed to isolate the effects of intervention techniques on spillover effects, particularly spillover between different contexts.

Moreover, the reactions of other employees and the conversations that the intervention sparked could also have contributed to the impact of the intervention. In a different context, previous research suggested that spillover between people can impact the results of a campaign (e.g. Southwell & Murphy,

2014). Hence, the interaction between employees and their personal social networks at work could have facilitated or hindered spillover effects to the home setting. For instance, if someone talked about possibilities of reducing meat consumption at home with their colleagues this could have had a positive effect on their behaviour at home. Similarly, if an employee had conversations with others who disregarded the intervention, this could have reduced or diminished positive changes in ESBs at home. Future research could use network analysis or similar methods (Southwell, Murphy, LeBaron, & Fitts Willoughby, 2014) to assess spillover effects between people and their effects on spillover between ESBs. In the present research it seems evident that the introduction of an intervention within a social setting (i.e. the workplace) could have simultaneous advantages and disadvantages in the form of social spillover effects (i.e. spillover between people). This would suggest that interventions targeting individual ESBs are, perhaps, distinct from those that target people in social settings and/or social behaviours.

Furthermore, several methodological factors could have impacted the observed positive spillover effects. For instance, the presence of myself as the researcher and initiator of the project during the intervention could have impacted upon how employees perceived the intervention. For example, they could have felt under surveillance by my presence which could have influenced their behaviour during the intervention. Similarly, my association with the intervention while also being the interviewer could have made interviewees feel uncomfortable to talk negatively about the intervention. Moreover, the interviews and/or the survey themselves could have acted as interventions and therefore impacted the observed spillover effects. These limitations have implications for the transferability of these findings and for future research. While it could be argued that the findings from this thesis are transferable to similar workplaces, a replication of the same study is unlikely to result in the same findings due to the participatory approach that was taken. Hence, the nature of the intervention is tied to and specific to the context within which it was generated. To date, research on contextual spillover effects of behaviour change intervention in real-world settings is still in its infancy. Hence, future research should further investigate what type of behaviour change intervention tool and approaches are most likely to lead to positive contextual spillover and which could result in reactant employee behaviour or negative spillover effects. While most real-world field studies are likely to have context specific elements, the implementation of more studies like in this thesis could help identify the common patterns that would help to better understand the context specific and more generalisable process patterns that lead to contextual spillover effects from work to home.

While it cannot be determined whether the interaction between the intervention techniques or a single technique contributed to the spillover effects, previous research suggests that norm-based interventions are likely to promote positive spillover effects (e.g. spillover from an electricity saving intervention to water saving behaviours; Bergquist et al., 2019). Similarly, purely information based interventions were found to be ineffective for promoting ESBs (Abrahamse et al., 2005), which may

also be applicable for spillover effects of information-based interventions. Moreover, experimental research showed that nudging is not very effective in promoting positive spillover effects (D’Adda, Capraro, & Tavoni, 2017). However, it could be argued that in the context of this study, the nudge element and information facilitated the engagement with the promoted behaviours (i.e. reducing meat consumption), it could be that the motivational aspect of the norm-based messaging led to the positive spillover effects (Bergquist et al., 2019). Future research should investigate which intervention techniques are most likely to lead to positive spillover effects and whether these might differ between behavioural domains (e.g. sustainable food consumption, electricity, recycling).

#### **6.4.1.2 INFLUENCE OF THE RESEARCHER ON THE INTERVENTION**

Research in a ‘real-world’ setting never allows for neutral and non-biased data collection – independent from its social reality – to test causal hypotheses (Cassell & Johnson, 2006). This is not necessarily a limitation but rather a reminder that the research results presented in this thesis do not comply with the expectations of experimental research, despite the quasi-experimental design and the hypothesis testing that was completed as part of the quantitative data analysis. Instead, the nature of the real-world setting and the participatory elements of the intervention design aimed at tailoring the intervention to the feedback from the reality of the people and their context in which the intervention took place. As such, during the development of the intervention, I, the researcher, made decisions based on immediate feedback I received from the workplace context (e.g. employees, canteen staff), which influenced the design of the intervention. This approach enabled the research to be tailored to the praxis demands, which would not have been possible in a strict experimental set-up (Johnson & Duberley, 2000). This is in compliance with the pragmatist epistemology which underpins this research (see CH3), and the focus on ‘what works’ and praxis demands that may be seen as biases to positivist researchers (Cassell & Johnson, 2006). Hence, the biases that this process entails, and the limited replicability of the study must be acknowledged.

#### **6.4.1.3 SHORT INTERVENTION PERIOD**

The behaviour change intervention in both the pilot and main study were based upon one-off interventions over a relatively short period of time. The recycling intervention of the pilot study was information and social norm based and had no behavioural element which, as indicated in previous research (Staddon et al., 2016), could have limited the effect of the intervention. The meat-reduction intervention of the main study, on the other hand, had a nudging (i.e. changed behaviour context in the form of meat availability in the canteen; Thaler & Sunstein, 2008; Thaler, Sunstein, & Balz, 2010) and information (i.e. information campaign) element, which, during the intervention, forced participants to change their food consumption at work. While it can be argued that the latter intervention was more likely to have led to spillover effects, because participants were confronted with an actual change in

their workplace which required behavioural actions (i.e. either eat less meat or eat elsewhere), the intervention only lasted one week.

Moreover, it should be noted that the post-intervention data collection took place one month after the intervention, which could have impacted the results. The reason for the delay is mostly of practical nature and include a few aspects (see also CH4, p 114 for more details). First, the canteen's chef advised against collecting data immediately after the intervention as most employees would be on annual leave in July. Thus, post-intervention data collection in July could have resulted in larger drop-out numbers. Second, due to the extensive and careful work required by the research designing and data collection for the post-intervention stage, the interview guide and survey were not ready to be distributed immediately after the behaviour change intervention. The delay in the data collection could have impacted the overall results as the behaviour change (i.e. spillover effects) could have happened immediately after the intervention. This is a limitation of this study and should be considered in future research. As discussed elsewhere, an assessment of ESBs immediately after the intervention as well as short-term (e.g. one month) and long-term (e.g. 6 month) follow-up behaviour change assessments would provide a more comprehensive picture of the spillover effects.

#### **6.4.1.4 NO MEASURE OF CHANGE IN ESB1 AT WORK**

Spillover effects are defined as the effect a change in one ESB (and/or context) has on other ESBs (and/or contexts), which tends to be measured by observing or manipulating ESB1 and measuring the effects of a change in ESB1 on secondary behaviours (e.g. Nash et al., 2017). In this thesis, a different approach was used where the change of ESB1 was not measured and instead the behaviour change was implemented in the behaviour change design. This means that the change in ESB1 (i.e. meat consumption at work) was manipulated in the intervention group and not the control group. The changes made to the available food during the intervention week forced a change in employees' food consumption in the workplace through the changed availability of meat, but only for the intervention group. As such, employees had to either eat the vegetarian and reduce meat dishes or they had to buy food elsewhere. This approach to changing ESB1 (i.e. sustainable consumption at work) to measuring potential spillover effects to ESB2 (i.e. sustainable food consumption at home) has the benefit of not needing to rely on voluntary behaviour change of ESB1, which, as previous research showed, can be limited in its effectiveness (Geaney, Kelly, et al., 2013; Geaney, Scotto Di Marrazzo, et al., 2013). Furthermore, this approach has been used in previous research in the context of policy change (e.g. plastic bag charge; see e.g. Poortinga et al., 2016).

Some methodological weaknesses of this design-based approach should be noted. By using independent samples (i.e. intervention and control group) with non-random group assignments, it was not possible to assess which individuals were more likely to adopt the promoted changes and under which conditions these changes might occur (Poortinga et al., 2013). Furthermore, this approach does

not allow for an analysis of the motivation for changing the initial ESB1; i.e. intrinsic or extrinsic motivation (e.g. Evans et al., 2012) and, therefore, externally or internally attributed behaviour change (Deci & Ryan, 1985). Particularly the absence of longitudinal measures of behaviour changes at home (i.e. contextual spillover effects) should be considered in future research to address these limitations.

While it is acknowledged that in this thesis, there was no measure of the effectiveness of the intervention and a change in ESB1, it is still some assurance that the employees changed their food consumption at work. Nonetheless, measure of the target behaviour to assess the effectiveness of the intervention in the workplace should be considered by future research. It should be noted that, initially, it was planned to analyse the sales data of the ‘premium meals’ (i.e. not the salad bar) from the canteen pre- and post-intervention. This would have measured the number of vegetarian and meat containing meals sold in the canteen in the weeks before and after the behaviour change intervention. An increase in vegetarian and decrease in meat containing meals sold relative to availability of the options post-intervention would have been an indicator of the effectiveness of the intervention in the workplace. However, the company pulled out at the last minute and did not provide the data as originally agreed without providing an explanation.

#### **6.4.1.5 LOW EMPLOYEE PARTICIPATION AND SUPPORT FROM THE COMPANY**

A high dropout rate and generally a relatively low level of employee participation in the research project could have led to the small sample for the quantitative study. Additionally the main supporter of the project (i.e. the facility manager) left the company midway through the development phase. The facility manager had promised access to data, support for the implementation of the intervention, and support in the employee engagement in the form of incentives for participation and attracting attention to the project. Unfortunately, the facility manager left the company just before the pre-intervention survey started. Although support was promised by the chef of the canteen, the new facility manager, and the HR team, the actual support during the implementation of the project was very limited. For instance, the survey was distributed via the online network of the company, however, a distribution via email was refused by the HR team.

Furthermore, it was initially agreed that printed copies of the survey could be distributed across offices and that the researcher would have access to those areas. However, with the new facility manager the access was limited to the canteen only, which limited the reach of the project in the company. The HR team and internal communications team also had staff turnovers and the new staff did not engage with the project at all, to the extent that emails remained unanswered. Moreover, employees reported that they did not know about the project or thought that it was not happening. Furthermore, the two workshops, that were held to engage employees in the development of the new menu and increase acceptance (see CH4), were scarcely attended by employees. As such, the lack of support from the company could have affected the participation of the employees in the project (i.e. surveys, interviews,

workshops) and the overall high dropout rate during the data collection. The dropout rate and potential explanations and implications for the findings are discussed in more detail below in section 6.4.2.

#### **6.4.1.6 DIARY DATA COLLECTION FAILED**

Third, the data collection through a food diary failed. As part of the qualitative data collection, participants were asked to complete a food diary. The aim of the food diary was to get a better insight into participants' diet and how this might change post-intervention as well as to triangulate the research methods. Participants were given the food diary at the end of each interview (for logistical reasons it was not possible to provide it beforehand), and asked to return the diary to a canteen staff member who would return these to the researcher. Unfortunately, only five participants returned their food diaries and some of the diaries were lost by the canteen staff. In total, only six diaries were returned after the first round of interviews (T1), which was considered insufficient to proceed with this method. As such, the diaries were not analysed and included in this thesis. Although the food diaries were not essential to the data collection, they could have provided some support and explanations for some of the findings of this study.

In the following three sections, the aforementioned problems and their implications for the research findings are discussed. Furthermore, more general limitations of each methodological approach and implications for the findings presented in this thesis are elaborated on. On this basis, recommendations for future research are discussed.

### **6.4.2 LIMITATIONS OF THE QUANTITATIVE FINDINGS**

#### **6.4.2.1 SAMPLING AND SAMPLE SIZE**

First, the limitations of the sampling method and the sample size should be acknowledged (see also sections 5.1.1.5 and 5.1.2.1). In the main study an overall sample between  $N = 150$  and  $N = 200$  was aimed for, however, the achieved overall sample size was  $N = 82$ . Furthermore, in both the pilot and main study, the sample sizes of the control group are considerably smaller than the sample of the intervention group. Hence, the suitable statistical tests were limited and had a relatively low statistical power (see section 5.1.1.5); i.e. the probability of making a type II error was higher than it would have been with a larger sample (Cohen, 1992). This means that, based on the presented results, the probability of concluding no effect, when actually there was an effect, is relatively high. As such, the presented quantitative results may be prone to assuming a lack of spillover effects when, in fact, positive or negative spillover effects occurred (Button et al., 2013). Similarly, a smaller sample increases the likelihood of finding effects which are not true, as a low statistical power decreases the reliability of the findings (for a detailed discussion see e.g. Button et al., 2013). While smaller sample sizes in real-world

studies are common (Bergquist et al., 2019), future research should aim for larger sample sized to reduce these limitations. For example, the lowest anticipated dropout rate could be included in the planning of field studies in order to increase recruitment offers and budgets. Furthermore, a focus on gatekeepers could help increase the overall reach of a study as gatekeepers can be instrumental in promoting a project within a company.

#### **6.4.2.2 VALIDITY & GENERALISABILITY**

Second, limitations in the internal validity of the results (i.e. alternative explanations for the found spillover effects) should be discussed. The quasi-experimental design of the quantitative data collection with an intervention and control group and a pre- and post-intervention condition can be considered an appropriate design choice to increase internal validity and minimise threats such testing effects, maturation (e.g. participants growing tired of the topic), history (e.g. events that occurred between the first and second measurement such as news stories or awareness campaigns), or statistical regression (Campbell & Stanley, 1963). Nonetheless, a number of threats to the internal validity should be noted (for an overview, see e.g. Cook & Campbell, 1979). For instance, experimental mortality (Campbell & Stanley, 1963; Shadish et al., 2002) in the form of a systematic drop-out of, for example, more or less pro-environmentally motivated participants could have increased or decreased the likelihood of finding statistically significant spillover effects. However, the drop-out analysis and statistical comparisons of the intervention and control group baseline data showed no statistically significant differences.

Generalisability of quantitative data results and the representativeness of the sample are among the most regarded criteria for the assessment of quantitative data results. While these criteria also apply to the quantitative results presented in this thesis, the focus of this research was more on the in-depth insight into ‘real-world’ settings, and the evaluation of spillover effects from a behaviour change intervention in such. The aim of this study was not to make generalisable knowledge contributions but rather to strike a balance between understanding of whether contextual spillover effects function in a real-world setting (i.e. the workplace), while also understanding theoretical relations and underlying mechanisms of spillover effects (Zhu, Barnes-farrell, & Dalal, 2015). The validity and transferability of the study is limited due to a small sample of both the quantitative and qualitative data (Bergquist et al., 2019). The relatively small sample in this study was mostly due to the limited pool of participants (i.e. total number of employees of the company). Although the sample of the presented main study has its limitations, typical quality guidelines used in psychological research that aims to generalise findings and effects are not entirely applicable. Nonetheless, the strengths of the used sample lies within its real-world applicability of an office-based workplace setting.



### 6.4.2.3 DROPOUT

Third, discontinuation of participants has been known to affect intervention-based repeated-measure studies, particularly in the clinical sector with drop-out rates often exceeding 50% (see e.g. review for dropout rates in PTSD treatment studies; Schottenbauer, Glass, Arnkoff, Tendick, & Gray, 2008). In the meat-intervention study presented in this thesis, the dropout rate is as high as 69%, with 60% drop-out in the intervention group and 76% drop-out in the control group. These drop-out rates are relatively high in comparison to previous research, such as clinical trial studies and diet-change studies (e.g. Neville, O'Hara, & Milat, 2009; Schottenbauer et al., 2008), and there might be a number of reasons for this.

Previous field-based interventions also report low overall recruitment rates (i.e. proportion of participants that completed the study in relation to number of people who were contacted). For example, in two field experiments, Bergquist et al. (2019) experienced recruitment rates below thirteen and eight percent, respectively. In other studies, final sample sizes of 19%-4% were reported (Alberts et al., 2016; Schultz, Estrada, Schmitt, Sokoloski, & Silva-Send, 2015; Sintov et al., 2017), which are similar to the rates achieved in both the pilot and main study of this thesis. While it must be acknowledged that such low recruitment rates may affect the generalisability and validity of the results, it is within a margin that was found in previous studies. Furthermore, it should be noted, that although the internal validity may be impaired through low response rates, the real-life setting and non-student sample increase the external validity of the results. It seems, that there might be a trade-off between achieving validity through high response rates (e.g. by recruiting students or panels) or through implementing research in a real-life setting (e.g. in real households or workplaces).

As discussed above, administrative issues could have been one of the main factors that may explain the high drop-out rate. The survey was distributed in form of a link through the company's internal network as well as in paper-based form. Participants were asked to create a personal code (i.e. based on birth month and letters of their names) by which their survey response was anonymised, which was used to match their T1 survey response to the response at T2. Several participants seem to have struggled to re-create the code created at T1 again at T2. An indication for this is that several survey responses at T1 and T2 matched with regards to their email address, but not with the code. As not every participant provided an email address or the same address at T1 and T2, it is possible that several responses at T1 and T2 were not matched.

Demotivation could have been another major factor to discontinue the survey, particularly for the control group. While the intervention groups received the intervention in the form of a changed menu that they could comment on both in the pre- and post-intervention survey, the control group only had the promise that their views will influence potential future changes to the canteen. Furthermore, when speaking with employees on site, many voiced their disbelief that anything will change, which

previous research identified as a barrier to ESB change in workplaces (Dumitru et al., 2016). Such a culture of perceived non-support could have affected the employees' motivation to engage in the research project (Hejjas et al., 2018). The relatively low attention that the open workshops received along with the surprise when the changed menu was actually implemented are further indicators for this. An additional factor could have been that the participants had to complete the survey in their break time, which, particularly for the call-centre based employees, was limited and strictly scheduled. As such, the motivation to take part in a survey during their break time could have been low. Although a prize draw in vouchers for the canteen was available as an incentive to take part in the surveys, the incentive may not have been attractive enough for participants to continue with the survey. These are just a number of potential factors that could have impacted the participation and drop-out rate.

Differences between the intervention and control group could have been influenced by the Hawthorne effect. For the control group, the lack of a behaviour change intervention could have had a negative effect, both in the pilot and main study, while simultaneously the sheer exposure to change (e.g. the Hawthorne effect; for a review see McCambridge, Witton, & Elbourne, 2014) could have had a positive effect on the intervention groups. If either or both of these effects occurred, they could be alternative explanations for any differences in the measurements between the intervention and control group in the post-intervention survey. Some researchers suggest that providing a different intervention for the control group can control for the Hawthorne effect (e.g. Troia, 1999), however, for both the pilot and the main study of this thesis this option was not feasible due to lack of time and financial support. This could constitute threats to the internal and external validity of the presented findings (Troia, 1999).

#### **6.4.2.4 MEASURES**

Fourth, the selection of explanatory and dependent variables and operationalisation of the constructs is another source for limitations of the quantitative findings that should be acknowledged. Although the explanatory and dependent variables (i.e. identity variables and behaviour measurements) were chosen based on previous literature and grounded in theoretical considerations, all measures were adapted and therefore not yet validated. Particularly the self-report based scales used to measure spillover behaviours may be limited. For instance, behaviours that were not measured or recorded with the used scales could have changed due to the behaviour change interventions (i.e. spillover effects could have occurred), but these changes were not recorded. This presumption can be partially supported with the qualitative findings from the main study, which exposed unexpected spillover effects (e.g. shopping behaviour in the supermarket). Future research should further validate behaviour measures, particularly those for sustainable food consumption, for example by including carbon footprint measures (see also discussion in section 6.2.5).

Fifth, all behavioural variables (i.e. dependent variables) were measured with self-report scales. While this is an established procedure in the field of environmental psychology and spillover research,

this approach has been criticised for its biases, such as producing an artificial covariance between the self-report measure (i.e. behaviour) and the predictor variables (i.e. identity variables) (for an overview of common methods biases see e.g. Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). For example, in the given survey, participants who indicated that they perceived themselves as a pro-environmental person would be likely to also report past pro-environmental behaviours. This creates an artificial correlation between the predictor and dependent variables, which in turn might lead to an overestimation of the relationship between the independent and dependent variables. It should be noted, that food diaries were planned for this study to better assess objective behaviours (Lanzini & Thøgersen, 2014; see e.g. Poortinga, Sautkina, Thomas, & Wolstenholme, 2016) and to reduce the retrospective bias that impacts survey studies (Ohly et al., 2010); however, due to lack of financial incentives and participant participation the use of food diaries had to be discarded.

Furthermore, several studies found discrepancies between self-reported and actual behaviours. For example, a study on hygiene behaviour of healthcare professionals found that observed practices were unrelated to carers' self-reported behaviour (Jenner et al., 2006), whereas a systematic review of 67 studies on smoking behaviour found trends of underestimation of self-reported smoking (Gorber, Schofield-Hurwitz, Hardt, Levasseur, & Tremblay, 2009) – a socially undesired behaviour. Similarly, a meta-analysis on the validity of self-report measures of ESBs found that self-reported ESBs only explained 21% of the variance of objective ESBs (Kormos & Gifford, 2014). Hence, a similar discrepancy between the self-reported and actual behaviour in this study and participants could have over- or underestimated their pro-environmental behaviours. These limitations should be considered when interpreting the quantitative results (see section 6.5 for future research).

### **6.4.3 LIMITATIONS OF QUALITATIVE FINDINGS**

With regards to the qualitative findings, a number of limitations have to be acknowledged. The qualitative findings are based on two methods – interview data and a visualisation method. In the methodology, several criteria have been discussed to assess the quality of qualitative research (see CH3). The main limitations for the qualitative findings are based on the sample. Furthermore, the application of the newly developed visualisation method contains a few considerations that may limit the findings from this method. Below, both points are discussed in more detail.

The visualisation method was developed on the basis of existing research (Martin & Czellar, 2016) and is a novel approach in assessing identity change, particularly in the context of spillover. While the findings from this method are insightful and make a valuable contribution to understanding the processes that lead to spillover effects, future research should further validate this method. Validations might include think aloud components where participants talk through their thoughts while positioning the terms (see e.g. Hope et al., 2018). Another way to further validate this approach could

be through experimental studies in which the terms and independent variables and treatment conditions could be manipulated. Furthermore, the inclusion of other key terms could further test some of the assumptions made based on the findings in this study. For example, an inclusion of terms that represent conflicting identities (e.g. meat-eater or meat) could contribute to a better understanding of the identity processes that an intervention might provoke.

A few limitations should be noted with regards to the sampling and sample of the qualitative data. A purposeful sampling approach was used based on self-reported behaviour collected in the surveys with the aim to include employees at different stages of change with respect to their transitions towards more sustainable dietary choices. Before the behaviour change intervention, 23 participants were interviewed, however of these only 13 took part in the behaviour change intervention and post-intervention interviews. What is noticeable about the participants that dropped out is that they were predominantly in the precontemplation stage of the stages of change model (Bamberg, 2013) which indicates that they were less open to diet changes. As such, the remaining interviewees were predominantly from the other three stages (i.e. contemplation, action, and maintenance) and, therefore, more open to changing their diet to be more sustainable. This is likely to have affected the findings of the qualitative data. Where reports of behaviour changes categorised as positive spillover effects dominated the interview themes, the self-selection of the interviewees is likely to have influenced these findings. The potential overrepresentation of positive spillover does not restrict the conclusions drawn from the findings, however, it indicates that a lack of spillover and negative spillover may have occurred but was not represented or underrepresented in the interview sample.

The above-mentioned limitation with regards to the overrepresentation of participants who were open to change their diet before the intervention is reflected in the recognition that the interviewees typically liked the intervention or voiced no objection against it. However, observations during the behaviour change intervention and report of the interviewees indicate that several employees of the company did not like the changes that were made during the intervention with some going so far to start online petitions against the changes (i.e. there were anecdotal reports of an online petition for a meat week). This further indicates that the findings presented in this study are valuable and insightful, but underrepresent negative reactions of employees. As such, future research should further develop the understanding of negative spillover effects including participants that object to behaviour change.

#### **6.4.4 LIMITATIONS OF THE MIXED METHODS APPROACH**

The aim of the mixed methods was to overcome some of the limitations of single methods approaches (as discussed above) and to allow for a more diverse perspective on spillover effects. Nonetheless, a few limitations of the used mixed methods approach should be discussed. Previous researcher have acknowledged that, from the practical point of view, mixed methods research include

potentially higher monetary and time costs to develop and conduct (Creswell et al., 2003a). This experience was made in this research project and became particularly apparent within the monetary and time constraints of a PhD project. These limitations are likely to have impacted the sample sizes in both the quantitative and qualitative approaches which in turn led to limitations of the respective methods. Although, it is believed that the advantages of the mixed methods approach dominate, these limitations must be acknowledged.

A convergent parallel design approach was used for the data collection as it was considered to be the most appropriate approach to answer the research questions (for a discussion see CH3). As such, quantitative and qualitative data was collected simultaneously rather than subsequently. While this approach allowed a more diverse perspective of the data, the integration of the quantitative and qualitative findings only took place at the interpretation of the results stage. Subsequent data collection, for example if qualitative methods were used to generate hypotheses which then could have been tested with quantitative methods, could have been useful for a more tailored and case specific quantitative data collection (Teddlie & Tashakkori, 2003).

The presented findings are based on a one-time post-intervention assessment (i.e. based on interviews and survey data). While this approach builds on previous single-time point studies (e.g. Barr, Shaw, Coles, & Prillwitz, 2010; Littleford, Ryley, & Firth, 2014; Whitmarsh et al., 2018), future research should assess longitudinal effects of behaviour change interventions in the workplace to other settings (see e.g. Poortinga et al., 2016; Thøgersen & Ölander, 2003). For example, follow-up interviews and surveys six months after the behaviour change intervention, as previously done in other studies (e.g. Russell, Evans, Fielding, & Hill, 2016), could have been conducted to assess the longitudinal spillover effects. This approach was originally planned and agreed on with the collaborating company, however, the drop-out rate after T2 and the lack of support from the company led to a rejection of the plan for follow up data collection.

## **6.5 FUTURE RESEARCH**

In the above section, a few suggestions for future research were already made. However, further avenues for future research should be highlighted based on the findings presented in this thesis and the limitations discussed above. While there are several future research avenues that could be further explored, in the following some of these are highlighted.

### **LINK SPILLOVER EFFECTS TO INTERVENTION TECHNIQUES**

First, future research should relate spillover effects more clearly to the intervention techniques. For example, a quasi-experimental field study could use more than one intervention group to compare potential differences between intervention techniques as well as interactions between them. Another

approach could be lab-based experiments where different types of intervention techniques could be compared and causal relationships can be drawn (see e.g. Evans et al., 2012). Furthermore, future research could investigate how social interactions during an intervention (e.g. in a workplace or household) might affect spillover effects. In the main study of this thesis it was observed that employees would talk with each other during the intervention about the changes and the information. Hence, future research could use network analyses approaches (e.g. Southwell & Murphy, 2014) to analyse how these interactions or social spillover effects may increase or decrease the likelihood for positive, negative, or a lack of spillover.

### **EMPIRICAL EVIDENCE FOR LINK BETWEEN IDENTITY THREAT AND NEGATIVE SPILLOVER**

Second, in this thesis a pathway to negative spillover through identity threat was theorised, however, the empirical evidence was insufficient. Future research should further investigate the role of identity threat for spillover effects, particularly in relation to a behaviour change intervention. While previous research found evidence for a link between identity threat and resistance to change (Murtagh et al., 2014), future research should investigate whether ‘identity threatening’ interventions may also lead to negative spillover effects. Particularly in the context of meat consumption this could link previous research around dissonance and identity threat (e.g., Rothgerber, 2014) with spillover research. For instance, in an experimental study it could be tested how self-identified meat-eaters react to identity threatening information about meat consumption and climate change (versus non-threatening information) in comparison to self-identified vegetarians or vegans.

Moreover, while the four guiding principles (continuity, distinctiveness, self-efficacy, and self-esteem) proposed in the IPT were not specifically included in the conceptual framework in this thesis, future research could include these. This could be particularly interesting in the context of identity threat by exploring the specific role of the guiding principles for spillover. For example, an experimental study could manipulate the four guiding principles to test how these are related to identity threat and might influence negative spillover. Recently, a study by Whitmarsh et al. (2018) investigated whether environmental self-identity predicted consistency of ESBs across settings, as it would be argued based on the guiding principle self-consistency, but they found no significant results. Future research could further explore mediating and moderating effects of the guiding principles. For instance, an exploration of self-efficacy, which has previously been suggested as a driving factor for spillover effects (Lauren et al., 2016; Thøgersen, 2011), could be further investigated and linked to barriers to contextual spillovers that were identified in this thesis (e.g. perceived behavioural control). This would contribute to a better understanding of the expectations and limitations of behaviour change interventions in one setting and spillover effects other settings.

Considering the roles of contextual similarities and differences and PBC are still unknown, future research should further investigate their effects spillover. For instance, future studies could

investigate the influence of different evaluation strategies of control as proposed in the Four-Factor Model of Perceived Control (Bryant, 1989). The Four-Factor Model of Perceived Control (Bryant, 1989) differentiates four types of evaluation of one's perceived control, namely avoiding of and coping with negative outcomes, and obtaining and savouring positive outcomes. As such, in the context of spillover, these strategies could be further investigated, which could help to explain why some people engage in post-intervention behaviours and others feel they are not in control of their own behaviour change.

Another avenue for assessing the link between identity and contextual characteristics could be through exploring the role and social context of settings an associated 'third places' (e.g. the supermarket). The qualitative findings presented in this thesis suggest that the supermarket is an important 'third place' for spillover and that contextual characteristics such as social interactions (e.g. family dynamics) and perceived control over behaviour change play an important role for contextual spillover effects. Future research could further investigate third places and what contextual characteristics could facilitate or hinder positive spillover effects. For example, ethnographic studies (e.g., Hargreaves, 2008; Nye & Hargreaves, 2010) could observe social dynamics in the home, workplace, and supermarket setting to better understand how individuals interact with these contexts and other people in those settings.

#### **LACK OF SPILLOVER AND INCONSISTENCIES IN IDENTITY**

Third, future research should further investigate the pathways that lead to a lack of spillover, inconsistencies across ESBs (Hope et al., 2018) and identities (Gregory-Smith & Manika, 2017). One approach to address these research gaps could be with a longitudinal qualitative study. After a behaviour change intervention, participants could, for example, be interviewed at multiple occasions, accompanied with a diary data collection, which could account for inconsistencies in behaviour changes. These inconsistencies could then be discussed in more depth in the interviews. The interviews could focus on the role of compartmentalisation and justification strategies which could make a valuable contribution to better understanding the lack of spillover and the role of identity consistency mechanisms. Another approach could be the implementation of a quantitative study in which multiple ESBs are collected over time and potential fluctuations between behaviour changes could be assessed in relation to identity variables. Such research could use apps in which participants log their everyday ESB changes which could be helpful to detect small fluctuations and changes in ESBs over time.

#### **LONGITUDINAL RESEARCH**

Fourth, the study presented in this thesis was one of the first to focus on meat consumption and spillover effects. Hence, more research is needed to better understand how meat consumption might be similar or differ from other ESBs. For example, future interventions and/or longitudinal studies could include meat consumption along with other ESBs (e.g. energy use, recycling) to assess potential

differences or similarities and how these behaviours might be related (see e.g., Thøgersen & Ölander, 2003). Future research should also implement longer interventions similar to the meat-reduction intervention of the main study in order to take a more in-depth account of spillover effects to the home setting. To my knowledge, there is no evidence for how long such an intervention should be implemented for in order to affect behaviour change, however, habit research could provide some indications. For example, Lally et al. (2010) found that habit formation in the real-world takes between 18 and 254 days (on average 66 days). While this is a large time range, it still indicates that an intervention that took more than 18 days would potentially be more likely to result in behaviour change.

Longitudinal research would account for long-term effects of both the intervention and the associated spillover effects, if they occur. The findings of the present research showed that spillover effects can lead to changes in various behaviours and settings. Longitudinal mixed methods research in particular would be suited to track these changes more rigorously over time and could potentially uncover processes of spillover effects. For instance, some interviewees in this research reported changes in their food purchasing behaviour and an increased awareness of the overall topic of sustainable diets. A longitudinal research design could follow the development of these changes and assess whether they are temporary or long-term. Moreover, longitudinal designs could help to better understand the integration of tenets from a behaviour change intervention into the identity structure as well as assimilation processes that might lead to a, potentially temporal, salience of existing green identity structures in the self.

