Redefining normal: The perceived normality of low and no meat diets and implications for sustainable dietary behaviour change

Vibhuti Patel
BSc, MSciComm

A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy

The University of Sheffield
Faculty of Science
Department of Psychology

December, 2022

Table of Contents

Declaration

I, the author, confirm that the Thesis is my own work. I am aware of the University's Guidance on the Use of Unfair Means (www.sheffield.ac.uk/ssid/unfair-means). This work has not been previously presented for an award at this, or any other, university.

Acknowledgements

This little space cannot possibly express how thankful I am to everyone who helped me throughout this four year journey and made this thesis possible. But I'll give it a try.

To my thesis supervisors, Dr Nicola Buckland and Professor Helen Kennedy, your feedback, insight, and unending support over the past four years have been absolutely invaluable. You have challenged and encouraged me to approach this topic in ways that I would not have otherwise considered, shaping me into the type of researcher I always wanted to be. Thank you.

Thanks to the Grantham Centre for Sustainable Futures for providing me with so many opportunities for training, funding, and a strong support network filled with amazing people!

Thank you to all of the research collaborators that made my work possible, especially to Associate Professor Miranda Mirosa and Martin Jones of the University of Otago, who both helped and supported me in carrying out my study in Aotearoa New Zealand during what was a very stressful time! Huge thanks also go to Iain Armstrong, Deborah Knight, and Tim Allen from the University of Sheffield for their assistance in organising another of my studies, and without whom this research may have never left the ground.

My sincerest gratitude goes to everyone who helped me settle in and call Sheffield home, including my UK-based family, friends, and the amazing women at Save a Stray, who allowed me to be a kitty foster mum and benefit from all the cuddles!

To Kristin, for being my mentor of sorts – I have learned so much from you, and you have given me so many opportunities to network and collaborate on some amazing projects. Thank you!

To my closest friends scattered all over the world, you have all been incredible and I am so lucky to have you in my life.

Jordi, thank you for being there for me – whether it's to laugh, cry, or complain (but mostly just talk about stupid things, honestly). You are a genuine light in my life, and I am so grateful to call you my best friend.

Jason, thank you for all of your assistance and advice throughout, and for being a constant source of laughter and support.

Rupesh, Gita, and their little fuzzball Ziggy, thank you for your encouragement, the surprise vegan treats, and for making my 2021 Christmas so memorable!

And to Nancy. You have quite literally gotten me through this, and I never expected to find such an amazing friend in Sheffield. I'll always remember our woodland karaoke sessions, spontaneous spending and feasting bouts, and all of our strange conversations.

Finally, the biggest ever thanks go to my amazing family in Aotearoa; mum, dad, Krishna, Leo, and Kevin. Despite the distance, you never felt far away. Thank you for your love and for always believing in me – especially when I didn't believe in myself. This one's for you.

Abstract

In the global north, high rates of meat consumption are contributing to multiple harms related to human health, animal welfare, and the natural environment. Alongside policy and economic changes, alleviating these harms requires substantial reductions in meat consumption. Meat consumption in the global north is a social norm, which appears to be shifting with reported increases in low and no meat (LNM) diets. However, the perceived normality of LNM diets – and any behavioural implications of these perceptions – remains relatively unexplored. This thesis aims to explore perceptions about LNM diets, and the individuals who follow them. Additionally, the effect of perceived LNM dietary norms on food choice behaviour was investigated. Five empirical studies were conducted to address these research aims, spanning several disciplines – primarily psychology, but incorporating elements of sociology, communications, and media studies.

Study one (Chapter Four) used a thematic analysis to explore representations of LNM diets on Twitter. Across two different samples (UK population and UK university staff and students), studies two and three (Chapter Five) used a between-subjects free association task and vignettes to explore and compare perceptions about meat reducers, vegetarians, and habitual meat consumers. Findings of these three studies indicated that positive representations of LNM diets were the most common on Twitter, and there was a high perceived prevalence of LNM diets among the samples of studies two and three. Furthermore, LNM diets and those who follow them, were associated with largely positive traits. Perceived commonness was considered indicative of descriptive norms, and positive perceptions were considered indicative of injunctive norms. Taken together, the results of these three studies suggest that LNM diets, and those who follow them, are increasingly perceived as normal.

Studies four (Chapter Six) and five (Chapter Seven) used naturalistic social norms interventions to assess the role of perceived LNM norms on meat and meatless food purchases. Study four was conducted at a university food outlet in Aotearoa New Zealand. Study five used several modes of social norms message delivery and was conducted at three food outlets at a UK university. Across both studies, there were no significant differences in meat or meatless food purchases resulting from the intervention. These findings may be due to a number of factors inherent in applied food choice research, as well as limited available resources. Further research – with access to larger teams with wider expertise, time, and funds - is required to explore the generalisability of these findings.

List of Tables

List of Figures

Dissemination, Recognition, and Research Activities

***A note on authorship*:** Due to differing norms in the disciplines in which the second supervisor (HK) is situated, she is not named as an author on publications. However, her input has nonetheless been invaluable and integral to these works.

Published articles:
Some of the work that forms this thesis has been published during the period of PhD registration. Copyright of these papers resides with the publishers, however reproduction of papers is permitted in the terms of the copyright agreements. Permission may be found in the Appendices.

- **Patel, V**. & Buckland, N. (2021). Perceptions about Meat Reducers: Results from Two UK Studies Exploring Personality Impressions and Perceived Group Membership. *Food Quality & Preference, 93.*

Articles under review:
At the time of thesis publication, studies four (Chapter Six) and five (Chapter Seven) are undergoing peer review:

- **Patel, V.,** Mirosa, M., & Buckland, N. (*under review*). Investigating the effect of meat reduction social norm messages on university food outlet purchases: Results from two studies in Aotearoa New Zealand and the UK.

Talks and presentations (indicates prize won):*
- **Patel, V.** Investigating the effect of meat reduction social norm messages on university food outlet purchases. Oral presentation at the Institute for Sustainable Food ECR conference* (2022), British Food and Drinking Group conference (2022), and Livestock, Environment, & People conference (2023).
- **Patel, V.** Perceptions about Meat Reducers and Implications for Social Norms Interventions to Reduce Meat Consumption. Oral presentation at the ISBNPA conference (2020).
- **Patel, V.** Perceptions about Meat Reducers and Implications for Social Norms Interventions to Reduce Meat Consumption. Posters presented at the World Biodiversity Forum, Switzerland (2020), Grantham Centre Annual Symposium (2019), N8 Agrifood conference (2019), and Livestock Environment and People conference (2019).

Recognition:
- In 2022, I was shortlisted for the National PhD Student of the Year UK award as part of the FindaMasters Postgrad Awards, open to all UK PhD students.

Outreach:
- Bash, K. & **Patel, V.** (2020). Why does meat matter and what can we do about it? Speaker for Sustainability Skills and Education Series, Green Impact Sheffield.
- **Patel, V.** (2021). Behaviour Change for Conservation. Speaker for Parks Victoria Partnerships Workshop.

Teaching and lectures:

- I delivered a lecture for the PSY1001 Social Psychology module at the University of Sheffield, titled *Social Norms and Sustainable Diets* (Spring semester, 2022).
- I worked as a graduate teaching assistant for the SCS2019 Advancing with Digital Methods module at the University of Sheffield (Autumn semester, 2021).
- I marked student examinations for PSY1001 and PSY2001 modules at the University of Sheffield (Spring semester, 2021).

Other studies published during PhD registration:

- Larner, E. Fish, A., Way, C., Muir, K., Graham, F., Armstrong, B., **Patel, V.,** Knight, D., Jourdain, R., Allen, T., Armstrong, I., Collister, J., Barnett, O., & Reynolds, C. (2021). Reaction to a low-carbon footprint food logo and other sustainable diet promotions in a UK University's Student Union 'Living Lab'. *Future of Food: Journal of Food, Agriculture, & Society, 9*(1).
- **Patel, V.** (2020). Ethics of Food Production and Consumption. In: Leal Filho W., Azul A., Brandli L., Özuyar P., Wall T. (eds) Zero Hunger.

External Research Activities:

- I designed and helped to conduct a behavioural intervention targeting household wood stove use using the Burner Alert system, in joint collaboration with the University of Nottingham.
- I assisted in developing a research project assessing organisational readiness to advocate sustainable diet policy among UK public health organisations, with the Faculty of Public Health UK & Eating Better.

Clarifying Terms and Definitions

- *Low or no meat (LNM) diets* refer to vegetarian, vegan, pescetarian, flexitarian, and meat reduction diets.
    - *Veganism* is a dietary pattern that excludes all animal products, including meat, fish, cheese, butter, milk, and eggs.
    - *Vegetarianism* is a dietary pattern that includes cheese, butter, milk, and eggs, but excludes meat and fish.
    - *Pescetarianism* is a dietary pattern that excludes meat, but includes fish and other animal products.
    - *Flexitarianism* is a dietary pattern that limits, but still includes occasional meat intake.
    - *Meat reducers* consume a variable amount of meat and/or fish, but are actively reducing their consumption of these items. As such, this dietary pattern encompasses the shift towards increasingly plant-based diets.
- *LNM adherents:* Individuals who practice LNM diets.
- *Meat* refers to all animal-based food products, including red and white meats (e.g. beef, lamb, pork, chicken, turkey, fish, seafood etc) that are either unprocessed (e.g. chicken breast, steak, fish filet) or processed (e.g. sausage, salami, meat mince, chicken nuggets, crab cakes) (from Lentz et al., 2018).
- *Society:* This research focuses on affluent societies in the Global North that are not subject to regional and economic constraints. To clarify, this research considers societies where the price of meat today, relative to average incomes, is low. This research does not consider societies where there may be no alternative to high meat diets (e.g. indigenous groups, nomadic pastoralists) or those that are too poor to afford large amounts of meat.

A Note on COVID-19

The COVID-19 pandemic begun in late 2019, one year into the PhD. The effects of the pandemic persisted throughout the PhD period, affecting the original thesis plan and requiring significant changes to be made. The subject matter of this thesis was also related to the pandemic given that the COVID-19 virus was zoonotic (i.e. transmitted from animals to humans) and possibly originated from a live animal food market (Sachs et al., 2022). The media highlighted the zoonotic roots of the virus, which may have raised general awareness of the safety issues surrounding animal consumption (Attwood & Hajat, 2020). As such, some of the results of the conducted studies may have been affected. This was an unavoidable aspect of researching such a topic in the midst of a pandemic with zoonotic origins. For transparency, the pre- or post-COVID status of each study will be specified in the methods section of each respective chapter, as well as any changes to the original plan that had to be made as a result.

1 Introduction

Contemporary eating patterns, particularly in the Global North, are excessively high in animal-based foods. In the year 2021, the average amount of meat consumed per capita in the UK was 62 kilograms (Organisation for Economic Co-operation and Development [OECD], 2022). Similar figures were common in other countries of the Global North (e.g. 74 kg in Aotearoa New Zealand; 101 kg in the United States), all of which exceeded the global averages (34 kg). Such high rates of meat consumption are associated with multiple harms related to the environment, human health, and animal suffering (see Table 1.1). Many of these harms stem from industrialised methods, which are common practice in contemporary food production. Considering these harms, it is clear that an urgent reduction in meat consumption is needed, particularly in the Global North where intake is, on average, double that of developing countries (Stoll-Kleemann & O'Riordan, 2015). Concerted efforts to reduce meat consumption and promote healthy, sustainable diets would alleviate the harms outlined in Table 1.1, and in so doing address several of the 17 Sustainable Development Goals (SDGs), a set of targets developed by the international community to improve human and planetary health (Griggs et al., 2013). Specifically, large scale meat reduction could lower food prices and insecurity (goals 1 and 2), reduce mortality and health costs associated with high meat intake (goal 3), reduce the use of finite land and water resources (goals 6 and 15), promote more responsible consumption (goal 12), reduce greenhouse gas emissions (goal 13), and significantly reduce deforestation and land degradation (goal 15) (Obersteiner et al., 2016). The need for meat reduction has become more pressing given the increase in global food inequality caused by the COVID-19 pandemic (Reisch, 2021), as well as the projected increase in global population and related demand for animal food products (Tilman & Clark, 2014).

Policy and regulatory measures to address the problems caused by high meat consumption are slow-moving, if at all existent (Dagevos & Voordouw, 2013). These measures are often rife with complex, controversial, or otherwise politically sensitive trade-offs, leading to low government interest in most countries and resulting largely in inaction. The UK government, for example, commissioned an independent review for a National Food Strategy in 2021 (Dimbleby, 2021), aiming to conceive an actionable plan for a better food system. To this end, the review included several highly ambitious recommendations to improve human health, reduce food insecurity, and increase sustainability. Measures to achieve these goals included an expansion of free school meals, a salt and sugar tax, improving environmental farming standards, and notably, a 30% cut in meat consumption. 30% is a moderate, challenging, yet feasible proportion. However the release of the government food strategy one year later (Department for Food, Environment, and Rural Affairs, 2022) revealed that the government disregarded all but a few, less impactful recommendations from Dimbleby (2021), including that to cut meat consumption. Since it is apparent that these issues are low on the government's agenda, complementary individual dietary changes must be considered. It is also possible that consumer-level change will generate the momentum needed to mobilise more powerful actors, such as governments, corporations, and other institutions.

Table 1.1. The problems caused by high rates of meat consumption, broadly categorised.

Harms	Description
Environmental	● Industrialised animal farming uses more land, water, and energy compared to equivalent plant foods (Godfray et al., 2018). ● The production of animal foods emits high amounts of greenhouse gases (i.e. carbon dioxide, nitrous oxide, methane), contributing heavily to the climate crisis (Gerber et al., 2013). ● Animal food production leaches pollutants (e.g. nitrates, ammonia) into groundwater, freshwater, and ocean ecosystems, resulting in 'dead zones' devoid of aquatic life (Diaz & Rosenberg, 2008). ● Habitat loss, overexploitation, and the acceleration of the climate crisis caused by high rates of meat consumption are significant drivers of ecosystem degradation and biodiversity loss (Coimbra et al., 2020; Machovina et al., 2015).
Ethical	● Industrialised farms are characterised by their confinement, selective breeding, overcrowding, and intensive feeding of farmed animals. ● This model yields high rates of inexpensive animal foods but causes enduring pain, lameness, disease, and psychological stress to animals (Rossi et al., 2014), raising a host of ethical questions.
Health	● The most common global cause of death is poor diet (Branca et al., 2019). ● Meat can provide nutritional benefits, however overconsumption is a significant driver of heart disease, obesity, stroke, diabetes, kidney disease, respiratory disease, liver disease, and cancers (Etemadi et al., 2017). ● Industrial animal farming facilitates antimicrobial resistance in humans, since approximately half of current antibiotic production is used in agriculture (Tang et al., 2017). ● Industrial animal farming facilitates the rise and spread of zoonotic pathogens. For example, the majority of novel avian influenza viruses have been traced back to industrialised chicken farms (Dhingra et al., 2018).
Social & economic	● A universal switch to lower meat dietary recommendations would result in savings between 950-1700 billion USD related to healthcare, environmental services, and greenhouse gas mitigation costs (Springmann et al., 2016). ● Meat processing causes high rates of injury, disease, and psychological stress among workers (May et al., 2012; Slade & Alleyne, 2021), many of whom are people of colour, immigrants, or otherwise disadvantaged (Winders & Abrell, 2021). ● The inefficiency of meat production means that a large proportion of land and resources are used to produce a relatively small amount of calories for a relatively small proportion of the global population, reducing food security and resource availability for local communities, especially those that are less affluent (West et al., 2014).

Individual dietary change is an essential part of the solution to these issues, together with changes to policy, corporate business practices, and at the farm level (Bajželj et al., 2014; Poore & Nemecek, 2018). In 2019, the EAT-*Lancet* Commission compiled a landmark report presenting a 'universal reference diet', in order to feed a population of 10 billion within planetary boundaries. It outlines dietary intakes of different food groups for optimal human and planetary health, recommending no more than 26 kg of meat (including red meat, poultry, and fish) per person per year. The EAT-*Lancet* report has been criticised for a number of reasons, including its neglect of local contexts and realities related to food affordability and availability (Hirvonen et al., 2020). However, it has nonetheless become an important publication in debates surrounding food system transformation, joining several others calling for diets lower in animal foods (e.g. Poore & Nemecek, 2018; Tilman & Clark, 2014). Alongside regulatory and economic measures, changing norms and consumer choice have been identified as key priorities to achieve the kinds of transformation outlined in these reports (Béné et al., 2020). However, despite calls to reduce intake from multiple bodies, meat consumption remains a normal practice in many countries.

Meat consumption is difficult to change for a number of reasons (see Chapter Two, section 2.4). At a fundamental level, meat has deep and symbolic roots in food consumption practices and cultures, which are largely perceived as 'normal' (Leroy & Praet, 2015). It is a desirable staple in most diets and is often made by food retailers to be the 'easy' choice (Dagevos, 2021), which contributes to the high intake levels noted previously.

Despite these high intake levels, evidence suggests that many individuals find aspects of meat production problematic (see Loughnan et al., 2014). For example, a recent survey revealed that the majority of UK adults find common animal farming practices, such as chicken debeaking and calf castration, unacceptable (Bryant Resesarch, 2022). This suggests an attitude-behaviour gap, which in this context has been termed 'the meat paradox' (Loughnan et al., 2014). The meat paradox is a type of cognitive dissonance (Festinger, 1957), a term which is used to describe the misalignment of beliefs and actions, resulting in a moral conflict that is experienced in those disturbed by the thought of their behaviour causing harm. Individuals may resolve this conflict by either, 1) bringing their behaviour into alignment with their ideals or attitudes (i.e. by rejecting meat, as illustrated by individuals who follow a meatless diet), or 2) by bringing their beliefs into alignment with their behaviour (i.e. adopting beliefs that accommodate or rationalise behaviour). The former is a viable solution; according to Rozin et al. (1997), vegetarians experience little to no tension between their diet and beliefs. However, given current rates of meat consumption, it seems that the latter approach – justifying or rationalising meat consumption – is far more common (Loughnan et al., 2014).

Rationalisation allows individuals to maintain a moral self-image and diffuse guilt while continuing to engage in practices or beliefs which may be harmful or problematic (Bandura, 1999). Related to meat consumption, rationalisation strategies have been summarised under four categories; *natural, necessary, nice,* and *normal* (Piazza et al., 2015). Characterising meat consumption as 'natural' appeals to aspects of human evolution and biology, compared to those of natural carnivores and herbivores. The 'necessary' argument is related to the 'natural' argument, claiming that meat is integral for survival and health. The 'nice' argument considers taste and sensory enjoyment derived from meat consumption. Finally, the 'normal' argument – the focus of this thesis – characterises

meat-eating as a prevalent and deeply embedded practice in societal, cultural, and individual life. Central to this rationalisation is the widespread practice and social acceptance of meat consumption in society. For example, when assessing spontaneous rationalisations cited by meat eaters, those coded under “normal” included phrases such as “Society says it's okay”; “I was raised eating meat”; “Meat is culturally accepted”; “A lot of other people eat meat” (Piazza et al., 2015).

As meat eating has been framed and understood as “normal”, so meat abstinence has been framed and understood as “abnormal”. For example, media analyses from 2011-2014 revealed that meat-free diets had been framed as abnormal or unachievable for ‘normal’ people (Cole & Morgan, 2011; Mastermann-Smith et al., 2014; see Chapter Four). However, meat-eating norms appear to be shifting. As awareness of the problems posed by meat consumption steadily grows, so too do efforts to change meat-eating norms. Low or no meat (LNM) diets are growing in presence, to wide recognition today from relative obscurity in the last century. In a 2021 representative survey of 2000 UK adults, approximately 6% of participants reported following a vegetarian diet (i.e. refraining from meat and fish, equating to approximately 3.3 million people), and 3% were vegan (i.e. refraining from all animal-derived food products, equating to approximately 1.6 million people) (Finder UK, 2022). These numbers have grown rapidly, from 1.1% of the population (approximately 542,000 people) reported to have been vegan in 2019 (Ipsos Mori, 2016). Alongside the attendant decline in per capita UK meat consumption from 2008 to 2019 (a decrease of approximately 17.4 grams per day; Stewart et al., 2021), such growth has led to claims that veganism is among the fastest growing lifestyle movements in history (Ipsos Mori, 2016). Flexitarianism, a dietary pattern that limits but still includes meat, is also growing in popularity. Reports estimate that between 14% (YouGov, 2019) and 39% (Penny et al., 2015) of the UK population follow a flexitarian diet, and that 44% are either willing to, or are currently reducing meat intake. Similar effects have been observed worldwide (see Dagevos, 2021 for a review).

The increased interest in LNM diets may have resulted from a range of contextual factors. First, there has been an increase in the frequency of severe environmental disasters in recent history, ranging from the 2019 wildfires in Australia and the Amazon rainforest, severe storms and flooding across parts of India, Asia, and Africa in 2020, and most recently the European summer heatwaves of 2022. These events have increased the salience of the climate crisis and highlighted the urgency for immediate preventative action. Second, there has been increased coverage of the climate crisis in the media (Boykoff et al., 2021), alongside large-scale campaigns and movements (e.g. *Veganuary* [uk.veganuary.com] and the youth climate strikes). Activists, such as Greta Thunberg, have mobilised these movements and gained worldwide audiences. Third, vegetarian and vegan food products have been increasingly incorporated into the product ranges of both large and small food businesses and corporations, which have themselves attracted media attention (e.g. Greggs vegan sausage rolls in the UK; see https://www.thesun.co.uk/money/10663262/veganuary-greggs-steak-bake-wagamamas-mcdonalds-kfc/). Finally, it is also possible that the rapid and wide sharing of content enabled by social media has contributed to LNM diet uptake (see Chapter Two, section 2.2.2.1). For example in a recent survey, nearly half of the UK participants stated that they would make changes to their diets based on what they had seen on social media (Arla Foods, 2022). These interacting factors present a unique and unprecedented backdrop to the research presented in this thesis.

While LNM diets are growing in presence, there is a need for these trends to accelerate considerably, in order to address the urgent threats posed by excessive meat intake (Stewart et al., 2021).

1.1 Rationale, Aims, and Programme of Current Research

Social norms are perceptions of others' beliefs and behaviours (Cialdini et al., 1990). Social norms related to diets are a key determinant of food choices, habits, and behaviours (Higgs & Thomas, 2016; see Chapter Two, section 2.1.1 for further detail). Perceived social norms are thus likely to influence dietary behaviours, an effect that has been empirically observed (see Chapter Two, section 2.3.3). This thesis explores perceived social norms surrounding LNM diets and those who follow them (i.e. LNM adherents). Furthermore, this thesis investigates the role of LNM-related norms in food purchasing behaviours by way of naturalistic social norms interventions. As such, this thesis makes an original contribution to knowledge by exploring these relatively unexplored research areas. Using a primarily psychological approach and incorporating elements of sociology, media, and communications studies, the research presented in this thesis provides a broader understanding of these topics (see Chapter Three, section 3.2 for a discussion about interdisciplinarity).

This thesis aims to answer two research questions:

1) How "normal" are LNM (low or no meat) diets, and those who follow them (i.e. LNM adherents) perceived to be?
2) Can messaging about LNM dietary norms change food choice behaviour?

These research questions are addressed after a literature review (Chapter Two) and overview of methods (Chapter Three) across five studies reported in subsequent chapters (see Figure 1.1):

- Study one (Chapter Four) addressed the first research question by exploring perceptions of the normality of LNM diets amongst Twitter users, through assessing the prevalence of, and engagement with LNM-related content using thematic analysis.
- Studies two and three (Chapter Five) addressed the first research question by examining how meat reducers are perceived, compared to how vegetarians and habitual meat consumers are perceived, using a free association task and vignettes.
- Studies four and five (Chapters Six and Seven) addressed the second research question, by testing the effect of social norm messaging on food choice purchases at university food outlets in the UK and Aotearoa New Zealand.

Chapter Eight comprises an in-depth discussion that consolidates the findings, and examines implications of the previous chapters. Overall strengths, limitations, and suggestions for future research are also given in this chapter.

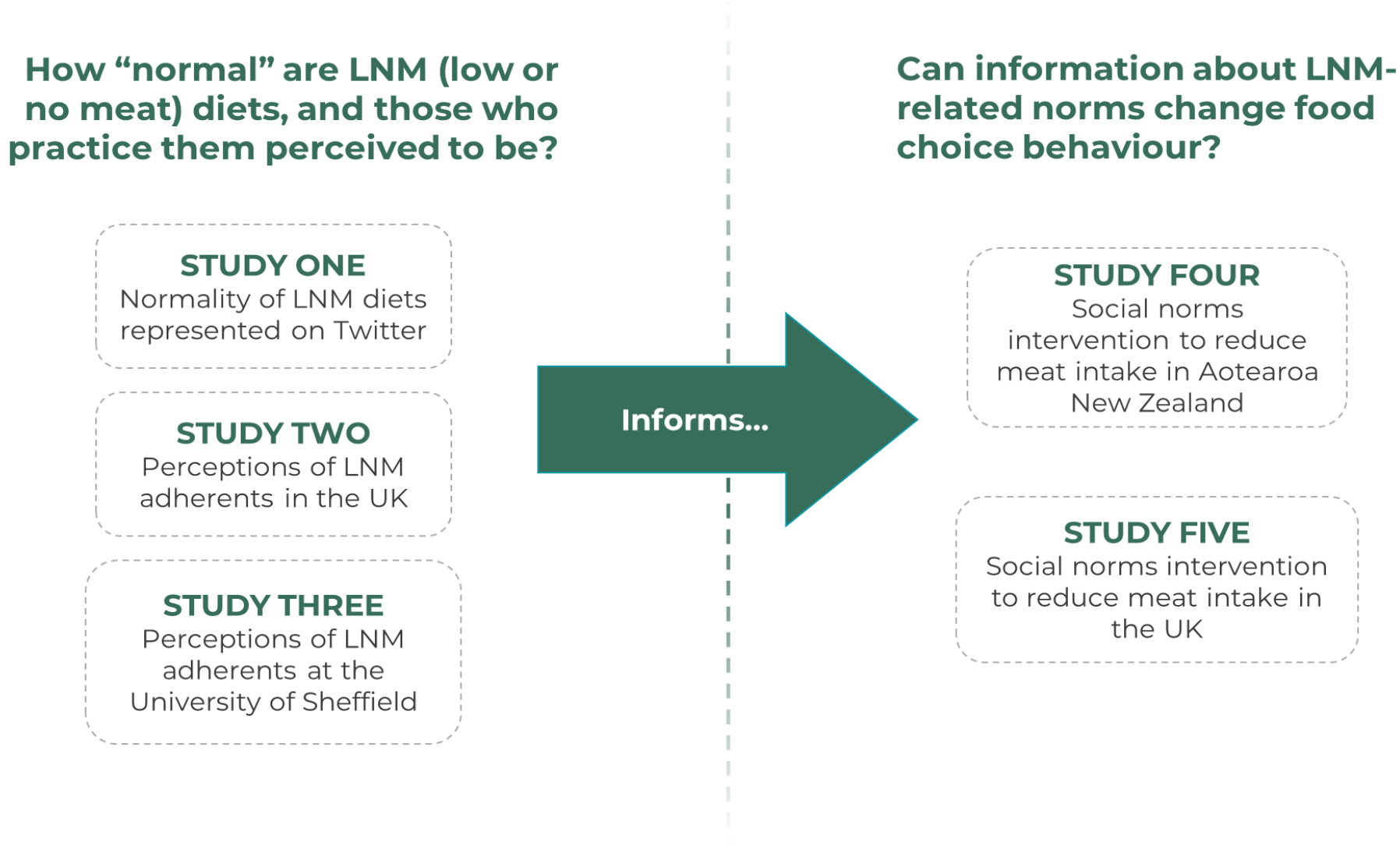


Figure 1.1. Conceptual map of research questions and studies included in this thesis. LNM diets refer to low or no meat diets, encompassing veganism, vegetarianism, pescetarianism, flexitarianism, and meat reduction.