## **MEDIATION AND MODERATION**

Fifth, future research should explore mediation and, particularly moderation to better understand factors that may influence spillover effects. For example, qualitative methods could be used in future research to uncover unexpected spillover effects that may be mediated or moderated by factors such as cognitive accessibility (Sintov et al., 2019), consistency (Whitmarsh et al., 2018), self-efficacy (Lauren et al., 2016). While mediating factors of spillover have already been investigated in a range of studies (e.g. personal norms and self-efficacy, Steinhorst et al., 2015; environmental identity, Truelove et al., 2016), especially moderating factors could be researched in future studies. Particularly in intervention studies, factors such as environmental identity could strengthen the links between ESBs possibly resulting in stronger positive spillover effects. A better understanding of mediating and moderating factors of any spillover effects would contribute to a better understanding of the circumstances under which positive spillover effects might be strengthened and barriers (e.g. difficulty of ESB or contextual factors) that might be lowering likelihood for positive spillover effects. Such future research would contribute to a more comprehensive understanding of lifestyle changes through spillover effects and internal (e.g. identity) as well as external (e.g. income) factors that might mediate or moderate any spillover.



## **CO-BENEFITS AND CONFLICTING MOTIVES FOR FOOD CHOICES**

Sixth, another relevant area for future research would be to investigate co-benefits and potentially conflicting motives for food choices. This thesis only focused on environmental benefits of different food choices and has not addressed, for example, health benefits of plant-based diets or conflicting motives such as cultural associations with meat consumption. Future research could investigate motives that are associated with food choices, such as meat consumption. For example, Dowsett et al. (2018) investigated reasons for people's meat consumption and found several categories that may conflict with environmental, ethical, or health motives for reducing meat consumption, in a survey with 460 participants. The most frequent responses included "Nutrients/protein/iron/anemia" (e.g. meat consumption is associated with higher protein intake) and "Enjoyment/love/like" (e.g. people enjoy eating meat) (Dowsett et al., 2018). Future research could further investigate the associated conflicting motives for meat consumption and other food choices to better understand people's decision-making processes and values around food consumption. Similarly, co-benefits such as health benefits (see e.g. Van Dooren et al., 2014) and ethical issues around food choices and, in particular, meat consumption could be explored in the context of framing interventions as well as factors that could facilitate or inhibit positive spillover effects.

## **CO-CREATION AND PARTICIPATORY RESEARCH**

Lastly, future projects that work with a partner organisation to develop and implement a behaviour change intervention in their workplace should include a few measures to improve acceptance and participation in the research project. The present study showed that the support of important gatekeepers within the organisation can be crucial for the success of the project. Hence, future projects should ensure a good relationship, inclusion and support of key individuals from the company throughout all project phases. For instance, co-creation and/or participatory approaches could potentially facilitate a good relationship with the stakeholders of an intervention and their investment in the research outcomes. Moreover, the inclusion of employees and the organisation's culture can be key factors for the success of the behaviour change intervention and the overall participation on the evaluation (i.e. data collection). Although I tried to pay attention to these key points, my experience from this research project taught me that they are more crucial to the success of the project than I had anticipated.

## 7 CONCLUSION

This thesis aimed to better understand contextual spillover effects and the role of underlying processes for contextual spillover. Drawing on Identity Process Theory (IPT; Breakwell, 1986), a theoretical framework was developed that explains pathways to positive, negative, and the lack of spillover through the lens of identity change. Spillover effects were assessed by investigating the effects a meat reduction intervention in a workplace on employees' environmentally sustainable behaviours (ESBs) at home. Two research questions were addressed: '*RQ1: How does a behaviour change intervention in the workplace affect environmentally sustainable behaviours at home?*' and '*RQ2: What role does identity play in the emergence of positive and negative contextual spillover effects (or a lack thereof)?*'

### 7.1 SUMMARY OF THE THESIS

An overview of the literature underpinning the research question was given in CH2. Furthermore, CH2 presented a conceptual framework of the process of spillover effects from the work to the home setting by adapting tenets of the intervention. A mixed methods approach was used to assess the proposed framework (see CH3) and a pilot study in the university setting (see Appendix A) and a field based intervention study in a private sector company were conducted to collect respective data (see CH4). A findings chapter (CH5) presented the quantitative and qualitative research findings of the main study. While an initial analysis of the findings in relation to the framework was conducted, the overall findings were not discussed in great detail in relation to their limitations and input to the spillover literature, theory and practice. Hence, this chapter discusses the findings presented in the previous chapter with a specific focus on the contribution of the proposed conceptual framework (see CH2).

In the second chapter (CH 2), the current spillover literature was reviewed and evidence for spillover effects both between ESBs and between contexts (e.g. work and home) was assessed. Moreover, key concepts and theoretical frameworks associated with spillover effects were introduced. Two main research gaps were identified. First, most spillover research is focussed on understanding links between two or more subsequent ESBs, while little seems to be known about the links between ESBs in different settings (i.e. contextual spillover). Second, identity was recognised as a key underlying factors of spillover effects, particularly positive spillover, however, a lack of knowledge about the underlying identity processes was identified as a research gap. To address the first research gap, the focus of this thesis was to better understand spillover effects between the work and home contexts as two places where people spend a lot of their time. The second gap was addressed by the development of a theoretical framework that describes pathways to positive, negative and a lack of spillover through understanding identity integration processes. The framework draws on Identity

Process Theory (IPT; Breakwell, 1986; Jaspal & Breakwell, 2014) and aims to explain how a persuasive appeal (e.g. a behaviour change intervention) can lead to identity integration processes, identity compartmentalisation, or experienced identity threat, which subsequently result in positive, a lack of, or negative spillover effects.

Furthermore, the literature review highlighted that more intervention based, and real-world research is needed to better understand spillover effects. Moreover, the need for mixed methods approaches was identified to shed light on the rather mixed evidence for spillover from predominantly quantitative methods approaches. In this thesis, these research gaps were addressed by realising two research projects, each of which included a behaviour change intervention in a real life setting and a mixed methods approach. The first project served as a pilot study and was a small-scale behaviour change intervention that was targeted at recycling and waste separation behaviour in university offices. Insights from the pilot study were used to design and implement the second, main research project, which was conducted in collaboration with a medium size private sector company. In the main project, a behaviour change intervention targeting at meat consumption in a workplace canteen was realised.

The third chapter (CH3) in this thesis described the methodology that informed the main study. The research was based in the pragmatist paradigm and a mixed methods approach was used in both the pilot and the main study with the aim to triangulate the evidence for spillover effects. A convergent parallel design was used to collect quantitative and qualitative data both before and after the behaviour change intervention of the main study, including pre- and post-intervention interviews, a visualisation method, and a pre- and post-intervention survey. The main study was divided into two chapters, one of which described the development, implementation, and evaluation of the behaviour change intervention (CH4), while the latter presented the findings from the main study (CH5).

With regards to the first research question ‘RQ1: How does a behaviour change intervention in the workplace affect environmentally sustainable behaviours at home?’, both quantitative and qualitative data analyses indicated positive and a lack of spillover effects from the behaviour change intervention at work to ESBs at home. The quantitative data analysis found no significant direct effects of the intervention to changes in self-reported red meat (i.e. the target behaviour of the intervention), fruit and vegetable, local, organic, or seasonal food consumption at home nor food waste avoidance behaviour.

The qualitative data showed a more nuanced picture of the types of behaviours the intervention affected. While some participants reported a reduction in their red meat consumption at home, the most dominant change was identified around decision making processes in the supermarket (e.g. increased selection of local produce). An increased awareness of problems related to sustainability and food was also identified, however, while this was recognised as a positive non-behavioural spillover effect, an increase in awareness was often accompanied by no behaviour changes (i.e. lack of spillover).

Noteworthy is the co-occurrence of both reported changes in some ESBs and lack of change in other ESBs which was interpreted as a simultaneous occurrence of positive and lack of spillover effects. Overall, the quantitative and qualitative findings provide strong evidence for positive effects of a behaviour change intervention at work to ESBs at home.

With regards to the second research question ‘RQ2: What role does identity play in the emergence of positive and negative contextual spillover effects (or a lack thereof)?’, both quantitative and qualitative findings suggest that identity plays an important role for spillover effects. The quantitative data found significant interaction effects between identity variables and the intervention condition. In the intervention group, a positive change in environmental identity variables (i.e. prominence of environmental identity) was associated with a decrease in negative changes in seasonal food consumption at home. This indicates that a change in environmental identity increases the likelihood for positive Spillover as well as the lack of spillover. Similarly, the visualisation method and the interview data analysis suggests that participants who increased the centrality of environmental identity tended to also report more post-intervention ESB changes at home. Interestingly, justifications, mental accounting, and reaffirmation of past behaviours were identified as identity related strategies that were associated with a lack of post-intervention behaviour change; interpreted as a lack of spillover. These findings suggest that identity also plays an important role in explaining the lack of spillover effects.

In the discussion chapter (CH6), the overall evidence for spillover effects and an evaluation of the theoretical framework were presented. Furthermore, the findings from the main study were discussed in relation to the existing literature, their limitations and implications for future research. The original framework proposed in CH2 was revised and adjusted in accordance with the findings from the empirical study. Overall, the revised theoretical framework provides a useful account for contextual spillover effects through identity processes. Future research should further validate the theoretical framework, particularly with regards to the role of identity thread for potential negative spillover effects and the identified strategies that seem to result in a lack of spillover.

## 7.2 MAIN CONTRIBUTIONS

This thesis makes novel contributions to the existing spillover literature, particularly towards the understanding of contextual spillover effects, the role of identity, spillover and meat consumption, and theoretical understanding of spillover through the introduction of a new framework for contextual spillover. Furthermore, this thesis makes several methodological contributions by using a mixed methods approach, introducing a new visual method to assess the centrality of identity, and assessing the effects of a real-world intervention in a workplace.

The focus on contextual spillover effects (i.e. work to home) and the implementation of a real-world intervention addresses a current gap in the literature. The theoretical framework combined IPT and previous spillover research to explain pathways to positive, negative, and the lack of contextual spillover effects. The evidence presented in this thesis indicates that a lack of and positive spillover effects can occur simultaneously and are influenced by external barriers (e.g. the social context) and internal negotiation processes (e.g. mental accounting). Future research is now required to test and evaluate these initial findings and the theoretical framework and confirm its relevance for understanding (contextual) spillover effects, validate the methodological approaches used in this thesis and address some of the incumbent limitation. The introduction of a new visual method to assess identity integration makes a further novel contribution, however, future research is required to further validate the method.

This thesis is one of the first research projects that studied spillover effects in a real-world setting with the actual recipients of a behaviour change intervention. It was shown that spillover effects from a behaviour change intervention in the workplace can occur but highlighted that several contextual and psychological barriers reduce the impact of positive spillover effects. This research showed that the acceptance of a behaviour change intervention in the workplace can play a crucial part for the success of the intervention, but also for spillover effects. Negative reactions, as they were observed during the behaviour change intervention of the main study, could have resulted in negative spillover effects, however, no evidence was found for this. Moreover, a low participation rate in the research project could have impacted the strength of the intervention and, subsequently, spillover effects. Future research should further investigate how employee participation or co-production of behaviour change programmes in workplaces affect potential spillover effects to other areas of life (e.g. the home). Applications in other workplace contexts (e.g. non-office based work) would further contribute to the understanding of how real-world workplace interventions affect ESBs at home.

Moreover, the focus on meat consumption was designed to directly address an impactful ESB that had received little attention in previous spillover research. This research showed that positive spillover effects from a food related behaviour change intervention at work are not limited to the home settings, but instead expand to other places, such as the supermarket. These findings make valuable implications for policy makers and practitioners by highlighting the importance of the connectedness of different contexts and the behaviours people engage in. Furthermore, particularly the qualitative findings, exposed contextual spillover effects to food related ESBs (e.g. increase in local food consumption). Future research should further investigate the link between food related ESBs and how these are linked and interact across different contexts.

Future research should further investigate how food related policies and choice architecture (i.e. availability of environmentally sustainable options) might influence people's diet choices across several settings (e.g. restaurants).

In the wider context, this thesis addresses several relevant issues around the consumption of meat, implementation and acceptance of behaviour change interventions in real-world settings, and pathways that can facilitate a change towards more sustainable lifestyles. The findings demonstrated in this thesis showed that a behaviour change intervention in a workplace can positively affect ESBs at home and therefore contribute to a reduction of individual CO<sub>2</sub>-emissions. However, these positive effects seem to be attenuated by multiple barriers (e.g. perceived control) and internal processes (e.g. reaffirmation, identity threat) resulting in smaller behaviour changes (i.e. contextual spillover effects) or no changes at all. However, overall, it was shown that spillover effects can accelerate a shift towards sustainable lifestyles and make a valuable contribution to a transition towards a more sustainable society.

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## 9 APPENDICIES

### 9.1 APPENDIX A – Pilot Study: Waste separation in University offices

#### 9.1.1 Recycling interventions and spillover effects

In the past decades, recycling behaviour and its antecedents have been widely studied (Hansmann, Bernasconi, Smieszek, Loukopoulos, & Scholz, 2006; McCarty & Shrum, 1994; Thomas & Sharp, 2013). Utilising knowledge about antecedents of recycling behaviour and ESBs more generally, behaviour change interventions have been developed and implemented to promote recycling behaviour in households (Schultz, 1999) and workplaces (Oke, 2015; Tudor, Barr, & Gilg, 2008). In a meta-analysis, Oke (2015) identified several factors that influence workplace recycling behaviour including past behaviours, contextual factors (e.g. availability of bins), attitudes, identity, and information. The author highlighted that recycling behaviour is complex and, therefore, may challenge waste management practitioners (Oke, 2015). Accordingly, Oke (2015) suggests, that a combination of intervention techniques addressing several factors at the same time would be the most promising approach when designing a behaviour change intervention targeting recycling behaviour.

Furthermore, previous research has assessed several intervention techniques. For instance, in another meta-analysis of 70 interventions, Varotto and Spagnolli (2017) found that social modelling (i.e. learning information through others) and environmental alterations (i.e. making recycling easier) were the most effective techniques to increase recycling behaviour. They further suggested that tailored interventions and segmentation increased the effectiveness of behaviour change interventions (Varotto & Spagnolli, 2017). The findings from both meta-analysis studies informed the development of behaviour change intervention of this pilot study (see next section). Particularly, the tailored approach and mixing of intervention techniques were taken into account for the development of the behaviour change intervention.

##### 9.1.1.1 SPILLOVER AND RECYCLING INTERVENTIONS

Spillover effects of waste related behaviours to and from other ESBs as well as spillover from behaviour change interventions have been investigated by several studies (e.g., Andersson et al., 2012; Ek & Miliute-Plepiene, 2018; Ha & Kwon, 2016; Truelove et al., 2016; Whitmarsh et al., 2018). For example, a study on consistency of recycling behaviour across the workplace and home setting with hospital workers found that similarities between recycling items increased spillover effects as similar items could act as prompts for the behaviour in each setting (Tudor et al., 2007). A more recent mixed methods study by Whitmarsh et al. (2018) found that waste separation behaviour across the home,

workplace, and holiday setting varied, indicating inconsistencies of waste separation behaviours across contexts. The authors highlighted the importance of both contextual (e.g. facilities) and individual factors (e.g. identity) for spillover effects of waste separation behaviours between different contexts (Whitmarsh et al., 2018). The following pilot study builds on the existing literature and investigates spillover effects from a behaviour change intervention in the workplace that promotes waste separation behaviours to ESBs at home.

Overall, the aim of this pilot study was threefold. First, the study aimed to explore the designing and implementation process of a tailored behaviour change intervention in a workplace – in the pilot study targeted at waste separation behaviours. To better understand the target behaviour from the intervention’s recipients’ perspective, focus groups were conducted with the aim to identify motivations and barriers to waste separation behaviours at work. Second, the pilot study aimed to investigate potential links between the tailored behaviour change intervention and potential spillover effects from work to home. To address this aim, a pre- and post-intervention survey with intervention recipients and a control group was implemented that measures self-reported changes in ESBs at home. Third, the pilot study aimed to explore survey scales (e.g. identity measures), research designs (e.g. quasi-experimental design), and methods (e.g. focus groups and self-reported surveys) that would subsequently inform the planning and implementation of the main study. This was addressed by implementing a mixed methods approach, by including a number of scales in the survey, and by developing and implementing a behaviour change intervention. In line with the overall research question of this thesis (see CH2, section 2) and the identified gaps in the literature (see CH2, section 2) the following hypotheses (H) and research objectives (RO) were proposed to explore spillover effects between the work and home context:

**ROI:** To explore if and how participants perceive spillover of ESBs between the work and home setting.

**H1:** The behaviour change intervention in the workplace has an effect<sup>10</sup> on the targeted behaviours waste separation in the home context.

**H2:** The behaviour change intervention in the workplace has an effect<sup>2</sup> on non-targeted ESBs at home.

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<sup>10</sup> Note: Based on the literature and the theoretical framework that was introduced in Chapter 2, all three types of spillover (positive, negative, and a lack thereof) can be expected in the intervention group. As such, no specific direction of the effect is hypothesised.

**H3:** 'Green' identity is a confounding factor in the effect of the intervention on recycling behaviour at home.

To address the research question and hypotheses, focus groups with academic and cleaning staff – which were identified as potential recipients of the behaviour change intervention – were conducted. The focus groups aimed to get the participants' perspectives on the target behaviour (i.e. waste separation at the university) and to develop and discuss ideas for the intervention. Additionally, the focus groups aimed at examining potential factors for spillover from the workplace to the home setting which were used to inform the interview questions of the main study. To examine spillover effects, a behaviour change intervention aiming to increase waste separation behaviour in university offices was implemented and ESBs at work and at home, before and after a behaviour change intervention, were examined by using a pre- and post-intervention survey. The following section provides details of the pilot study including a method and sample description of the pilot study (9.1.2), results (9.1.4) and a brief discussion and implications of the results for the main study (3.6.2).

### **9.1.2 Method and Sample**

The data for the pilot study was collected from staff members of a university office building and consists of a qualitative and quantitative data collection part: (1) a pre-intervention focus group and (2) a pre- and post-intervention survey. Additionally, objective data of the target behaviour was collected by monitoring bins before and after the behaviour change intervention (see section 9.1.2.3). Three focus groups lasted one hour each and were conducted in June 2016. In order to capture some of the diversity of people involved in the recycling process, three categories of university employees were invited to take part, which included academic staff, porters, and cleaning staff.

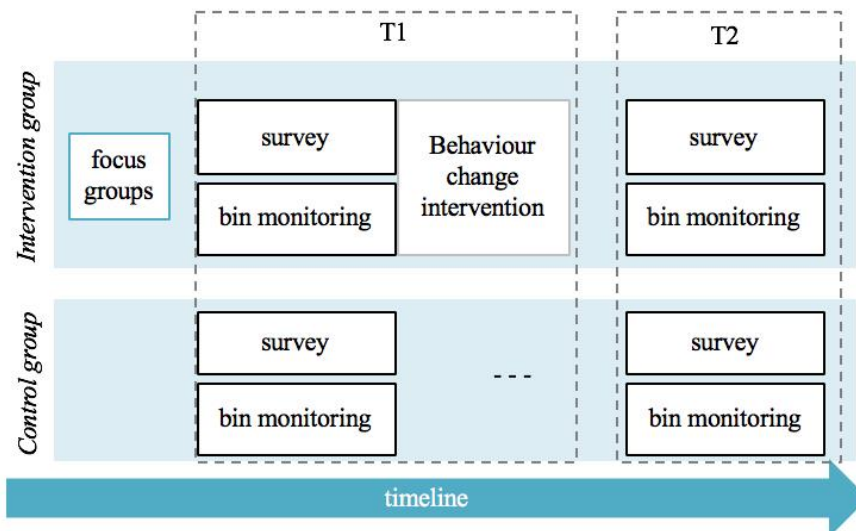
The behaviour change intervention took place in one university building, and two further (smaller) buildings were chosen as control groups. The buildings were chosen by an EFM representative with the aim to match recycling performance and occupancy size between the intervention and control group. EFM estimated the occupant number of the intervention building to be 350 and of the control group 250 occupants (i.e. staff members) – although exact numbers of occupants and recycling rates were not available according to the EFM.

A sequential exploratory design was used for the data collection. This is characterised by a phase of qualitative data collection and analysis followed by a phase of quantitative data collection and analysis (Creswell et al., 2003a). The purpose of this research design was threefold. First, the qualitative data was used to inform the behaviour change intervention; that is to uncover barriers of and promoters for recycling in the workplace under investigation. Second, the qualitative research was used to explore potential spillover effects of recycling behaviour between the work and the home context. And third,



the quantitative data was used to test ideas generated from the explorative phase (i.e. barriers and facilitators of spillover effects between home and work) as well as the literature (i.e. identity).

Consequently, qualitative data was collected first in the form of focus groups which were also analysed prior to the quantitative data collection. In the second phase, quantitative data was collected with an employee survey and a monitoring of bins in offices. The pre-intervention survey was directly followed by the behaviour change intervention; for the intervention group only. A second survey and a second bin monitoring were conducted one month after the behaviour change intervention. For an illustration see Figure 57. It should be noted that the research design of the pilot study deviates from the main study (see CH3 and CH5) as a convergent parallel design (i.e. collecting both qualitative and quantitative data pre- and post-intervention) was considered to time intensive for the pilot study.



*Figure 57: Illustration of sequential exploratory design used in Pilot Study*

In the following, the procedure for the focus groups (9.1.2.1), surveys (9.1.2.2), and objective data collection (9.1.2.3), and the results are described (9.1.4). As this section is only concern with the pilot study which aimed to inform the main study, the results are only described briefly. Implications of the pilot study for the main study are discussed in section 3.6.2. The pilot study received ethics approval by the university of Sheffield Management ethics committee (see section 9.1.6).

### 9.1.2.1 FOCUS GROUPS

Overall, three focus groups were conducted (two with academic staff and one with cleaning staff), which were recruited via staff-email lists and through the EFM. Participants were invited to take part in a discussion about waste separation behaviour at the university and as an incentive provided with a light lunch or breakfast (depending on the time of the focus group). The main aim of the focus groups was to explore potential barriers to waste separation behaviours at the university, which is why the only sampling method for the focus groups was to make sure that both academic and cleaning staff were

represented. The focus groups took 60 minutes and were led, recorded, and transcribed by the researcher. At the beginning of each focus group, participants were given an information sheet and signed a consent form (see section 9.1.5). Participants were asked questions about their perception of recycling in their workplace, easy and difficult materials to recycle, their perceived connection between recycling at work and home, barriers to recycling at work, and how recycling at the university could be improved (see section 9.1.7 for full focus group guide). Senior staff members of the EFM team were not present as this may have influenced the participants. The focus groups varied in size and were female dominated (see Table 35).

**Table 35: Focus group participants**

| Focus Group (FG)              | Total participants | Female | Male |
|-------------------------------|--------------------|--------|------|
| Cleaners & Porters            | 9                  | 8      | 1    |
| University Staff<br>(Group A) | 3                  | 2      | 1    |
| University Staff<br>(Group B) | 7                  | 4      | 3    |

The transcripts of the focus groups were analysed using thematic analysis (Braun & Clarke, 2006). The focus group transcripts were coded following a procedure described by Braun and Clarke (2006). The codes were grouped in themes that focussed on barriers to waste separation behaviours in the university setting. Furthermore, participants were asked about links between waste separation behaviours at work and home, which was explored as potential pathways for spillover effects between the two contexts. In the following, the results from the focus groups with regards to these two areas are presented.

#### **9.1.2.1.1 BARRIERS TO WASTE SEPARATION BEHAVIOURS AT THE UNIVERSITY**

The findings of the focus groups revealed that the main issues around waste separation behaviours at the university were threefold. Firstly, all participants reported to experience confusion about what can and what cannot be recycled. Second, a dominant theme was that participants mentioned myths about what happened to the separated waste at the university, which seemed to be connected with a disbelief in the effectiveness of recycling in the first place. Third, participants found bin labelling in the university offices inconsistent and confusing. A summary of the themes around the barriers to waste separation in the university and illustrative codes are shown in Table 36.

**Table 36: Summary of focus group themes - barriers to recycling at work**

| Obstacles to recycling                    | Summary (sub-themes)                          | Illustrative quotes   |
|---|---|---|
| Confusion                                 | Myths   | “I’ve also heard that recycling gets landfilled. That there isn’t a facility to cope with all the recycling.” (academic staff)  |
|   | Inconsistent communication                    | “There isn’t great clarity about what to put in which bins and where they are and there doesn’t seem to be great consistency across the organisation.” (academic staff)   |
|   | Confusion about materials                     | “I always thought if you could tear it, it was paper” (academic staff)  |
|   | Confusion about bins and co-mingled recycling | “I have moved into my own little office and I have this blue bin, but I don’t know what to put in there”; “I didn’t even realise it was co-mingled. I thought the one next to the printer was just for paper.” (academic staff) |
|   | Confusion about labels and stickers           | “We often don’t find labels on the bins.” (academic staff)  |
| De-motivation                             | Helplessness                                  | “I think that thing of looking into the recycling bin and seeing all sorts of wrong things in there really makes you feel a bit ‘what’s the point’” (academic staff)  |
| Individual Factors                        | Time  | “It’s about time, people get too busy” (academic staff)   |
| Problems reported by cleaners and porters | Mis-use of facilities                         | “Recycling bins are used for confidential waste” (cleaning staff)   |
|   |   | “Posters are being put down by departments” (cleaning staff)  |

### 9.1.2.1.2 EXPLORING SPILLOVER EFFECTS

In addition to barriers to waste separation behaviours at the university, responses to questions about the links between waste separation behaviours at the university and at home were analysed using thematic analysis. As a dominant theme, differences between waste separation facilities at home and at work and different perceptions of responsibility for recycling at home and at work were identified. These could constitute potential barriers to consistency of waste separation behaviours between work and home (i.e. contextual spillover). The most dominant theme around the link between the two contexts and waste separation behaviour was that participants perceived the university and home setting as different places where recycling facilities are different, which, according to the participants, caused confusion. This indicates that differences between the contexts and waste separation facilities and seem to act as barriers to spillover effects between settings. Equally, similarities between the waste separation facilities in different contexts seem to facilitate consistent behaviour across contexts; i.e. contextual spillover effect – which is illustrated by the following quotes from the focus group:

*“In Leeds I can’t recycle glass, so I have to bring it to the supermarket. But I can recycle plastics 1-4.[note: participant mentions types of plastics without further explanation]. At home I know exactly what goes in which bin.” (staff FG A).*

*“I think it is easy with paper. It is the same at home it is the same at work, there is no question about it. But the rest is a bit confusing between home and work and it’s about time to prepare it for recycling.” (staff FG B).*

This illustrates how similarities and differences between the behaviour and settings seem to play a role in facilitating or hindering spillover effects; which is in line with previous research (Littleford et al., 2014). Littleford et al. (2014) found that the same equipment used in both the home and work setting is associated with consistency across settings; however, the authors suggest their findings are not sufficient to evidence spillover effects. Nonetheless, similar policies and information across settings could facilitate spillover effects between settings. Based on these findings and previous literature, one theme of the interview questions in the main study focussed in similarities and differences between work and home (see CH5, section 4).

After the focus groups were conducted and analysed, the key findings were presented to EFM and a behaviour change intervention was developed tailored to the problems identified in the focus groups. Furthermore, a survey was developed to test the hypotheses and trial scales for the main study (see 9.1.4.2). The themes around waste separation barriers were indicative for the design of the behaviour change intervention, which is discussed in more detail in the next section (9.1.3). The identified theme around spillover effects in the focus groups highlighted the importance of the behaviour context and indicate patterns to look out for in the main study (e.g. similarities and differences between settings). In the next section, the survey and the behaviour change intervention are described in more detail.

## **9.1.2.2 SURVEY**

### **9.1.2.2.1 PARTICIPANTS AND DESIGN**

The survey was distributed in December 2016 (T1) via email lists to all staff of the chosen university building through administrative staff members of the two university buildings. A total of 108 employees in the intervention group and 71 employees in the control group took part in the first survey resulting in an estimated response rate of 30% and 28%, respectively. The second survey was distributed in January 2017 (T2) via the same channels as at T1. In total 70 employees from the intervention group and 37 employees from the control group took part in the second survey. However, only 27 employees from the intervention group and 18 employees from the control group could be matched with the survey data from the T1 survey.

To match participants between T1 and T2, participants were asked to generate a code that they could use to match their response with the second survey. Overall, this results in a drop-out rate from T1 to T2 of 75% in both the intervention group (for a more detailed discussion about the dropout rate, see CH6, section 6.4.2.3). A drop-out analysis was conducted to compare the participants that completed both surveys (T1 and T2) with participants that dropped out after T1. This was completed with an independent t-test which compared the two groups at T1. The aim of the drop-out analysis was to test whether the participants that dropped out were different to the participants that completed the

second survey to detect potential biases. The results of the t-test showed significant differences between the participants that completed both surveys and those that dropped out after the first survey for some of the variables (i.e. Compartmentalisation of Identity – graphic, Energy behaviour at home T1, Recycling behaviour at work T1, Prominence of Environmental Identity T1; see section 9.1.4.2). This could indicate a confounding factor that could explain the drop-out. Nonetheless, the matched data set was used for the analysis of the pilot study data. Demographics including age, gender, qualification and job role differed slightly between the intervention and control group (see Table 37).

**Table 37: Survey sample demographics**

|   | Intervention Group | Control Group |
|---|--------------------|---------------|
| N at T1                                 | 108                | 71            |
| N at T2                                 | 70                 | 37            |
| N T1 and T2 matched                     | 27                 | 18            |
| <b>Age in %</b>                         |                    |               |
| 18-25                                   | 3.6                | 11.1          |
| 26-35                                   | 32.1               | 27.8          |
| 36-45                                   | 35.7               | 22.2          |
| 46-55                                   | 21.4               | 22.2          |
| 56-65                                   | 7.1                | 16.7          |
| <b>Gender in %</b>                      |                    |               |
| male                                    | 25                 | 27.8          |
| female                                  | 71.4               | 72.2          |
| other                                   | 3.6                | 0             |
| <b>Qualification in %</b>               |                    |               |
| A/AS level                              | 10.7               | 0             |
| BSc/ BA                                 | 35.7               | 16.7          |
| MSc/ MA                                 | 21.4               | 55.6          |
| PhD                                     | 28.6               | 27.8          |
| Other                                   | 3.6                | 0             |
| <b>Job Role in %</b>                    |                    |               |
| Academic Staff                          | 21.4               | 50            |
| Research Staff                          | 17.9               | 0             |
| Professional Services & Technical Staff | 46.4               | 27.8          |
| Postgraduate student (e.g. PhD)         | 10.7               | 0             |
| Support staff                           | 3.6                | 22.2          |

#### **9.1.2.2.2 MEASURES**

The 15-minute questionnaire included closed questions addressing environmental self-identity, compartmentalisation of work-home-identity, prominence of environmental identity, recycling behaviour at work and at home, intention to recycle at home, attitudes towards recycling at work and at home, energy saving behaviour at work and at home (for an overview see Table 40) as well as demographic variables (see Table 37). The intervention group received a behaviour change intervention

at the end of the survey in the form of feedback for their reported recycling behaviour at work. For participating, participants could enter a prize draw to win one £50 and one £25 Amazon voucher.

### **9.1.2.3 OBJECTIVE MEASURES – BIN AUDIT**

Bins were monitored before and after the behaviour change intervention in both the intervention and control group. The aim of the objective measure was to triangulate the methods and to measure direct effects of the behaviour change intervention on recycling behaviour in the workplace. In addition to the self-reported recycling behaviour, the objective measure can provide information about the effectiveness of the behaviour change intervention which may impact the strength of the potential spillover effect at home. Although the bins are not directly linked with the survey participants (for ethical reasons), cross-sectional data of the waste separation rate in the bins was considered a useful approach and particularly valuable for the project partner the EFM.