Without deviation from the norm, progress is not possible.
Frank Zappa

2 On Norms, Society, Behaviour, and Change

Meat eating is considered to be a normal practice in many countries around the world, especially so in the Global North. But what does it mean for something to be regarded as normal? How do individuals perceive, identify, and acquire norms, and what factors determine when they are, and when they are not followed? The Oxford dictionary defines "normal" as "conforming to a standard; usual, typical, or expected". The concept of "normal" and its constituents (e.g. "norms", "normality") are widely used in everyday language and have long been the subject of theoretical consideration in many disciplines, including psychology, sociology, philosophy, law, and economics (see Legros & Cislaghi, 2020). Understanding the various theoretical conceptions of "normal" may help to clarify what a "normal" behaviour entails, and how these notions may play a role in reducing meat-eating behaviour. Focusing on psychological and sociological perspectives, this chapter explores various conceptions of "norms" and "normal" (section 2.1) and the formation of norms (section 2.2). This is followed by an examination of behaviour change theory (section 2.3), meat-eating as a changing norm (section 2.4), and the application of behavioural science and social norms to encourage reduced meat consumption (section 2.4.2).

2.1 Conceptualising Normal

Today, "normal" is often conceptualised as both factual (i.e. referring to the present, average state) and normative (i.e. referring to the aspirational or desirable state) (Misztal, 2001). These ideas were present but underdeveloped in the earliest conceptions of normality, which have theoretical roots in both social psychology and sociology. It seems that a combination of the two; the factual and the normative, were central to early inquiry into this topic.

The notion of "normal" is inherently complex and ambiguous. In a sociological sense, it is considered an aspect of 'everyday life', which may be described as the observable backdrop and manifestation of human social existence. Sztompka (2008) conceptualises everyday life is the web of encounters, interactions, relationships, bonds, and links with others, encompassing everything from cooperation to conflict, empathy to discrimination. It therefore encompasses all forms of social existence; not just the significant (e.g. presidential inaugurations, labour strikes), but also the mundane (e.g. lunch at work, watching TV with family). The interacting and dynamic facets of everyday life are considered 'normal', and stable for that point in time. However, Misztal (2001) argued that normality can be questioned or criticised. It may be seen to be overly demanding of conformity and consensus, or fraught with inequalities. Indeed, the current status quo has been associated with injustice and inequality (Rawls, 2009). Therefore, whilst normality has also been associated with the present, factual state, it has also been associated with the desirable, aspirational state (Goffman, 1974). This duality was succinctly summarised by Rabikowska (2010); normality is a state to come in the future, but it is also immersed in the present, itself the source of ambitions and desires. At the same time, in times of disruption or upheaval, the stability of 'normal, everyday life' becomes

desirable and uncertainty about the future becomes a source of anxiety. This was particularly evident during the COVID-19 pandemic where disruption to everyday routines resulted in a longing to 'return to normal' (Codagnone et al., 2021; see section 2.2.3). As such, normality is associated with notions of predictability, reliability, safety, and comfort, but also aspiration, idealism, and perfection.

Other work maintains that, in societies and groups, norms regulate the social response to individual behaviour; norm violation will be met with social sanction or punishment, whereas norm conformity will be socially rewarded (see section 2.1.2 for further detail). Some sociologists speculate that contemporary norms have roots in statutes and laws and/or are shaped or imposed by those who possess or exercise power (Foucault, 1977). For example, institutions (from prison guards to national states) exercise disciplinary power to impose and control behaviours, to the extent that individuals begin to internalise the power structure (Foucault, 1977). Applied to norms, Foucault (1977) argues that externally imposed normality, given time and continuous exposure, becomes internalised normality with the original external constraints and imposition no longer perceived as such. In this way, normality is a reflection and product of power structures, which may or may not continue to be salient. While Foucault's (1977) analysis of power structures as the root of norms is valid in many cases, it is not necessarily true that it applies to all contemporary norms. This becomes apparent given that some norms do not operate through explicit constraint and instead operate merely by providing a standard of orientation and validation, which may or may not be adhered to (for example, in the case of consumer norms). By their very definition, norms are informal and unwritten, yet they can exert a very strong influence over social behaviour.

2.1.1 Social Norm Theory

Alongside the sociological inquiry outlined above, a new psychological theory of social norms was being developed. In the 1950s, several experimental studies (e.g. Asch, 1952) demonstrated that individual cognition and behaviour were subject to group influences. However, at that time "group influence" was a blanket term with little nuance about the social factors it encompassed. Building upon this early empirical work, Deutsch and Gerrard (1955) identified two types of influence that may fall under the umbrella of "group influence"; normative influence and informational influence. Normative influence was described as the influence to conform with the expectations of others, and informational influence was described as the "influence to accept information obtained from another as evidence about reality" (Deutsch & Gerrard, 1955, p. 629). This assessment was later developed and refined by Cialdini and colleagues (1990), who distinguished norms into one of two types: *descriptive* (building upon informational influence) or *injunctive* norms (building upon normative influence). This analysis of norms is the most common empirical interpretation to date.

Descriptive norms refer to statistically average behaviour, or what most people are doing (Cialdini et al., 1990). For example, shaking hands when meeting someone for the first time, and giving a person space in an otherwise empty elevator are both examples of descriptive social norms. Even seemingly mundane and everyday behaviours, such as saying "please" and "thank you" are descriptive norms; there is no formal, written rule that dictates this behaviour, yet it is widely practiced based on similar behaviours directly observable in others. When individuals follow descriptive norms, they are

conforming to the most common behaviour in a social setting. While descriptive norms describe *what is,* injunctive norms refer to *what ought to be;* they guide what is considered to be appropriate behaviour in a social setting (Ajzen, 1991; Cialdini et al., 1990). Thus, injunctive norms invoke notions of prosociality, moral ideals, and Goffman's (1974) ideas regarding the aspirational nature of "normal". For example, staying silent in a library and not littering in a public park are both injunctive norms, because they are perceived by many as the moral or "correct" way to behave, and this is evidenced in the fact that most people are indeed silent in libraries and do not litter in public parks. When individuals follow injunctive norms, they are acting according to how they think they *should* or *ought to* act. For a norm to be injunctive, there must be a belief that, 1) others have opinions about what behaviours are correct, and 2) norm violations will have negative social consequences (see section 2.1.2 for further discussion). Injunctive norms are further distinguished into prescriptive or proscriptive norms, where the former describes what others do and/or approve of doing (e.g. washing hands after using the bathroom), and the latter focuses on what others do not do, or do not approve of (e.g. wiping muddy feet when entering a house; Anderson & Dunning, 2014).

Descriptive and injunctive norms are social norms, described as shared, implicit rules of conduct that are sustained by what is deemed to be acceptable or unacceptable at a societal or group level (Elster, 1989). There is general, cross-disciplinary consensus that social norms describe behaviours that, 1) are "social" in some sense, and 2) inform action-oriented decision-making in some way (Legros & Cislaghi, 2020). Social norms do *not* include instinctual or reactive behaviours (e.g. fleeing from danger), or behaviours that originate from personal tastes or preferences (e.g. an individual who has a strong preference for vanilla ice cream will not purchase chocolate ice cream in response to an observable descriptive preference for chocolate ice cream). Another important consideration is that while norms generally fit into descriptive or injunctive categories, the distinction is often blurred. This is because, in describing what most people do (descriptive norm), there is an inevitable inference that this behaviour is what most people *should* do (injunctive norm). Similarly, many injunctive norms are intrinsically descriptive by virtue of their status as injunctive norms. For example, most people believe others should brush their teeth (injunctive norm) and so most people brush their teeth (descriptive norm). Thus, descriptive and injunctive norms often (but do not always) overlap.

Evidence suggests that social norms, or cumulative considerations of what is descriptively average and what is injunctively ideal, influence what individuals perceive to be normal (Bear & Knobe, 2017; Wysocki, 2020). In a series of experiments, Bear and Knobe (2017) demonstrated that people's judgement of the "normal" practice of a behaviour was influenced by both descriptive and injunctive considerations. Furthermore, people's representations of normal often fall *in between* what is believed to be average and what is believed to be ideal. For example, participants in an online survey considered three hours the "normal" amount of television to watch per day, falling between ratings of the perceived average amount (descriptive norm; 4 hours) and perceived ideal amount (injunctive norm; 2.3 hours) (Bear & Knobe, 2017). Other experiments have uncovered similar effects; in a study using vignettes about a fictional student's political opinions, participants' assessment of what was a "normal" opinion fell between what was perceived to be common opinion (descriptive norm) and what opinions were positively evaluated (injunctive norm) (Wysocki, 2020).

These studies reveal that, 1) perceptions of normal behaviours or practices draw upon perceptions of the “commonness” and “idealness” of that behaviour or practice among others, and 2) the extent to which something is perceived as normal often falls in between “commonness” and “idealness” ratings. While this is true in many instances, it is not always the case. In certain scenarios (e.g. amount of money cheated on taxes), the perceived normal amount was not intermediary between the average or ideal (Bear & Knobe, 2017). Nonetheless, perceptions of the average and ideal seem effective in predicting perceptions of normal in most instances. This becomes important when considering the downstream effects of normality judgements on human thoughts, feelings, and behaviour. For instance, empirical evidence suggests that individuals are more inclined to behave morally or prosocially if they regard such behaviour as normal (Bicchieri & Xiao, 2009).

2.1.2 Norm Conformity and Mechanisms of Norm Maintenance

Individuals are highly motivated to behave in accordance with social norms, even the mundane and arbitrary (Pryor et al., 2019). This section examines why norms are generally followed, and the various forces and effects that work to maintain norms, such that they generally become both self-perpetuating and resistant to change.

There are two common explanations as to why norms are followed. First, Cialdini et al. (1990) propose that individuals follow norms because, “if everyone is doing it, it must be a sensible thing to do" (p. 1). This forms the basis of the Focus Theory of Normative Conduct, which posits that this presumption is advantageous to individuals, because it provides an information-processing shortcut when faced with a decision on how to behave in a given situation. Imitating the choices of others indicates that people believe that these choices are the most efficient, effective, appropriate, or good, which reduces the cognitive effort involved in evaluating each choice individually (Cialdini et al., 1990).

The other common explanation for why norms are followed is that violating norms is incongruent with the needs or desires of the group at large, and will result in negative social sanction, subtle (e.g. gossip, staring) or explicit (e.g. ostracism). As a result, Henrich and Boyd (1998) argue that norms are maintained through fear of punishment In this way, norm conformity seems to be an adaptive behaviour rooted in human evolutionary history. Tomasello (2014) argues that, relative to most other animals, humans are a fundamentally social species who are especially attuned to behavioural cooperation and coordination. In fact, humans’ capacity to internalise norms and propensity to conform may promote cooperative behaviour, which would facilitate the survival of a group (Tomasello, 2008). A symptom of this inclination to conformity is that humans have an inherent desire to fit in and be liked (Baumeister & Leary, 1995). Conforming to social norms may, therefore, be a route to social acceptance and a way to avoid social punishment or contempt (e.g. stigmatisation, gossip) and its emotional consequences. As such, the (threat of) social punishment of those who violate group norms helps to maintain beliefs and behaviours, and partially explains why most members within a group hold similar beliefs and act in similar ways (Henrich & Boyd, 1998).

The mechanisms underlying norm conformity manifest in, and overlap heavily with a communications theory known as the spiral of silence theory, developed by Noelle-Neumann (1974).