The bin monitoring took place in randomly selected offices both in the intervention and control group buildings. The data collection involved a count of items per general waste and mixed recycling that were placed in the incorrect bins. For example, if a general waste bin contained five items of which two were recyclable, the bin was allocated the bin contamination number two. This data was provided by the cleaning team and documented by the researcher. Four types of offices were assessed, namely multiple occupancy office, single occupancy office, PhD office (multiple occupancy), and kitchen/common room. In total 62 offices were monitored, 31 in the control and 31 in the intervention group. The bins were monitored before and after the behaviour change intervention and outside office hours; i.e. 6am on a weekday before bin collection. The results of the bin audit are presented in section 9.1.4.1.


### **9.1.3 Behaviour change intervention**

The behaviour change intervention was targeted at improving waste separation behaviour at work and combined the techniques of information provision and feedback (see e.g. Abrahamse et al., 2005). The focus groups revealed that participants experienced confusion about what could and could not be recycled which, in collaboration with the EFM, led to the decision to tackle waste separation behaviour at the university. Hence, the behaviour change intervention focussed on feedback on current recycling behaviour combined with information about the environmental impact of the behaviour.


After filling out the survey, all participants were asked which bin they normally used for a number of items (see example Figure 58). The participants of the intervention group received feedback for their answer whereas the control group received the next question. The feedback consisted of either a green smiley face, indicating a correct answer, or a red sad face, indicating an incorrect answer as well as the correct answer and information about the environmental consequences of disposing of the item correctly (see Figure 58). The smiley faces were a subtle injunctive norm indicating social approval

of correct behaviour (McDonald & Crandall, 2015). As previous research suggests that information provision alone is not effective it was combined with the injunctive norm and social approval as a form of feedback (Abrahamse et al., 2005; Staats, van Leeuwen, & Wit, 2000). In combination, it was hoped that these intervention techniques would tackle some of the barriers identified in the focus groups (i.e. confusion about what can and cannot be recycled).


Please indicate which bin you normally use to dispose of each of the following items.

|   | Recycling bin (blue)  | General waste bin (grey) | Either                | I don't know          | I don't use these products |
|---|-----------------------|--------------------------|-----------------------|-----------------------|----------------------------|
|  | <input type="radio"/> | <input type="radio"/>    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      |

Correct! Well done!




Sorry, that is incorrect.




---

**Plastic pots go in the blue recycling bin.**  
Recycling plastic packaging has a positive influence on our environment. It decreases the need for raw materials which helps to save energy.



**Plastic pots go in the blue recycling bin.**  
Recycling plastic packaging has a positive influence on our environment. It decreases the need for raw materials which helps to save energy.



**Figure 58: Intervention - Information and feedback**

The intervention focussed on ten materials that, according to EFM and the pre-intervention survey, were identified as the most confusing and frequently used. These materials included coffee cups, food waste, food package; e.g. sandwich cartons, plastic film (e.g. on fruit boxes), food contaminated materials; e.g. cardboard/ pizza cartons, bottle caps, cans, juice cartons, paper tissues, and plastic bottles. The intervention was developed by the researcher and approved by the EFM's waste manager.

## 9.1.4 Results from pilot study

### 9.1.4.1 BIN AUDIT DATA

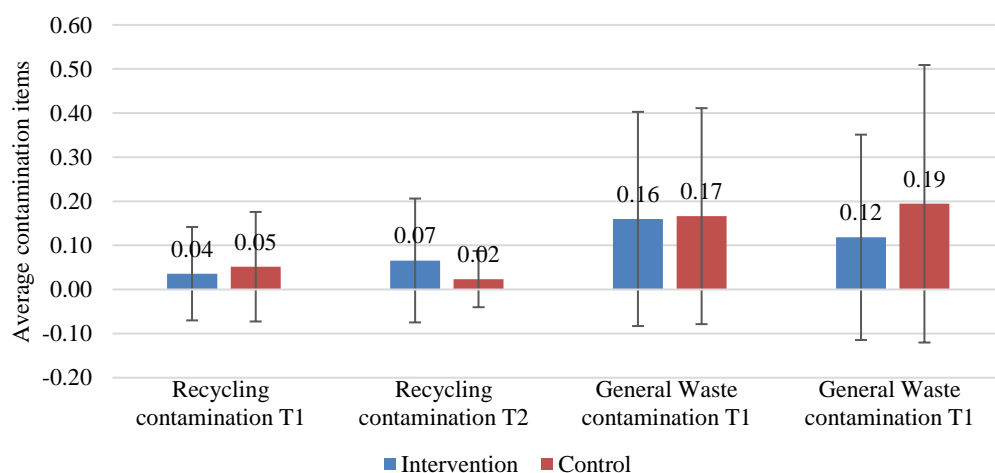
The aim of the bin audit was to assess whether the intervention had worked. Although this does not address the research objectives, it was of particular interest for the EFM. Bins at the sites of the

intervention and control groups were audited both before and after the behaviour change intervention. For this a total of 60 offices were audited by the cleaning team and the number of contaminating items for each bin (i.e. recyclables in general waste bins and general waste in recycling bins). Overall, 24 offices of the intervention group and 36 office of the control group were audited. Table 38 shows the types of offices that were audited in both groups. Most audited offices had one recycling and one general waste bin, except for some of the multi occupancy offices which often had several bins of each type.

**Table 38: Types and numbers of audited offices**

|                    |                          |    |
|--------------------|--------------------------|----|
| Intervention Group | Multiple occupancy       | 8  |
|                    | Single office            | 10 |
|                    | PhD (multiple occupancy) | 2  |
|                    | Kitchen or common area   | 4  |
|                    | Total                    | 24 |
| Control Group      | Multiple occupancy       | 14 |
|                    | Single office            | 14 |
|                    | PhD (multiple occupancy) | 1  |
|                    | Kitchen or common area   | 7  |
|                    | Total                    | 36 |

Figure 59 shows the average contamination in recycling and general waste bins (T1) and after (T2) the behaviour change intervention for both the intervention and the control group. The numbers are very small partially due to a large number of empty bins that were included in the audit. Moreover, the data shows that no significant differences between the intervention and control group were found. It should be noted that the bins were monitored from randomly selected offices of the intervention and control groups, however, not every occupant of the monitored buildings took part in the T1 survey and therefore also not in the intervention.



**Figure 59: Bin audit**

In addition to a count of contaminating items for each bin, notes were made of the type of contaminating materials (see Table 38 below).



**Table 39: Types of contamination material in bins**

|                    | Recycling bins T1                                    | Recycling bins T2             | General waste bins T1   | General waste bins T2  |
|--------------------|--|-------------------------------|---|--|
| Intervention Group | food plate, paper towels, coffee cup                 | food, paper towel, tetra pack | cardboard, paper, paper, catering tray, plastic bottles, plastic container, plastic trays, yoghurt pots | paper, plastic, plastic pots, plastic tubs, water bottle   |
| Control Group      | coffee cup, crisp wrapper, paper towel, sandwich bag | paper towel                   | plastic bottles, plastic pot, paper, plastic bag, plastic tub   | coke bottle, paper, plastic bottle, plastic tray, plastic pot, plastic bottle, plastic tray, tubs, water bottle, yoghurt pot |

#### 9.1.4.2 SURVEY DATA

The data from the Qualtrics survey was downloaded into excel and prepared for hypothesis testing. This involved cleaning the data set and merging the data from T1 and T2. At T1, 165 university employees took part in the study of which seven were deleted due to missing data (less than 80% survey completion), 46 dropped out on the first page of the survey, and nine participants dropped out. Participants that had finished less than 80% of the survey were deleted. The final data set for T1 consisted of 110 participants. At T2, 119 participants took part in the survey. Of these, nine participants were deleted due to incomplete survey data (four dropped out after first page, 5 dropped out during survey). In total, the data set for T2 consists of 110 participants. The data sets T1 and T2 were merged using the codes that participants had provided and a total of 47 participants were matched across the two data sets (see appendix); 28 in the intervention group and 19 in the control group. In the final data set, items were recoded and item and scale descriptives were assessed. Overall, the scales showed sufficient reliability ranging from Chronbach's  $\alpha_{(stand.)} = .624$  (Recycling behaviour at home T1) to Chronbach's  $\alpha_{(stand.)} = .860$  (Intention to recycle at home T2; more details see Table 40) (Field, 2009).

**Table 40: Summary of scales - pilot study**

| Variable/ Scale                                  | Source   | Adapted Items  | Scale   | Cronbach's $\alpha$ (stand.) T1         | Cronbach's $\alpha$ (stand.) T2         | Included in main study |
|--|--|--|---|---|---|------------------------|
| Environmental self-identity                      | Whitmarsh & O'Neill, 2010                              | At work, I would be embarrassed to be seen as having an environmentally-friendly lifestyle.<br>At work, I think of myself as someone who is very concerned with environmental issues.<br>At work, I would not want my colleagues to think of me as someone who is concerned about environmental issues.<br>At home, I think of myself as someone who is very concerned with environmental issues.<br>At home, I would be embarrassed to be seen as having an environmentally-friendly lifestyle. At home, I would not want my family or friends to think of me as someone who is concerned about environmental issues. | strongly disagree = 1<br>disagree = 2<br>neither agree or disagree = 3<br>agree = 4<br>strongly agree = 5 | .794<br>N = 47<br>M = 4.32<br>SD = 0.73 | Not measured at T2                      | Yes                    |
| Compartmentalisation work-home-identity (visual) | Martin & Czellar, 2016<br>Aron, Aron, & Smollan, 1992) | Below, please choose the picture which describes the relationship between your self and your home environment.<br>Below, please choose the picture which describes the relationship between your self and your work environment.<br>Below, please choose the picture which describes the relationship between how you view your home and your workplace environment.   |   | .649<br>N = 47<br>M = 2.85<br>SD = 0.73 | Not measured at T2                      | No                     |
|  |  |  |   |   |   |                        |
| Compartmentalisation work-home-identity          | Desrochers et al., 2005                                | It is often difficult to tell where my work life ends and my home life begins.<br>There is a difference between how sustainably I act at work versus at home.<br>At work, I see myself as someone concerned with environmental issues, but I do not at home.<br>At home, I see myself as someone concerned with environmental issues, but I do not at work.<br>In my life there is a clear boundary between my work and my home.   | strongly disagree = 1<br>to strongly agree = 5  | .628<br>N = 47<br>M = 2.54<br>SD = 0.65 | Not measured at T2                      | Yes                    |
| Prominence of environmental identity             | Ellestad & Stets, 2016                                 | How would you feel if a colleague commented on you being a “good” pro-environmental person?<br>How would you feel if a family or household member commented on you being a “good” pro-environmental person?  | indifferent = 1; ok = 2; good = 3; very good = 4; terrific = 5  | .764<br>N = 47<br>M = 3.19<br>SD = 1.05 | .774<br>N = 47<br>M = 2.96<br>SD = 0.99 | Yes                    |

|                              |  |   |   |   |     |
|------------------------------|--|---|---|---|-----|
|                              | How would you feel if a colleague commented on you being a “poor” pro-environmental person?  | indifferent = 1<br>slightly upset = 2;<br>moderately upset = 3;<br>very upset = 4;<br>extremely upset = 5                               | .769<br>N = 47<br>M = 3.11<br>SD = 1.02 | .771<br>N = 47<br>M = 2.98<br>SD = 0.91 | Yes |
|                              | How would you feel if a family or household member commented on you being a “poor” pro-environmental person?   |   |   |   |     |
|                              | Note: The scale compares the emotional responses associated with being a ‘good’ or a ‘bad’ environmental person at work and at home.   |   |   |   |     |
| Recycling behaviour at work  | Now for the last part we would like you to show us how you usually dispose 10 typical products while you are at WORK at the University of Sheffield. Please indicate which bin you normally use to dispose of each of the following items.<br>Plastic pots (e.g. yogurt pots, plastic cups)<br>Plastic film (e.g. salad bags, crisp bag, chocolate bar wrapping)<br>Coffee 'to go' cups<br>Paper tissues<br>Juice/milk cartons (e.g. Tetra Pak)<br>Food & drink cans (e.g. baked beans)<br>Plastic trays (e.g. for fruit or cake)<br>Plastic tubs (plastic containers with a lid)<br>Glass bottles and jars<br>Plastic bottles                         | 1 = recycling bin (blue)<br>2 = general waste bin<br>3 = either<br>4 = I don't know<br>7 = I don't know<br>8 = I don't use this product | n/a                                     | n/a                                     | No  |
| Recycling behaviour at home  | In the past 2 weeks, how frequently have you engaged in the following activities at home to be pro-environmental?<br>Reused or repair items instead of throwing them away.<br>Bought products with less packaging.<br>Put paper/cardboard in a separate recycling bin.<br>Put glass in a separate recycling bin.<br>Put plastic bottles in a separate recycling bin.<br>Put plastic tubs in a separate recycling bin.<br>Put cans in a separate recycling bin.<br>Put organic kitchen waste in a separate compost bin.   | 1 = never<br>2 = rarely<br>3 = sometimes<br>4 = often<br>5 = always<br>6 = I can't recycle this item at home                            | .624<br>N = 47<br>M = 4.53<br>SD = 0.84 | .724<br>N = 47<br>M = 4.39<br>SD = 0.97 | No  |
| Intention to recycle at home | In the next 2 weeks, to what extent do you agree or disagree that you intend to engage in the following activities at home in order to be pro-environmental?<br>I intend to reuse or repair items instead of throwing them away.<br>I intend to buy products with less packaging.<br>I intend to put paper/cardboard in the recycling bin.<br>I intend to put glass in a separate recycling bin.<br>I intend to put plastic bottles in a separate recycling bin.<br>I intend to put plastic tubs in a separate recycling bin.<br>I intend to put cans in a separate recycling bin.<br>I intend to put organic kitchen waste in a separate compost bin. | strongly disagree = 1;<br>disagree = 2<br>neither agree or disagree = 3;<br>agree = 4;<br>strongly agree = 5                            | .811<br>N = 46<br>M = 4.48<br>SD = 0.73 | .860<br>N = 46<br>M = 3.17<br>SD = 0.88 | No  |

|                                     |   |   |   |   |    |
|-------------------------------------|---|---|---|---|----|
| Attitudes towards recycling at work | For me, recycling at work is ...<br>easy – difficult<br>complex – simple<br>expected of me – not expected of me<br>a good thing – a bad thing<br>makes me feel bad – makes me feel good   | 5-point poles, e.g.<br>easy – difficult                             | .741<br><br>N = 47<br>M = 3.84<br>SD = 0.78 | .687<br><br>N = 47<br>M = 4.07<br>SD = 0.70 | No |
| Attitudes towards recycling at home | For me, recycling at home is ...<br>easy – difficult<br>complex – simple<br>expected of me – not expected of me<br>a good thing – a bad thing<br>makes me feel bad – makes me feel good   | 5-point poles, e.g.<br>easy – difficult                             | .721<br><br>N = 47<br>M = 4.28<br>SD = 0.63 | .744<br><br>N = 47<br>M = 4.34<br>SD = 0.63 | No |
| Energy saving behaviour at work     | In the past 2 weeks how frequently have you engaged in the following activities at work to conserve energy?<br>Turned electrical devices off instead of putting them on standby (to save energy).<br>Turned the lights off in a room where nobody is present.<br>Turned your laptop or computer off at night, instead of leaving it on standby.<br>Added or removed clothing rather than turning heating or air conditioning up when it's hot or cold.<br>Turned heating or air conditioning down if you could find other ways to remain comfortable. | 1 = never<br>2 = rarely<br>3 = sometimes<br>4 = often<br>5 = always | .685<br><br>N = 35<br>M = 3.89<br>SD = 0.79 | .644<br><br>N = 35<br>M = 3.92<br>SD = 0.75 | No |
| Energy saving at home               | In the past 2 weeks how frequently have you engaged in the following activities at home to conserve energy?<br>Turned electrical devices off instead of putting them on standby (to save energy).<br>Turned the lights off in a room where nobody is present.<br>Turned your laptop or computer off at night, instead of leaving it on standby.<br>Added or removed clothing rather than turning heating or air conditioning up when it's hot or cold.<br>Turned heating or air conditioning down if you could find other ways to remain comfortable. | 1 = never<br>2 = rarely<br>3 = sometimes<br>4 = often<br>5 = always | .653<br><br>N = 44<br>M = 3.95<br>SD = 0.67 | .724<br><br>N = 47<br>M = 3.86<br>SD = 0.68 | No |

#### 9.1.4.2.1 TESTING ASSUMPTIONS OF PARAMETRIC DATA

When testing parametric data (e.g. with mixed ANOVA), a number of assumptions need to be tested before continuing with the analysis (Field, 2009). Normal distribution of the data was analysed with the Kolmogorov-Smirnov-test and Shapiro-Wilk. Most scales showed significant values for both Kolmogorov-Smirnov-test and Shapiro-Wilk statistics (see 9.4.2.1). Significant results of both tests indicate a non-normal distribution of the relevant scale which can impair the robustness of parametric analysis (e.g. F-tests in ANOVA; Field, 2009). Further tests of kurtosis and skewness showed skewness and kurtosis larger than -2 and 2 indicating skewed scales to the positive or negative end of the scale (see appendix A, 9.4.2.1; George & Mallery, 2003).

Homogeneity of variance between the control and intervention group was assessed by using the Levene test (Field, 2009). Most scales showed non-significant results, however, Levene's test indicated unequal variances for three scales: Compartmentalisation of Identity – graphic ( $F = 19.341, p = .000$ ), Recycling behaviour at home T1 ( $F = 4.936, p = .031$ ), and Recycling behaviour at home T2 ( $F = 13.029, p = .001$ ), for more details see Appendix A, 9.4.2.2. Unequal variances between groups violate assumptions for parametric data and can impair the robustness of parametric analysis (e.g. F-test in ANOVA; Field, 2009).

An outlier analysis was performed using stem-and-leaf and Boxplot diagrams of the scales (see Appendix A, 9.4.2.3; Field, 2009). Several outliers were identified with one case being a persistent outlier across several scales (case 38). After consulting several options including data transformation and deleting the outlier (Field, 2009), the outlier was kept in the sample. The outlier was further investigated, but the data provided by the participant showed a reasonable answer pattern in the survey and therefore a deletion of the case would not be ethical. Several transformations were tested, including log transformation and square root transformation (see Field, 2009, p155), however, the transformation did not produce improved results. Hence, further analyses were completed with and without the outlier.

Overall, a violation of the assumptions can impair the robustness of the F-test which can lead to unreliable results (Field, 2009). Table 41 shows a summary of the assumptions and whether they are met. Although the F-test is considered a robust with regards to violations to assumptions, a number of assumptions must be met in order to avoid Type I and Type II errors. For the data set in this analysis, the assumptions to calculate a mixed ANOVA are not met. These include non-normality of some of the dependent variables and unequal variances for three scales (i.e. homogeneity is not given). Several types of data transformation with the aim to normalise the dataset were conducted (in accordance with Field, 2009), however, the normalisation did not work. Hence, a mixed ANOVA is not the suitable analysis for the data in this study.

**Table 41: Assumption testing**

| Assumption for Mixed ANOVA   | Assumption met?   |
|--|---|
| Dependent variable has to be measured at a continuous level.   | Yes.  |
| Within-subject factor has at least two dependent categorical groups.   | Yes. Two time points: pre-and post-intervention measure   |
| Between-subject factor has at least two independent categorical groups.  | Yes. Intervention and control group.  |
| There are no significant outliers in both within-subject and between-subject factor. Normality of dependent variables. | Analysis showed several outliers for several DV and one consistent outlier (case 38). K-S test, values of skewness and kurtosis as well as Q-Q plots were used to analyse. Normality is not assumed for most variables (see appendix A) |
| Homogeneity of variance for both within and between subject factors.   | Levene’s test was used to analyse homogeneity (see Appendix A, 9.4.2.2). Levene’s test showed unequal variance for three scales.  |

**9.1.4.2.2 HYPOTHESES TESTING**

To test the proposed hypotheses, mixed ANOVA were initially the choice of analytic tool. However, the assumption testing suggests that the requirements for a mixed ANOVA are not met. Hence, the non-parametric sample-related Wilcoxon ranked test was used to test the proposed hypotheses. By using the Wilcoxon instead of mixed ANOVA, several limitations had to be accepted. This included that, instead of testing both within and between subject variance as with the mixed ANOVA, the sample-related Wilcoxon test can only test ranks within subjects. By way of compromise, the data set was split to analyse and display intervention and control group results of the sample-related Wilcoxon test separately.

**Table 42: Overview hypotheses**

| Hypothesis  | Variables used  | Test used  |
|---|---|--|
| H1: The behaviour change intervention in the workplace has an effect on the targeted behaviours waste separation in the home context. | IV: Treatment (IG vs CG)<br>DV: Recycling behaviour at home; Intention to recycle at home; attitudes towards recycling at home.   | Non-parametric tests:<br>Sample-related<br>Wilcoxon (compares T1 and T2) |
| H2: The behaviour change intervention in the workplace has an effect on non-targeted ESBs at home.                                    | IV: Treatment (IG vs CG)<br>DV: Energy behaviour at home; Reusing behaviour at home; Intention to reuse at home.  | Non-parametric tests:<br>Sample-related<br>Wilcoxon (compares T1 and T2) |
| H3: ‘Green’ identity has is a cofounding factor in the effect of the intervention on recycling behaviour at home.                     | IV: Treatment (IG vs CG)<br>DV: Recycling behaviour at home; Intention to recycle at home; attitudes towards recycling at home.<br>CV: Environmental Identity; Prominence of environmental identity at work | Not possible to test with non-parametric tests.                          |

*Note: IV = Independent variable; DV = dependent variable; CV = covariate; IG = Intervention group; CG = Control group.* <sup>§</sup>Based on the literature and the theoretical framework that was introduced in Chapter 2, all three types of spillover (positive, negative, and a lack thereof) can be expected in the intervention group. As such, no specific direction of the effect is hypothesised.

Furthermore, although several scales were surveyed in this pilot study, only a few were included in the analysis as a reporting of all tests would exceed the space of this chapter. These scales were

further used in the main study that is described in CH5 and CH6. Table 42 shows an overview of the hypotheses, the used variables to test each hypothesis and which test was used. The variables included in the analysis were chosen based on the appropriateness to address the hypotheses. The Wilcoxon test results for each hypothesis are provided in the following section.

**H1:** The behaviour change intervention in the workplace has an effect on the targeted behaviours waste separation in the home context. For the intervention group, the Wilcoxon Signed-ranks test indicated that recycling behaviour at home at T2 scores (Mdn = 5.00) were not statistically significantly different to the recycling behaviour at home at T1 scores (Mdn = 5.00),  $Z = 9,00$   $p = .389$ . For the control group, on the other hand, the Wilcoxon Signed-ranks test indicated that recycling behaviour at home at T2 scores (Mdn = 4.60) were statistically significantly lower than the recycling behaviour at home at T1 scores (Mdn = 5.00),  $Z = 1,00$ ,  $p = .046$ . This indicates no spillover effects from the behaviour change intervention at work to recycling behaviour at home for the intervention group. However, the results showed a significant negative effect in the control group's recycling behaviour at home. To explore H1 further, the same analysis was conducted with intention to recycle at home and attitudes towards recycling at home, as previous studies have shown spillover effects from an intervention to intentions and attitudes.

**H1<sub>a&b</sub>:** A behaviour change intervention that promotes recycling behaviour at work has an effect on (a) intention to recycle at home for the intervention group, and (b) attitudes on recycling at home for the intervention group. For the intervention group, the Wilcoxon Signed-ranks test indicated that intention to recycle at T2 scores (Mdn = 5.00) were not statistically significantly different to the intention to recycle at home at T1 scores (Mdn = 5.00),  $Z = 62$ ,  $p = .886$ . Similarly, for the control group, the Wilcoxon Signed-ranks test indicated that intention to recycle at T2 scores (Mdn = 4.40) were not statistically significantly different to the intention to recycle at home at T1 scores (Mdn = 4.20),  $Z = 12,5$ ,  $p = .233$ . This indicates no spillover effects from the behaviour change intervention at work to the intention to recycle at home for both the intervention and control group.

For the intervention group, the Wilcoxon Signed-ranks test indicated that attitudes towards recycling at home at T2 scores (Mdn = 4.40) were not statistically significantly different to attitudes towards recycling at home at T1 scores (Mdn = 4.60),  $Z = 109$ ,  $p = .819$ . For the control group, on the other hand, the Wilcoxon Signed-ranks test indicated that attitudes towards recycling at home at T2 scores (Mdn = 4.20) were not statistically significantly different to attitudes towards recycling at home at T1 scores (Mdn = 4.60),  $Z = 51,5$ ,  $p = .324$ . This indicates no spillover effects from the behaviour change intervention at work to the attitudes towards recycling at home for both the intervention and control group.

**H2:** The behaviour change intervention in the workplace has an effect<sup>1</sup> on non-targeted ESBs at home. The behaviours tested here are (a) energy saving behaviour at home, (b) reusing behaviour at home, and (c) intention to reuse at home.

For the intervention group, the Wilcoxon Signed-ranks test indicated that energy saving behaviour at home at T2 scores (Mdn = 3.90) were not statistically significantly different to energy saving behaviour at home at T1 scores (Mdn = 4.10),  $Z = 111$ ,  $p = .263$ . Similarly, for the control group the Wilcoxon Signed-ranks test indicated that energy saving behaviour at home at T2 scores (Mdn = 4.00) were not statistically significantly different to energy saving behaviour at home at T1 scores (Mdn = 3.80),  $Z = 38$ ,  $p = .200$ . This indicates no spillover effects from the behaviour change intervention at work to energy saving behaviour at home for both the intervention and control group.

For the intervention group, the Wilcoxon Signed-ranks test indicated reusing behaviour at home at T2 scores (Mdn = 3.50) were not statistically significantly different to reusing behaviour at home at T1 scores (Mdn = 3.00),  $Z = 89.5$ ,  $p = .530$ . For the control group the Wilcoxon Signed-ranks test indicated that reusing behaviour at home at T2 scores (Mdn = 3.00) were not statistically significantly different reusing behaviour at home at T1 scores (Mdn = 3.00),  $Z = 38$ ,  $p = .335$ . This indicates no spillover effects from the behaviour change intervention at work to reusing behaviour at home for both the intervention and control group.

For the intervention group, the Wilcoxon Signed-ranks test indicated that intention to reuse at home at T2 scores (Mdn = 4.00) were not statistically significantly different to intention to reuse at home at T1 scores (Mdn = 4.00),  $Z = 144.5$ ,  $p = .126$ . Similarly, for the control group the Wilcoxon Signed-ranks test indicated that intention to reuse at home at T2 scores (Mdn = 4.00) were not statistically significantly different to intention to reuse at home at T1 scores (Mdn = 3.50),  $Z = 39.5$ ,  $p = .552$ . This indicates no spillover effects from the behaviour change intervention at work to the attitudes towards recycling at home for both the intervention and control group.

Overall, the results show no evidence for spillover effects from the behaviour change intervention in the workplace (i.e. university offices) to recycling, reusing, or energy saving behaviours, intentions, or attitudes in the home setting; except for recycling behaviour at home in the control group. The control group showed a significantly lower recycling behaviour rate at home after the behaviour change intervention. These results and potential explanations are discussed in the following discussion section.

The analysis of the survey data showed no statistical evidence for spillover effects from the behaviour change intervention in the workplace to the home setting. The only significant effect found in the analysis of the quantitative data was a decrease in recycling behaviour at home in the control group. Moral licencing (e.g. Brañas-Garza et al., 2013; Mazar & Zhong, 2010) could offer an explanation for the decrease in recycling behaviour for the control group. It could be that taking part in



the study itself and answering questions about recycling had an effects on recycling behaviours at home for both the control and intervention group. Participants could have experienced their contribution to the research project (i.e. taking part in the survey) as a ‘green’ or moral behaviour, which in turn could have made them feel licenced to reduce their recycling behaviour at home. The intervention could have neutralised that effect for the intervention group. In that case, the intervention would have had a positive spillover to recycling behaviours at home for the intervention groups, however, moral licencing effects could have diminished this effect. However, further research would be needed to better understand these quantitative findings.

### 9.1.5 Invitation, Information Sheet & Consent form



## Help us improve recycling here at Regent Court

- ✓ Complete our short survey on environmental attitudes and recycling at Regent Court
- ✓ Complete a short quiz about recycling
- ✓ Win a £25 Amazon voucher

#### How does your taking part help?

We are trying to understand what motivates people to recycle at Regent Court so we can improve...

- our **recycling facilities** here at the University.
- **the way we communicate** with you more effectively about recycling and wider environmental issues.

follow this link:

How can I take part?

[bit.ly/2geNHQ1](https://bit.ly/2geNHQ1)

Feel free to contact us should you have any questions!

**Best wishes, Charlotte & Caroline**

Charlotte Winnert  
Environment Officer  
Estates & Facility Management  
C.L.Winnert@sheffield.ac.uk

Caroline Verfuert  
PhD Student  
Management School  
cverfuert@sheffield.ac.uk



#### More information about the survey on the back of this leaflet:

It is always important to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

**Figure 60: Invitation to take part in pilot study (intervention group example)**

### **9.1.5.1 INFORMATION SHEET AND CONSENT FORM FOR FOCUS GROUPS**

An investigation of recycling behaviour in the workplace and potential drivers for behavioural spillover

You are being invited to take part in a research project. Before you decide whether to take part, it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully. Ask us if there is anything that is not clear or if you would like more information. Take the time to decide whether or not you wish to take part. Thank you for reading this!

#### **What is the purpose of this project?**

The aim of this research is to understand recycling behaviour in the workplace and more generally the dissemination of pro-environmental behaviours at work and at home. With the findings gathered from this research, we would be able to improve the recycling performance of the University of Sheffield and provide the Estates and Facilities Management with advice to create programmes that aim to facilitate recycling. Therefore, if you take part in this research you will be helping with the ongoing development of programmes that aim to increase the University's environmental sustainability performance.

#### **Do I have to take part?**

It is up to you to decide whether or not to take part. Choosing not to take part will involve no penalty or loss of benefits to which you are otherwise entitled. In other words, your work will not be affected by you not taking part in this research. If you do decide to take part, you will be given this information sheet to keep. Moreover, even if you decide to take part at this moment, you are still free to withdraw at any time, without penalty or loss of benefits, and without giving a reason. It should, however, be noted that it will not be possible to withdraw already published findings or information that is stored in anonymised data sets.

#### **What will happen if I do take part? What do I have to do?**

If you choose to take part in this Focus Group, you will be asked some general questions about your recycling behaviour, habits and beliefs and, as a group, will be able to answer and discuss these questions. Comments, feedback and suggestions about your experience with recycling at the University of Sheffield are also welcome. The researcher will be taking notes and, if all the participants give consent, she will use an audio-recording device.

#### **What are the possible risks and disadvantages of taking part?**

There are no expected or foreseeable risks involved in taking part in this research.

#### **What are the possible benefits of taking part?**

We hope that this research will help us to get a better understanding of why people recycle at work and also what might stop them from recycling. These findings will help the University of Sheffield Estates and Facilities Management to design programmes that can facilitate recycling at the University. Moreover, this study will take place during your work hours so your time for participating will be compensated.

#### **Will my taking part in this project be kept confidential?**

Any information about you which is disseminated will have your name removed so that you cannot be recognised from it and all references to you will be anonymised. All information which is collected about you will be kept strictly confidential, and in accordance with the Data Protection Act (1998). Data will be kept securely by the researcher in a password-protected PC, and after five years it will be deleted.

#### **Who has reviewed the project?**

The project has been inspected and approved by the University of Sheffield Psychology Department ethics committee in accordance with the University of Sheffield ethics policy. This policy can be inspected at:

<http://www.sheffield.ac.uk/ris/other/committees/ethicscommittee>

Contact for further information

If you have any questions or would like any more information, please do not hesitate to contact the researcher as detailed below.

Many thanks for your interest in this project!

**Please tick the appropriate boxes** **Yes**

**Taking Part**

I have read and understood the project information sheet.

I have been given the opportunity to ask questions about the project.

I agree to take part in Focus Group. I understand that the researcher will be taking notes and will use an audio-recording device if we all agree to it.

I agree to be audio-recorded **Yes** **No**


I understand that my taking part is voluntary; I can withdraw from the study at any time and I do not have to give any reasons for why I no longer want to take part. Withdrawing from the study will not affect my work in any way.

**Use of the information I provide**

I understand that my words may be quoted (in an anonymous way) in publications, reports, web pages, and other research outputs.

**So we can use the information you provide legally**

I agree to assign the copyright I hold in any materials related to this project to the researcher Caroline Verfuert.

|   |  |                    |
|---|--|--------------------|
| Name of participant [printed]             | Signature  | 06/06/2016<br>Date |
| Caroline Verfuert<br>Researcher [printed] | <br>Signature | 23/05/2016<br>Date |

Project contact details for further information.  
*(Please feel free to get in touch at any time)*

|  
Caroline Verfuert  
Room B03, Management School Doctoral Centre  
University of Sheffield  
169 – 171 Northumberland Road  
S10 1DF, Sheffield  
Email: [cverfuert@sheffield.ac.uk](mailto:cverfuert@sheffield.ac.uk)

**Figure 61: Consent form for the focus groups**

# Information Sheet

## **What is the project's purpose?**

This project builds on focus groups previously carried out at the University of Sheffield. The purpose of this study is to better understand recycling practises in the workplace and also in the home settings.

## **Why have I been chosen?**

You have been chosen because as an employee at the University of Sheffield you will have knowledge and experience with recycling in your building and your workplace.

## **What will happen if I take part?**

You will be asked to complete a web-based questionnaire (estimated 10 minutes completion time). The questionnaire will include questions about your opinions and perception on recycling and environmental issues in your workplace and your home.

The questionnaire will be followed by a task where you will be asked to show us how you usually dispose of 10 typical products while you are at work (estimated 5-10 minutes completion time).

After you have completed the questionnaire you will be able to enter a **prize draw to win a £25 Amazon voucher**.

You may also wish to agree to be sent an email for a shorter follow-up questionnaire in 2-3 weeks.

## **Do I have to take part? - NO**

It is up to you to decide whether or not to take part. If you wish to take part, you should indicate your agreement to the online consent form. You can still withdraw at any time simply by closing your browser. You do not have to give a reason.

## **Will my taking part in this project be kept confidential? - YES**

All the information that we collect about you during the course of the research will be kept strictly confidential. You will not be able to be identified or identifiable in any reports or publications. Your institution will also not be identified or identifiable. Any data collected about you in the online questionnaire will be stored online in a form protected by passwords and other relevant security processes and technologies.

Data collected may be shared in an anonymised form to allow reuse by the research team and other third parties. These anonymised data will not allow any individuals or their institutions to be identified or identifiable.

## **Has this study been ethically approved? - YES**

The project has been assessed and approved by the University of Management School ethics committee in accordance with the University of Sheffield ethics policy. *Please feel free to get in touch at any time.*

## **Who is organising and funding the research?**

The research is organised by Caroline Verfuert, a PhD student at the University of Sheffield Management School and Psychology Department. This study has been developed in collaboration with the Estates and Facility Management at the University of Sheffield.

The study is part of my PhD project funded by the Management School.

Please feel free to get in touch any time by emailing me: [cverfuert@sheffield.ac.uk](mailto:cverfuert@sheffield.ac.uk)

*Figure 62: Information Sheet survey*

1. Page of survey  
[ this section comes after the information sheet]

**Do you consent to take part in this study?**

Please tick the box to give your consent to the following statements and to continue to the study.

- I understand that if I wish to withdraw from the study I can simply close my browser. I understand that if I wish for my data to be withdrawn I can contact the research team and request this, quoting the code I will generate in the next step.
- I understand that if I wish to discuss the study further or have any questions I can contact the researcher using the details provided.
- I am happy for my anonymised data to be used in the study.

I give my consent to take part in this study.

Project contact details for further information.  
(Please feel free to get in touch at any time)

Caroline Verfuert  
Room B03, Management School Doctoral Centre  
University of Sheffield  
169 – 171 Northumberland Road  
S10 1DF, Sheffield  
Email: [cverfuert@sheffield.ac.uk](mailto:cverfuert@sheffield.ac.uk)

Figure 63: Consent form for online survey

## 9.1.6 Ethics approval

Caroline Verfuert  
Registration number: 150214139  
Management School  
Programme: PhD Management

Dear Caroline

**PROJECT TITLE:** Improving recycling behaviour in University building  
**APPLICATION:** Reference Number 010308

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 04/11/2016 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 010308 (dated 02/11/2016).
- Participant information sheet 1020507 version 2 (16/10/2016).
- Participant information sheet 1020506 version 2 (17/10/2016).
- Participant information sheet 1024543 version 2 (02/11/2016).
- Participant consent form 1020509 version 2 (16/10/2016).
- Participant consent form 1020508 version 2 (17/10/2016).
- Participant consent form 1024541 version 1 (01/11/2016).

If during the course of the project you need to [deviate significantly from the above-approved documentation](#) please inform me since written approval will be required.

Yours sincerely

Rebecca Roberts  
Ethics Administrator  
Management School

Figure 64: Ethics approval for pilot study

## 9.1.7 Focus group guide

### 9.1.7.1.1 GUIDELINE FOR FOCUS GROUP OF PILOT STUDY

Dates: April 2016

Method: focus group

Total: 3-4 groups focus groups with 4-6 people each

2-3 groups of staff members and one focus group with cleaning staff

Duration: est. 60 minutes

Incentives: Tea/coffee and sandwiches

Data collection: Recording

Data interpretation: Analyse themes from notes and audio (later transcription)

#### 9.1.7.1.1.1 FOCUS GROUP GUIDELINES WITH OFFICE STAFF

---

Welcome

Thank you for attending this focus group.

This is a discussion group and should take more or less 60 minutes.

What is it about

This focus group is part of my PhD research and a project in collaboration with the University Estates.

We would like to discuss your perception and practices of recycling in the University's offices.

Consent

You have been handed out an information sheet regarding the purpose of this focus group which contains more details about the study and my contact in case you have any questions.

You have also been handed out a consent form that we asked you to fill-out prior to the focus group if you decide to take part. It would be great if you could hand me the signed form now.

I would now start the recording if that is ok with everyone.

Guidelines

We are interested in your opinions; there are no right or wrong answers, only different opinions. This discussion group is NOT part of your worktime and therefore: is optional. Nothing you say here will impact your work in any way, and your answers will NOT be shared with your manager, supervisor, or your colleagues. Your identity will be anonymised at the end of the study, before any results are shown.

My role as a moderator will be to guide the discussion.

If possible, it would be great if you could put your cell phones on silent.

(Short intro, 2.5 min., → record all voices individually)

Let's begin! I would like to start with a little introduction.

Introduction

Could I ask all of you to please introduce yourselves and tell us your **first name** and, of the top of your head, **what does recycling mean to you?** What do you associate with recycling?

Recycling at home

Do you recycle at home and if so how?

What type of bins do you have? What goes in the recycling bin?

Recycling at the University

How do you recycle at the University and in your offices?

Is it any different from your home?

What type of bins do you have in your office?

Struggles

How confident do you feel about choosing the right bin for your waste?

Example: When you have the package of your lunch sandwich, do you know which bin it goes to?

Coffee cup (take away)

A lot of people report struggles about what goes in which bin. Which struggles do you experience? Why?

Are there any signs that explain how to recycle? Are the signs clear and easy to understand?

Which materials do you find confusing?

E.g. plastics, paper towels?

What are typical struggles when you recycle at home?

Do you experience the same struggles with recycling like at work? Or is it different at home?

Responsibility

Who do you think is responsible for the recycling at the University?

Do you feel responsible?

Who is responsible for the recycling at your home?

Do you think your recycling behaviour makes a difference at home?

What happens to the waste and is it important?

What do you think happens to the waste? Where does it go once it left your office?

What do you think happens to recyclables (e.g. paper or cans) when you throw it in the general waste bin?

What do you think happens to general waste (e.g. an apple or a tissue) when you throw it in the recycling bin?

Do you think recycling is important for the environment?

Why? Do you think your recycling behaviour makes a difference?

What stops people

What do you think might stop you/ people in general from not always separating their waste properly in their offices?

What do you think why do people sometimes throw recyclables in the general waste bin and general waste in the recycling bin?

What, in your opinion, could be done to help people recycle more?

What do you think would motivate you to recycle more? Just anything that comes to your mind ☺

Could the University provide anything to help you increase your recycling?

Objective knowledge

Choose between recycling bin, general waste, not sure

Emotions

How do you feel when you throw recyclables in the general waste bin?

And how do you feel when you throw general waste in the recycling bin? Do you feel happy or guilty when you recycle/ don't recycle? Do you think it makes a difference? How do you feel about the potential environmental impact of recycling?

(Brief conclusion)

Thank you all for the great discussion! That was really helpful and very interesting. Do you have any other comments/questions/feedback

---

#### **9.1.7.1.1.2 FOCUS GROUP GUIDELINES WITH CLEANING STAFF**

---

Thank you for attending this focus group.

This is a discussion group and should take more or less 60 minutes.

What is it about

This focus group is part of my PhD research and a project in collaboration with the University Estates.

We would like to discuss your perception and practices of recycling in the University's offices.

Consent

You have been handed out an information sheet regarding the purpose of this focus group which contains more details about the study and my contact in case you have any questions.

You have also been handed out a consent form that we asked you to fill-out prior to the focus group if you decide to take part. It would be great if you could hand me the signed form now.

I would now start the recording if that is ok with everyone.

Guidelines

We are interested in your opinions; there are no right or wrong answers, only different opinions. This discussion group is NOT part of your worktime and therefore: is optional. Nothing you say here will impact your work in any way, and your answers will NOT be shared with your manager, supervisor, or your colleagues. Your identity will be anonymised at the end of the study, before any results are shown.

My role as a moderator will be to guide the discussion.

If possible, it would be great if you could put your cell phones on silent.

(Short intro, 2.5 min., → record all voices individually)

Let's begin! I would like to start with a little introduction.

Introduction

Could I ask all of you to please introduce yourselves and tell us your first name and, of the top of your head, what does recycling mean to you? What do you associate with recycling?

Recycling at home

How do you recycle at home?

What type of bins do you have?

Recycling at the University

How is recycling done at the University?

Is it easy or difficult?

Do you think people care?

What happens to the waste

What do you think happens to the waste? Where does it go once you've collected it?  
Do you think recycling is important?  
Why?  
Do you think it affects the environment?  
Confusion and what stops people  
A lot of people report confusion about recycling at the university.  
What do you think why do people struggle to recycle correctly?  
What do you think might stop you/ people in general from not always separating their waste properly?  
What, in your opinion, could be done to help people recycle more?  
What do you think would motivate you to recycle more? Just anything that comes to your mind ☺  
Could the University provide anything to help you increase your recycling?  
What do you find confusing?  
Do you feel you have been instructed sufficiently about how recycling works at the University?  
What would make it less confusing?  
Reporting problems  
We found that people sometimes remove the bins in their offices. Do you find that as well?  
When you see that bins are missing, what do you do?  
Do you report it? If not, why?  
Why do you think people don't report any problems around the bins (missing bins or bad recycling behaviour of the office worker)?  
Is there anything that could be done about that?  
Responsibility  
Who do you think is responsible for the recycling at the University?  
Do you think you play an important part?

---

## 9.1.8 Survey

### 9.1.8.1 DROP-OUT ANALYSIS

This is a t-test comparing the participants that completed the T2 survey with the participants that dropped out across the variables that were tested. Independent sample t-test



**Table 43: Drop-out analysis**

|  |                             | Levene's Test for Equality of Variances |      | t-test for Equality of Means |        |                 | 95% Confidence Interval of Difference |       |       |
|--|-----------------------------|---|------|------------------------------|--------|-----------------|---------------------------------------|-------|-------|
|  |                             | F                                       | Sig. | t                            | df     | Sig. (2-tailed) | Mean Diff.                            | Lower | Upper |
| Environmental Identity                     | Equal variances assumed     | 0.03                                    | 0.86 | 0.41                         | 108.00 | 0.68            | 0.05                                  | -0.18 | 0.28  |
|  | Equal variances not assumed |   |      | 0.41                         | 94.19  | 0.69            | 0.05                                  | -0.18 | 0.28  |
| Environmental Identity at home             | Equal variances assumed     | 0.10                                    | 0.75 | 0.35                         | 108.00 | 0.73            | 0.04                                  | -0.21 | 0.29  |
|  | Equal variances not assumed |   |      | 0.34                         | 86.43  | 0.74            | 0.04                                  | -0.21 | 0.30  |
| Compartmentalisation of Identity           | Equal variances assumed     | 0.05                                    | 0.83 | -0.30                        | 106.00 | 0.76            | -0.05                                 | -0.34 | 0.25  |
|  | Equal variances not assumed |   |      | -0.30                        | 102.68 | 0.76            | -0.05                                 | -0.34 | 0.25  |
| Compartmentalisation of Identity - graphic | Equal variances assumed     | 2.89                                    | 0.09 | 0.97                         | 96.00  | 0.33            | 0.12                                  | -0.12 | 0.36  |
|  | Equal variances not assumed |   |      | 0.94                         | 72.68  | 0.35            | 0.12                                  | -0.14 | 0.37  |
| <b>Energy behaviour at home T1</b>         | Equal variances assumed     | 0.71                                    | 0.40 | -0.33                        | 102.00 | 0.74            | -0.05                                 | -0.33 | 0.24  |
|  | Equal variances not assumed |   |      | -0.34                        | 99.80  | 0.74            | -0.05                                 | -0.33 | 0.23  |
| Energy behaviour at work T1                | Equal variances assumed     | 0.00                                    | 0.96 | -0.06                        | 84.00  | 0.95            | -0.01                                 | -0.40 | 0.38  |
|  | Equal variances not assumed |   |      | -0.06                        | 79.29  | 0.95            | -0.01                                 | -0.40 | 0.37  |
| Recycling behaviour at home T1             | Equal variances assumed     | 0.12                                    | 0.73 | -0.34                        | 105.00 | 0.73            | -0.05                                 | -0.31 | 0.22  |
|  | Equal variances not assumed |   |      | -0.35                        | 100.65 | 0.73            | -0.05                                 | -0.30 | 0.21  |
| Recycling behaviour at work T1             | Equal variances assumed     | 4.10                                    | 0.05 | 0.75                         | 95.00  | 0.46            | 0.28                                  | -0.47 | 1.04  |
|  | Equal variances not assumed |   |      | 0.76                         | 93.31  | 0.45            | 0.28                                  | -0.45 | 1.02  |
| Prominence of Environmental Identity T1    | Equal variances assumed     | 0.38                                    | 0.54 | 1.19                         | 108.00 | 0.24            | 0.23                                  | -0.15 | 0.60  |
|  | Equal variances not assumed |   |      | 1.18                         | 95.62  | 0.24            | 0.23                                  | -0.16 | 0.61  |

Note: Bold scores show significant values indicating a significant difference in the variance between the drop-outs and participants that took part in the T2 survey.

### 9.1.8.2 NORMALITY OF DEPENDENT VARIABLES

**Table 44: Tests of Normality all scales**

|   | Kolmogorov-Smirnova |    |      | Shapiro-Wilk |    |      |
|---|---------------------|----|------|--------------|----|------|
|   | Statistic           | df | Sig. | Statistic    | df | Sig. |
| Environmental Identity at Work                  | .206                | 46 | .000 | .895         | 46 | .001 |
| Environmental Identity at Home                  | .185                | 46 | .000 | .789         | 46 | .000 |
| Environmental Identity at Home & Work           | .188                | 46 | .000 | .856         | 46 | .000 |
| Compartmentalisation of Identity                | .114                | 46 | .167 | .965         | 46 | .175 |
| Compartmentalisation of Identity - graphic      | .183                | 46 | .001 | .954         | 46 | .065 |
| Prominence of environmental Identity T1         | .122                | 46 | .083 | .963         | 46 | .144 |
| Prominence of environmental Identity at work T1 | .130                | 46 | .049 | .955         | 46 | .073 |
| Prominence of environmental Identity at home T1 | .166                | 46 | .003 | .943         | 46 | .024 |
| Prominence of Pro-environmental Identity T2     | .143                | 46 | .020 | .965         | 46 | .179 |
| Prominence of environmental Identity at work T2 | .213                | 46 | .000 | .939         | 46 | .018 |
| Prominence of environmental Identity at home T2 | .161                | 46 | .004 | .945         | 46 | .030 |
| Attitudes towards recycling at home T1          | .160                | 46 | .005 | .912         | 46 | .002 |
| Attitudes towards recycling at home T2          | .153                | 46 | .009 | .897         | 46 | .001 |
| Attitudes towards recycling at work T1          | .115                | 46 | .162 | .958         | 46 | .093 |
| Attitudes towards recycling at work T2          | .146                | 46 | .015 | .931         | 46 | .009 |
| Energy behaviour at home T1                     | .080                | 46 | .200 | .962         | 46 | .139 |
| Energy behaviour at home T2                     | .099                | 46 | .200 | .964         | 46 | .158 |
| Energy behaviour at work T1                     | .166                | 46 | .003 | .938         | 46 | .016 |
| Energy behaviour at work T2                     | .094                | 46 | .200 | .966         | 46 | .193 |
| Recycling behaviour at home T1                  | .324                | 46 | .000 | .627         | 46 | .000 |
| Recycling behaviour at home T2                  | .300                | 46 | .000 | .688         | 46 | .000 |
| Intention to recycle at home T1                 | .267                | 46 | .000 | .699         | 46 | .000 |
| Intention to recycle at home T2                 | .281                | 46 | .000 | .732         | 46 | .000 |
| Reusing behaviour at home T1                    | .163                | 46 | .004 | .921         | 46 | .004 |
| Reusing behaviour at home T2                    | .123                | 46 | .077 | .958         | 46 | .093 |
| Intention to reuse at home T1                   | .247                | 46 | .000 | .844         | 46 | .000 |
| Intention to reuse at home T2                   | .168                | 46 | .002 | .911         | 46 | .002 |

Note: Bold scores show significant values indicating a non-normal distribution

**Table 45: Skewness and Kurtosis scores for all scales**

| Scales  | N  | Mean | SD   | Skewness | Kurtosis |
|---|----|------|------|----------|----------|
| Environmental Identity at Work                      | 47 | 1.43 | 0.21 | -0.97    | 0.65     |
| Environmental Identity at Home                      | 47 | 4.32 | 0.73 | -2.22    | 8.19     |
| Environmental Identity at Home & Work               | 47 | 4.31 | 0.66 | -1.62    | 4.06     |
| Compartmentalisation of Identity                    | 47 | 2.54 | 0.65 | -0.21    | -0.21    |
| Compartmentalisation of Identity                    | 47 | 3.50 | 1.09 | -0.46    | -0.68    |
| Compartmentalisation of Identity - graphic          | 47 | 2.85 | 0.73 | 0.36     | 0.33     |
| Prominence of Pro-environmental Identity T1         | 47 | 3.15 | 1.00 | -0.20    | -0.31    |
| Prominence of Pro-environmental Identity at work T1 | 47 | 3.11 | 1.02 | -0.22    | -0.39    |
| Prominence of Pro-environmental Identity at home T1 | 47 | 3.19 | 1.05 | -0.22    | -0.52    |
| Prominence of Pro-environmental Identity T2         | 47 | 2.97 | 0.90 | 0.42     | 0.17     |
| Prominence of Pro-environmental Identity at work T2 | 47 | 2.98 | 0.91 | 0.24     | 0.50     |
| Prominence of Pro-environmental Identity at home T2 | 47 | 2.96 | 0.99 | 0.42     | -0.49    |
| Attitudes towards recycling at home T1              | 47 | 4.28 | 0.63 | -1.01    | 1.23     |
| Attitudes towards recycling at home T2              | 47 | 4.34 | 0.63 | -0.95    | 0.60     |
| Attitudes towards recycling at work T1              | 47 | 3.84 | 0.78 | -0.22    | -0.40    |

|  |    |      |      |       |       |
|--|----|------|------|-------|-------|
| Attitudes towards recycling at work T2 | 47 | 4.07 | 0.70 | -0.34 | -1.03 |
| Energy behaviour at home T1            | 47 | 3.95 | 0.67 | -0.03 | -0.74 |
| Energy behaviour at home T2            | 47 | 3.86 | 0.68 | -0.11 | -0.96 |
| Energy behaviour at work T1            | 47 | 3.89 | 0.79 | -0.15 | -1.19 |
| Energy behaviour at work T2            | 47 | 3.92 | 0.75 | -0.41 | -0.34 |
| Recycling behaviour at home T1         | 47 | 4.53 | 0.84 | -2.44 | 6.75  |
| Recycling behaviour at home T2         | 46 | 4.39 | 0.97 | -1.86 | 3.05  |
| Intention to recycle at home T1        | 47 | 4.48 | 0.73 | -2.49 | 9.90  |
| Intention to recycle at home T2        | 47 | 4.43 | 0.83 | -1.99 | 5.25  |
| Reusing behaviour at home T1           | 47 | 3.15 | 0.71 | -0.69 | 0.78  |
| Reusing behaviour at home T2           | 46 | 3.17 | 0.88 | -0.30 | 0.19  |
| Intention to reuse at home T1          | 47 | 3.62 | 0.69 | -1.34 | 3.19  |
| Intention to reuse at home T2          | 47 | 3.78 | 0.84 | -0.63 | 1.32  |

Note: Bold numbers indicating extreme skewness or kurtosis indicating a non-normal distribution of the scale.

### 9.1.8.3 LEVENE TEST OF HOMOGENEITY OF VARIANCE

*Table 46: Levene test*

|   | Levene Statistic | df | df2 | Sig. |
|---|------------------|----|-----|------|
| Environmental Identity at Work                      | 3.318            | 1  | 45  | .075 |
| Environmental Identity at Home                      | 1.664            | 1  | 45  | .204 |
| Environmental Identity at Home & Work               | 2.854            | 1  | 45  | .098 |
| Compartmentalisation of Identity                    | 1.897            | 1  | 45  | .175 |
| Compartmentalisation of Identity                    | 1.194            | 1  | 45  | .280 |
| Compartmentalisation of Identity - graphic          | 19.341           | 1  | 45  | .000 |
| Prominence of Pro-environmental Identity T1         | .235             | 1  | 45  | .630 |
| Prominence of Pro-environmental Identity at work T1 | .566             | 1  | 45  | .456 |
| Prominence of Pro-environmental Identity at home T1 | .693             | 1  | 45  | .410 |
| Prominence of Pro-environmental Identity T2         | .121             | 1  | 45  | .729 |
| Prominence of Pro-environmental Identity at work T2 | .017             | 1  | 45  | .897 |
| Prominence of Pro-environmental Identity at home T2 | 2.038            | 1  | 45  | .160 |
| Attitudes towards recycling at home T1              | 3.630            | 1  | 45  | .063 |
| Attitudes towards recycling at home T2              | 2.966            | 1  | 45  | .092 |
| Attitudes towards recycling at work T1              | .027             | 1  | 45  | .870 |
| Attitudes towards recycling at work T2              | .000             | 1  | 45  | .992 |
| Energy behaviour at home T1                         | .015             | 1  | 45  | .904 |
| Energy behaviour at home T2                         | .053             | 1  | 45  | .819 |
| Energy behaviour at work T1                         | .843             | 1  | 45  | .364 |
| Energy behaviour at work T2                         | 2.233            | 1  | 45  | .142 |
| Recycling behaviour at home T1                      | 4.936            | 1  | 45  | .031 |
| Recycling behaviour at home T2                      | 13.029           | 1  | 44  | .001 |
| Intention to recycle at home T1                     | 2.534            | 1  | 45  | .118 |
| Intention to recycle at home T2                     | 3.967            | 1  | 45  | .053 |
| Reusing behaviour at home T1                        | .078             | 1  | 45  | .781 |
| Reusing behaviour at home T2                        | .007             | 1  | 44  | .934 |
| Intention to reuse at home T1                       | .106             | 1  | 45  | .746 |
| Intention to reuse at home T2                       | .804             | 1  | 45  | .375 |

Note: Bold numbers indicating extreme skewness or kurtosis indicating a non-normal distribution of the scale.

#### 9.1.8.4 OUTLIER ANALYSIS

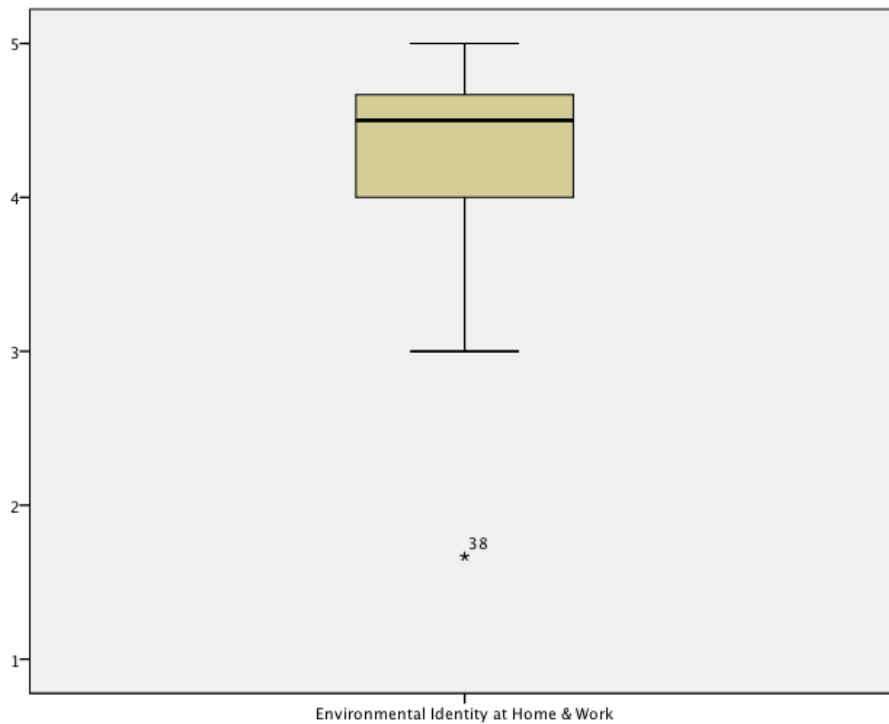


Figure 65: Example of the Boxplot diagram that were used to identify outliers

#### 9.1.8.5 NON-PARAMETRIC TEST EXCLUDING OUTLIER

Table 47: Wilcoxon test excluding outlier case 38

| Within subject comparison           | Group | Median T1 | Median T2 | Z      | p    |
|-------------------------------------|-------|-----------|-----------|--------|------|
| Recycling behaviour at home         | IG    | 5.00      | 5.00      | 9.00   | .389 |
|                                     | CG    | 5.00      | 4.60      | 1.00   | .046 |
| Intention to recycle at home        | IG    | 5.00      | 5.00      | 62.50  | .886 |
|                                     | CG    | 4.40      | 4.20      | 12.50  | .233 |
| Attitudes towards recycling at home | IG    | 4.60      | 4.40      | 109.00 | .819 |
|                                     | CG    | 4.20      | 4.60      | 51.50  | .324 |
| Energy behaviour at home            | IG    | 3.87      | 4.00      | 111.00 | .263 |
|                                     | CG    | 3.80      | 4.00      | 38.00  | .200 |
| Reusing behaviour at home           | IG    | 3.00      | 3.50      | 89.50  | .530 |
|                                     | CG    | 3.00      | 3.00      | 38.00  | .335 |
| Intention to reuse at home          | IG    | 4.00      | 4.00      | 144.50 | .126 |
|                                     | CG    | 3.50      | 4.00      | 39.50  | .552 |

Note: IG = Intervention Group, CG = Control Group

## 9.2 APPENDIX B – Main Study: Behaviour Change Intervention

### 9.2.1 Ethics Approval

Caroline Verfuert  
Registration number: 150214139  
Management School  
Programme: PhD Management

Dear Caroline

**PROJECT TITLE:** Sustainable food consumption at work and at home  
**APPLICATION:** Reference Number 012376

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 19/01/2017 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 012376 (dated 19/12/2016).
- Participant information sheet 1026082 version 1 (19/12/2016).
- Participant information sheet 1026083 version 1 (19/12/2016).
- Participant information sheet 1026084 version 1 (19/12/2016).
- Participant consent form 1026085 version 1 (19/12/2016).
- Participant consent form 1026086 version 1 (19/12/2016).
- Participant consent form 1026088 version 1 (19/12/2016).

The following optional amendments were suggested:

*need to pay attention to forms, which need to indicate either PhD supervisor or Dean, as well as School's details. re-think relationship between external partner and the outcome of the research to be used for the PhD*

If during the course of the project you need to [deviate significantly from the above-approved documentation](#) please inform me since written approval will be required.

Yours sincerely

Rebecca Roberts  
Ethics Administrator  
Management School

### 9.2.2 Project Pitch

The text below was sent to the partner organization as an initial pitch to ask for a project collaboration.

Promoting pro-environmental behaviours in your workplace

What is the aim of the project?

Through a **collaborative project**, we hope to develop productive solutions to **promote pro-environmental behaviours** in your workplace. The project is part of a PhD project that aims to achieve a better understanding of ways to promote pro-environmental behaviours in the workplace and how these sustainable practices might have a ‘spillover’ effects to the home setting.

Plusnet already recognises the importance of an innovative and socially responsible workplace culture. With the proposed project we hope to further **increase Plusnet’s CSR activities** with a focus on **promoting environmental behaviours** in your workplace.

Why would Plusnet collaborate?

Going 'green' is more than a trend and environmentally sustainable business practices have become an integral part of the corporate world. Particularly in the service sector, a good **image** and being a **forward-thinking business** are crucial to **attract and retain customers**. To **differentiate from competitors** taking corporate social responsibility (CSR) seriously and communicating it transparently plays a key role. In addition, providing a work environment that is committed to sustainable practices becomes increasingly important to **attract quality employees**.

Potential **direct benefits** for Plusnet are:

Improving your CSR performance

Reducing your carbon footprint

Reducing your waste, energy and water consumption (dependent upon project undertaken)

Partnership with the University of Sheffield

Saving money from reduced waste, energy, and/or water consumption

Potential **indirect benefits** for Plusnet are:

Attracting quality employees

Attracting new customers

Enhancing reputation

Differentiating from competitors

How are we going to achieve that?

**1<sup>st</sup> Phase: Setting the baseline and goals.** Together we identify goals that you would like to achieve, e.g. energy reduction. To get a picture of where we are at, we suggest conducting a survey among your employees and an analysis of objective measures such as your energy or water consumption (depending on the goals).

**2<sup>nd</sup> Phase: Tailored behaviour change intervention.** In collaboration with your employees we would like to identify practices that could be promoted to reach the goals. This could be in the form of workshops lead by us. We will use established behaviour change tools and together with your employees we will develop an intervention that is tailored to you.

**3<sup>rd</sup> Phase: Implementation of intervention.** The intervention will be implemented by Caroline in collaboration with your employees and management support.

**4<sup>th</sup> Phase: Evaluation (part 1).** To measure the success of the intervention we suggest conducting another survey and analysis of objective measures. This will be compared with the baseline data (see phase 1). For an optimal outcome, the evaluation will be repeated 2-3 times about 3 months apart.

**5<sup>th</sup> Phase: Evaluation (part 2).** To better understand the influence of the intervention on your employees' environmental behavior we would like to conduct interviews with 15-20 of your employees. These interviews will be conducted shortly after the intervention and will inform potential improvement of the intervention.

**6<sup>th</sup> Phase: Presentation of results and final report.** The results of the intervention will feed into a report and a toolkit that Plusnet can use for future projects.

Your involvement

To run the proposed project, we would need **access to employees of Plusnet** to carry out surveys, workshops and interviews as well as **access to data to monitor performance changes** (e.g. energy use data).

**Survey:** The survey will be developed by us in consultation with you. Ideally about 100 or more people would participate in the surveys on 5 separate occasions in phases 1 and 4.