The spiral of silence occurs when individuals are hesitant to share abnormal or controversial ideas, leading to self-censorship, reservation, or endorsement of the status quo (Noelle-Neumann, 1974). This hesitancy stems from a fear or threat of social isolation, which in turn stems from the perception of a majority opinion within a social group at odds with the opinion of that individual. According to the theory, if an individual perceives their opinion to be in the minority, they will be more inclined to remain silent, whilst holders of the majority opinion will speak more openly and confidently, consolidating and reinforcing the majority opinion. As such, the spiral of silence may be capable of dynamically driving or reinforcing public opinion, as well as the willingness of individuals to express their own views (Taylor, 1982). This is particularly likely to occur with controversial issues or those with moral components (Noelle-Neumann, 1974). Recently, however, criticisms of this theory have emerged pertaining to the digital age; these are discussed in section 2.2.2.1.

Conformity to social norms indicates that norms are self-perpetuating in nature. However, there are several other effects that act to maintain existing norms. First, Hume (1992) reasons that norms may be maintained as a result of the *is-ought problem;* when individuals derive or infer the injunctive (what should be) from the descriptive (what is). Related to this*, existence bias* describes instances where the mere existence of something is considered evidence of its positive qualities. This means that individuals tend to regard any existing norms as valuable or good. This effect has been demonstrated to be stronger the longer a norm has endured, and is not consciously perceived (Crandall et al., 2008). For example, torture practices framed to be longstanding garners increased support, acceptability, and justification, compared to practices framed to be younger (Crandall et al., 2008). This effect acts to increase resistance to change. Third, d*efault bias* describes instances where the default is perceived to be the preferred option (invoking injunctive notions), or the one that the most people would follow (invoking descriptive notions; Everett et al., 2015). In other words, default options tend to be perceived as superior over alternatives. Fourth, individuals tend towards loss aversion; losses are given more weight than gains, and individuals will take more action to prevent losses than they will to secure gains (Kahneman & Tversky, 1984). Following norms is comfortable, whereas dissenting behaviours may have unfamiliar, potentially unpleasant consequences, facilitating norm maintenance. Finally, norms are implicitly endorsed simply because they are norms. The status quo indicates that stimuli are, or have been, socially validated. Through implied social validation, this *status quo bias* (Samuelson & Zeckhauser, 1988) gives norms additional resilience.

2.2 Norms and Society

As discussed in section 2.1.2, most norms appear to be adaptive; behaviours practiced *en masse* become norms because they confer some kind of evolutionary advantage. In many cases, this advantage manifests in improved group cooperation and efficiency, given the human propensity for sociality (Tomasello, 2008). However, this is not always the case. Norms may be neutral, or even harmful, to individual health or wellbeing (e.g. binge drinking or smoking cigarettes), groups (oppressive norms e.g. racism, female genital mutilation), or nonhuman groups or entities (animals or the natural environment, e.g. factory farming). In such cases, norm change becomes the goal. This section will discuss how norms are acquired and formed, the role of norms in society, and instances where a prevailing norm may become undesirable, paving the way for norm change.

2.2.1 Normalisation & Moralisation

The primary model used to explain the large-scale acquisition of new norms is normalisation. Normalisation occurs when new norms become, or are assumed to become, part of mainstream or common thinking. When considering normalisation as an object of academic inquiry, social scientists generally distinguish between top-down and more horizontal models (Krzyżanowski, 2020). Top-down normalisation is most clearly defined by the work of Foucault (1977), who describes it as the intentional strategy and hegemonic actions of actors to regulate and impose social realities upon other social groups by introducing and legitimising norms (see section 2.1). As such, normalisation defines "normal" as that which conforms to the norm, and "abnormal" as that which is incapable of conformity. Vaughan (1996) illustrates a different view of normalisation using the example of the events leading up to the explosion of the *Challenger* space shuttle in 1986. Here, the process of normalisation was described as a series of incremental stretches of normative boundaries through deviance. In other words, slight deviations from the norm gradually became the norm, and thus paved the way for additional progressive deviance. The result is a shift in norms that is not explicitly related to Foucault's (1977) focus on hegemonic power structures. Hereafter, this thesis will focus on norm change that loosely encompasses Vaughan's (1996) model of normalisation, since it more accurately describes the topic of meat eating and meat abstinence.

While norms generally fit into descriptive or injunctive categories, the distinction is not always entirely clear. As noted in section 2.1.1, many behaviours are influenced by both types of norms and the distinction between the two may be blurred. In cases where there is no overlap, descriptive norms may become moralised injunctive norms over time. Moralisation is a form of normalisation, occurring when descriptive, morally neutral behaviours *acquire* moral properties. An example related to the subject matter of this thesis is the consumption of dog meat. In Western society, this behaviour is both highly uncommon and morally abhorrent. The moral aspect against eating dog meat (injunctive norm) likely arose as a result of its uncommonness (not consuming dog meat being the descriptive norm in Western countries); indeed dog meat consumption is prevalent in some countries who lack these moral qualms. There is also the potential for this effect to reduce or cease the practice of a descriptive norm. Rozin (1999) describes the moralisation of smoking behaviour; a once widespread and even endorsed behaviour became a moral violation, to such a level that even older generations who grew up in a cigarette-tolerant society expressed the same negative judgement towards smoking as younger generations (Rozin & Singh, 1999).

Rozin (1999) outlines several consequences of moralisation that may contribute to the growth of new norms throughout society. First, moralisation may evoke action by governments and other institutions, who become inclined to support the changes in society's preferences. Second, it becomes more acceptable to confront those who are violating the new norm by practicing the immoral behaviour. Third, the moralisation of a behaviour on an individual scale is more likely to become internalised and therefore more durable over time (Rozin et al., 1997). Fourth, moralisation increases parent-to-child transmission, as values are much more likely to be passed on to children than preferences. Finally, moralised behaviours often relate to disgust, which, when linked to a behaviour or practice, becomes a powerful motivator to avoid or reject that practice. By means of these consequences, moralisation may factor into and facilitate instances of social (norm) change.

2.2.2 Subjective Norm Formation

When enough individuals begin to practice a novel behaviour, at what point is this novel behaviour considered "normal"? According to norm theory, norms are constructed by the retrieval of similar experiences upon observing an event or phenomenon (Kahneman & Miller, 1986). If similar experiences are readily available for retrieval, then those events are perceived to be normal; if similar experiences are not readily available, then those events are perceived to be abnormal (Kahneman & Miller, 1986). The key factor of *availability* may be characterised as any combination of recency, frequency, intensity, familiarity, or meaningfulness. In other words, the more an event is observed, the more accessible and available it becomes as a representation that may be retrieved upon observing a similar event, and thus the more 'normal' it becomes upon subsequent observations. Conversely, an abnormal event is one that does not have representations that resemble it, and instead has highly available alternatives. For example, where there is an established social norm, behavioural expression that is congruent with this norm is likely to go unnoticed. However, behavioural expression that is incongruent with this norm will evoke readily available representations of alternatives. When this happens, the deviant behaviour becomes the "effect to be explained", or the one that is considered remarkable and therefore questioned (e.g. Kahneman & Miller, 1986).

Under norm theory, the retrieval of similar experiences influences evaluations of what constitutes a normal behaviour or phenomenon. Our everyday lives are rich with social experiences, and these experiences are all subject to this effect. Individuals may observe the behaviour of close friends and family at gatherings or events, or the behaviour of acquaintances or colleagues at meetings or classes, or the behaviour of strangers walking down the street or on the television. Individuals may see these behaviours directly, or hear about them through others. In recent years, social media have become an important part of the social experience and thus may also be a source for retrieval when evaluating the normality of behaviours or phenomena. Together, these experiences are added to a mental bank, available for retrieval to evaluate the normality of encountered phenomena.

2.2.2.1 Social Media and Norm Formation

Part of the research presented in this thesis explores the ways in which social media content may inform norm formation (see Chapters Four and Seven). Social media are digital platforms or applications that facilitate the voluntary sharing of information and other content via online communities or networks, amongst the many other roles that they play in society. they differ from more traditional media in that they enable social connection (Bruns, 2015). Some of the more popular social media platforms in the UK include Facebook, Twitter, and Instagram (YouGov, 2021). These platforms began as avenues to create and share information with others to facilitate connection, and have since become embedded in the everyday experiences of many people around the world. There were approximately 4.62 billion social media users worldwide in January, 2022, spending an average of 2 hours and 27 minutes on social media daily (DataReportal, 2022). In addition to creating and sharing content, social media users also spend considerable time viewing content generated by others (e.g. friends, family). Consequently, it has been argued that social media should be viewed as an integral part of society, since interactions and engagement on social

media take place within specific historic, social, or political contexts and are very often linked to activities occurring outside it (Quan-Haase & Sloan, 2017). As a result, the content viewed on social media may be another source of information available for retrieval under norm theory (see section 2.2.2 for more detail).

The ubiquity of social media means that they may have an effect on perceived norms. Unlike traditional media, social media's role models are often everyday peers. This may increase the influence of social media compared to traditional media: as Moreno et al. (2016) argue, emulation of behaviours viewed on social media may be perceived as more achievable and more socially rewarding. It has also been argued that social media platforms offer the possibility of an individuals' communications reaching people who could not be reached offline (Bruns & Burgess, 2012). For users with access to skills and resources that enable social media use, this increases the spread and scope of information about attitudes and behaviours, as well as the social approval or disapproval of them. In this way, social media content may be seen as representations of descriptive and injunctive norms, with the prevalence of content (i.e. number of posts viewed) representing descriptive norms, and engagement indicators (i.e. 'likes', follows, shares) representing injunctive norms. Boot et al. (2021) argue that 'likes' and comments on social media portray popular attitudes and opinions among peers, which may create a persuasive, 'bandwagon' effect. Indeed, there is evidence to suggest that a high number of 'likes' influences observers to also 'like' that content (Sherman et al., 2016). Furthermore, an online experiment by Kim (2018) revealed that manipulating the number of 'likes' and shares on an article about sunburn and skin cancer influenced behavioural intention. Specifically, high numbers of observable 'likes' and shares increased intentions to wear sunscreen, to check skin, and to seek out further information about skin cancer prevention. Together, these studies indicate that the representation of norms on social media may increase their influence on attitudes and offline behaviours (see Chapter Four).

Engagement with social media content can influence personal actions and behaviours. With regard to the effect of social media on participation in civic and political issues, a recent meta-analysis revealed an overall positive effect (Boulianne, 2015). On larger scales of social change, social media help movements to accomplish their goals by increasing the speed, reach, and effectiveness of their communications and mobilisation (e.g. a notable case study of this effect is the Black Lives Matter [BLM] movement; De Choudhury et al., 2016). Such is the benefit to advocacy that, in a survey conducted by Obar et al. (2012) among advocate groups, the overwhelming majority recognised social media as essential to their work.

Social media content has also been demonstrated to affect perceived norms, attitudes, and behavioural intentions on smaller scales. Empirical research with adolescents suggests that information about alcohol use by peers, communicated via social media platforms, may lead to higher estimated drinking norms, and increased interest in, or intention to consume, alcohol (Fournier et al., 2013; Litt & Stock, 2011). Related to eating behaviour, a 2022 survey conducted by dairy company Arla Foods found that 18% of UK participants relied on social media as a legitimate source of information, and 49% stated that they would make changes to their diets based on what they had seen or read on social media (Arla Foods, 2022). Furthermore, Hawkins et al. (2020) demonstrated that perceived descriptive norms of Facebook users' fruit and vegetable consumption (that is, the amount of fruit and vegetables individuals perceive typical Facebook users to consume)

predicted individuals' own, self-reported fruit and vegetable consumption (Hawkins et al., 2020). These results provide the beginnings of empirical evidence that social media may shape perceived norms and influence offline behaviours. However, it is difficult to draw absolute conclusions from such studies. Given the numerous contextual factors that influence perceptions, behaviour, and social media use in everyday life, these results may not apply to all 'real world' engagement of social media content. Furthermore, users encounter, process, and interpret social media content in different ways; it may be ignored, avoided, superficially checked, or fully read and understood (Goyanes & Demeter, 2022). Despite this variability, social media are a central aspect of many people's everyday social experience, and further research into its effects on offline actions is thus warranted. For this reason, social media content was incorporated into two studies in this thesis.

2.2.3 The Societal Role of Norms

The role of norms in society is to encourage benign social behaviour and facilitate coordination. Norms function as an indication of whether behaviours should be socially sanctioned or praised. As such, the concept of norms often evokes aspirational, injunctive notions. For example, criticising that something "is not normal" implies that normal is an ideal that should be aspired to. As discussed in section 2.1, normality has been conceived as both the present (descriptive) state as well as an aspirational (ideal) state. This implies that normality allows us to understand what is desirable, and thus to establish a crucial injunctive ideal. As discussed in previous sections, individuals have a tendency to conform, and may accept and even endorse norms that are imperfect or harmful. However, exceptions can and do exist, as part of the fabric of social life. Where norms favour or serve some groups over others, these others may mobilise and advocate for change. This is evident in the social movements that have risen in number and momentum in recent years.

The status quo generally goes unnoticed by the majority because it is unconsciously conveyed and transmitted by conformity. In other words, what is normal is often only brought to the forefront where norm violations, through non-conformity, occur. It is only at this point, when challenged by an alternative viewpoint, do the legitimacy of rationalisations become questioned (Haidt, 2001). For instance, male-only voting seems nonsensical today, however this sentiment is only held on a large scale now that it is no longer the norm.