**Objective data:** To measure the success of the intervention we would like to analyse changes in objective measures such as your energy or water consumption. For this we would need access to the data. The analysis will be in consultation with you.

**Intervention:** The intervention will be developed in collaboration with you and your employees. This could be in the form of 2-3 workshops and would involve 15-30 of your employees. The implementation of the intervention will be with the same people that take part in the surveys.

The PhD project is fully-funded until September 2018. This includes a salary for the PhD researcher, Caroline, access to resources (e.g. software) and a workplace at the University. **All we need from you is your time and your support in the project.**

Our involvement

The main partner for the project will be Caroline, a PhD researcher at the Sheffield University Management School. For the duration of the project she will continue to work within the university, with visits to your offices as and when necessary.

Her involvement will include **data collection** and **analysis**, development and implementation of the **tailored behaviour change intervention** with you, **evaluation** and monitoring performance changes, and **presenting findings** in a format suitable to you.

We would like this to be a **collaborative project with you as our research partner**. As a result of the project we will produce a **report for your organisation**. Furthermore, we will put together a **toolkit** based on the findings of the project and the evaluation which will support you with material to promote pro-environmental behaviour among your employees in other locations and in the future.

What is The University of Sheffield's benefit?

We believe that through the collaboration with industry experts like Plusnet we can produce research that is both scientifically robust, as well as applicable to industry.

Our anticipated outcome of this project is to **publish academic papers** based on our findings. The collected data will support Caroline to complete her PhD programme at the Sheffield University Management School. Lastly, in addition to the experience gained through the project, we hope that this could be the **beginning of a long and successful partnership** between Plusnet and The University of Sheffield.

Who is involved?

**Caroline Verfuert**, PhD researcher at Sheffield University Management School

**Dr. Chris Jones**, University of Sheffield Psychology Department

**Dr. Diana Gregory-Smith**, Sheffield University Management School

**Dr. Caroline Oates**, Sheffield University Management School

**Critical Research in Marketing and Society Research Cluster (CReiMS)**: We draw upon a strong narrative of sustainability and ethical consumer research whilst aiming to integrate and collaborate with practitioners to promote socially responsible work practices. We are keen to work with Plusnet as an industry expert and would value your insight.

**Environment and Behaviour Research Group (EBRG)**: We are an interdisciplinary research group interested in attitudes and behaviours towards energy, technologies, sustainability and climate change. There is a strong focus on multi-disciplinary research and on the application of psychological theory to a range of environmental challenges.

### Proposed project plan

| Milestones                        |  | Months | Potential timeline      |
|-----------------------------------|--|--------|-------------------------|
| 1 <sup>st</sup> Phase             | Project start: Develop and agree on goals of the project   | 1      | November 2016           |
|                                   | Development of baseline data collection: survey, objective measures (including ethics approval through the university)   | 2-3    | December-January 2016/7 |
|                                   | Data collection and analysis   | 4      | February 2017           |
| 2 <sup>nd</sup> Phase             | Workshop to develop behaviour change intervention with your employees (including ethics approval through the university) | 5-6    | March-April 2017        |
| 3 <sup>rd</sup> Phase             | Implementation of behaviour change intervention  | 7      | May 2017                |
| 4 <sup>th</sup> Phase             | Evaluation of intervention: survey, objective measures   | 8      | June 2017               |
| 5 <sup>th</sup> Phase             | Evaluation of intervention: interviews with employees  | 9-10   | July-August 2017        |
| 6 <sup>th</sup> Phase             | Interim report   | 12     | October 2017            |
| 4 <sup>th</sup> Phase (continued) | Continued evaluation of intervention: survey, objective measures   | 12     | October 2017            |
|                                   | Continued evaluation of intervention: survey, objective measures   | 15     | February 2018           |
|                                   | Continued evaluation of intervention: survey, objective measures   | 17     | June 2018               |
| 6 <sup>th</sup> Phase             | Final report and toolkit   | 18     | July 2018               |

## 9.2.3 Survey Related Material

### 9.2.3.1 PRE-INTERVENTION SURVEY (T1)

#### 9.2.3.1.1 INVITATION & LEAFLET

# Plusnet Newsbites



## Participation in 'sustainability at work' project

Would you like to have a say in creating a more sustainable workplace at Plusnet? We are starting a project to offer more sustainable food choices in the canteen – and we are inviting you to shape the project with us!

How can we make our meals more sustainable for you and the environment? We need your ideas and to learn more about your food choices, opinions and experiences.

### How can you participate?

- 1) To get a picture of your opinions and activities around food and sustainability we would like you to take fill out a survey:  
(see QR-code, it takes about 10 minutes)
- 2) Take part in a workshop to discuss sustainable food and the food of the canteen
- 3) Take part in an interview and photo diary

If you're interested or have any questions, simply email [cverfueth@sheffield.ac.uk](mailto:cverfueth@sheffield.ac.uk)



To participate in the sustainable food project, you don't need to be a regular visitor of the canteen nor do you need to know anything about sustainable food or even like it.

**\*\*\* There will be a raffle for 1x £50 & 1x £25 Amazon vouchers, free premium meals in the canteen, wine, and chocolate for everyone who takes part. \*\*\***

With this project we are aiming to make Plusnet a more sustainable workplace by providing sustainable and healthy food choices. Studies show that a sustainable workplace is good for employees and for the planet! We are working with Caroline, a researcher from the University of Sheffield, as she is an expert in sustainable behaviour and interested in people's sustainable and unsustainable food choices. This project will also be part of her PhD research. Thank you – we're looking forward to hear your ideas!



**Do you have something to say?**  
If you have something to post in here, simply email [plusnetfacilities@plus.net](mailto:plusnetfacilities@plus.net)

Figure 66: Company online newsletter to promote pre-intervention survey (Example 1)



**Sustainable workplace**

We like to keep up with the times so we are starting a project to create more sustainable food choices in the canteen. How can we make our meals more sustainable for you and the environment? We need your ideas and to learn more about your food choices, opinions and experiences.

To take part just fill out this survey ([link to survey](#))  
 If you are based in Sheffield you can also...  
 ... take part in a workshop to discuss sustainable food OR  
 ... take part in an interview and photo diary  
 If you're interested email [cverfuerrth@sheffield.ac.uk](mailto:cverfuerrth@sheffield.ac.uk)

**There will be a raffle for 1x £50 & 1x £25 Amazon vouchers, free premium meals in the canteen, wine, and chocolate for everyone who takes part!** For this project we work together with Caroline who is a researcher at the University of Sheffield.




Figure 67: Company online newsletter to promote pre-intervention survey (Example 2)

**Sustainability at Plusnet**




We know loads of you are interested in sustainability. We are happy to invite you to create a sustainable food week with us!

Together with Caroline, a researcher from the University of Sheffield, we developed ideas to create more sustainable food choices at Plusnet. Would you like to be part of it and tell us about your ideas? Then take part in this survey ([link to study](#)). It will help us to get a picture of your opinions and activities around food and sustainability.

Studies show that a sustainable workplace is good for employees and for the planet! We will have a **raffle for 1x £50 & 1x £25 Amazon vouchers, free premium meals in the canteen, wine, and chocolate for everyone who takes part!** Do you have any questions? Simply email [cverfuerrth@sheffield.ac.uk](mailto:cverfuerrth@sheffield.ac.uk)

Figure 68: Company online newsletter to promote pre-intervention survey (Example 3)

**Plusnet Newsbites**



**SUSTAINABLE FOOD WEEK – YOUR VIEWS**

**What did you think about the sustainable food week?**  
 What changes did you like? What did you not like?  
 What are your views and actions around sustainability and food at work & home?

**Take part in our 2<sup>nd</sup> survey and help us evaluate the sustainable food week.**

**Why should you take part?**

- You can win 1 of 3x £25 Amazon vouchers!
- Your input helps us to provide the food you like.

**How can you take part in the survey?**

- Just follow this link: [link to survey](#)

Any questions? Email Caroline: [cverfuerrth@sheffield.ac.uk](mailto:cverfuerrth@sheffield.ac.uk)  
 For more information please see the [information sheet](#)

**WIN 1 OF  
3X £25  
AMAZON VOUCHERS**




Figure 69: Company online newsletter to promote post-intervention survey

Figure 70: Leaflet to promote post-intervention survey

### 9.2.3.1.2 INFORMATION SHEET

More information about the survey:

It is always important to understand why the research project is being done and what it will involve. Please take time to read the following information carefully. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

What is the project's purpose?

Over the course of a few weeks we will ask employees at Plusnet to participate in four to five surveys. The first survey will take about 10 minutes and the following three to four surveys will take about 5 minutes.

The purpose of this research project is to better understand environmentally sustainable practices in the workplace at Plusnet and also in the home settings. In particular, we are interested in the food consumption at the canteen of Plusnet.

We understand environmentally sustainable practices as activities that reduce consumption of natural resources and harm of the natural environment as little as possible. This includes how we buy, what we consume and how we organise our daily lives. But, to take part in my study you do not need to engage in any activities that are environmentally sustainable.

Why have I been chosen?

You have been chosen because as an employee at Plusnet you will have knowledge and experience with activities at your workplace and particularly about the food in the canteen at Plusnet.

What will happen if I take part?

You will be asked to complete a web-based questionnaire (estimated 10 minutes completion time).

The questionnaire will include questions about your opinions and perception on food and environmental issues in your workplace and your home.

After you have completed the questionnaire you will be able to enter a **prize draw to win 'Love to Shop' vouchers, wine, and chocolate.**

After the first online survey you will be invited to take part in additional 2-3 short surveys. However, taking part in the first survey does not require you to take part in any further surveys.

Do I have to take part? - NO

It is up to you to decide whether or not to take part. If you wish to take part, you should indicate your agreement to the online consent form. You can still withdraw at any time simply by closing your browser. You do not have to give a reason.

Will my taking part in this project be kept confidential? - YES

All the information that we collect about you during the course of the research will be kept strictly confidential. You will not be able to be identified in any reports or publications. Any data collected about you in the survey will be stored online in a form protected by passwords and other relevant security processes and technologies.

Data collected may be shared in an anonymised form to allow reuse by the research team and other third parties. These anonymised data will not allow any individuals to be identified or identifiable.

Has this study been ethically approved? - YES

The project has been assessed and approved by the University of Management School ethics committee in accordance with the University of Sheffield ethics policy.

Please feel free to get in touch at any time.

Who is organising and funding the research?

The research is organised by Caroline Verfuert, a PhD student at the University of Sheffield Management School and Psychology Department. This study has been developed in collaboration with the Plusnet PLC.

The study is part of my PhD project funded by the Management School.

To get to the survey, just follow this link: [Online Survey](#)

Please feel free to get in touch any time by emailing me: [cverfuert@sheffield.ac.uk](mailto:cverfuert@sheffield.ac.uk)

### 9.2.3.1.3 PAPER PENCIL VERSION OF THE SURVEY T1 FOR THE INTERVENTION GROUP

The first two pages of the paper pencil survey included the information sheet and the consent form (see below).

#### Information Sheet

##### More information about the survey:

It is always important to understand why the research project is being done and what it will involve. Please take time to read the following information carefully. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this!

##### What is the project's purpose?

The purpose of this research project is to better understand environmentally sustainable practices in the workplace at Plusnet and also in the home setting. In particular, we are interested in the food consumption at the canteen of Plusnet. We understand environmentally sustainable practices as activities that reduce consumption of natural resources and harm of the natural environment as little as possible. This includes how we buy, what we consume and how we organise our daily lives. But, to take part in the study you do not need to engage in any activities that are environmentally sustainable. Over the course of a few weeks we will ask employees at Plusnet to participate in three to four surveys. The first survey will take about 10 minutes and the following three to four surveys will take about 5 minutes.

##### Why have I been chosen?

You have been chosen because as an employee at Plusnet you will have knowledge and experience with activities at your workplace and particularly about the food in the canteen at Plusnet.

##### What will happen if I take part?

You will be asked to complete a web-based questionnaire (estimated 10 minutes completion time).

The questionnaire will include questions about your opinions and perception on food and environmental issues in your workplace and your home.

After you have completed the questionnaire you will be able to enter a raffle to win either 1x £50 Amazon voucher, 1x £25 Amazon voucher, free premium meals in the canteen, wine, or chocolate.

After the first online survey you will be invited to take part in additional 2-3 short surveys. However, taking part in the first survey does not require you to take part in any further surveys.

##### Do I have to take part? - NO

It is up to you to decide whether or not to take part. If you wish to take part, you should indicate your agreement to the online consent form. You can still withdraw at any time simply by closing your browser. You do not have to give a reason.

##### Will my taking part in this project be kept confidential? - YES

All the information that we collect about you during the course of the research will be kept strictly confidential. You will not be able to be identified in any reports or publications. Any data collected about you in the survey will be stored online in a form protected by passwords and other relevant security processes and technologies.

Data collected may be shared in an anonymised form to allow reuse by the research team and other third parties. These anonymised data will not allow any individuals to be identified or identifiable.

##### Has this study been ethically approved? - YES

The project has been assessed and approved by the University of Management School ethics committee in accordance with the University of Sheffield ethics policy. Please feel free to get in touch at any time.

##### Who is organising and funding the research?

The research is organised by Caroline Verfuert, a PhD student at the University of Sheffield Management School and Psychology Department. This study has been developed in collaboration with the Plusnet PLC. The study is part of my PhD project funded by the Management School.

Should you have any concern about any ethical issues regarding this study, please contact:

Caroline Verfuert, project leader  
E: [cverfuert@sheffield.ac.uk](mailto:cverfuert@sheffield.ac.uk)  
Sheffield University Management School  
Doctoral Centre  
169-171 Northumberland Road  
Sheffield S10 1DF

OR

Rebecca Roberts  
Research Manager at the University of Sheffield  
Management School  
E: [r.e.roberts@sheffield.ac.uk](mailto:r.e.roberts@sheffield.ac.uk)

#### Thank you for your participation!

##### Before we start, do you consent to take part in this study?

(Please tick the box to give your consent to the following statements and to continue to the study.)

- I am happy for my anonymised data to be used in the study.
- I understand that if I wish to withdraw from the study I can simply close my browser. I understand that if I wish for my data to be withdrawn I can contact the research team and request this, quoting the code I will generate in the next step.
- I understand that if I wish to discuss the study further or have any questions I can contact the researcher using the details provided.
- I confirm that I am 18 or older.

I give my consent to take part in this study

For more information about the study, please read the information sheet (previous page).

#### Enter the prize draw!

After you have completed the questionnaire you will be able to enter a prize draw to win

- 1st prize: 1x £50 Amazon voucher
- 2nd prize: 1x £25 Amazon voucher
- runner up prizes include free premium meals in the canteen, wine, and chocolate

There will be a short follow-up study in the summer. To match your responses with the follow-up study while retaining your anonymity we would like you to create a code based on the following questions.

For example, '21math' as shown in example below.

|   |                      |
|---|----------------------|
| What day is your birthday?<br>(e.g. 21 for 21st October)                        | <input type="text"/> |
| first and second letter of your<br>mother's first name<br>(e.g. 'ma' for Maria) | <input type="text"/> |
| Last two letters of your surname<br>(e.g. 'th' for Smith)                       | <input type="text"/> |

In the following section we will ask a few questions about how you see yourself, your actions and your work-life-balance. There are no right or wrong answers. Please answer spontaneously with what comes to your mind first.

To what extent does each statement describe you?  
Indicate your level of agreement by marking the appropriate response.

|   | strongly disagree     | disagree              | neutral               | agree                 | strongly agree        |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| I believe that I personally can influence the impact I have on the environment. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I believe that I'm in control of my environmental impact.                       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I believe that I'm able to avoid negative impact on the environment.            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I am certain that I can reduce my impact on the environment.                    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

|   | strongly disagree     | disagree              | neutral               | agree                 | strongly agree        |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| I derive self-value from my environmentally friendly behaviours.                        | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I'm able to do environmentally friendly things as well as most other people.            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| At times I think I'm no good at all at being environmentally friendly.                  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| All in all, I'm inclined to feel that I am a failure at being environmentally friendly. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I feel good when I act in environmentally friendly ways.                                | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| On the whole, I'm satisfied with my environmental behaviour.                            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

|   | indifferent           | ok                    | happy                 | very happy            | extremely happy       |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| How would you feel if a colleague commented on you being a "good" environmentally friendly person?                  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| How would you feel if a family or household member commented on you being a "good" environmentally friendly person? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

|   | indifferent           | slightly upset        | moderately upset      | very upset            | extremely upset       |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| How would you feel if a colleague commented on you being a "poor" environmentally friendly person?                  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| How would you feel if a family or household member commented on you being a "poor" environmentally friendly person? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Now we will ask you about your opinions and activities around sustainable food and environmentally friendly behaviours.

**Note:** Sustainable food is here understood as adopting a diet with lower environmental impact. Amongst other things this can include a preference for organic, local, and seasonal food and reduced meat and dairy consumption. (There are no right or wrong answers, we are interested in your honest answer.)

Which of the following statements best describes how you feel about your current level of sustainable food consumption and whether you have any plans to try to change it? (Please choose which statement fits best to your current situation)

- At the moment, I don't pay attention to whether my food is sustainable or not. I'm happy with the current food I consume and see no reason why I should change it.
- At the moment, I still don't eat sustainable food for most of my meals. I would like to increase my sustainable food consumption, but, at the moment, I feel it would be impossible for me to do so.
- At the moment, I don't eat sustainable food for most of my meals. I'm currently thinking about changing some or all of these meals to be more sustainable, but at the moment I'm unsure how I can do this, or when I should do so.
- At the moment, I don't eat sustainable food for most of my meals, but it is my aim to increase my current level of sustainable food consumption. I already know which meals I will replace and which alternative foodstuff I will use, but, as yet, have not actually put this into practice.
- Because I'm aware of many problems associated with unsustainable food consumption, I already try to use sustainable food alternatives as much as possible. I will maintain or even increase my already high level of sustainable food consumption in the next months.
- As I already eat sustainable food all the time, increasing my level of sustainable consumption is not currently an issue for me.

To what extent does each statement describe you?  
Indicate your level of agreement by marking the appropriate response.

|   | strongly disagree     | disagree              | neutral               | agree                 | strongly agree        |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| It is often difficult to tell where my work life ends and my home life begins.              | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| There is a difference between how environmentally friendly I act at work versus at home.    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| At work, I see myself as someone concerned with environmental issues, but I do not at home. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| At home, I see myself as someone concerned with environmental issues, but I do not at work. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| In my life there is a clear boundary between my work and my home.                           | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

|  | strongly disagree     | disagree              | neutral               | agree                 | strongly agree        |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| I would be embarrassed to be seen as having an environmentally-friendly lifestyle.                           | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I would not want my colleagues to think of me as someone who is concerned about environmental issues.        | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I would not want my family or friends to think of me as someone who is concerned about environmental issues. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I think of myself as someone who is very concerned with environmental issues.                                | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

**Note:** Sustainable food is here understood as adopting a diet with lower environmental impact. Amongst other things this can include a preference for organic, local, and seasonal food and reduced meat and dairy consumption. (There are no right or wrong answers, we are interested in your honest answer.)

For me, eating sustainable food **at home** is/would be ...

|                    |                       |                       |                       |                       |                       |                    |
|--------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------|
| easy               | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | difficult          |
| makes me feel good | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | makes me feel bad  |
| expected of me     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | not expected of me |
| a good thing       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | a bad thing        |

For me, eating sustainable food **at work** is/would be ...

|                    |                       |                       |                       |                       |                       |                    |
|--------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------|
| easy               | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | difficult          |
| makes me feel good | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | makes me feel bad  |
| expected of me     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | not expected of me |
| a good thing       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | a bad thing        |

In the past 2 weeks how frequently have you engaged in the following activities **at HOME**?

|  | never                 | rarely                | sometimes             | often                 | always                | not applicable to me  |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| I bought organic food                              | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I bought seasonal vegetables                       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I bought locally sourced food (produced in the UK) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |



In the **past 2 weeks** how frequently have you consumed the following foods **at HOME**?

|  | never                 | less than once a month | 1-2 times a month     | 1-2 times a week      | 3-6 times a week      | once a day            | more than once a day  | not applicable to me  |
|--|-----------------------|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <b>Red meat</b> (e.g. beef, pork, lamb)    | <input type="radio"/> | <input type="radio"/>  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| <b>White meat</b> (e.g. chicken, turkey)   | <input type="radio"/> | <input type="radio"/>  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| <b>Dairy</b> (e.g. milk, eggs, cheese)     | <input type="radio"/> | <input type="radio"/>  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| <b>Fruit &amp; vegetables</b>              | <input type="radio"/> | <input type="radio"/>  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| <b>Processed food</b> (e.g. frozen pizza)  | <input type="radio"/> | <input type="radio"/>  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| <b>Legumes</b> (e.g. beans, lentils, peas) | <input type="radio"/> | <input type="radio"/>  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| <b>Fish</b> (fish & seafood)               | <input type="radio"/> | <input type="radio"/>  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

In the **past 2 weeks** how frequently have you engaged in the following activities **at HOME** to reduce food waste?

|   | never                 | rarely                | sometimes             | often                 | always                | not applicable to me  |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| I ate leftovers   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I planned my shopping according to what I needed        | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I only cooked the necessary amount of food              | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I looked up recipes for using up the food I already had | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

What sustainable food choices would you like to see in the canteen?

If you do not eat in the canteen, why is this?

In the **past 2 weeks** how frequently have you engaged in the following activities **at HOME** to reduce waste?

|  | never                 | rarely                | sometimes             | often                 | always                | not applicable to me  |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| I re-used plastic bags   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I bought products with less packaging  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I used a compost bin for my kitchen waste  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I used a travel mug instead of a to-go coffee/tea mug                                  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I used a container to transport and/or store my food instead of non-reusable packaging | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Where at Plusnet are you based?  Sheffield  Leeds

Are you regularly eating in the canteen at Plusnet?  Yes  No

What could be improved in the canteen?

Finally, we would like to ask you a few demographics

How many months have you been working for Plusnet?  
in month

Please indicate your role at Plusnet:

Please select your age group.  18-25  56-65  
 26-35  over 65  
 36-45  prefer not to say  
 46-55

What is your gender?  Female  Male  Other

Tick the box that indicates the **highest qualification** you have obtained (or equivalent).  
 If your UK qualification is not listed, tick the box that contains its nearest equivalent. If you have qualifications gained outside the UK, tick the box of the nearest UK equivalent (if known).

GCSE/ O level (or equivalent)  PhD (or equivalent)  
 A/AS level (or equivalent)  Other   
 University degree (undergraduate, BSc/ BA)  No formal qualification  
 Masters degree (or equivalent)  Prefer not to say

There will be a second shorter survey (5 mins), which we will sent round in a few weeks. Please indicate if you'd be happy to be send a link via email for the follow-up survey.

I'm happy to be contacted again via email for a short follow-up survey

If you wish to enter the prize draw to win

- 1st prize: 1x £50 Amazon voucher,
  - 2nd prize: 1x £25 Amazon voucher,
  - runner up prizes include a free premium meal in the canteen, wine, and chocolate
- please provide your email below.

(Please note, your email will be stored separately from your survey answers to guarantee your anonymity)

Would you be interested in taking part in a **workshop where we will discuss a new menu**? The workshop will take about **90 minutes** and will take place at Plusnet. In return you will receive **two free premium meals at the canteen**. Please provide your email and we will contact you.

Would you be interested in taking part in an **interview about food**? You will be interviewed two times by Caroline and each interview will take about **30-60 minutes**. Additionally you will be asked to fill out a food diary over the course of 2 week. In return you will receive **two free premium meals at the canteen**. **If you're interested please provide your email address** and we will contact you with more details.

Thank you participating in this survey!

The study is part of my PhD project funded by the Management School.

Please feel free to get in touch at any time if you have any questions or would like to found out more about this project.

Caroline Verfuert  
 PhD researcher  
 Email: [cverfuert@sheffield.ac.uk](mailto:cverfuert@sheffield.ac.uk)

If you have any further comments or feedback on the survey please enter below.

---

### 9.2.3.2 POST-INTERVENTION SURVEY (T2)

Table 48: Survey Schedule and Text for Intervention Group T2 Survey

| When  | Text   |
|---|--|
| 1 <sup>st</sup> invite for T2 survey: Monday 24th July am | <p><b>It's time for part two of the sustainability and food survey we've been running!</b></p> <p>This time, we want to know what you thought about the sustainable food week that happened in the canteen a couple of weeks ago.</p> <p><b>If you complete the survey, we'll give you a Premium Meal voucher and you'll be entered for a chance to win one of 3x £25 Amazon vouchers plus, your thoughts will go into the planning for future canteen meals!</b></p> <p><b>And it only takes 8 minutes to complete!</b></p> <p><u><a href="#">Click here to start survey</a></u></p> <p>Or copy and paste the URL below into your internet browser:<br/>       Please complete by end of August. The prize draw will be in September.<br/>       This survey is part of the evaluation of the sustainable food week.<br/>       For more information see the <a href="#">information sheet</a> or contact <a href="mailto:cverfuert@sheffield.ac.uk">cverfuert@sheffield.ac.uk</a></p> <p>Kind Regards,<br/>       Caroline</p> |
| 1 <sup>st</sup> reminder: Friday 28th July am             | <p>***Reminder to take survey***</p> <p>On Monday we sent you a survey, asking for your opinions the sustainable food week and more generally about your opinions and activities around food and sustainability.</p> <p>If you have already completed and submitted the survey, thank you for your valuable input.</p> <p>If not, please complete your survey: <a href="#">link to survey</a></p> <p>If you have already started the survey, you can finish it by using the link above and you will return to where you left it.</p>   |

Your thoughts are much appreciated as they will help us evaluate the sustainable food week and will go into the planning for future canteen meals.

If you complete the survey, we'll give you a Premium Meal voucher and you'll be entered for a chance to win one of 3x £25 Amazon vouchers.  
The survey takes 5-8 minutes to complete, but you can take a break at any time and return to it by using the link we provided.

Please complete by end of August. The prize draw will be in September.  
This survey is part of the evaluation of the sustainable food week.  
For more information see the information sheet or contact [cverfuert@sheffield.ac.uk](mailto:cverfuert@sheffield.ac.uk)

|   |                             |
|---|-----------------------------|
| 2 <sup>nd</sup> reminder: 10 <sup>th</sup> August<br>(2 weeks after initial survey) | Same text as reminder above |
| Final reminder: 21 <sup>st</sup> August<br>(4 weeks after initial survey)           | Same text as reminder above |

**Table 49: Survey Schedule and Text for Control Group T2 Survey**

| When  | Text   |
|---|--|
| 1 <sup>st</sup> invite for T2 survey: Monday 24th July am | <p>It's time for part two of the sustainability and food survey we've been running! A new menu has been tested in Sheffield which will come to Leeds later this year. To improve the menu, we want to hear your opinions.<br/>If you complete the survey, we'll give you a Premium Meal voucher and you'll be entered for a chance to win one of 3x £25 Amazon vouchers;<br/>Plus, your thoughts will go into the planning for future canteen meals!<br/>And it only takes 6-8 minutes to complete!</p> <p><a href="#">Click here to start survey</a><br/>Or copy and paste the URL below into your internet browser: Note: The link is personalised and valid for 60 days. If you wish to complete the survey at a later time you can simply close the browser and click on the link at another time to complete the survey.</p> <p>Please complete by end of August. The prize draw will be in September.<br/>This survey is part of the evaluation of the sustainable food project at Plusnet.<br/>For more information see the <a href="#">information sheet</a> or contact <a href="mailto:cverfuert@sheffield.ac.uk">cverfuert@sheffield.ac.uk</a></p> <p>Kind Regards,<br/>Caroline</p> |
| 1 <sup>st</sup> reminder: Friday 28th July am             | <p>***Reminder to take survey***</p> <p>Last week we sent you part two of our survey, asking for your opinions and activities around food and sustainability.</p> <p>If you have already completed and submitted the survey, thank you for your valuable input.<br/>If not, please complete your survey: <a href="#">link to survey</a><br/>If you have already started the survey, you can finish it by using the link above and you will return to where you left it.</p> <p>Your thoughts are much appreciated as they will go into the planning for future canteen meals!</p> <p>If you complete the survey we'll give you a Premium Meal voucher and you'll be entered for a chance to win one of 3x £25 Amazon vouchers.</p>   |

The survey takes 5-7 minutes to complete, but you can take a break at any time and return to it by using the link we provided.

Please complete by end of August. The prize draw will be in September.  
For more information see the [information sheet](#) or contact [cverfueth@sheffield.ac.uk](mailto:cverfueth@sheffield.ac.uk)

Many thanks!  
Caroline

2<sup>nd</sup> reminder: 10<sup>th</sup>  
August  
(2 weeks after  
initial survey)      Same text as reminder above

Final reminder: 21<sup>st</sup>  
August  
(4 weeks after  
initial survey)      Same text as reminder above

### 9.2.3.2.1 POST-INTERVENTION SURVEY INTERVENTION GROUP

Below displays the additional questions that participants from the intervention group were asked in addition to the questions from T1 (see above). The control group received the same survey as at T1.

| <b>Eating less meat...</b>                   | <b>strongly disagree</b> | <b>disagree</b>       | <b>neutral</b>        | <b>agree</b>          | <b>strongly agree</b> |
|--|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| ...means I would have to change who I am.    | <input type="radio"/>    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| ...imposes a change on my current lifestyle. | <input type="radio"/>    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| ...threatens my freedom.                     | <input type="radio"/>    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Did you eat in the canteen during the sustainable food week? (10th-14th July)       Yes     No

| <b>What did you think about the sustainable food week?</b>                    | <b>strongly disagree</b> | <b>disagree</b>       | <b>neutral</b>        | <b>agree</b>          | <b>strongly agree</b> | <b>I didn't notice any changes</b> |
|---|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------------------|
| I liked the food changes made in the canteen during the sustainable food week | <input type="radio"/>    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>              |
| I found the information about sustainability & food useful                    | <input type="radio"/>    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>              |
| I like the new plates   | <input type="radio"/>    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>              |



What changes would you like to see in the future in the canteen?

What things would you like to keep the same in the canteen from before the sustainable food week?

If you have already taken the first survey, please fill in your code below.  
If we can match your code with the one you provided in the first survey and you also provide an email address for us to contact you, you will receive 1x Premium Meal voucher. If you can't remember your code or didn't provide an email, just contact [cverfueth@Sheffield.ac.uk](mailto:cverfueth@Sheffield.ac.uk)

For example, '21math' as shown in example below.

|   |                      |
|---|----------------------|
| What day is your birthday?<br>(e.g. 21 for 21st October)                        | <input type="text"/> |
| first and second letter of your<br>mother's first name<br>(e.g. 'ma' for Maria) | <input type="text"/> |
| Last two letters of your surname<br>(e.g. 'th' for Smith)                       | <input type="text"/> |

## 9.2.4 Interview Material

### 9.2.4.1 INVITATION TO INTERVIEWS

#### 9.2.4.1.1 PRE-INTERVENTION INTERVIEWS



Figure 71: Pre-intervention interview invitation

#### 9.2.4.1.2 POST-INTERVENTION INTERVIEWS

Personalised invitation email:

Dear XXX,

Thank you for taking part in the interview the other week.

As I mentioned at the time, there is a **second part to the interview** where I find out what you thought about the sustainability week (which is currently happening!).

The second part will, again, take **30-60 minutes** and ideally this will be **between 24th July and 11th August**. But any later time would be okay as well. What time works best for you? I'm free most days between 8am and 6pm.

Once you have completed the second interview you will receive a **£10 Amazon voucher** or a **£10Love2Shop voucher**. In addition, you will get **2x vouchers for Premium Meals**.

Having the second part of the interview is really important for my research, but also as part of understanding how the week has gone and giving you a chance to speak about it.

Please let me know by replying to this email what time would be best for you.

Kind regards,  
Caroline

## 9.2.4.2 INTERVIEW GUIDES

**Table 50: Interview guide T1**

---

Dates: May 2017

Method: semi-structured interviews

Duration: 30-60 minutes

Incentives: £10 amazon voucher (received after 2nd interview)

---

Can you tell me a bit about your favourite foods?

What do you eat in a normal day? (maybe refer to the food diary)

I brought some diet types. [show labels]

[Give people labels 'meateater', 'vegetarian', 'pescatarian', 'vegan', 'flexitarian']

What do you think of these?

Do any of these describe you?

What do you think of the other groups?

What do you think sustainability means?

What does sustainability mean to you in your everyday life?

Is it a part of who you are as a person?

What do you think are sustainable behaviours?

Definition of sustainability [For this project we focus on the environmental aspect of sustainability. We define sustainable practices as activities that reduce consumption of natural resources and harm of the natural environment to a minimum. This includes how we buy, what we consume and how we organise our daily lives.]

Are there any ways you act sustainably at work?

How do you feel about yourself when you act sustainably at work?

Are there any ways you act sustainably at home?

How do you feel about yourself when you act sustainably at work?

Do you think acting sustainably at home and at work is related?

If yes - Can you describe how that is related?

Which direction does it go? Home→Work, Work→Home, both ways?

If not - What separates them?

Do you think food and sustainability are connected?

What is your opinion on sustainable food?

Do you normally eat 'sustainable' food?

Do you eat sustainable food at work?

Do you eat sustainable food at home?

---

**Table 51: Interview Guide T2**

---

Dates: August 2017

Method: semi-structured interviews

Duration: 30-60 minutes

Incentives: £10 amazon voucher (received after 2nd interview)

---

What did you think about the sustainable food week?

What do you think about the new plates?

What did you think about the information on the impact of food on the environment (provided on the table talkers)

How did it make you think about your food consumption?

---

---

How did it make you think about yourself?

What did you think about the new food choices?

Now I would like to reflect with you how your perception and behaviour around sustainability and food is since we last met. I will ask you a few things I asked you last time already.

Again, I brought some diet types. [show labels]

[Give people labels 'meat eater', 'vegetarian', 'pescatarian', 'vegan', 'flexitarian']

What do you think of these now?

What do you think of the other groups?

What does sustainability mean to you?

What does sustainable food mean to you?

[CARD WITH PERSON] Imagine that is your Self. Could you sort these words around? Close to you means it is quite central to you, far away means it is not very central to you.

What role does sustainability play for who you are as a person? - Has it changed since we last spoke?

What role does sustainable food play for who you are as a person? - Has it changed since we last spoke?

How did the changes we made in the canteen influence what you eat at home, if at all?

Has your eating behaviour generally changed?

Did you tell other people outside your work about the changes?

What did you tell them?

How do you think about sustainable behaviours at home since we last spoke?

How did the sustainable food week make you think about other sustainable behaviours?

How do you think about sustainability at Plusnet now?

---

### 9.2.4.2.1 INFORMATION SHEET

It is always important to understand why the research project is being done and what it will involve. Please take time to read the following information carefully. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

#### **What is the project's purpose?**

The purpose of this project is to better understand environmentally sustainable practises in the workplace at Plusnet and also in the home settings. In particular, we are interested in the food consumption at the canteen of Plusnet. We understand environmentally sustainable practices as activities that reduce consumption of natural resources and harm of the natural environment as little as possible. This includes how we buy, what we consume and how we organise our daily lives. But, to take part in the workshop you do not need to engage in any activities that are environmentally sustainable.

#### **Why have I been chosen?**

You have been chosen because in the survey expressed interest in taking part in 2 interviews. As an employee at Plusnet you will have knowledge and experience with activities at your workplace and particularly about the food in the canteen at Plusnet.

#### **What will happen if I take part?**

##### 1<sup>st</sup> INTERVIEW

- You will be asked to fill out a food diary and to take pictures of food you have at home, at work or eat out for 1 week before the interview.
- **After that, you will be up with Caroline for 30-60 minutes to discuss topics such as your opinions on environmentally sustainable activities, food, activities at work and how all that might be part of who you are.**

##### 2<sup>nd</sup> INTERVIEW

- **After the first discussion Caroline will give you a second food diary which you will be asked to fill out a few weeks later (in June or July). Once you have filled that out I will ask you for a second interview, again for about 30-60 minutes.**

For your participation you will receive **2 vouchers for premium meals at the canteen** and, once you have completed the second interview, **a £10 Amazon voucher**.

#### **Do I have to take part? - NO**

It is up to you to decide whether or not to take part. If you wish to take part, you should indicate your agreement to the online consent form. You can still withdraw at any time simply by closing your browser. You do not have to give a reason.

#### **Will my taking part in this project be kept confidential? - YES**

All the information that we collect about you during the course of the research will be kept strictly confidential. You will not be able to be identified or identifiable in any reports or publications. Any data collected about you in the online questionnaire will be stored online in a form protected by passwords and other relevant security processes and technologies. Data collected may be shared in an anonymised form to allow reuse by the research team and other third parties. These anonymised data will not allow any individuals to be identified or identifiable.

#### **Has this study been ethically approved? - YES**

The project has been assessed and approved by the University of Management School ethics committee in accordance with the University of Sheffield ethics policy.

#### **Who is organising and funding the research?**

The research is organised by Caroline Verfuert, a PhD student at the University of Sheffield Management School and Psychology Department. This study has been developed in collaboration with the Plusnet PLC. The study is part of my PhD project funded by the Management School.

Please feel free to get in touch any time by emailing me: [cverfuert@sheffield.ac.uk](mailto:cverfuert@sheffield.ac.uk)

Should you have any concern about any ethical issues regarding this study, please contact:

Caroline Verfuert, project leader  
E: [cverfuert@sheffield.ac.uk](mailto:cverfuert@sheffield.ac.uk)  
Sheffield University Management School  
Doctoral Centre  
169-171 Northumberland Road  
Sheffield S10 1DF

OR

Rebecca Roberts  
Research Manager at the University of Sheffield  
Management School  
E: [r.e.roberts@sheffield.ac.uk](mailto:r.e.roberts@sheffield.ac.uk)

### 9.2.4.2.2 CONSENT FORM

**Please tick the appropriate boxes** **Yes**

**Taking Part**

I have read and understood the project information sheet.

I have been given the opportunity to ask questions about the project.

I agree to take part in the interviews and fill out the food diary. I understand that the researcher will be taking notes and will use an audio-recording device if we all agree to it.

I agree to be audio-recorded **Yes** **No**

I understand that my taking part is voluntary; I can withdraw from the study at any time and I do not have to give any reasons for why I no longer want to take part. Withdrawing from the study will not affect my work in any way.

**Use of the information I provide**

I understand that my words may be quoted (in an anonymous way) in publications, reports, web pages, and other research outputs.

**So we can use the information you provide legally**

I agree to assign the copyright I hold in any materials related to this project to the researcher Caroline Verfuert.

\_\_\_\_\_  
Name of participant [printed]                      Signature                      Date

\_\_\_\_\_  
Researcher [printed]                      Signature                      Date

Project contact details for further information.  
*(Please feel free to get in touch at any time)*

## 9.2.5 Pre-Intervention Workshops

### 9.2.5.1.1 INVITATION TO WORKSHOP



**You are invited to take part in a workshop to discuss the new menu in the canteen!**

**What is the workshop about?**  
We will discuss a new menu for the canteen that Justin and I developed. We will introduce the menu in a 'sustainable food week' in the first week of June but would to discuss it with you first.

**What will happen in the workshop?**

- During the workshop we would like to **discuss a new menu** for the canteen at Plusnet. We would also like to **develop ideas with you** about activities that could encourage environmentally sustainable food consumption at the canteen in Plusnet.
- You are invited as you might already try to eat environmentally sustainable food or because you don't. We would like to hear all sides.
- As a thank you for your participation you will receive **2 vouchers for premium meals** at the canteen.

**How long, where, when?**  
The workshop will take 90 minutes and will take place at Plusnet.  
[to be added: time and date!]

**What is the point of all this?**  
We are aiming to make Plusnet a more sustainable workplace by providing sustainable and healthy food choices. Studies show that a sustainable workplace is good for employees and for the planet! We are working with Caroline, a researcher from the University of Sheffield, as she is an expert in sustainable behaviour. This project will also be part of her PhD research. For more information see next page.



Sheffield  
University  
Management  
School.



## 9.2.5.1.2 INFORMATION SHEET WORKSHOP

### Information Sheet

#### More information about the workshop:

It is always important to understand why the research project is being done and what it will involve. Please take time to read the following information carefully. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

#### What is the project's purpose?

The purpose of this project is to better understand environmentally sustainable practises in the workplace at Plusnet and also in the home settings. In particular, we are interested in the food consumption at the canteen of Plusnet. We understand environmentally sustainable practices as activities that reduce consumption of natural resources and harm of the natural environment as little as possible. This includes how we buy, what we consume and how we organise our daily lives. But, to take part in the workshop you do not need to engage in any activities that are environmentally sustainable.

#### Why have I been chosen?

You have been chosen because in the survey expressed interest in taking part in the workshop. As an employee at Plusnet you will have knowledge and experience with activities at your workplace and particularly about the food in the canteen at Plusnet.

#### What will happen if I take part?

- You will be asked to participate in a workshop which will take about 90.
- During the workshop we would like to discuss a new menu for the canteen at Plusnet. We would also like to develop ideas with you about activities that could encourage environmentally sustainable food consumption at the canteen in Plusnet.
- For your participation you will receive 2 vouchers for premium meals at the canteen.

#### Do I have to take part? - NO

It is up to you to decide whether or not to take part. If you wish to take part, you should indicate your agreement to the online consent form. You can still withdraw at any time simply by closing your browser. You do not have to give a reason.

#### Will my taking part in this project be kept confidential? - YES

All the information that we collect about you during the course of the research will be kept strictly confidential. You will not be able to be identified or identifiable in any reports or publications. Any data collected about you in the online questionnaire will be stored online in a form protected by passwords and other relevant security processes and technologies.

Data collected may be shared in an anonymised form to allow reuse by the research team and other third parties. These anonymised data will not allow any individuals to be identified or identifiable.

#### Has this study been ethically approved? - YES

The project has been assessed and approved by the University of Management School ethics committee in accordance with the University of Sheffield ethics policy.

#### Who is organising and funding the research?

The research is organised by Caroline Verfuert, a PhD student at the University of Sheffield Management School and Psychology Department. This study has been developed in collaboration with the Plusnet PLC.

The study is part of my PhD project funded by the Management School.

Please feel free to get in touch any time by emailing me: [cverfuert@sheffield.ac.uk](mailto:cverfuert@sheffield.ac.uk)

Should you have any concern about any ethical issues regarding this study, please contact:

Caroline Verfuert, project leader  
E: [cverfuert@sheffield.ac.uk](mailto:cverfuert@sheffield.ac.uk)  
Sheffield University Management School  
Doctoral Centre  
169-171 Northumberland Road  
Sheffield S10 1DF

OR

Rebecca Roberts  
Research Manager at the University of Sheffield  
Management School  
E: [r.e.roberts@sheffield.ac.uk](mailto:r.e.roberts@sheffield.ac.uk)



## 9.2.6 Behaviour Change Intervention Material

### 9.2.6.1.1 LEAFLETS ANNOUNCING SUSTAINABLE FOOD WEEK



Figure 72: Leaflets that advertised the behaviour change intervention and invited employees to participate in the survey, interviews, and the pre-intervention workshops to discuss the new menu

## 9.2.6.1.2 RECIPE BOOKLET

Note: Examples from recipe booklet that was developed by researcher for the chef of the canteen. The recipe booklet contained 34 recipes.

Salad bar examples (free for employees)

### Roast carrot hummus

Makes 1 bowl

**NUT-FREE**

- 4 medium carrots (about 400g), peeled
- 1½ teaspoons paprika
- 10 tablespoons olive oil, plus more for the carrots
- salt
- 3 garlic cloves, peeled
- 2 x 400g cans of chickpeas, drained and rinsed
- 3 tablespoons tahini
- juice of 2 juicy lemons, or 3 if they're not very juicy
- 1 teaspoon ground cumin



Preheat the oven to 220°C (fan 200°C).

Chop the carrots into quarters, then put them on a baking tray with ½ teaspoon of the paprika, a drizzle of olive oil and a sprinkling of salt. Roast for about 40 minutes, until soft and tender, adding the garlic cloves for the last 10 minutes. Leave to cool.

Meanwhile, place the chickpeas into a food processor with the 10 tablespoons of olive oil, the tahini, lemon juice, remaining 1 teaspoon of paprika, the ground cumin and salt, spoon in 4 tablespoons of water and blend until smooth and creamy.

Once the carrots and garlic have cooled, add them to the processor and finish blending. When the hummus is smooth and creamy, scoop it into a bowl and serve.

This will keep in an airtight container in the fridge for up to 7 days.

Source: deliciously ella book, p. 200

vegetarian

vegan

**Nutritional Summary** (per large scoop):

|                        |                  |                     |                      |                    |
|------------------------|------------------|---------------------|----------------------|--------------------|
| <b>Calories</b><br>154 | <b>Fat</b><br>7g | <b>Carbs</b><br>18g | <b>Protein</b><br>6g | <b>Sugar</b><br>4g |
|------------------------|------------------|---------------------|----------------------|--------------------|

**Vitamins:** A 76% - C 6% - Calcium 3% - Iron 11%

### Carrot & Fennel Slaw

Serves 4 as a side dish

Source: Deliciously Ella book, p 167  
Preparation: 10 mins

Serves 4 as a side dish

**NUT-FREE**

- 2 tablespoons olive oil
- 1 tablespoon toasted sesame oil
- 4 tablespoons coconut yogurt
- 2 tablespoons apple cider vinegar
- juice of ½ lemon
- salt and pepper
- 1 small fennel bulb
- 2 medium carrots, peeled
- 4 spring onions
- 2 tablespoons black sesame seeds
- handful of chopped fresh coriander

Place the olive oil, sesame oil, yogurt, vinegar and lemon juice in a mixing bowl and whisk vigorously to make an emulsion, then season with salt and pepper.

Trim the base of the fennel bulb and, using a mandolin, slice it as thin as possible. (If you don't have a mandolin, just slice it very thinly with a knife.) Place the sliced fennel into the bowl with the dressing.

Next, slice the carrots on the mandolin, or use a shredder, so they resemble ribbons or shreds; if you don't have a mandolin, use a vegetable peeler to make ribbons. You want the carrot to retain a bit of crunch, so it's better to take the time to do this, rather than just grating it. Place in the bowl with the fennel and dressing and mix with your hands so everything is coated nicely.

Finely chop the spring onions and mix them into the slaw.

Sprinkle with the sesame seeds and chopped coriander and serve.



vegetarian

vegan

**Nutritional Summary:**

|                        |                     |                       |                      |                    |
|------------------------|---------------------|-----------------------|----------------------|--------------------|
| <b>Calories</b><br>213 | <b>Fat</b><br>18.6g | <b>Carbs</b><br>12.6g | <b>Protein</b><br>3g | <b>Sugar</b><br>4g |
|------------------------|---------------------|-----------------------|----------------------|--------------------|

**Vitamins:** A 180% - C 30% - Calcium 7% - Iron 8%

Salad bar examples (free for employees)

### Sesame slaw

Serves 3

**NUT-FREE**

- 2 carrots
- ½ white cabbage
- finely grated zest of 1 unwaxed lime and juice of 2 limes
- 2 tablespoons sesame seeds
- 2 tablespoons toasted sesame oil
- 5 tablespoons olive oil
- 2 tablespoons tamarind
- 1 tablespoon honey
- generous sprinkling of salt



Start by peeling and grating the carrots (use the fattest holes on the grater, or the grater setting on your food processor). Next, finely shred the cabbage by slicing finely with a sharp knife. Mix together in a bowl.

Zest 1 of the limes, then squeeze the juice of both limes into the bowl and add the grated zest. Add the sesame seeds, sesame oil, olive oil, tamarind, honey and salt and stir well, until the carrots and cabbage are totally covered in dressing.

Leave the slaw to sit for 10-20 minutes before serving; this allows it to soften and absorb the flavours of the dressing.

**SUPER-SPEEDY**  
10 minutes, plus marinating time

Source: deliciously ella book, p. 99

vegetarian

**Nutritional Summary** (per serving, 1 tbsp):

|                        |                   |                    |                      |                    |
|------------------------|-------------------|--------------------|----------------------|--------------------|
| <b>Calories</b><br>152 | <b>Fat</b><br>13g | <b>Carbs</b><br>9g | <b>Protein</b><br>2g | <b>Sugar</b><br>6g |
|------------------------|-------------------|--------------------|----------------------|--------------------|

**Vitamins:** A 137% - C 20% - Calcium 4% - Iron 5%

### Coronation chicken

**INGREDIENTS**

Serves 4

- Shredded Chicken from a medium sized pre roasted chicken
- 3 tbsp Mayo (Vegan mayo OR natural plain yoghurt)
- Mild curry powder to taste
- 1/2 tsp Cinnamon
- Ground Black Pepper
- 1 tbsp Mango chutney
- sultanas - as many as you fancy

**METHOD**

- Mix the mayo, curry powder, cinnamon, black pepper, chutney and sultanas together. Altering quantities to your preferred taste mix the combined ingredients with the shredded chicken
- Serve with baked potatoes, wraps, sandwiches etc.

**NOTE:** Use leftovers from chicken roast! Pick ALL (!) meat from the bones

**Note:** Use different spices e.g. teriyaki for variations

Source: <https://www.bbcgoodfood.com/recipes/6080/instant-coronation-chicken>



**Nutritional Summary:**

|                        |                  |                     |                       |                    |
|------------------------|------------------|---------------------|-----------------------|--------------------|
| <b>Calories</b><br>234 | <b>Fat</b><br>9g | <b>Carbs</b><br>11g | <b>Protein</b><br>25g | <b>Sugar</b><br>9g |
|------------------------|------------------|---------------------|-----------------------|--------------------|

**Vitamins:** A 4% - C 1% - Calcium 2% - Iron 8%

Salad bar examples (free for employees)

## Kale & sweet potato salad

Serves 4

**WDF-FREE**

- 1 large sweet potato, peeled or well scrubbed
- 5 tablespoons olive oil
- salt and pepper
- 200g kale, coarse ribs removed
- 2 tablespoons apple cider vinegar
- Juice of ½ lemon
- 100g sun-dried tomatoes in oil (drained weight), finely chopped
- 100g pitted black olives, finely chopped
- 100g pine nuts or sunflower seeds



Preheat the oven to 220°C (fan 200°C)

Cut the sweet potato into 1cm cubes, place in a roasting tray, drizzle with 2 tablespoons of the olive oil and add lots of salt and pepper. Roast for 45 minutes or until cooked through and slightly crispy.

Meanwhile, add the kale to a food processor and pulse a few times to break it down into little pieces. Tip it into a large salad bowl with the remaining olive oil, the vinegar, salt and pepper, the lemon juice, sun-dried tomatoes and olives. Toss the salad well so all the ingredients are evenly coated in the dressing.

When the sweet potato chunks are cooked, remove from the oven and stir them through the salad.

Finally, heat a frying pan over a medium heat and dry-fry the pine nuts for a few minutes or until golden brown (Watch carefully when cooking this, as they burn easily). Remove from the heat and sprinkle on to the salad.

Note: can be served hot or cold

Source: deliciously ella book

vegetarian

vegan

**Nutritional Summary** (per serving):

|                        |                   |                     |                      |                    |
|------------------------|-------------------|---------------------|----------------------|--------------------|
| <b>Calories</b><br>363 | <b>Fat</b><br>32g | <b>Carbs</b><br>18g | <b>Protein</b><br>6g | <b>Sugar</b><br>3g |
|------------------------|-------------------|---------------------|----------------------|--------------------|

**Vitamins:** A 219% - C 131% - Calcium 7% - Iron 21%

## Pasta Bolognese

Serves 4-6, 20-30 minutes

**INGREDIENTS**

- 1 large onion, chopped
- 1 stick celery, finely chopped (optional)
- 3 cloves of garlic, crushed
- 1/2 red pepper, chopped
- 1 medium courgette, chopped in half lengthways then sliced
- 100g (4oz) mushrooms, chopped
- 1 tin whole cooked lentils
- 2 x 400g tins of chopped tomatoes OR a large jar of pasta sauce, eg Meridian
- 1 tbsp tomato purée
- 2 bay leaves
- 3 tsp basil
- 2 tsp oregano

**INSTRUCTIONS**

- Fry the onion, red pepper (and celery if using) in the oil until soft.
- Add the garlic, courgette and mushrooms and cook until the mushrooms are golden brown.
- Add the purée and tinned tomatoes, stir well and simmer for 10 minutes over a low heat. If using the lentil option, add now and let them cook in for a couple of minutes, stirring well.
- Serve on a bed of cooked spaghetti or other pasta

Source: <http://www.veganrecipeclub.org.uk/recipes/easy-vegan-spaghetti-bolognese>

Note: Vegan if no cheese garnish is used. Gluten free if pasta is gluten free



vegetarian

vegan

**Nutritional Summary:**

|                        |                    |                       |                         |                       |
|------------------------|--------------------|-----------------------|-------------------------|-----------------------|
| <b>Calories</b><br>490 | <b>Fat</b><br>3.4g | <b>Carbs</b><br>92.5g | <b>Protein</b><br>25.5g | <b>Sugar</b><br>14.5g |
|------------------------|--------------------|-----------------------|-------------------------|-----------------------|

**Vitamins:** A 116% - C 76% - Calcium 6% - Iron 46%

## 3 bean stew

Serves 6

**WDF-FREE**

- large glug of olive oil
- 2 celery sticks, finely chopped
- 1 medium onion, finely chopped (optional)
- salt and pepper
- 4 garlic cloves, finely chopped
- 2 red chillies, deseeded and finely chopped
- 400g can of chopped tomatoes
- 4 tablespoons tomato purée
- 2 red peppers, finely chopped
- 400g can each of butter beans, black beans and cannellini beans, drained and rinsed
- large handful of fresh coriander

Heat the oil in a large saucepan over a medium heat. Add the celery and onion if using with lots of salt and pepper, then stir. Cook until the celery is turning translucent, then add the garlic and chillies and cook for a minute, stirring so that nothing catches.

Add the canned tomatoes, tomato purée, red peppers and 350ml of water and let it bubble for about 30 minutes, stirring to break down the tomatoes now and then, until the sauce is starting to reduce and the peppers are soft.

Once you're ready to eat, add the beans. They'll need about 10 minutes.

Source: deliciously ella book



vegetarian

vegan

**Nutritional Summary** (per serving, 1 scoop):

|                        |                  |                     |                       |                    |
|------------------------|------------------|---------------------|-----------------------|--------------------|
| <b>Calories</b><br>240 | <b>Fat</b><br>3g | <b>Carbs</b><br>41g | <b>Protein</b><br>15g | <b>Sugar</b><br>3g |
|------------------------|------------------|---------------------|-----------------------|--------------------|

**Vitamins:** A 15% - C 35% - Calcium 7% - Iron 25%

## Roasted vegetable lasagne

PREP ca 25 mins | COOK: 70 MINS | Serves 6

**Ingredients**

- 3 red peppers
- 2 aubergines
- 1 Courgette
- 8 tbsp olive oil, plus a little for greasing
- ½ quantity tomato sauce (see 1<sup>st</sup> page)
- 300g fresh pack lasagne sheets
- ½ quantity white sauce (see 1<sup>st</sup> page)
- 125g ball mozzarella (or vegetarian alternative)
- Optional: spinach, carrots, mushrooms, onion, kale etc (use leftover vegetables or seasonal)

**METHOD**

- Heat oven to 200°C/fan 180°C/gas 6.
- Deseed the peppers, halve, then cut into large chunks.
- Trim ends off aubergines, then cut into slices about ½cm thick. Lightly grease 2 large baking trays, then place peppers and aubergines on top. Toss with the olive oil, season well, then roast for 25 mins until lightly browned.
- Reduce oven to 180°C/fan 160°C/gas 4.
- Lightly oil an ovenproof serving dish.
- Arrange a layer of the vegetables on the bottom, then pour over a third of the tomato sauce. Top with a layer of lasagne, then drizzle over a quarter of the white sauce. Repeat until you have 3 layers of pasta.
- To finish, spoon remaining white sauce over the pasta, making sure the whole surface is covered. Scatter mozzarella over the top with the tomatoes. Bake for 45 mins until bubbling and golden.



Source: <https://www.bbcgoodfood.com/recipes/10603/roasted-vegetable-lasagne>

vegetarian

**Nutritional Summary:**

|                        |                   |                     |                       |                    |
|------------------------|-------------------|---------------------|-----------------------|--------------------|
| <b>Calories</b><br>490 | <b>Fat</b><br>29g | <b>Carbs</b><br>47g | <b>Protein</b><br>14g | <b>Sugar</b><br>9g |
|------------------------|-------------------|---------------------|-----------------------|--------------------|

**Vitamins:** A 23% - C 75% - Calcium 12% - Iron 10%

Premium meal example (available for employees at subsidised price)



## CHICKPEA, QUINOA & TURMERIC CURRY

PREP ca 20 mins | COOK: 30-40 MINS | Serves 4-6

### Ingredients

- 500g new potatoes, halved
- 3 garlic cloves, crushed
- 3 teaspoons ground turmeric
- 1 teaspoon ground coriander
- 1 teaspoon chilli flakes or powder
- 1 teaspoon ground ginger
- 400g can of coconut milk
- 1 tbsp tomato purée
- 180g quinoa
- 400g chickpeas, (use prepared chickpeas)
- 150g spinach (ideally fresh)
- 400g can of chopped tomatoes
- salt and pepper



### METHOD

- Pre-cook potatoes
- Place the potatoes in a large pan and add the garlic, turmeric, coriander, chilli, ginger, coconut milk, tomato purée and tomatoes. Bring to the boil, season with salt and pepper
- then add the quinoa with a mug of just-boiled water (300ml). If served with rice just prepare rice to be served as a side
- Reduce the heat to a simmer, place the lid on and allow to cook. Over the next 30 minutes, stir every 5 minutes or so to make sure nothing sticks to the bottom.
- Halfway through cooking, add the chickpeas.
- When there are just 5 minutes left, add the spinach and stir it in until it wilts.

Source: <https://deliciouslyella.com/book-two-recipe-chickpea-quinoa-and-turmeric-curry/>

vegetarian

Vegan\*

### Nutritional Summary:

|                 |            |              |                |              |
|-----------------|------------|--------------|----------------|--------------|
| Calories<br>444 | Fat<br>12g | Carbs<br>67g | Protein<br>18g | Sugar<br>11g |
|-----------------|------------|--------------|----------------|--------------|

Vitamins: A 99% - C 62% - Calcium 10% - Iron 38%

## Chicken parmigiana

PREP: 15 MINS | COOK: 15 MINS | Serves 4

### Ingredients

- 2 large, skinless chicken breasts, halved through the middle
- 2 eggs, beaten
- 75g breadcrumb
- 75g Parmesan, grated
- 1 tbsp olive oil
- 2 garlic cloves, crushed
- half a 690ml jar passata
- 1 tsp caster sugar
- 1 tsp dried oregano
- half a 125g ball light mozzarella, torn
- Steamed vegetables as a side (e.g. peas and carrots)

### METHOD

- Place the chicken breasts between cling film sheets and bash out with a rolling pin until they are the thickness of a £1 coin. Dip in the egg, then breadcrumbs, mixed with half the Parmesan. Set aside on a plate in the fridge while you make the sauce.
- Heat oil and cook garlic for 1 min, then tip in passata, sugar and oregano. Season and simmer for 5-10 mins.
- Heat grill to High and cook the chicken for 5 mins each side, then remove. Pour the tomato sauce into a shallow ovenproof dish and top with the chicken. Scatter over the mozzarella and remaining Parmesan and grill for 3-4 mins until the cheese has melted and the sauce is bubbling.
- Serve with vegetables or salad and some pasta or potatoes, if you like.



Source: <https://www.bbcgoodfood.com/recipes/1267633/chicken-parmigiana>

### 9.2.6.1.3 MATERIAL INFORMATION CAMPAIGN

#### Double sided table talker

Side one

You asked, we got them for you.  
New sustainable plates!

### 4 sustainability facts about the new bagasse plates

1. They are **made of recycled sugarcane**.
2. They use **99% less CO<sub>2</sub>** than Styrofoam plates.
3. They **break down to soil** and therefore reduce our waste.
4. They **use less water** in the production process.

Side two

**GOOD NEWS! - We got new sustainable plates!**

#### What are they made of?

The new plates are made from bagasse. Bagasse is the fiber that is left over from the sugar extraction process from the sugar cane. Bagasse can be used to make paper-like material (e.g. plates), building material or biofuel.

#### Bagasse vs. Styrofoam

The current plates are made of Styrofoam.

|                                   | BAGASSE  | STYROFOAM  |
|-----------------------------------|--|--|
| What material is it made of?      | sugar plant  | Fossil fuels   |
| Is it compostable?                | Yes, it takes about 90 days to decompose. This means that they break down to soil and leave no rubbish behind. | No, it does not decompose. It's estimated that it takes a few hundred years to break down. |
| What emits more CO <sub>2</sub> ? | The production of bagasse plates uses less CO <sub>2</sub> than styrofoam, plastic or paper plates.            | X  |
| What uses more water?             | The production of bagasse plates uses less water than styrofoam, plastic or paper plates.                      | X  |

Identity & social norm message

**SUSTAINABLE FOOD WEEK**

Are **YOU** a sustainable eater?



**58% of your colleagues already eat sustainable foods or aim to increase their intake!**

(based on the survey with employees at Plusnet between April and July)



**What sustainable food type are YOU?**

Did you eat any meat today?

- No**
  - Did you eat any fish?
    - No**
      - Did you eat any dairy (e.g. milk, cheese, eggs)?
        - Yes**: Sustainable food **advancer**. Good job! You know where to make the right cuts to lower your CO<sub>2</sub>. Your CO<sub>2</sub> today was 3.9kg ★★★★★
        - No**: Sustainable food **champion**. Congratulations! You understand the game! Your CO<sub>2</sub> today was less than 3kg today was 4.7kg ★★★★★
    - Yes**: Sustainable food **improver**. You have done well today. Reducing meat is a first step towards a sustainable diet. Your CO<sub>2</sub> today was 5.6kg ★★★★★
- Yes**
  - How much meat did you eat?
    - A little bit (less than 50g)**: Sustainable food **improver**. You have done well today. Reducing meat is a first step towards a sustainable diet. Your CO<sub>2</sub> today was 4.7kg ★★★★★
    - some (50g-100g)**: Sustainable food **newcomer**. You like meat but you don't eat it excessively. Your CO<sub>2</sub> footprint today was 5.6kg ★★★★★
    - A lot (more than 100g)**: Sustainable food **novice**. The impact of meat consumption on our environment might be new to you. Good news is, there is room for improvement. Your CO<sub>2</sub> today was 7.2kg ★★★★★

Source: Numbers are based on a 2000kcal diet. Scarborough et al. (2014). Dietary greenhouse gas emissions of meat-eaters, fish-eaters, vegetarians and vegans in the UK. *Climatic Change*, 125(2), 179-192.



CO<sub>2</sub> Information message (1)

**This is how much CO<sub>2</sub> your food produces every year:**

This is how many times you would need to drive to Barcelona (and back!) to produce the same amount of CO<sub>2</sub> as your food. (The car used to calculate this is a Ford Fiesta)

|                                   |                      |  |
|-----------------------------------|----------------------|--|
| Vegan                             | 8473 miles per year  | → 4x Sheffield to Barcelona & back (70h)     |
| Vegetarian                        | 9603 miles per year  | → 4 ½ x Sheffield to Barcelona & back (79h)  |
| No beef (but eats other meats)    | 10732 miles per year | → 5x Sheffield to Barcelona & back (87.5h)   |
| Average (eats beef & other meats) | 14122 miles per year | → 6 ½ x Sheffield to Barcelona & back (114h) |
| Meat lover                        | 18641 miles per year | → 8 ½ x Sheffield to Barcelona & back (149h) |



**SHEFFIELD TO BARCELONA**

Note: CO<sub>2</sub> is one of the main drivers of climate change. By reducing our CO<sub>2</sub> emissions we lower the impact of climate change.