Individuals who conform to social norms consider those who violate the norm to be the "effect to be explained", or those who are remarkable and questioned (Kahneman & Miller, 1986; see earlier discussion in section 2.2.2). It is also possible for groups to be regarded as the "effect to be explained"; groups that practice counter-normative behaviours (e.g. vegans, non-drinkers) may be marked as those who do not fit with implicit expectations. Being marked as the "effect to be explained" tends to justify the differential treatment (e.g. discrimination) of these individuals and groups, since majorities that practice the default standard are generally perceived to be more powerful, of higher status, and to possess more agency (Bruckmüller & Abele, 2010). However, in many cases the "effect to be explained" practices counter-normative behaviours because they actively desire, and wish to work toward social change. Such individuals or groups refuse to accept what is considered to be "normal" in certain contexts; they are dissatisfied with some aspect of the prevailing norm, which challenges the idea that norms are always aspirational.

Phenomena like a global pandemic may divorce “normal” from “good” in the public conscience and provide the catalyst for calls to change the norm. The COVID-19 pandemic, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), resulted in enormous global upheaval in almost every factor imaginable. The risk posed by the disease, and the measures used by countries in attempt to mitigate its effects and spread (e.g. lockdown), though variable in their stringency, induced a crisis in economies and trade, health, and society on an international scale. During the early stages of the virus, people lamented the loss of “normality” and longed for a return to normal life, one where they would no longer be troubled by face masks, social distancing, travel restrictions, job losses, and self-isolation (Weir, 2020). However, the virus was not entirely damaging. As countries shut their borders, there was an unprecedented decline in global travel and tourism, which reduced air and water pollution, greenhouse gas emissions, and facilitated ecological restoration (see Rume & Islam, 2020). The virus also, in some areas, showcased the best of human nature and society, resulting in an increase in prosocial behaviour (e.g. empathy, compassion, solidarity; Galea, 2020). The virus served as a reminder of the importance of these qualities, not just in times in adversity but at all times. As such, there became an increasing call for society not to return to “pre-COVID” normal, but to use the pandemic to establish a “new normal”, one where infinite economic growth, social inequality, and economic expansion are demoted in favour of environmental preservation, economic stability, and social equity (e.g. Spash, 2020).

Social norms can change and have done so throughout history, leading to speculation that normality is a relative term based around current trends in time (Syristová, 2010). Norms may be acquired or changed through cumulative individual change, coordinated societal change, or a combination of both. However in many cases, large-scale norm change begins with cumulative individual behaviour change; the formation of “effects to be explained”. How do individuals come to change their behaviours? This question will be addressed in the next section.

2.3 The Behaviour Change Toolbox

Norm and behaviour change have occurred organically throughout history. However, recent work in social psychology and behavioural economics have sought to expedite the process by developing and implementing strategies, informed by the ever-increasing understanding of behaviour and decision-making. Given the fundamental importance of behaviour change in alleviating the harms caused by meat consumption (see Chapter One), this section will discuss some of these tools and the theories of behaviour upon which they are based.

2.3.1 The COM-B Model of Behaviour

Numerous models have been developed in an attempt to understand behaviour and behaviour change. Discussion in this section will focus on the COM-B model (Michie et al., 2014), a prominent behavioural model that further develops similar models (e.g. the Theory of Planned Behaviour [TPB]; Ajzen, 1985). The COM-B attempts to model the factors that inform behaviour, and notably incorporates social and normative influences.

The main premise of the COM-B model (Michie et al., 2014) is that behaviour is an outcome of three factors; capability, opportunity, and motivation. *Capability* describes both the physical and psychological ability to perform the behaviour, including any strength, stamina, knowledge, or understanding involved. Individuals must also be provided with the *opportunity* to practice the behaviour; there must be a conducive and enabling physical and social environment, allowing the time, resources, and social cues required to prompt the behaviour. Finally, individuals must have the *motivation* to practice the behaviour, including both reflective motivation (e.g. conscious beliefs or attitudes towards the behaviour), and automatic motivation (e.g. anticipation of a positive emotional response to the behaviour or habitual processes) (see Figure 2.1). The COM-B model offers a comprehensive framework for behaviour change, whereby changing behaviour necessitates a change in at least one of its three determinants of behaviour. As such, the model can be used to inform the design of behavioural interventions, which target one or several of these factors. The Behaviour Change Wheel (Michie et al., 2013), developed by the same authors, is often used as a guide for this purpose.

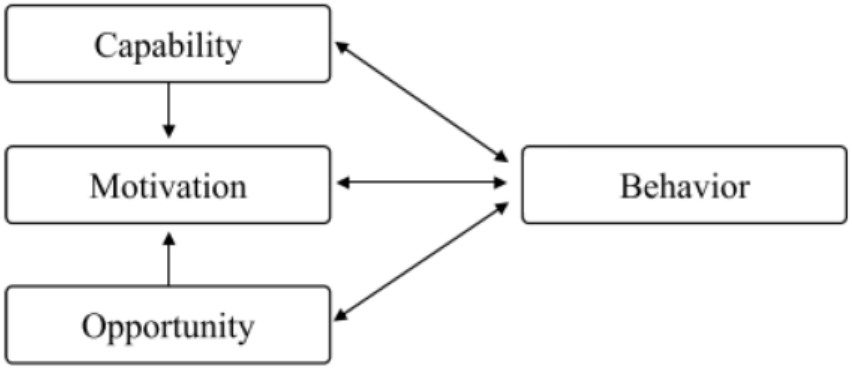


Figure 2.1. The COM-B model of behaviour (Michie et al., 2014).

There are many types of behavioural interventions, to suit different contexts and target behaviours. The various designs of these interventions were informed by understandings of human decision-making, which will be discussed in the next section.

2.3.2 Behavioural Economics & Understandings of Human Decision-Making

Behavioural economics emerged out of its rejection of prevailing understandings of behaviour under neoclassical economic theory. There are three primary aspects of neoclassical theory that were contested by behavioural economics. First, under neoclassical theory, individuals make rational decisions that are primarily driven by self-interest or gratification (Camerer & Loewenstein, 2004). Second, individuals make decisions based on stable, consistent preferences that do not vary with context. Finally, neoclassical theory assumes that if there was insufficient information available to inform decisions, individuals would seek out further information and decide accordingly. Behavioural economics recognises that these premises do not generally hold true in real-world decision-making. Instead, behavioural economics recognises human decision-making as, 1) heavily influenced by social

norms and expectations rather than self-interest, 2) based on preferences that vary across different contexts and how information is framed or delivered, and 3) limited by capacity to seek out and use information in the decision-making process, due to limited time and cognitive ability (Kahneman & Tversky, 1979; Simon, 2000).

Historical understanding of human decision-making assumed that choices were made based on expected utility; choices with the highest expected utility were those most commonly chosen. This idea was consolidated in a number of 'subjective expected utility models', which recognised all decisions as conscious, rational, and reflective (Savage, 1954). However, human decision-making is complex and nuanced, and the limitations of these models in characterising different types of behaviour quickly became apparent. Dual process models, such as the reflective impulsive model developed by Strack & Deutsch (2004), addressed these limitations by distinguishing between behaviours that are reflective, conscious, and deliberative, and those that are impulsive, non-conscious, and automatic. Under the reflective impulsive model, these two different types of behaviours are governed by two distinct cognitive systems, the reflective and the impulsive, which operate concurrently and in parallel to dictate choices (Strack & Deutsch, 2004). This work was extended by Kahneman (2011), who named them the fast and slow systems. The fast, automatic system is responsible for routine, habitual behaviours. It facilitates quick and often unconscious decision-making to maintain the cognitive capacity required for more deliberative behaviours, which are managed by the slower, reflective system. However, the two systems may also operate antagonistically. An example given by Marteau (2017) concerns the decision of a sustainably-minded individual to accept a climate-unfriendly food at a conference dinner. If one's cognitive attention is taken by a lively conversation with fellow attendees (engaging the reflective system), being offered the food item will activate the automatic system, resulting in a positive behavioural response to accept the food item. Conversely if there is no engagement of the reflective system, it will be available to deliberate on the decision to accept the food item, increasing the possibility that the food item will be declined.

Practitioners aiming to promote meat reduction, or indeed any consumer behaviour change, may consider targeting one of two avenues. The first concerns sustained, rational, and conscious behaviour change, and work towards changing a behaviour to meet a long-term goal. These types of behaviours are represented by the slow, reflective system of Kahneman's (2011) system model, and intervention strategies to change these include goal setting, social support, feedback, and habit formation (see Michie et al. [2013] for a comprehensive list). The second avenue towards meat reduction behaviour targets situational, unconscious, quick decision-making (e.g. when choosing a meat versus meatless option at a café or restaurant). In these situations, alternative behaviour change strategies are more effective in influencing consumer behaviour and choice.

These strategies may adjust aspects of the choice architecture (e.g. adjusting the visibility, prominence, or availability of target items) or use different forms of messaging to nudge consumers in desirable directions, without compromising their freedom of choice. These types of strategies have been criticised on the grounds of paternalism; questions about whether governments or institutions *should* be influencing competent, autonomous individuals in particular directions regardless of their own preferences or beliefs. However, Sunstein (2015, 2018) maintains that this type of influence, in some form is inevitable, and cannot be avoided by any government, institution,

or business that provides information, services, signals, choices, permissions, or prohibitions. In the case of healthy and sustainable diets, the question thus becomes not whether our diets should be influenced, but in what direction and by whom. Furthermore, it has been argued that individuals are not always rational in their choices, and inclinations towards risk- and loss-aversion (see Chapter Two, section 2.1.2) may influence beliefs or behaviours that individuals later consider harmful (Coggon, 2018). For example, people used to smoke and use plastic bags without questioning these practices. Smoking regulation and plastic bag levies both drew accusations of paternalism, being seen as interfering with people's rights. However they are now widely supported, and these types of strategies played an important role in both.

Despite these criticisms, Sunstein (2015) argues that these alternative behaviour change strategies are less coercive and more cost-effective than traditional strategies (e.g. bans, penalties), do not incur a cost or loss on the individual, and work to make self-desired or value-aligned choices easier. These factors have been found to result in a generally high level of public acceptance, especially in relation to pro-environmental and pro-health behaviours (Sunstein & Reisch, 2019). There is a large variety of intervention strategies of this nature. One prominent example uses social norms to influence choices, which is the focus of two of the studies in this thesis.

2.3.3 Social Norms Interventions

Social norms interventions aim to shape individuals' behaviours by correcting misperceptions about or making salient the behaviours or normative beliefs of others. The premise of social norms interventions is based on the empirically confirmed principle that individuals tend to conform to what others do, and will look to the behaviour of others if in a position of uncertainty or high cognitive load (Farrow et al., 2017). The social norm intervention is a behaviour change strategy that emerged in the 1980s (Perkins & Berkowitz, 1986), when it was deployed to reduce substance abuse (i.e. alcohol, cigarettes, drugs) in university or college students. In these cases, the intervention corrected misperceptions about the target behaviour and its prevalence. For example, early research on alcohol consumption in college students revealed that students preferred to drink at moderate levels, but believed that their peers consumed alcohol at a heavier and more frequent level (e.g. Perkins & Berkowitz, 1986). Thus, students were inclined to consume more alcohol themselves in order to align with this misperceived norm, even if this meant that they disregarded their own personal preferences. Where an inflated perceived norm does not exist, social norms interventions may still be used to make behaviours and norms more visible - especially where these norms and behaviours are not apparent in social settings and everyday life. This variant of the intervention has been applied to various behaviours, such as those related to sustainability (e.g. electricity use, hotel towel re-use), eating (e.g. vegetable, sugar intake), and pro-sociality (e.g. bullying, road safety, risky sexual behaviours) (e.g. Farrow et al., 2017; Higgs et al., 2019).

Generally, social norms interventions expose participants to normative messages about a behaviour of interest. Norms may be communicated in different ways, including via personalised normative feedback, focus group discussions, or marketing materials (Miller & Prentice, 2016). Whatever form the normative message takes, participants' own behaviours or choices are assessed following exposure. This is to identify differences, either compared to past behaviour in the same individuals,

or compared to individuals who were not exposed to normative messages (see Chapter Three, section 3.6 for a full methodological overview of social norms interventions). Social norms interventions are theoretically grounded in the COM-B model (Michie et al., 2014; see section 2.3.1), and Kahneman's (2011) dual process model (see section 2.3.2). The norms messages used in social norms interventions address the *opportunity* aspect of the COM-B model, which includes social factors to enable behaviour. At the same time, the intervention approach itself targets the fast system of Kahneman's (2011) dual process model, or the unconscious decision-making system that does not involve substantial cognitive deliberation. Social norms interventions may therefore be useful to policymakers seeking to steer behaviours in desirable directions. Indeed, Kinzig et al. (2013) argue that successful policies induce short-term behaviour change alongside long-term changes in social norms. This assertion is based on the idea that changing behaviour through interventions can influence an individual's values, which will sustain the change after the intervention ends. An example of this effect can be found in recycling behaviour; the introduction of recycling programs was initially met with resistance and disdain, however it has become a normative behaviour such that, for many, intervention is no longer required (Kinzig et al., 2013).