**What is sustainable food?**

- ✓ Low **environmental impact**
  - CO<sub>2</sub>, water use, land use
- ✓ Contributes to **healthy life** for present and **future generations**


Source: Adapted definition from the FAO

**How do YOU become a sustainable eater?**

- Eat less meat** – particularly red meat
- Eat more vegetables & fruit** – particularly seasonal & local



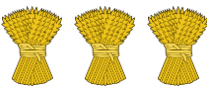
Note: CO<sub>2</sub> is one of the main drivers of climate change. By reducing our CO<sub>2</sub> emissions we lower the impact of climate change.




SUSTAINABLE FOOD WEEK

## How many resources are in 1 quarter-pound Hamburger?


food: 3kg of grains



water: 200 L




energy: 30h having a light on  
(used for feed, production & transport)



30h

10 w standard LED light bulb




The University of Sheffield. Source: J.L. Capper, Journal of Animal Science, December, 2011.

## What is sustainable food?


- ✓ Low **environmental impact**
  - CO<sub>2</sub>, water use, land use
- ✓ Contributes to **healthy life** for present and **future generations**

Source: Adapted definition from the FAO

## How do YOU become a resource hero?



**Eat less meat**  
– particularly red meat



**Eat more vegetables & fruit**  
– particularly seasonal & local


The University of Sheffield. Note: Overconsumption of resources is one of the main challenges of our society.

SUSTAINABLE FOOD WEEK

## How far does 1kg of your food take you?


This is how far you could go by car (Ford Fiesta) to produce the same carbon as 1kg of your food:

| 1kg of ...          | Distance                            |
|---------------------|-------------------------------------|
| Beef, lamb          | 110.15 miles → Plusnet to Snowdonia |
| Chicken, fish, pork | 20.9 miles → Plusnet to Doncaster   |
| Dairy               | 23.72 miles → Plusnet to Wakefield  |
| Cereals, bread      | 10.17 miles → Plusnet to Hathersage |
| Vegetables          | 3.95 miles → Plusnet to Meadowhall  |
| Fruit               | 7.34 miles → Plusnet to Rotherham   |




The University of Sheffield.

## How do YOU become a low carbon eater?



**Eat less meat**  
– particularly red meat



**Eat more vegetables & fruit**  
– particularly seasonal & local

### 12 plant based protein heroes you can eat instead of meat

(g of Protein per 100g)

|                    |                      |
|--------------------|----------------------|
| Potato: 2g         | ●●                   |
| Spinach: 3g        | ●●●                  |
| Peas: 5g           | ●●●●●                |
| Kidney Beans: 9g   | ●●●●●●●●●            |
| Lentils: 9g        | ●●●●●●●●●            |
| Chick peas: 9g     | ●●●●●●●●●            |
| Wheat Bread: 11g   | ●●●●●●●●●●●          |
| Tofu: 15g          | ●●●●●●●●●●●●●        |
| Oats: 17g          | ●●●●●●●●●●●●●●●      |
| Almonds: 21g       | ●●●●●●●●●●●●●●●●●    |
| Peanut butter: 23g | ●●●●●●●●●●●●●●●●●●●  |
| Pumpkin seeds: 24g | ●●●●●●●●●●●●●●●●●●●● |

CO<sub>2</sub> Information message (3)

## What is your CO<sub>2</sub> footprint?


Calculations of greenhouse gas emissions from the production, processing and transportation of specific food items

■ Main chart compares 110g of food against a journey in a mid-sized car ■ Number shows kg of carbon dioxide equivalent produced per 1kg of food


| Food Item     | CO <sub>2</sub> Equivalent (kg) |
|---------------|---------------------------------|
| Lentils       | 10.8                            |
| Milk          | 1.9                             |
| Tofu          | 2.0                             |
| Yogurt        | 2.2                             |
| Peanut butter | 2.5                             |
| Potatoes      | 2.9                             |
| Tuna          | 6.1                             |
| Turkey        | 10.9                            |
| Pork          | 12.1                            |
| Beef          | 27.0                            |
| Tomato        | 1.1                             |
| Beans         | 2.0                             |
| Broccoli      | 2.0                             |
| Nuts          | 2.3                             |
| Rice          | 2.7                             |
| Eggs          | 4.8                             |
| Chicken       | 6.9                             |
| Salmon        | 11.9                            |
| Cheese        | 13.5                            |
| Lamb          | 39.2                            |

Source: EnvironmentalWorkingGroup

### How can YOU become a sustainable eater?



→ Eat less meat (particularly red)



→ Eat more fruit & vegetables

Note: CO<sub>2</sub> is one of the main drivers of climate change. By reducing our CO<sub>2</sub> emissions we lower the impact of climate change.

The University of Sheffield

## What sustainable food type are YOU?

**Did you eat any meat today?**

**No** → Did you eat any fish? → **No** → Did you eat any dairy (e.g. milk, cheese, eggs)? → **Yes** → Sustainable food **novice** (3 stars) / **newcomer** (2 stars) / **improver** (3 stars) / **champion** (5 stars)

**Yes** → How much meat did you eat? → **A little bit** (less than 50g) → Sustainable food **novice** (3 stars) / **newcomer** (2 stars) / **improver** (3 stars) / **champion** (5 stars)

**Some** (50g-100g) → Sustainable food **novice** (3 stars) / **newcomer** (2 stars) / **improver** (3 stars) / **champion** (5 stars)

**A lot** (more than 100g) → Sustainable food **novice** (3 stars) / **newcomer** (2 stars) / **improver** (3 stars) / **champion** (5 stars)

**Yes** → Sustainable food **advancer** (4 stars) / **expert** (5 stars) / **champion** (5 stars)

Source: Numbers are based on a 2000kcal diet. Scarborough et al. (2014). Dietary greenhouse gas emissions of meat-eaters, fish-eaters, vegetarians and vegans in the UK. Climatic Change, 125(2), 179-192.

The University of Sheffield

Water Information message (1)

## HOW MUCH water\* IS NEEDED TO PRODUCE 1 KG OF FOOD ?


|          |        |
|----------|--------|
| Tomato   | 214    |
| Broccoli | 283    |
| Orange   | 533    |
| Apple    | 822    |
| Peach    | 910    |
| Tofu     | 2,513  |
| Cheese   | 3,178  |
| Egg      | 3,920  |
| Chicken  | 4,325  |
| Butter   | 5,553  |
| Pork     | 5,998  |
| Beef     | 15,415 |

\* Litres

www.SimpleHappyKitchen.com

SIMPLE HAPPY KITCHEN

## How do YOU become a water saver?



Eat less meat – particularly red meat










Eat more vegetables & fruit – particularly seasonal & local

The University of Sheffield

Water Information message (2)

## How much water is needed to produce your food?

|                              |   |             |
|------------------------------|---|-------------|
| 1 BEEF STEAK (200G)          |  | 3083 litres |
| 1 HAMBURGER                  |  | 2400 litres |
| 1 PIZZA                      |  | 1239 litres |
| 1 CHICKEN BREAST (100G)      |  | 433 litres  |
| 1 PORTION OF PASTA           |  | 185 litres  |
| 1 APPLE                      |  | 125 litres  |
| 1 PORTION OF POTATOES (250G) |  | 72 litres   |



## How can YOU become a water saver?



Eat less meat  
– particularly red meat



Eat more vegetables & fruit  
– particularly seasonal & local



Land Information message

## How can YOU become a land saver?



Eat less meat  
– particularly red meat



Eat more vegetables & fruit  
– particularly seasonal & local

### What is sustainable food?

- ✓ Low **environmental impact**
  - CO<sub>2</sub>, water use, land use
- ✓ Contributes to **healthy life** for present and **future generations**



Source: Adapted definition from the FAO

## How much land does your food need to grow?

Space needed to grow one plate  
(square represents space in relation)



1 plate of chips with sausage (pork)



4m<sup>2</sup>



1 plate of vegetable stew



0.5 m<sup>2</sup>



1 plate of spaghetti with tomato sauce



0.5 m<sup>2</sup>



Add some parmesan to your meal?



0.3 m<sup>2</sup>



Source: [https://www.2000m2.eu/wp-content/uploads/2000m2\\_Flaechenbuffet.pdf](https://www.2000m2.eu/wp-content/uploads/2000m2_Flaechenbuffet.pdf)



## 9.2.7 Evaluation of the Sustainable Food Week

### 9.2.7.1 SURVEY RESULTS

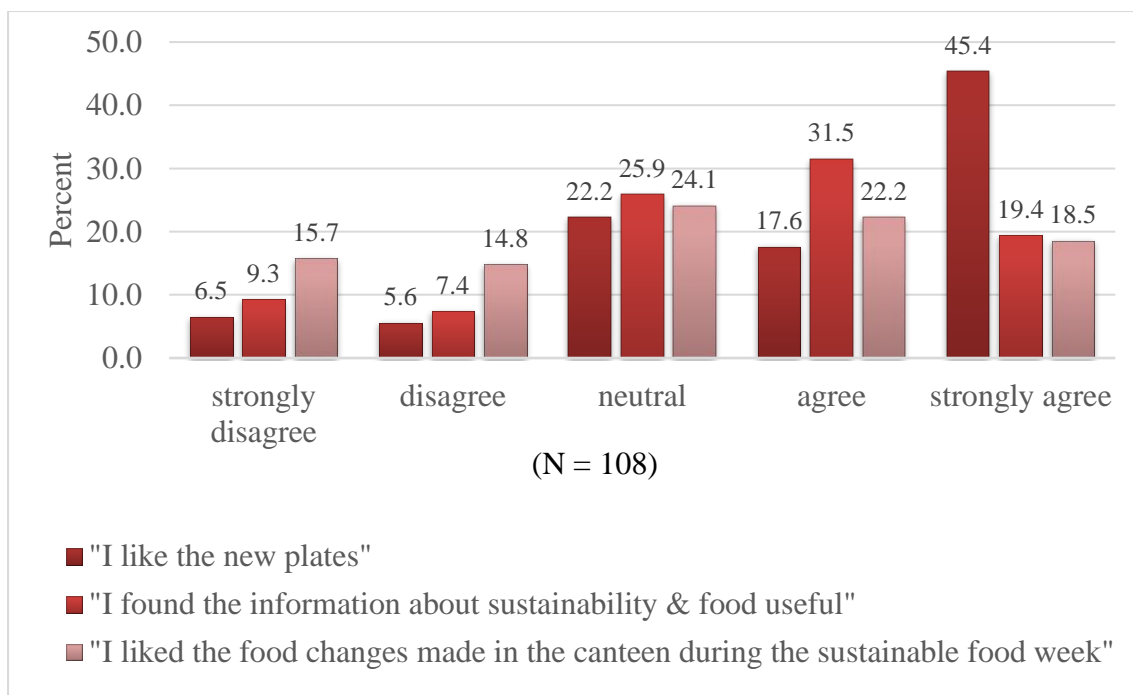
The post-intervention survey consisted of open and closed questions which aimed at collecting feedback on the behaviour change intervention from the intervention group. In the following, the feedback of the intervention group to the sustainable food week is presented. Open and closed survey questions were included in the T2 survey (for survey question details see CH5, section 4.2.2.1, Table 8). Table 52 provides an overview of key demographics of the post-intervention survey responses that were included in the feedback section below. It should be noted that only responses from the intervention group were analysed to evaluate the behaviour change intervention. An analysis of the survey responses is provided in the section below.

*Table 52: Sample description T2 (intervention group only)*

| Frequency in (N)     | Intervention Group |
|----------------------|--------------------|
| Total                | 108                |
| Gender               |                    |
| male                 | 68                 |
| female               | 37                 |
| prefer not to say    | 3                  |
| Age                  |                    |
| 18-25                | 14                 |
| 26-35                | 47                 |
| 36-45                | 35                 |
| 46-55                | 11                 |
| 56-65                | 1                  |
| Regular canteen user |                    |
| Yes (No)             | 102 (6)            |

#### 9.2.7.1.1 CLOSED SURVEY QUESTIONS – AGREEMENT TO STATEMENTS

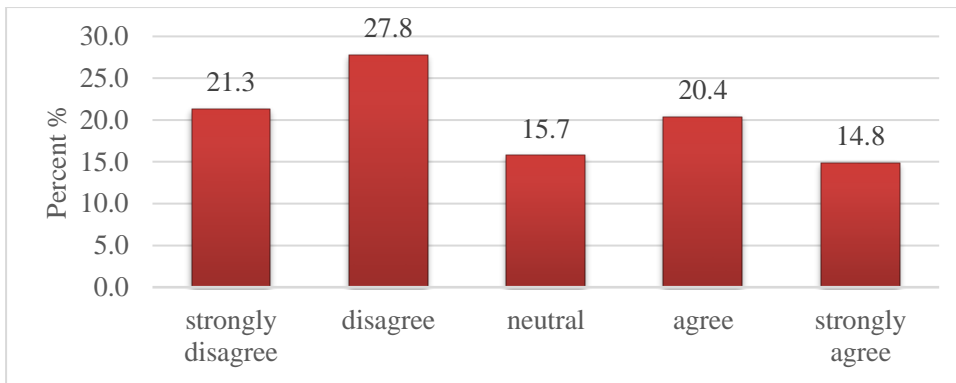
In the post-intervention survey, the intervention group was asked to provide some feedback for the changes made during the sustainable food week. Participants were asked how much they liked some of the changes that were made. The intervention group was asked to indicate their agreement to the statements “I like the new places”, “I found the information about sustainability and food useful”, and “I liked the food changes made in the canteen during the sustainable food week”. Figure 73 shows the distribution of the agreement to the statements.



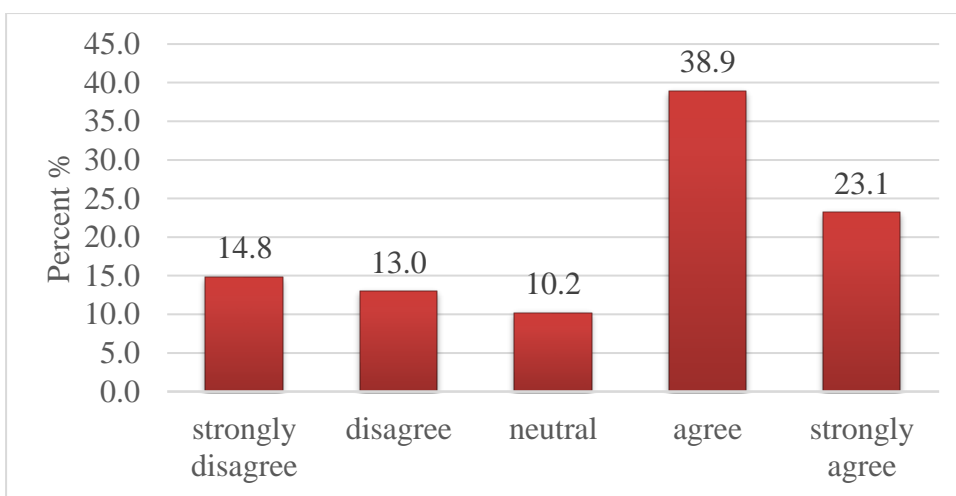
**Figure 73: Feedback to behaviour change intervention**

Overall, the introduction of the bagasse plates was the most popular change with 63% of the participants agreeing or strongly agreeing to liking the new plates. The information campaign was overall found relatively useful half of the participants agreeing or strongly agreeing to have found it useful and a quarter being neutral about the usefulness. However, 17% of the participants did not find the information useful. The changes to the menu were the least popular changes made during the sustainable food week with 30.5% of the participants disagreeing or strongly disagreeing to have liked the changes. Nonetheless, 40.7% of the participants agreed or strongly agreed to having liked the changes, which suggests that overall the sustainable food week, including the changes to the menu, were popular among the employees of the intervention group. These numbers are particularly interesting in relation to the positive and negative reactions presented above.

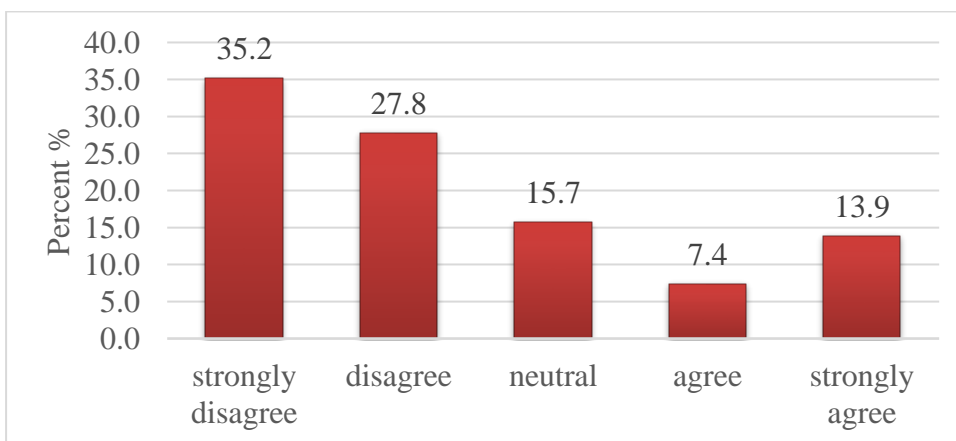
However, after there had been such a strong reaction towards the reduction of meat, as discussed above, the survey participants were asked a few questions about what changing their meat consumption means to them. Participants were asked to indicate their agreement to three statements (see Figures 75-77). Overall, over one third of the participants agreed or strongly agreed that eating less meat would change who they are. This indicates that for these participants meat consumption constitutes a part of their identity (see Figure 74). Even more participants (62%) agreed or strongly agreed to the statement that eating less meat would impose a change to their current lifestyle (see Figure 75). This indicates how much meat consumption is perceived as a part of the participants' life and could help explain why the reduction of meat availability in the canteen was experienced to many employees as a drastic change. However, two thirds of the participants disagreed or strongly disagreed that a reduced meat consumption would threaten their freedom (see Figure 76).



**Figure 74: Agreement to statement "Eating less meat means I would have to change who I am."**



**Figure 75: Agreement to statement "Eating less meat imposes a change on my current lifestyle."**



**Figure 76: Agreement to statement "Eating less meat threatens my freedom."**

Overall, the descriptive analysis provides a broader overview of how the behaviour change intervention was perceived. In addition to the observations that were discussed in the previous section, the feedback from the survey suggests that of the people who responded there was a sense that meat

consumption was an important part of their sense of identity, which could explain some of the resistance observed. Employees reacted differently to these changes, ranging from positive feedback and an appreciation of the changes to negative reactions in the form of vocal opposition and the search for protests with the purchase of meat products of small groups of employees.

### 9.2.7.1.2 OPEN SURVEY

In the open survey, participants were asked, which changes they would like and not like to keep from the sustainable food week and about their general feedback (see section 9.2.3.2). The survey responses were analysed using the thematic analysis approach (Braun & Clarke, 2006). The survey answers were transferred into NVIVO and coded based on an initial template, which seemed suitable to structure the coding including three categories: liked changes, disliked changes, future recommendations. The initial template was adapted based on the identified codes (see Braun & Clarke, 2006; more detail in CH5, section 5.2.1.2) and the codes were checked by a fellow PhD student, who agreed with the themes. The final template included five main themes, as displayed in Table 53.

*Table 53: Suggestions for future changes in the canteen*

| Suggestion                           | Example quote from survey   |
|--------------------------------------|---|
| Local meat                           | ”Can we source all our meat from within 20 miles (or whatever) of Sheffield?”   |
| More lean meat & less processed meat | “Lean meat rather than processed”   |
| Meat, but less ...                   | “I think it's important that we still have a small selection of cold meats available. Less than we had before, but perhaps two selections each day rather than four.” |
| More vegetarian & vegan options      | “More plant-based options, i.e. hummus, falafel, bean burritos, veggie burgers, dhal, mostly hummus though”   |
| Sustainably sourced options          | “At least one sustainable food choice every day”; “More seasonal/local produce[...] I consider my sustainability at home in eating local produce, in season veg etc.” |

### 9.2.7.2 UNSTRUCTURED, ANECDOTAL OBSERVATIONS

During the sustainable food week, I kept a research diary (Nadin & Cassell, 2006) with the aim to reflect on the events and observations during the intervention. In the following, these notes are summarized and commented on in the section below. The presented quotes were selected as to illustrate some of the voices of employees during the sustainable food week. It should be noted though, that the selection did not follow a systematic analysis due to an unsystematic collection of the data (i.e. through the research diary). By the time the sustainable food week was implemented, I was recognised by some of the employees and they sought direct contact during the intervention. As such, the observations below are a mix of passive observations (i.e. the researcher being in the background) and active engagement with employees when these reached out to the researcher to talk about the sustainable food week. Furthermore, this section includes reports about the food consumption (i.e. how much food is consumed

or sold) as well as reactions by the canteen staff and feedback that employees send to the canteen manager or the facility manager.

#### **9.2.7.2.1.1 ENGAGEMENT WITH THE INFORMATION MATERIAL**

Overall, I observed that employees engaged with the information material. The table talkers were placed in the middle of the tables, standing up with information on both sides. Most of the employees I observed read the information when they sat down at the tables, often in small groups, and started discussing the information. The overheard discussions were around the implications of the information, related information people had come across previously (e.g. a vegan friend who told them about climate change), and debates about the credibility of the information. Employees were observed picking up the table talkers and taking pictures of them and the posters.

#### **9.2.7.2.1.2 ACCEPTANCE OF CHANGES**

An overall appreciation of the changes were observed in the form of verbal approval or reports from other people (e.g. the kitchen staff talked about an increase of acceptance of the changes later in the week). However, via my observations it appeared that a dominant perception was that employees felt forced to change their meat consumption, rather than having a choice. The canteen staff as well as some employees reported that there was an initial shock for the first two days, however, most people seemed to have accepted the changes by mid-week. Some people said that they were happy to see a change, while others said that they would just get through it, looking forward to the return of the meat the following week. The evaluation of the behaviour change intervention is mixed. While some employees welcomed the changes and showed interest in the information campaign, others reacted negatively and rejected the changes.

#### **9.2.7.2.2 POSITIVE AND NEUTRAL REACTIONS TO THE CHANGES**

While the negative reactions were voiced louder (e.g. employees raising their voice to complain to one another about the lack of meat), several employees also reacted positively towards the changes. For example, someone came up to me in my role as the researcher and said how they thought it was really good food. Someone else reported to have tried every new dish and liking the changes and voiced their excitement about the changes. A few employees came up to the researcher and asked about the changes and talked about how much they liked it. Some talked about how the menu changes and how the provided information made them think about their food consumption. For example, a female employee said that she really liked the changes and that it made her make better choices. Furthermore, she expressed her liking of the provided information, which she found helpful and interesting. Another employee emailed the researcher, praising the sustainable food week. Furthermore, she reported that the information campaign in particular made an impression on her with regards to reconsidering her food choices outside the workplace:

*“[...] Good job on the info around the canteen I consider myself aware of what I eat but found it helpful as I don't always have the will power despite the best intentions and will often go for convenience rather than what is best for me and the environment. I would love to see these changes stay. Maybe just a leaner meat option for those who really want it rather than processed meat.” (email from employee, JD, female)*

The positive voices were less dominant than the negative voices, with 11 employees that came to me during the sustainable food week to talk about the changes. However, the feedback from the post-intervention survey (see section 9.2.7.1) shows that the picture is mixed and less negative than the observations and encounters with participants might suggest. In addition to positive and negative reactions to the sustainable food week, other observations were made that should be noted. These the engagement with the information campaign material, acceptance of the changes, the general food consumption during the sustainable food week, as well as reactions and reports of the kitchen staff.

### **9.2.7.2.3 NEGATIVE REACTIONS TO THE CHANGES**

Several employees (an estimated 20-30) reacted negatively to the changes in the canteen, particularly during the first two or three days. Some employees asked the canteen staff for meat and were wondering where the meat and the fish went. A small group of people collectively left the canteen, loudly voicing their disappointment about the lack of meat. A common complaint was the lack of meat, although it should be noted that there was always a choice of meat available, or the lack of choice of meat. Overall, a few patterns can be identified with regards to negative reactions. These include making fun of the information provided, exaggerating the impact of the changes to their lunch, and treating meat consumption as a special need they had.

#### **9.2.7.2.3.1 MAKING FUN OF THE PROVIDED INFORMATION**

Generally, employees were observed to engage with the information. However, making fun and discrediting the information provided in the information campaign seemed to be a reoccurring pattern, particularly during the first few days of the sustainable food week. For example, a group of five men was observed while discussing the implications of the provided information. They talked about how reducing meat was very restrictive and that there was nothing they could eat, not even fish. They engaged with the information that categorised the sustainability of amounts of meats (see Figure 77), however, they deemed it as an impossible request:

*Employee 1: “If you don't eat fish and if you don't eat dairy then you don't enjoy life. This is bullshit.” (anonymous, employee, male)*

*Employee 2: “To be a sustainable food champion you can't have any meat, you can't have any fish”(anonymous, employee, male)*

*Employee 3: “That's bullshit, what can you eat then? Insects?” (anonymous, employee, male)*

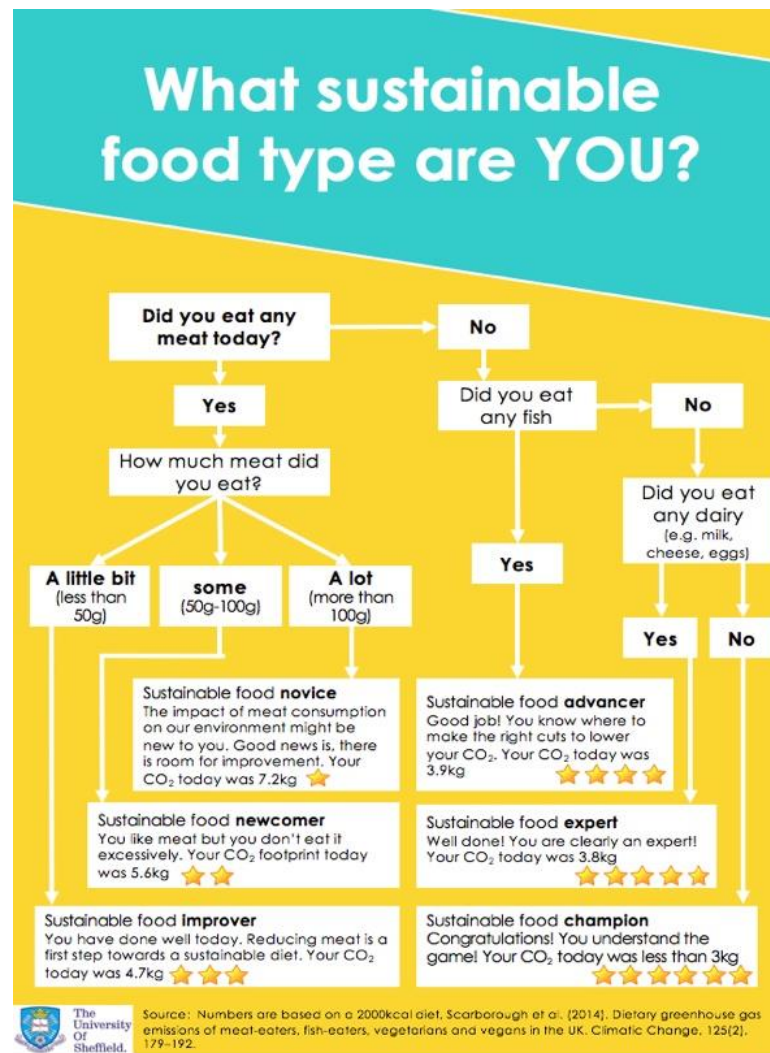


Figure 77: Flow chart categorising amounts of meat consumption

### 9.2.7.2.3.2 OVERSTATING THE IMPACT OF THE CHANGES

Another dominant pattern was the exaggeration of the impact that the meat reduction had on people’s lunches and lives. These would typically include ‘all or nothing’ approaches with employees saying that there was ‘no meat at all’ available, even though, as already mentioned above, there were one to three meat options available in the free food area and one meat option in the premium meal section. Other reactions included employees expressing that it was ‘impossible’ for them to eat any of the provided food. For example, an employee talked to the researcher and said that he could not get himself to eat any of the provided food. This form of exaggeration was observed among a few employees, who voiced their concern that the provided food was not really seen as an alternative to meat to the point that some employees left the canteen saying that “*there is nothing to eat*” (anonymous employee, male).

During the sustainable food week, several complaints were also made to the canteen and facility management, particularly during the first few days. Although, the facility manager said that this was a

common reaction regardless of the types of changes (e.g. previously they had a ‘riot’ in the canteen when chips were served only three times a week instead of daily), a few complaints should be noted. For example, according to the facility manager, a group of employees that call themselves ‘*the obesity group*’ started a petition for a meat week in which they wanted to eat Panda bears for lunch as a type of endangered species and particularly unsustainable meat choice. They contacted the HR department and the facility management to push for their request. Another example, provided by the facility manager, was an email from an employee who reported that he “*had to eat out for the first time in 9 years as he could not find anything to eat in the salad bar section.*” (email from employee, anonymous). He reasoned his complaint with the argument that there was no choice of eat meat except for coronation chicken, which he thought did not look very nice so he refused to eat it.

#### **9.2.7.2.3.3 MEAT AS A SPECIAL NEED**

Highlighting an individual, special need for meat was another reaction some employees showed during the sustainable food week. Some of which were gender related with most negative reactions coming from male employees, although some women also voiced their rejection to the changes in the canteen. For example, one male employee explained his need for meat by relating it to his masculinity:

*"I am a man, I need meat. I've been in the marine and had meat for every meal and I was the fittest person. I had to go out yesterday because I couldn't eat anything" (anonymous employee, male)*

Another example was provided by a female employee through a feedback box that was put up in the canteen. In a note she highlighted her special need for meat during her pregnancy while also questioning the reduction of meat as an approach to increase sustainability efforts. Another female employee told the researcher about her medical condition, which, according to her, required her to eat meat. It should be noted that the latter was one of the interviewees (ID129).

*"I understand sustainability, but why does this mean sacrificing all meat. Surely, sourcing locally reared non red meat is also an option? When there is little variety on offer besides dairy and carbs, it is hard to maintain a balanced diet, especially in pregnancy. I hope there are further options available during the week." (written note by female employee, anonymous)*

*"I need meat. We need dead animals on our plates. I personally need it because of my medical conditions" (female employee, interviewee ID 129)*

#### **9.2.7.2.3.4 BUYING MEAT AND BRINGING IT TO THE CANTEEN**

While most employees’ negative reactions included negative comments, a few employees, including a small group, engaged in a reactant behaviour. A small group in particular voiced their reluctance to eat any of the provided meals loudly so that surrounding people could hear. They discussed among themselves how they disagreed with the reduction of meat and that their only option was to go out and buy meat that they could add to the canteen food. They then left the canteen to return a few



minutes later with a bag full of ham. Other people went out to eat elsewhere altogether in protest of the changes made during the sustainable food week.

Although only a minority engaged in the reactant behaviour, it indicated that these people experienced the changes in the canteen very strongly, potentially even seeing the changes as threatening. While the food in the canteen was provided for free and, conveniently, very close to their workplace, they would go out of their way and pay extra money to eat meat instead of having less meat at work. This behaviour in conjunction with their raised voices announcing their rejection of the changes could indicate identity threat. As proposed in the Identity Process Theory (Breakwell, 1986) and the theoretical framework, the collective action (i.e. forming a group) and their raised voices when rejecting the intervention and discussing their plan to buy meat elsewhere indicates an enhancement of existing meat identity.

#### **9.2.7.2.4 THE KITCHEN STAFFS' REACTIONS**

Most of the kitchen staff were very supportive of the changes while others disregarded the causes behind the intervention altogether. The chef was really positive about everything, however, he was very new to the company and seemed to worry a lot about the popularity of the canteen. Hence, the negative reactions seemed to make him less engaged in the research project. One staff member (M., male) reacted positively about the changes and particularly voiced his support for the healthy aspects about the food changes. M. also encouraged employees to take part in the survey and interviews. A second staff member (P., male) was also positive about the changes and particularly interested in their relation to climate changes as he talked about how he was worried about the consequences. Another staff member (L., female), reacted negatively to the changes. During the sustainable food week, she complained about the food to other employees and called it “disgusting”. She started a discussion about the cause behind the intervention and was in disbelief about the connection between climate change and meat consumption. When offered information material she said:

*“don't give me anything to read. Where is it even from? The internet? I don't believe anything they write on the internet anyway”. (kitchen staff, L., female)*

Furthermore, she suggested that eating meat would actually be beneficial to the environment and implied that reducing meat production would actually be unethical:

*“The more cows we kill the more space we will have - that's just logic there for you [...] Do you want to prevent cows from having sex now? That's another side of being a vegetarian then. [...] I don't care about other people, in the UK nobody is starving” (kitchen staff, L., female)*

Interestingly, after the behaviour change intervention she had changed her mind and mentioned that maybe a reduction of meat would be better for everyone.

## 9.3 APPENDIX C – Main Study: Findings

### 9.3.1 Quantitative data analysis

### 9.3.2 Testing assumptions for Mixed ANOVA

#### 9.3.2.1.1 NORMAL DISTRIBUTION

Normal distribution of all variables was assessed by considering several tests and graphs. First, the Kolmogorov-Smirnov as well as Shapiro-Wilk test of normality were calculated. Results were significant for all variables indicating a non-normal distribution of the variables. Second, histograms of the scale distributions and P-P plots were used to further assess normality. Overall, the picture is mixed with most histograms and P-P plots indicating mostly normally distributed data except for some variables where the distribution upon visual inspection might need further investigation.

Hence, thirdly, the values of skewness and kurtosis were assessed. Values close to zero indicate a normal distribution whereas positive or negative values of skewness indicate a distribution leaning to the left or the right, respectively (Field, 2009, p. 138). Positive values of kurtosis indicate a peak in the distribution whereas negative values indicate a flat distribution (Field, 2009, p. 138). According to George and Mallery (2003), values for skewness and kurtosis between -2 and 2 are considered acceptable to still assume normal which is the case for all variables in the presented sample. However, Field (2009) describes an approach on how to convert skewness and kurtosis values into z-scores which can then be tested for their significance. The z-scores for skewness and kurtosis can be calculated as follows (Field, 2009; p. 139):

$$Z(\text{skewness}) = \frac{\text{skew}-0}{SE(\text{skew})} \text{ and } Z(\text{kurtosis}) = \frac{\text{kurtosis}-0}{SE(\text{kurtosis})}$$

Z-scores were calculated for the intervention and the control group separately by using excel and SPSS (see appendix E, table X). Z-scores greater than 3.29 are significant at  $p < .001$ , z-scores greater than 2.58 are significant at  $p < .05$ , and z-scores greater than 1.96 are significant at  $p < .01$ . For the control group z-scores were significant at  $p < .001$  for two scale at  $p < .01$  for one scale, and at  $p < .05$  for two scales. For the intervention group z-scores were significant at  $p < .001$  for one scale, at  $p < .01$  for one scale, and for at  $p < .05$  for two scales. Hence, these results show, that the variables with significant p-values are not normally distributed.

The F-statistic used in mixed ANOVA is relatively robust against violation of normality when the groups sizes are equal (Field, 2009). However, in this sample the group sizes are unequal which means that the power and robustness of the F-statistic is affected by skew and non-normality (Field, 2009, p 360). Transformation is a frequently used approach to overcome non-normality, however, it is

often criticised for affecting other assumptions instead (Field, 2009). Some variables were transformed using log linear transformation (Field, 2009). Nevertheless, the transformed data was still non-normally distributed. A recent study that tested the robustness of F-test under several conditions, including small and unequal sample sizes and non-normally distributed data found that F-test is 100% robust in terms of Type I error, if homogeneity of variance is given (Blanca, Alarcón, Arnau, Bono, & Bendayan, 2017). Hence, a mixed ANOVA can be calculated if the homogeneity of variance between the intervention and control group can be assumed.

### 9.3.2.1.2 HOMOGENEITY OF VARIANCE BETWEEN INTERVENTION AND CONTROL GROUP

Homogeneity of variance is an essential assumption for mixed ANOVA testing. Mixed ANOVA is an analyses of variances – between and within subjects – and a violation of homogeneity of variance negatively affects the robustness of the F-test used in the mixed ANOVA analyses (Field, 2009). To assess the homogeneity of variance, the Levene test and the variance ratio (Hartley’s  $F_{MAX}$ ) were assessed (Field, 2009).

The Levene test shows, that for most variables the variances were equal (see appendix E, table X), except for three variables. Variances for high CO<sub>2</sub> food consumption T1 were significantly different between the intervention and control group,  $F(1, 80) = 4.57, p < .05$ . Similarly, variances were significantly different for low CO<sub>2</sub> food consumption T1,  $F(1, 80) = 5.59, p < .05$  and food waste at home T2,  $F(1, 80) = 4.37$ .

In a next step, the variance ratio (Hartley’s  $F_{MAX}$ ) was calculated by dividing the larger variance by the smaller variance (Deviant, 2015):

$$F(MAX) = \frac{\text{larger variance}}{\text{smaller variance}}$$

The values of the Hartley’s  $F_{MAX}$  were identified in a table (Deviant, 2015) which suggests that the for this sample  $F_{MAX}$  had to be  $< 1.67$  in order for the variances to be assessed as homogeneous. Most variables showed a  $F_{MAX}$  variance ratio below 1.67, except for seven variables. These results indicate that the homogeneity of variance between the intervention and control group was not met. In combination with the violation of the normal distribution assumption, a robust F-test is not likely. As such, a mixed ANOVA is not the appropriate analysis for the data in this study.

**Table 54: Levene Test**

|   | Levene Statistic | df1 | df2 | Sig. |
|---|------------------|-----|-----|------|
| Self efficacy T1                              | .836             | 1   | 80  | .363 |
| Self-esteem T1                                | 1.239            | 1   | 80  | .269 |
| Self efficacy T2                              | .661             | 1   | 80  | .419 |
| Self-esteem T2                                | .184             | 1   | 80  | .669 |
| Prominence of environmental identity at T1    | 1.000            | 1   | 79  | .320 |
| Prominence of environmental identity at T2    | 1.235            | 1   | 80  | .270 |
| Attitudes towards sustainable food at work T1 | .014             | 1   | 79  | .906 |

|   |       |   |    |       |
|---|-------|---|----|-------|
| Attitudes towards sustainable food at home T1   | .089  | 1 | 79 | .766  |
| Attitudes towards sustainable food at home T2   | 2.374 | 1 | 80 | .127  |
| Attitudes towards sustainable food at work T2   | 3.595 | 1 | 80 | .062  |
| Meat consumption (high CO2) T1                  | 4.566 | 1 | 80 | .036* |
| Meat consumption (high CO2) T2                  | 5.590 | 1 | 79 | .021* |
| Plant-based food consumption (low CO2) T1       | .002  | 1 | 80 | .961  |
| Plant-based food consumption (low CO2) T2       | .465  | 1 | 79 | .497  |
| Food waste at home T1                           | .376  | 1 | 80 | .541  |
| Food waste at home T2                           | 4.366 | 1 | 79 | .040* |
| Food source (organic, local, and seasonal) (T1) | 2.835 | 1 | 80 | .096  |
| Food source (organic, local, and seasonal) (T2) | .012  | 1 | 78 | .912  |

\*  $p < 0.05$ ; \*\*  $p < 0.001$

### 9.3.2.1.3 FMAX

Table 55: FMAX

| Variable  | N  | Var CG | Var IG | Variance ratio<br>$F_{MAX}$ |
|---|----|--------|--------|-----------------------------|
| High score means high prominence of environmental identity at work T1               | 80 | 0.896  | 1.004  | 1.121                       |
| High score means high prominence of environmental identity at work T2               | 80 | 1.831  | 1.096  | 1.671                       |
| High score means high prominence of environmental identity at home T1               | 80 | 1.023  | 0.958  | 1.068                       |
| High score means high prominence of environmental identity at home T2               | 80 | 1.878  | 1.119  | 1.678                       |
| High score means high environmental identity at T1                                  | 80 | 0.625  | 0.438  | 1.427                       |
| High score means high environmental identity at T2                                  | 80 | 0.504  | 0.543  | 1.077                       |
| Food waste at home  | 80 | 0.791  | 0.969  | 1.225                       |
| Food waste at home  | 80 | 0.356  | 0.712  | 2.000                       |
| High score means low frequency in meat consumption which means low CO2              | 80 | 0.760  | 1.496  | 1.968                       |
| High score means low frequency in meat consumption which means low CO2              | 80 | 0.535  | 1.587  | 2.966                       |
| High score means high frequency in plant-based food consumption which means low CO2 | 80 | 1.698  | 1.492  | 1.138                       |

### 9.3.2.1.4 HIGH AND LOW EXPOSURE DIFFERENCES

To investigate this, a movement scores was calculated for each participant for all variables (i.e. the change between T1 and T2). A between subject ANOVA showed no significant differences between the three groups as can be seen in Table 56. A lower exposure to the intervention could be relevant for the interpretation of the results. A between group ANOVA of these scores showed that A between subject ANOVA was calculated to assess potential group differences, however, none of these group differences were statistically significant, except for fruit and vegetable consumption (see Table 57). Post hoc comparison using the Tukey HSD test indicated that the mean score for the low exposure group ( $M = .857$ ,  $SD = 1.68$ ) was significantly different than the control group ( $M = -.208$ ,  $SD = 1.02$ ). However, the low exposure group ( $M = .857$ ,  $SD = 1.68$ ) did not significantly differ from the high exposure group ( $M = .310$ ,  $SD = 1.09$ ).

**Table 56: Between subject ANOVA for exposure to intervention**

| Variable                                     | df | F     | $\eta^2$ | p    |
|--|----|-------|----------|------|
| Red meat consumption at home (T1)            | 2  | .641  | .016     | .530 |
| Fruit and vegetable consumption at home (T1) | 2  | 2.012 | .022     | .409 |
| Organic food consumption at home (T1)        | 2  | .138  | .003     | .872 |
| Local food consumption at home (T1)          | 2  | .102  | .003     | .903 |
| Seasonal food consumption at home (T1)       | 2  | .480  | .012     | .620 |
| Food waste avoidance behaviour at home (T1)  | 2  | .077  | .002     | .926 |
| Environmental Identity (T1)                  | 2  | .453  | .011     | .637 |
| Prominence of Environmental Identity (T1)    | 2  | 1.643 | .040     | .200 |
| Stages of change                             | 2  | .101  | .003     | .904 |

\* p < .05, \*\* p < .01, \*\*\* p < .001

**Table 57: Between subject ANOVA for changes in variables for exposure to intervention**

| Changes in the variables                | df | F     | $\eta^2$ | p     |
|---|----|-------|----------|-------|
| Red meat consumption at home            | 2  | .029  | .001     | .972  |
| Fruit and vegetable consumption at home | 2  | 3.668 | .087     | .030* |
| Organic food consumption at home        | 2  | .012  | .000     | .998  |
| Local food consumption at home          | 2  | .228  | .006     | .797  |
| Seasonal food consumption at home       | 2  | 1.770 | .045     | .177  |
| Food waste avoidance behaviour at home  | 2  | 2.708 | .065     | .073  |
| Environmental Identity                  | 2  | .445  | .011     | .642  |
| Prominence of Environmental Identity    | 2  | .122  | .003     | .885  |
| Stages of change                        | 2  | 1.372 | .034     | .359  |

\* p < .05, \*\* p < .01, \*\*\* p < .001

A between subject ANOVA was calculated showed no significant differences between the three groups, as can be seen in Table 56. This indicates that the low exposure intervention group significantly increased their fruit and vegetable consumption at home after the behaviour change intervention in comparison to the control group. Although it could be expected that the high exposure group would differ significantly from the control group, these findings are still in line with the expectation that a behaviour change intervention has an effect on the intervention but not the control group. Overall, these findings suggest that there is no significant difference in the movement of any of the dependent variables for between the high and low exposure groups. As such, the low and high exposure group were analysed together as the intervention group.

### 9.3.2.2 TESTING NORMALITY FOR CHANGE VARIABLES

**Table 58: Test of Normality for change scores of DV**

|   | Kolmogorov-Smirnov |    |      | Shapiro-Wilk |    |      |
|---|--------------------|----|------|--------------|----|------|
|   | Statistic          | df | Sig. | Statistic    | df | Sig. |
| Change of red meat consumption            | .264               | 81 | .000 | .888         | 81 | .000 |
| Change of fruit and vegetable consumption | .218               | 80 | .000 | .906         | 80 | .000 |
| Change of food waste behaviour            | .119               | 81 | .007 | .965         | 81 | .026 |
| Change of seasonal food consumption       | .219               | 79 | .000 | .913         | 79 | .000 |
| Change of organic food consumption        | .234               | 79 | .000 | .918         | 79 | .000 |
| Change of local food consumption          | .271               | 80 | .000 | .880         | 80 | .000 |

### 9.3.2.3 SURVEY ITEMS

*Table 59: Survey Items*

| Scale   | Source   | Adapted items  | Scale values  |
|---|--|--|---|
| Psychological Variables   |  |  |   |
| Environmental Identity  | Adapted from Whitmarsh & O'Neill, 2010   | I would be embarrassed to be seen as having an environmentally-friendly lifestyle. (recoded)                           | 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree |
|   |  | I would not want my colleagues to think of me as someone who is concerned about environmental issues. (recoded)        |   |
|   |  | I would not want my family or friends to think of me as someone who is concerned about environmental issues. (recoded) |   |
|   |  | I think of myself as someone who is very concerned with environmental issues.  |   |
| Prominence of Environmental Identity  | Adapted from Ellestad & Stets, 1998  | How would you feel if a colleague commented on you being a “good” environmentally friendly person?                     | 1 = indifferent; 2 = ok; 3 = happy; 4 = very happy; 5 = extremely happy         |
|   |  | How would you feel if a family or household member commented on you being a “good” environmentally friendly person?    |   |
|   |  | How would you feel if a colleague commented on you being a “poor” environmentally friendly person?                     |   |
|   |  | How would you feel if a family or household member commented on you being a “poor” environmentally friendly person?    |   |
| Stage membership  | Adapted from Bamberg, 2013   |  |   |
|   | Which of the following statements best describes how you feel about your current level of sustainable food consumption and whether you have any plans to try to change it?   |  | 1 = Stage 1   |
|   | At the moment, I still don't eat sustainable food for most of my meals. I would like to increase my sustainable food consumption, but, at the moment, I feel it would be impossible for me to do so.   |  | 2 = Stage 2   |
|   | At the moment, I don't eat sustainable food for most of my meals. I would like to increase my sustainable food consumption, but, at the moment, I feel it would be impossible for me to do so.   |  | 3 = Stage 3   |
|   | At the moment, I don't eat sustainable food for most of my meals. I'm currently thinking about changing some or all of these meals to be more sustainable, but at the moment I'm unsure how I can do this, or when I should do so.                       |  | 4 = Stage 4   |
|   | At the moment, I don't eat sustainable food for most of my meals, but it is my aim to increase my current level of sustainable food consumption. I already know which meals I will replace and which alternative foodstuff I will use, but, as yet, have |  | 5 = Stage 5   |
| Because I'm aware of many problems associated with unsustainable food consumption, I already try to use sustainable food alternatives as much as possible. I will maintain or even increase my already high level of sustainable food consumption in the next month |  | 6 = Stage 5  |   |

| Behaviour variables (DV) |                             |   |  |
|--------------------------|-----------------------------|---|--|
| Food source              | Inspired by food guidelines | In the past 2 weeks how frequently have you engaged in the following activities at HOME?<br>I bought organic food<br>I bought seasonal vegetables<br>I bought locally sourced food (produced in the UK)   | 1 = never; 2 = rarely;<br>3 = sometimes; 4 = often; 5 = always   |
| Food Consumption         | Inspired by food guidelines | In the past 2 weeks how frequently have you engaged in the following activities at HOME?<br>- Red meat<br>- White meat<br>- Dairy<br>- Fruit & vegetables<br>- Processed Food<br>- Legumes<br>- Seafood   | 1 = never; 2 = less than once a month; 3 = 1-2 times a month; 4 = 1-2 times a week; 5 = 3-6 times a week; 6 = once a day; 7 = more than once a day |
| Food waste               |                             | In the past 2 weeks how frequently have you engaged in the following activities at HOME to reduce food waste?<br>I ate leftovers<br>I planned my shopping according to what I needed<br>I only cooked the necessary amount of food<br>I looked up recipes for using up the food I already had | 1 = never; 2 = rarely;<br>3 = sometimes; 4 = often; 5 = always   |

Note: all 'positive' statements are in high numbers, all 'negative' are in low numbers

## 9.3.3 Qualitative data analysis

### 9.3.3.1 TEMPLATES

*Table 60: Summary of the template*

| Theme                       | Subthemes level 1  | Subthemes level 2  | Subthemes level 3  |
|-----------------------------|--|--|--|
| 1) Identity                 | 1.1 Diet type<br>1.2 Visual association<br>1.3 Environmental identity<br>1.4 Environmental Identity process<br>1.5 Environmental Identity concept<br>1.6 Ingroup & Outgroup<br>1.7 Food identity<br>1.8 Ideal self | 1.2.4 Visual association T1<br>1.2.5 Visual association T2<br>1.3.1 Environmental identity at home & work<br>1.3.2 general environmental identity  |  |
| 2) Spillover                | 2.1 Descriptive (T1)<br>2.2 factors (T1 & T2)  | 2.2.1 mindset & awareness<br>2.2.10 other<br>2.2.2 personal norms<br>2.2.3 social norms<br>2.2.4 costs<br>2.2.5 habits<br>2.2.6 similarities & differences contexts<br>2.2.7 family dynamics<br>2.2.8 convenience<br>2.2.9 control   |  |
| 3) IPT components (T2 only) | 3.1 Stage 1 - Perception of sustainable food week<br>3.2 Stage 2 - Identity integration process<br>3.3 Stage 3 - Contextual spillover<br>3.4 People spillover  | 3.1.1 Perception of intervention<br>3.1.2 Perception of plates<br>3.1.3 Perception of information<br>3.1.4 General effect of intervention<br>3.1.5 Reactions of co-workers<br>3.2.1 Denial & defensive reaction/Scepticism<br>3.2.2 Compartmentalisation of identity<br>3.2.3 Integration of identity<br>3.3.1 Positive spillover<br>3.3.2 Lack of spillover<br>3.3.3 Negative spillover | 3.3.1.1 List of behaviours<br>3.3.1.2 Attitude Change<br>3.3.1.3 Deflection<br>3.3.1.4 Increased awareness<br>3.3.3.1 Compensatory thoughts or behaviour |
| 4) Behavioural context      | 4.1 Home context<br>4.2 Work context & work culture<br>4.3 Culture & Norms<br>4.4 Third places   | 4.1.1 ESB at home (T1)<br>4.1.2 social environment<br>4.2.1 ESB behaviour at work (T1) barriers at work<br>4.2.2 social environment<br>4.3.2 Upbringing<br>4.4.1 Supermarket<br>4.4.2 Media<br>4.4.3 Restaurants   |  |



### 9.3.3.2 EXCERPT OF AN INTERVIEW

T2 – 15/08/2017 TRANSCRIPT, Post-intervention

**ID 107 T2; C = Interviewer; 107\_T2 = Interviewee**

C: So first of all, I would like to talk about the sustainable food week and what did you think about it?

107\_T2:

I thought it was really good err, I mean from a variety point of view it was nice just nice for things to be a bit different I enjoyed that. I mean I the point is, of coming every that week just to see kind of how it was, err, but no I felt it was good, err so vegetarian kind of alternative as it were obviously with there being the sustainable, well, kind of meat not being particularly sustainable so but by trying vegetarian alternative stuff and I thought that was quite good. Err, some of the stuff I really enjoyed and the pasta that we had was really good, and yes it was good I felt it was good anyway.

C: Great what did you like about it like what particular?

107\_T2: To be honest everything seemed a bit healthier than usual. Err, and I guess that's kind of a by-product of it, that's definitely a good thing to be fair sometimes the food choice isn't particularly healthy err, cos they have got the salad bar the premium meals not a healthy option where it's that was probably not the case so, so that was good. Err, so some of the some of the things were, so I guess as I said before as well was when you have a vegetarian option it's just like the meat option meat taken out veg put it and that's not always the most appealing thing where that wasn't quite the case I didn't think. So yes, that was good.

C: What did you not like about it? If anything,

107\_T2: Err from my point of view I didn't I just good. Err I get I guess it's kind of an attitude to go in with open mind and try stuff and, yes, there wasn't anything I had that week that I didn't think was good and there were a couple of things were a lot better than I expected them to be so.

C: Okay that's great so can you say what you expected how it turned out?

107\_T2: Err so the err, the curry we had or might be a little bit bland looking at it was really nice, really tasty. Err, pasta as well - can't remember if it was spaghetti or lasagna or now but that was really good quite a long time ago now. But that was good.

C: Brilliant. Err, what do you think about the new plates?

107\_T2: That should just have them. I don't see why we haven't moved over to polystyrene ones anyways, so we should definitely have them. They are proper environmental friendly plates. Just seem silly otherwise I don't understand what the decision was.

C: Yes, that's good err what did you think about the information that was on the tables?

107\_T2: Err so I found it quite interesting, and I guess that kind of having that information their kind of reaffirmed why you were making specific choices helps you make specific choices which was really good. So, the only problem I would say was obviously so if you come in for a premium meal then you just kind of go and have a look and you wouldn't see the sign particularly until you were there like ordering the food kind of thing and you might not necessarily have the time to look through it all. Err, but obviously there is on all the tables when you like, and you know it was quite informative so that was good useful.

C: How did it help you to err make the choices?

107\_T2: I wouldn't say it necessarily did err, err at the time anyway so I guess knowing that both of them were sustainable choices just going well that is the one I like the look of [inaud 4.24] and then and then while you were eating it sat at the table you can read about it, so I think it's more like I kind of going forward thing rather than at that particularly time. So

C: Err and err, do you remember how you reacted when you read the information?

107\_T2: Err so some of the things I was quite surprised by like the amount of kind of effort energy I suppose into make especially with the meat products kind of the effort and the energy that goes into them and some of the paper stuff, the difference was quite substantial. So yes, I was quite surprised by some of that. [5:05]

C: Okay and how did that make you feel. About the food choices?

107\_T2: Err again probably going forward that's something that I've got more at the forefront of my head at the moment. Err as I say at the time the not that much impact but again because you know a bit whichever choice made was [inaud 5.27] what people normally have.

C: Because it was the sustainable

107\_T2: Yes yes. Yes, going forward then a bit more of a difference, especially where like red meat concerned as well because err, I didn't understand the impact on like the difference between meat and poultry didn't quite understand the amount of difference between those two as well so.

C: Okay and do you feel like knowing more of

107\_T2: Yes, definitely yes. Would be able to make. Better choices going for better choices going forward.

C: And how do you think err, that has impacted err, what you eat now?

107\_T2: Obviously, a little bit more aware of it now as a result of the sustainable food week kind of this programme as well. As a whole err, so the Nourish [food shop in town] in town, I guess you know Nourish, I have been there a few more times because that's kind of the most sustainable, well, maybe more I don't kind of know about the sustainability of it but it seems that way but certainly more kind of ethical where they err, so I've been there a few more times. Than I would have been prior to that. Err, to sustainable food week I haven't actually been in the office that much to make those choices but yes, its definitely at the forefront of my mind a lot more that it was before.

C: Okay and err, so when you were at home err, what do eat now has that had any err how did this kind of reflect?

107\_T2: Err because I don't do much of the shopping at home its quite difficult, you know but err, but there is something that kind of looking, you know actively looking for a bit more if I'm there doing the shop I actively look kind of this if there is any indicator of its more sustainable or less sustainable kind of thing, I mean with the meat thing we would tend to go for got some chicken or turkey more of the time anyway than red meat cheaper for most part, so err, because the two kind of fit together it makes it a bit easier to make more sustainable choice without that actually necessarily be the main reason. But err, and I mean we do try to you know eat fruit and veg and err and lentils stuff like that maybe a bit more than previously. Has been something me and my wife have talked about as well kind as part of the whole exercise as well. Because she was quite interested to know kind of what it was all about and stuff like that so yes so try to make a few different choices maybe but again with young family quite difficult at the time and you have got to prepare meals with family in mind so.

C: So, err, can you tell me like when you are in supermarket what kind of things do you look out for to make more sustainable choices as you have just mentioned?

107\_T2: And so, can't so looking so as an example so err, because I'm more clued up on Palm oil, palm oil is it a bit of a thing at the moment I'm aware of so err, and we were buying just like chocolate spread and Nutella spread whatever, and you can get well it has on the label that its sustainably sourced palm oil or doesn't say anything about it, so we have got that option make the choice a sustainable one just the kind of thing.

C: How did okay how did you become aware of palm oil? [9:35]

107\_T2: I knew it was its been in the news and that kind of thing, just err, I has been a bit of a traverse about over land being cleared, farms and not being particularly good for the environment and stuff like that so

C: Okay and how do you think the sustainable food week related to you looking at the palm oil?

107\_T2: I think it's just more of a consciousness thing I am more have more awareness of it in general and err, so I care more about it that way I guess.

C: Okay can you give examples of what things you now consider like aspects of sustainable food because palm oil is something that is you know err, that is something we did talk about in the sustainable food week because I'm really interested in

107\_T2: I'm not try and think how that came about really err, I'm sure I just saw something on the news about it, whereas before I would just like skipped over it. But actually, I was quite interested related to what we have talked about before so, err, when and everything really particular examples err, again some of this just because I've been away for a little bit and I haven't really gotten anything in particular. But no err, yes just paid more attention really to stuff like that and see if there is anything any indicator of that. I wouldn't say we shopped anywhere different at the moment anyway, and err, not sure about that will change might or not I guess that depends on how particular supermarkets or whatever if they have them more kind of obvious attitude to err, sourcing sustainable food or not. I would say that if you know if the supermarket did, was kind of open say well we are going to source more sustainable food [inaud 11.19] that would probably be fine I would probably be a positive action there going forward. I guess it's just maybe an ease thing as well. Err, it is I would still say it's quite difficult to go in the supermarket and make sustainable food choices. Err, can be cos it's not really in all the thing that is on label or anything like that something you have to look for and I think if it was a bit easier, then I would definitely act on that.

C: Okay so what indicators are you normally looking for?

107\_T2: Err as I say just any things maybe on the label that suggests, err, I guess for the most part I don't know whether this is an assumption on my part, but I guess if something is organically farmed then its potentially more

sustainable certainly in like fruit and veg space, and in the meat space, but if its organic it's probably more sustainable than the non-organic in terms of.

C: Is that something you look out for now do you buy more organic?

107\_T2: I do yes err, and I mean it's something that done kind of sporadically in the past like but again try and try and make that kind of get that balance between it being organic and it cost organic obviously for the most part does cost more and it's kind of finding that nice middle ground between where where does the value lie; whereas now I probably be a little bit less concerned and [inaud 13.03] Financially doesn't matter if twenty p more for mushrooms whatever. Really doesn't matter err, but when you have got those two packs in front of you typically previously probably gone for the cheaper one now go for the organic one and just not really worry about it too much.

C: Again, how do you think that relates to the sustainable?

107\_T2: Err again so and again I'm making assumptions that the organic stuff is probably more sustainable so and there I could be wrong about it, I don't know, but yes I guess make it more it's more ethical if you see what I suppose that kind of where that's come from.

C: Okay err, so just thinking about the sustainable food week, what do you think was the main message of it what was the main thing the [inaud 14.40] that was there I mean I'm not asking for any quotes just

107\_T2: So I guess that err the information that was displayed about kind of the effort that goes into the like growing particular types of food was what I kind of mainly remember from it, and and so you know having messages there and being able to see the actual impact in kind of the litres of water or whatever was used, I found that really useful.

C: Okay and err, have you adopted any of those things like directly from you talked about like choosing more organic food now than you had previously?

107\_T2: Yes

C: Have you adopted anything that you learn from? [15:00]

107\_T2: Yes, so I mean planning meals we are probably doing them a bit differently and again, trying to avoid, maybe more so than previously, red meat and stuff like that, is not sustainable food so err, again cos I don't primarily kind of prepare the meals just cos the way things are at home at the moment. That's kind of I haven't had that much influence on it but it's definitely something we have talked about and conscientiously discussed.

[...]

C: Okay so I brought some like this little person again, I've got the three terms they haven't changed so its sustainability, sustainable food and environmentally friendly self. You just want to briefly say what comes to mind when you see these terms now?

107\_T2: So, I guess from the environmental self thing that's kind of again more holistic thing where touching on multiple aspects if you like kind of saving energy and stuff like that as well and recycling all those kinds of things. Err, sustainable and sustainable food err, food that has the less impact on the environmental well, essentially negative, or a neutral impact on the environment so, that the production of our food doesn't harm the environmental or prevent food form being produced in the future and sustainability being kind of again what holistic things, just having a neutral impact not just food but err, environmental aspects as well.

C: And err could you sort again as we did last time like with central to you can you put on the little person if it's like not so central be further and away and central means central to who you are.

107\_T2: I guess that they are all kind of close but not I mean, I wouldn't it's not an overarching thing that I do with something that you know I do try to make improvements, but it's not like making wholesale changes or anything like that so I guess just fairly close not not a central thing.

C: Okay and err how is that different between like err?

107\_T2: Err so obviously at home you can do more, err whereas in the office you can kind of bound by the office environment a bit more, whereas at home just do, you do what you think is the correct thing to do. err, that not that there is any other than the whole plate issues there is nothing in the office that particularly seen as really, really bad. And as a whole, the BT group trying to do some environmentally good things. The kind of with the recycling and err, the steps to save energy in the building and stuff like that. Err, but you know there is nothing I would say as an individuals for the most part that we do in the office whereas at home obviously we have got your owns choices that you can make about it.

C: How has that changed since sustainable food week do you think? [40:00]

107\_T2: So, I think err, I mean I'm choosing to eat in the canteen so, I [inaud] some impact there because I think err, well what I would say is that what this sustainable food week has said to me, so I think some of the choices that that are made in the canteen are probably not the choices that should made so err, maybe I'll eat elsewhere

and go somewhere, I don't know more that offers a more ethically correct choice rather than stay in the canteen. Err, I wouldn't say from home point of view apart from trying to make incremental changes I wouldn't say anything particular has changed there, err, I guess because what that this issues anyway so err, from the other end, you know, yes I do try and think about, but again they are making the correct choice often I wouldn't say more, aside from the food aspect and err, at home.



C: Okay just take a picture. So, do you think for you and next job is that something you will be looking at for in the company?

107\_T2: No, I'm just kind of moving back into new BT group so err, so it I mean so from the point of view the reason I've moving this time I've moved out of shift work because my wife does shifts so its more of a child care thing. err, and so er, so is didn't really think about that, but it means you know I'm from an ethical standpoint I will be working for like a BT group away so that where I came from before PlusNet, so you know its wasn't, so I mean I wouldn't necessarily work for a company that I thought was unethical or doing that things that thought well that's really unsustainable err, but you know company that had a massive negative environmental impact I wouldn't work for, but I mean that wouldn't have changed as a result of what we have done [sustainable food week] that's my own ethical compass kind of things so.

C: Okay and err, what role do you think your identity plays with what you eat or how you eat.

107\_T2: So I guess if you think of yourself as ethical person, if you make moral decisions you know it needs to be reflected in kind all aspects and food is an aspects of that it should be reflected in. Again I've myself fairly healthy and you know falls within that healthy eating thing again cos they kind of overlap quite nicely they kind of part of that as well.

C: And how do you think err, the sustainable food week has impacted that at all?

107\_T2: So, I think well its again because I don't know some of the things about the impact of certain food production so that has been the main impact of understanding that a bit more, I wouldn't say from an identity point of view it has changed anything but would say its because I know more about it, better educated about it now. Err as a result of that can now come and know more about what are the better choices.

[...]