Given the human tendency to align with social norms (Cialdini et al., 1990), researchers employing social norms interventions expect that exposing individuals to norms information will result in behaviour change. However, it is important to highlight that this is based on a relatively simple (and somewhat outdated) model of communication; the hypodermic needle model (Sullivan, 2009). The hypodermic needle model proposed that, when individuals are exposed to a message or piece of communication, it is received, processed, and acted upon in a straightforward, immediate, and uniform way. The model therefore conceives audiences as passive and homogenous, with little agency or ability to actively question, resist, or reject messages. The hypodermic needle model has fallen out of favour in the realm of communication theory, since it is widely recognised that audiences are active and non-homogenous. Other models account for the varied interpretation of messages according to receivers' attitudes, perceptions, knowledge, and/or experience (e.g. Berlo, 1960), and the resultant variation in how messages are used or acted upon. Subjective interpretation of messages is further complicated by competing messages, cues, or noise, influencing the attention or cognitive processing afforded to each. A social norms message is thus one of many daily inputs that could either confirm or contradict preconceived ideas or background knowledge (Bineham, 1988). However, the hypodermic needle model is not entirely discredited, and has even seen a slight resurgence in the digital age (Nwabueze & Okonkwo, 2018), possibly because messages shared on social media are likely to come from trusted messengers or personal connections. While the aim of social norms interventions, and indeed any interventions that target the fast decision-making system, is to avoid substantial cognitive processing (Kahneman, 2011; see section 2.3.2), it is nonetheless assumed that social norms messages are read, understood, and acted upon in some way. This assumption is a potential limitation to social norms interventions, however previous successful interventions of this type seemingly suggest its potential in behaviour change.

2.3.3.1 A Systematic Overview of Social Norms Interventions

Social norms interventions have been applied in a range of domains, including in relation to pro-social, health, eating, and environmental behaviours. To explore the general effectiveness of social

norms interventions or experiments, a systematic review of reviews (systematic overview) was conducted. The review was conducted using guidance for conducting systematic overviews and PRISMA guidelines (Moher et al., 2009).

Three databases were searched (SCOPUS, Web of Science, PsycINFO) using the Title, Abstract, and Keywords search fields up to May 2023. Search terms encompassed factors that comprise the Population Intervention Comparison Outcome and Study Type (PICOS) model, where *population* was defined as adults (18+) in countries of the Global North (i.e. nations of the world which are characterised by a high level of economic and industrial development, aligned with the focus of this thesis), *phenomenon of interest* was social norms interventions or experiments to change behaviour, and *study type* was systematic reviews. As such, the search terms used were "social norm*" AND (behavio* OR choice*) AND "review". All searches were limited to English language. Following the removal of duplicates, the titles and abstracts of 99 search results were screened (see Figure 2.2 for the PRISMA flowchart detailing this process).

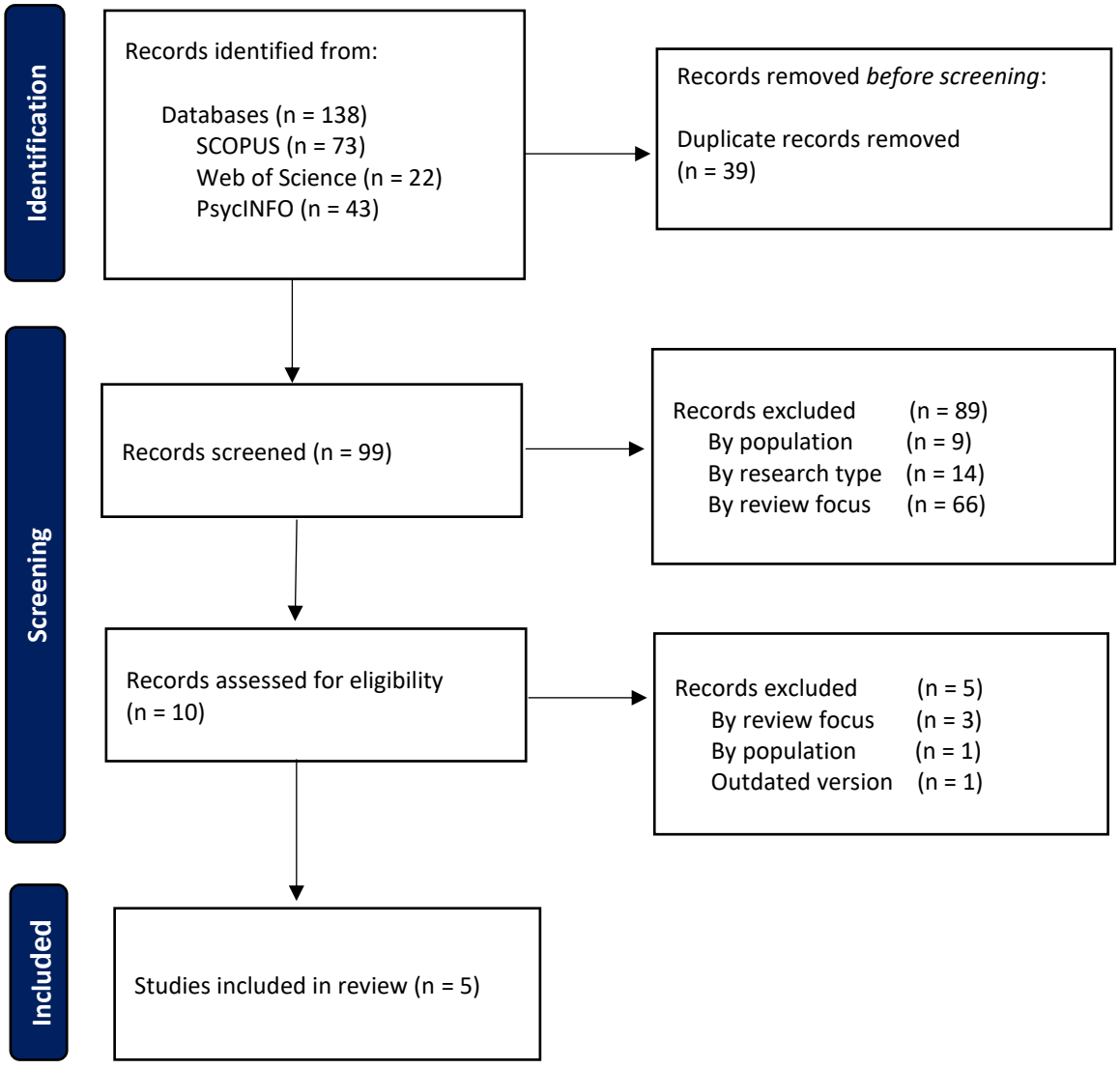


Figure 2.2. PRISMA flowchart illustrating the process of review selection.

Articles were included if they, 1) were systematic reviews, 2) included studies conducted among adults aged 18+, and 3) explored the effect of social norms interventions or experiments on behaviours in a range of domains. Articles were excluded if they, 1) were not systematic reviews, 2) were conducted among populations outside of the inclusion criteria, or 3) did not focus on social norms and behaviour change via experiments or interventions. The full texts of ten articles were reviewed; following this screening, five articles remained for inclusion. Characteristics and key findings of the included reviews are summarised in Table 2.1.

Overall, five reviews spanning a total of 234 studies were assessed as part of this systematic overview. Two of the reviews focussed on alcohol intake, two focussed on food intake and/or choice, and one covered various health, environmental, and social behaviours (including, but not limited to, both alcohol and food consumption). The results of this systematic overview demonstrate that studies applying social norms interventions to these different domains have yielded mixed results. With regard to alcohol intake, reviews indicate that social norms interventions have a limited effect, if any, in both the short and long term (Foxcroft et al., 2015; Prestwich et al., 2016). Comparatively, it seems that social norms interventions may be more effective at influencing food behaviours (i.e. both intake and choice), with the two reviews in this area illustrating consistent effects (Robinson et al., 2014; Stok et al., 2016). However, it should be noted that the majority of studies in both of these reviews were conducted under controlled laboratory conditions and did not assess "natural" food behaviours in the field. The final review in this systematic overview focused exclusively on social norms interventions outside of the laboratory, exploring a range of health, pro-environmental, and social behaviours (Yamin et al., 2019). The results of this review revealed that 75% of the interventions, which included those targeting food and pro-environmental behaviours, had statistically significant effects that were aligned with the norm messages.

Finally, the quality of studies was assessed in all but one of the reviews. Quality was assessed using various methods; for example, one review used loosely appraised studies during the screening process (Yamin et al., 2019), one review used the GRADE (Grades of Recommendation, Assessment, Development and Evaluation) framework (Foxcroft et al., 2015), and another used the Cochrane Collaboration Criteria (Stok et al., 2016). However, all of the reviews that appraised the quality of included studies assessed factors related to both internal and external validity, such as the process of randomisation, the nature of control and comparison groups, and the appropriateness of the outcome measure. The one review that focused on alcohol intake and also included a quality appraisal (Foxcroft et al., 2015) included studies that were of generally lower quality, compared to the two focusing on food (Robinson et al., 2014; Stok et al., 2016). The authors report that many of their reviewed studies did not adequately report randomisation, allocation concealment, or participant blinding, and this – alongside high attrition rates – lead to poor estimations of intervention effects. It is also possible that the differences in outcome measure between food- and alcohol-related reviews accounted for the discrepancy in quality ratings. For example, the reviews exploring food intake/choice were more likely to assess objective behavioural measures (e.g. weights, quantities, sales), whereas the review exploring alcohol consumption solely relied on less objective self-reports. This may have affected quality ratings, depending on how this factor was weighted across the various quality assessments.

Table 2.1. Characteristics of studies included in systematic overview

Author	Targeted behaviour	Included studies	Study types	Quality	Summary of key findings
Foxcroft et al. (2015)	Alcohol intake (long term)	70	All studies were RCTs[1].	Low-moderate	Social norms interventions had limited effects on alcohol intake among university students over the long term (4+ months post-intervention). Only small or no effects were found across the social norm delivery strategies assessed (e.g. personalised feedback, norms marketing).
Prestwich et al. (2016)	Alcohol intake	41	All studies were RCTs.	Not assessed	Reviewed studies that focused on providing information about peer alcohol intake were effective at changing perceived norms and perceived social support. However, these were associated with only small changes in alcohol intake.
Robinson et al. (2014)	Food intake and/or choice	15	Most studies were lab-based RCTs. Two used alternative norm comparisons instead of control conditions.	High	Food intake norms had a moderate effect on the quantity of food consumed, and food choice norms had a consistent effect on the choice of foods consumed.
Stok et al. (2016)	Food intake	16[2]	Most studies were RCTs. Others used alternative norm comparisons instead of control conditions.	Good	All experimental studies testing the influence of descriptive social norms on food intake reported significant effects in line with the norm message. These effects occurred whether norms were explicit (e.g. a written message) or implicit (e.g. environmental cues). Injunctive norms did not affect food intake.
Yamin et al. (2019)	Various health, environmental, social behaviours	92	Most studies were RCTs. Others used pre-post designs with no control.	Studies were screened through a relatively loose appraisal process given the broad nature of the review.	75% of the reviewed studies reported significant effects of social norms on target behaviours. In studies that measured actual behavioural outcomes (not self-reports), 89% reported significant, small effects. Situated interventions that directly exposed participants to peer behaviours/opinions seemed to be most effective, compared to remote interventions that used group summary norm information.

All reviews were of studies in adults aged 18+, that tested the effects of social norms on behavioural outcomes. [1] Randomised Controlled Trial; [2] While 33 studies were reviewed in total, only 16 of these assessed the effect of social norms experimentally; the remaining 17 were correlational.

Overall, despite the limited and relatively low quality effects on alcohol intake, social norms appear to be more effective when applied to food consumption. Therefore, aligning with reviews on food intake and choice, applying social norms to meat reduction could be potentially promising - especially given that the application of social norms interventions in this area, to date, comprises but a small handful of studies.

2.3.3.2 Application to Eating Behaviours

Social norms interventions have been widely applied to eating behaviours. They have particular promise in this domain since, as Higgs and Thomas (2016) argue, eating behaviours are heavily influenced by social factors. As discussed in section 2.1.2, people conform to social norms due to their adaptive advantages, a desire to affiliate, and implications of "correct" behaviour (e.g. Cialdini et al., 1990). This is likely to hold true for eating behaviour. Higgs (2015) proposes that eating norms may have evolved to ensure the selection of safe and nutritious foods and to promote cooperation and food sharing. Like other norms, Higgs (2015) argues that eating norms are perpetuated by the threat of social judgement should individuals deviate. This may be particularly important considering that most eating occurs in a social context.

Reviews of laboratory-based studies revealed that social norms consistently and reliably influence both food intake and choice (e.g. Robinson et al., 2014; see section 2.3.3.1). For example, participants who were led to believe that others have eaten a lot of food increased their own intake as a result. It is also the case that norm information indicating the food choices of others significantly influenced participants' own choices. An advantage of laboratory studies is that they allow the testing of social norms messages in isolation of other factors influencing food choice, such as participants' appetite levels, environmental cues, available choices, which are controlled in lab studies (see Blundell et al., 2010). However, the focus of this research is on real-world behaviours, and thus field interventions that incorporate the complexities of food decisions are more appropriate. This is because field settings offer an assessment of behavioural interventions that are more grounded in, and applicable to, everyday life.

There have been relatively few social norms interventions that have targeted food behaviours in field settings. Those that have been undertaken have largely aimed to promote the purchase or consumption of healthier foods. Among the earliest of these, Mollen et al. (2013) explored the effect of descriptive social norm messages about healthy (i.e. salads) and unhealthy (i.e. burgers) options on self-reported food selection in a university food court. The norms messages read, ''Every day more than 150 [university name] students have a [burger/tossed salad] for lunch here''. It was found that the healthy descriptive norm message significantly increased self-reported selection of salad.

A series of subsequent studies built upon this earlier work. Thomas et al. (2017) aimed to increase the purchase of vegetable side orders in workplace cafeterias. During an intervention phase, posters were displayed in the cafeteria reading, "Most people here choose to eat vegetables with their lunch", an accurate statement based on purchase data immediately prior to the intervention. Assessment of the purchase data following the intervention revealed an increase in vegetable side orders during the intervention phase, an effect that persisted after the posters were removed in a

post-intervention phase. Two follow-up studies were then conducted in student canteens using a similar designs, where the effect of a descriptive social norm message ("Did you know that most students here choose to eat vegetables with their meal?") was compared to that of a health message endorsing the benefits of vegetable consumption ("Did you know that students who choose to eat vegetables have a lower risk of heart disease?") (Collins et al., 2019). For both studies, exposure to the social norm message was associated with an overall increase in vegetable purchases, whereas the health message was only associated with an increase in vegetable purchases in one of the two studies. Finally, Payne et al. (2015) employed a social norms intervention in supermarkets, where placards placed on grocery trolleys contained norms messages surrounding the purchase of fruit and vegetables ("In this store, most people choose at least x produce items", with "x" denoting the average number specific to that store). Payne et al. (2015)'s analysis of the purchase data found that the intervention significantly increased shopper spending on produce. Furthermore, there was no significant increase in overall spending, suggesting that customers were switching to healthier purchases. Together, these studies indicate that social norms interventions may be an effective means of promoting healthier food choices in real-world settings.

Limiting or eliminating meat consumption is both a pro-environmental behaviour and an eating behaviour. Meat eating behaviour, and interventions to reduce it, will be discussed in the following section.

2.4 Changing Meat Eating Behaviour

As discussed in Chapter One, meat eating is an established and highly valued social norm, and this is often used to justify and rationalise consumption. This section will explain the various influences on meat eating behaviour, followed by an assessment of applied behaviour change interventions.

2.4.1 Influences on Meat Eating Behaviour

Many factors interact to influence meat eating behaviour and intentions to reduce consumption. It is important to note that, relative to many other behaviours, the act of meat consumption is infused with ethical concerns and is emotionally charged (see Chapter One). Consequently, meat consumption is driven by many influences. On a fundamental level, Godfray et al. (2018) identify biological factors as a determinant of meat eating behaviour. They argue that humans have an innate preference for energy-dense and nutrient-rich foods (including meat), which may have evolved in historical environments where food scarcity was a constant risk. The human propensity for meat has continued today even in the absence of food scarcity, and where it once facilitated survival, it now predisposes us to diseases related to overconsumption. Godfray et al. (2018) argue that these biological factors may interact with other psychosocial factors to shape contemporary Western high meat diets. These factors have been consolidated by Stoll-Kleemann and Schmidt (2017) into three categories: personal factors, sociocultural factors, and external factors (Figure 2.3).

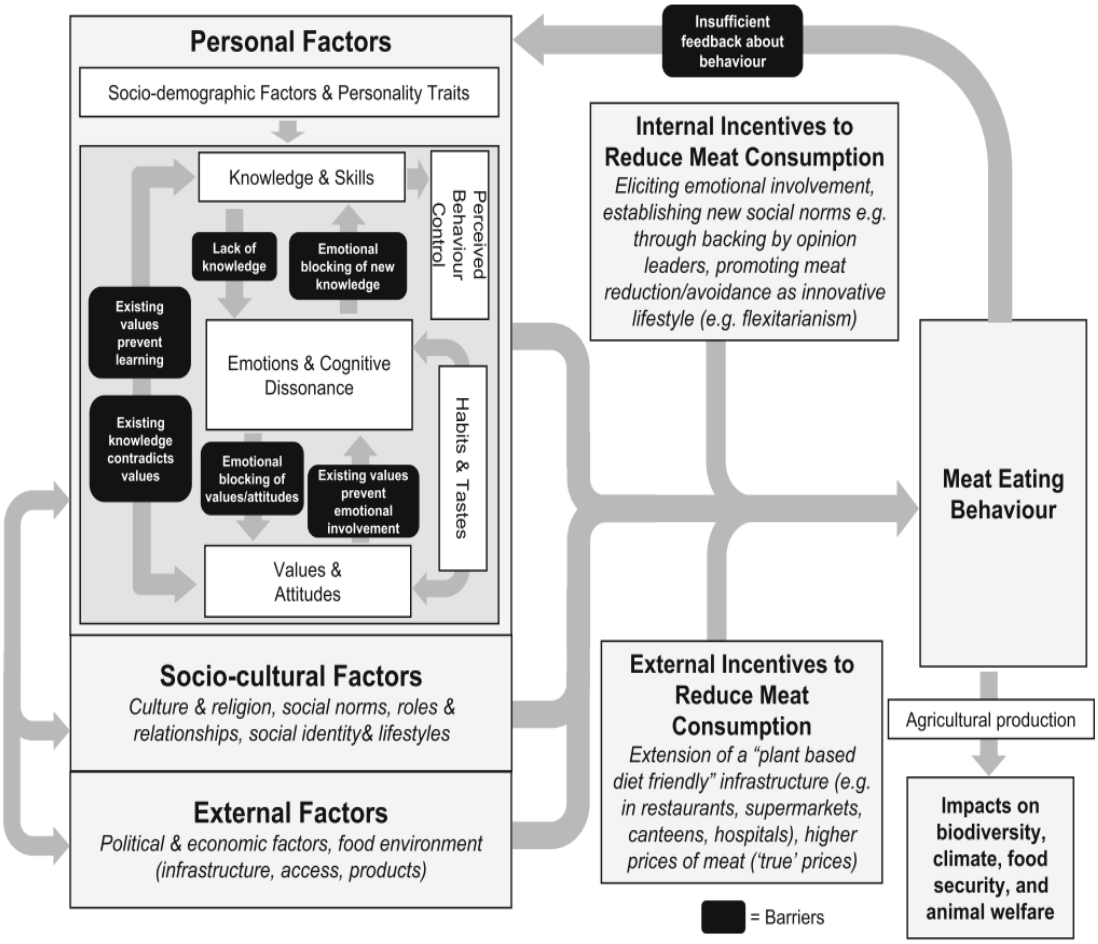


Figure 2.3. Model of factors that influence meat consumption (Stoll-Kleemann & Schmidt, 2017).

Personal factors incorporate an individuals' knowledge, skills, emotions, cognitive dissonance, values, attitudes, habits, tastes, sociodemographic traits, and personality. Knowledge and skills include factual understandings (such as knowledge of the environmental or health impacts of meat), and practical skills or experience in preparing meatless meals with or without protein substitutes (e.g. Dibb & Fitzpatrick, 2014). Emotions are often underappreciated in their capacity to influence food choice, and become important with regard to meat given the inherent emotional aspect of animal slaughter. Values describe an individuals' "guiding principles", which help them to judge situations and determine their attitudes and behaviours. Values are closely related to an individuals' ethical code, which may lead to voluntary avoidance or minimisation of meat (Ruby, 2012). Habits are repetitive, routine, and reliable day-to-day practices that operate through reinforcement and reward, and are highly resistant to change due to the effort involved. Taste is often cited as a barrier to meat reduction (e.g. Rosenfeld & Tomiyama, 2020), and is encompassed under one of Piazza et al.'s (2015) "4 Ns" of meat eating rationalisation (meat as *natural, normal, necessary,* and *nice;* see Chapter One). Sociodemographic variables can also affect meat consumption. Women, younger people, and people of higher socioeconomic status are more open to, or are already consuming less meat or adopting flexitarian or vegetarian lifestyles (e.g. Dibb & Fitzpatrick, 2014; Tobler et al., 2011). Finally, personal traits may play a role in meat consumption. People inclined to agreeableness and openness have been found to be positively associated with lower meat consumption (Keller &

Siegrist, 2015), and those inclined to right-wing ideologies are more likely to have favourable attitudes towards meat consumption (Dhont & Hodson, 2014). These personal factors all interact heavily with one another. For example, an individual's habits may inform their attitudes, or vice versa, and their existing values or emotions may prevent the acquisition of new knowledge. Thus, it can be useful for interventions to either promote a change in values, or activate existing values to make congruent behaviours or choices easier (Marteau, 2017).

Social norms fall under the umbrella of sociocultural factors, which also include culture, religion, social identity, social roles, and lifestyles. Meat and meat eating have symbolic meaning in many religions and cultures around the world. For instance, meat eating is often considered an aspirational practice and symbol of wealth in countries going through economic transition (Popkin, 2006) and in Western society, meat is associated with power, dominance, and masculinity (Rothgerber, 2013). This is also linked to the factors of social identity, lifestyles, and norms. Food choice may act as a social marker around which one can construct social identity and presentation to others. In support of this, Higgs (2015) argues that people "adjust their eating behaviour to manage their public image and create certain impressions on others" (p. 39). Indeed, the presence or implied choices or beliefs of others strongly affects eating behaviours due to a widespread desire to seek social approval and avoid social contempt. This has been extensively demonstrated related to meat consumption. For example, Lea and Worsley (2001) found that in men, the most influential predictor for the frequency of meat intake was the amount of vegetarian and non-vegetarian friends. Cheah et al. (2020) demonstrated that the social leanings of others (e.g. friends and family) affected both consumer attitudes and intentions towards reducing meat consumption. Most recently, individuals tended to report higher meat intake when they perceived a congruent injunctive norm (i.e. social approval) among friends and significant others (Sharps et al., 2021; see Chapter Four, section 4.1 for further detail about this study).

External factors include political and economic factors, and those related to the food environment (e.g. infrastructure, food access, and food availability). Effective and widespread meat reduction requires synergistic government policies and complementary business practices and initiatives (Dibb & Fitzpatrick, 2014). This is already happening in some areas of the world. In Germany, for example, meat reduction has been identified and included as part of the national climate goals, and German meat-free options in food establishments have risen significantly (O'Riordan & Stoll-Kleemann, 2015). However, this is challenging for most governments due to opposition from powerful interest groups (e.g. animal agribusiness). Economic factors are extremely important determinants of meat-eating behaviour, and in many Western countries, meat is heavily subsidised and commonly originates from industrialised factory farms, which together contributes to appealingly low prices and higher levels of consumption (Stoll-Kleemann & Schmidt, 2017). Finally, food environment constitutes the physical surroundings surrounding food choice and consumption, from supermarket access and availability to the availability of meat alternatives within those supermarkets. Availability, affordability, and convenience all contribute to meat eating and meat reduction behaviour. Food environment may also refer to the wider, interconnected social, economic, cultural, and technological contexts in which individuals' food decisions are made (Reisch, 2021). As such, behaviour change efforts require complementary and supportive changes to the food environment to be sustained, which are likely to include institutional, contextual, and systemic change.

The factors discussed in this section act in tandem, forming a model of meat-eating influences (Figure 2.3; Stoll-Kleemann & Schmidt, 2017). Collective meat consumption, in turn, contributes to the various harms discussed in Chapter One. Research into, and efforts to change meat-eating behaviour may be informed by this model of meat-eating influences (see Harguess et al., 2020).

Behaviour change campaigns, especially those related to sustainability, are often built on the assumption that information provision – the consequences of 'bad' behaviours and/or the benefits of adopting 'good' behaviours – will inevitably lead to behavioural change (see Finger, 1994). Unfortunately, whilst these types of campaigns may alter behavioural intention, they experience limited success with long-term behaviour change (e.g. Bianchi et al., 2018). This is especially true for behaviours that require substantial effort or financial expense to change, or for behaviours that have strong, existing prior beliefs, values, or emotions associated with them. This is reminiscent of the hypodermic needle model of communication which treats communication as a one-way transfer of information that results in homogenous understanding and action (see section 2.3.3 for full detail). The relative ineffectiveness of information provision on behaviour change may also be influenced by the attitude-behaviour gap, which is well-documented in meat consumption behaviour (e.g. Loughnan et al., 2014; see Chapter One). As discussed in Chapter One, the relationship between values, attitudes, and behaviours is often antagonistic, weak, or non-existent, resulting in the practice of behaviours that may directly conflict with values. In the context of meat, values surrounding animal welfare, environmental wellbeing, or personal health may underlie *intentions* to reduce consumption. Yet, a person who holds such values may nonetheless purchase and consume meat. Consequently, values and attitudes may influence intentions, but it is not enough for interventions and campaigns to target these. Instead, the barriers that result in the attitude-behaviour gap should be targeted, to make desirable, value-aligned behaviours easier.

2.4.2 Meat Eating and Behaviour Change

As discussed in the preceding section, individuals must overcome multiple barriers in order to successfully alter their meat consumption; from barriers of personal taste, culture, and social pressure to those related to food availability and cooking skills. Meat reduction encompasses both sustained, rational, and conscious processes (e.g. ongoing dietary shift towards LNM diets), and also situational, unconscious, quick decision-making (e.g. when choosing a meat versus meatless option at a café or restaurant). This section will examine how behavioural theory and interventions have been applied to meat reduction behaviour across both of these avenues.

The sustained, rational, and conscious process of meat reduction has been accurately modelled by behavioural theory (e.g. the COM-B model; Graça et al., 2019), and a number of studies have employed interventions that align with this avenue of meat reduction. For example, interventions have provided meatless alternatives as well as ongoing information and support (Amiot et al., 2018; Bianchi et al., 2019). However, these types of interventions are time- and resource-intensive and are thus difficult to implement and scale. Consequently, this thesis focuses on experimental interventions to affect behaviour in field, or real-world food selection contexts, by 'nudging' (see section 2.3.2). Despite criticisms (see section 2.3.2), such interventions are favourable as they require minimal investment on behalf of caterers or food outlet mangers, have a relatively low risk

of affecting sales or revenue, and are non-intrusive in nature (Gravert & Kurz, 2019). Production and consumption are interacting and co-dependent parts of the food system, and food retail represents a vitally important bridge between the two. Since action is needed at all stages to address the problems of the food system and excessive meat consumption in the Global North (Marteau, 2017), behaviour change measures at these settings may complement both individual and policy action.

Insights from literature about the most effective strategies to reduce meat consumption by way of interventions have been summarised under three critical pillars; 1) interventions that make sustainable food more appealing, 2) interventions that make sustainable food normal, and 3) interventions that make sustainable food easy (The Behavioural Insights Team, 2020). There have been relatively few contextual interventions aiming to reduce meat eating behaviour or promote higher intake of meatless meals; a 2018 review identified just 18 studies (Bianchi et al., 2018). Importantly, some of the intervention types included in the review were more effective than others. Whilst altering the description or labelling of meat products was overall ineffective at changing behaviour, interventions which altered the portion sizes, sensory properties, or positioning of meat items were more effective. Increasing the availability of vegetarian meals may also be an effective intervention. A recent study found that doubling the proportion of vegetarian meals offered at university colleges resulted in a 41-79% increase in vegetarian sales (Garnett et al., 2019), especially among individuals who were least likely to purchase vegetarian meals prior to the intervention. Furthermore, increasing vegetarian availability did not affect total sales, increasing the favourability of this intervention type for caterers or outlet managers.

However, these types of interventions have significant operational costs and require effort, reducing their acceptability to stakeholders and thus their scalability (Sparkman et al., 2020). One intervention that may bypass these limitations is the social norms intervention, which falls squarely under pillar two of the Behavioural Insights Team's guidelines for effective strategies to promote sustainable foods: interventions that make sustainable food normal (The Behavioural Insights Team, 2020). Evidence regarding social norms interventions applied to meat consumption – one of the primary foci of this thesis – will be discussed in the next section.

2.4.3 Social Norms Interventions and Meat Consumption

Social norms interventions have found success in encouraging both pro-environmental behaviours and healthier eating behaviours (see section 2.3.3 for further discussion), and may have particular promise when applied to meat reduction behaviour. The reasons for this are threefold. First, high levels of meat consumption are both a personal risk (as a health issue) and a collective threat (as an environmental issue), increasing the normative pressure to change behaviour. Second, eating behaviours are heavily influenced by social factors, and this is especially the case with meat eating (see section 2.4.1). Finally, meat eating commonly conflicts with an individual's values and is enabled by rationalisation or avoidance strategies (see Chapter One). Therefore, knowledge or information based interventions are often ineffective, calling for alternative behaviour change strategies that target the faster automatic decision-making system (Kahneman, 2011) to exert a more imperceptible effect on behaviour. Social norms interventions address all of these points.

There have been very few social norms interventions that have been applied to meat eating behaviour, and fewer still that have been employed naturalistically in field contexts. These have yielded mixed results. Sparkman and Walton (2017) delivered an intervention at a college cafeteria, where customers waiting in a queue to order food were approached by the researchers. Customers were randomly presented with either a dynamic or static norms message. The dynamic norms message revealed that people at that college had begun to limit their meat consumption over recent years, and the static norms message revealed that people at the college were limiting their meat consumption, with no indication of the recency of behavioural shift. The researchers found that customers presented with the dynamic norms message were more likely to purchase meatless meals, compared to those in the static norms condition and those who were not exposed to any norms message (Sparkman & Walton, 2017). However, the norms messages used in the study were researcher-delivered; members of the research team manually disseminated the norms information to participants. As such, whilst this work demonstrated the role that social norms may have in reducing meat eating behaviour in college cafeterias, the researcher-delivered nature of the intervention does not necessarily represent a true naturalistic study.

To address this, the same authors conducted further interventions using similar dynamic norms messages placed on menus (Sparkman et al., 2020). In this way, this set of studies was more naturalistic, as norms messages were displayed without researcher involvement. The authors noted that this may have reduced the number of customers who noticed the message, however this was weighed against the benefits of real-world implementation. Four interventions were conducted in a range of different sites (i.e. a campus café, an online food delivery service, a fine dining restaurant), each of which had a substantial number of meatless offerings. Norms messages were placed either at the top of a large menu board (study 1; campus café), on the top of the menu webpage (study 2; online restaurant), or on the top of individual menus (studies 3 and 4; restaurant), and used norms information specific to each site. There were moderate increases in meatless orders in three out of the four studies, however this did not always reach statistical significance. Notably, one of the four interventions (i.e. dinner time at the fine dining restaurant) was associated with a 'boomerang' effect whereby the norms message *reduced* vegetarian orders. The authors speculated that the higher socioeconomic status of customers in this particular setting was the cause. They offered this explanation because these groups have been found, by other researchers such as Na et al. (2016), to be more likely to resist the influence of social norms and prefer to maintain overt autonomy in their choices. Whilst these results are somewhat mixed, they nonetheless demonstrate the potential effect of naturalistic social norms interventions in reducing meat eating behaviour in real-world settings.

Most recently, Çoker et al. (2022) conducted a social norms intervention in UK retail cafeterias. Dynamic norm messages, similar to those used by Sparkman et al. (2020), were placed on digital menu and information screen boards within each of the 22 research sites. Therefore, like the studies by Sparkman et al. (2020), this study was a true naturalistic study that did not involve researcher-delivered norms messages. Analysis of sales revealed no change in meat-based or meatless meal sales. The authors highlight a number of potential explanatory factors, including the many competing cues present in food choice settings, or more proximal experiences of peer behaviours (e.g. the choices of dining companions, which may be more influential than the norms message).

Other factors, such as the importance of norm message visibility and design, are considerations that have been identified in previous research (see Chapter Three, section 3.6 for an overview).

Using social norms messaging illuminates the meat reduction behaviour of social peers, facilitating the perception that this behaviour is common, desirable, and advantageous to follow in order to maintain social standing and group cohesion. Studies that have used this type of messaging have yielded mixed results, however this does not invalidate the approach. Rather, they hint at the potential promise of this strategy for researchers and practitioners aiming to promote meat reduction behaviour. This thesis aims to ascertain the perceived normality of LNM diets and their adherents, and to gauge how positive perceptions of LNM diets, if they exist, may be harnessed to reduce meat intake in naturalistic, real-world food choice contexts.

This chapter has provided an in-depth review of the literature about norms, norm perception, behaviour, and behaviour change as they relate to meat consumption. These topics provide important background and context to the research presented in this thesis.

3 General Methodology

This chapter presents a description of the methods used to address the two research questions outlined in Chapter One: (1) *How "normal" are LNM (low or no meat) diets and their adherents perceived to be,* and (2) *Can information about LNM dietary norms change food choice behaviour?* First, the epistemology of a mixed methods interdisciplinary approach is described, followed by a description and justification of each method used.

3.1 Research Paradigm

Research paradigms are philosophical positions concerned with the nature of reality, and the investigative research route taken to assess it. Research paradigms are common beliefs and ways of thinking that are shared amongst scientists, which inform the ways that problems should be understood and addressed (Kuhn, 1962). Identifying with a research paradigm reflects a researcher's ontological and epistemological beliefs, relating to the nature of reality and the origin of knowledge. These beliefs heavily influence the methodology, approach, design, and direction of research.

There are three predominant paradigms traditionally used in research: positivism, constructivism, and pragmatism. Under positivism, there exists a single, measurable reality that can be explored and understood using fact-based and objective investigation and statistical analysis. In other words, positivists favour the use of the scientific method and rigorous hypothesis testing in research (Atkinson & Hammersley, 1994). Research informed by this paradigm primarily focuses on quantitative research methods most often utilised in the "hard" sciences, such as experiments or surveys that collect and analyse numerical data. Conversely, constructivism advocates a more subjective view of reality and knowledge acquisition. Under constructivism, researchers interpret different realities, which are inextricably tied to different interests, values, and perspectives (Teddlie & Tashakkori, 2009). As such, constructivists tend to favour the qualitative methods often associated with the humanities and "soft" sciences, such as observations, interviews, or thematic analysis.

Whilst positivism and constructivism have traditionally dominated epistemological and methodological approaches to research, pragmatism is favoured in the new age of interdisciplinary research and mixed methods. Pragmatism lies between positivism and constructivism and combines elements of both. Researchers aligning to pragmatism believe that methodological decisions should be based on the respective strengths and limitations of both paradigms to ensure the best fit for the research question (Denscombe, 2008; Teddlie & Tashakkori, 2009). Pragmatic approaches are therefore flexible, and allow for the use of a quantitative designs, qualitative designs, or a combination of both, known as mixed methods. Mixed methods research combines the strengths, and addresses the limitations of both quantitative and qualitative approaches to provide a more balanced, informative, and complete understanding of the phenomena being investigated (Johnson

et al., 2007). As such, it represents a flexible, efficient, and logical synthesis of two extremes, and is often used in social research.

The research presented in this thesis consists of five studies, together constituting a mixed methods and thus pragmatic approach. The research combines psychological research with elements of sociology, communications, media, and internet research to explore the nature of LNM diets, their perceived normality, and their potential in reducing meat-eating behaviour in naturalistic food choice contexts. Table 3.1 presents an overview of the research and methods in this thesis.

Table 3.1. Overview of thesis research and methodologies

Study	Research Question	Methodology	Method
Study 1 (Chapter 4) *Normality of LNM diets represented on Twitter*	1*	Quantitative Qualitative	• Digital methods (Twitter data capture) • Thematic analysis
Study 2 (Chapter 5) *Perceptions of LNM adherents in the UK*	1	Quantitative Qualitative	• Free association task & rank-frequency method • Online survey
Study 3 (Chapter 5) *Perceptions of LNM adherents among a UK university sample*	1	Quantitative	• Vignettes • Online survey
Study 4 (Chapter 6) *Social norms intervention: Aotearoa New Zealand*	2**	Quantitative	• Social norms intervention • Survey
Study 5 (Chapter 7) *Social norms intervention: UK*	2	Quantitative	• Complex social norms intervention • Survey

* How "normal" are LNM (low or no meat) diets, and those who practice them perceived to be?

** Can information about LNM dietary norms change food choice behaviour?

3.2 Interdisciplinary Research

The research presented in the thesis is primarily psychological, but also includes sociological interests, concerns, and approaches – specifically related to media, communications, and internet studies. As such, this thesis sought to be more interdisciplinary in nature. There have been multiple attempts to define interdisciplinary research (see Choi & Pak, 2006 for an overview). The Canadian Institutes of Health Research (2005) stated that interdisciplinary research analyses, synthesises, and harmonises links between disciplines into a coordinated and coherent whole. Broadly, interdisciplinary research calls for a less fragmented and more synergistic approach to research compared to monodisciplinary research, by combining elements of several disciplines to encourage new perspectives, ideas, approaches, and solutions to complex problems. This becomes particularly important in fields related to social issues and the complex nature of human behaviour, including

population health and environmental issues (e.g. Ledford, 2015; Rylance, 2015). The complexity, ambiguity, and uncertainty of such major global challenges necessitates the consolidation of different values, viewpoints, and worldviews, which can be achieved using interdisciplinary research. Reducing current rates of meat consumption is a good example of an issue that could benefit from an interdisciplinary approach, as meat eating is affected by a range of factors, including psychological, sociological, economic, political, and cultural (see Stoll-Kleemann & Schmidt, 2017). As such, understanding the nature of meat-eating behaviour, and thus ways to promote reduced meat intake, requires interdisciplinary understanding.

Psychology is the scientific study of mind and behaviour, and sociology the study of human society. The two disciplines have been historically divided through the binary opposition between "the individual" and "society"; generally, the focus of psychology lies with the individual, whereas sociological inquiry emphasises society (Brossard & Sallée, 2019). For an example, psychologists may focus on the way that individuals think and act, whereas a sociologist would consider this to be a product of individuals' lived experiences and sociocultural context (Lahire, 2019). Considering behaviour or behaviour change, psychologists are more likely to focus on individual factors such as mood, cognition, or life history. Conversely, sociologists are not concerned with behaviour, and are more likely to focus on factors such as cultures, communities, media, structural inequalities, power dynamics, and everyday interactions and influences. These differing viewpoints manifest in methodological approaches to research. Psychologists are more likely to value "scientific purity", or experiments with high scientific fidelity, consistency, and internal validity. On the other hand, sociologists may be more pragmatic and observational, and posit that objectivity is not possible given researchers' positions within different sociocultural power dynamics and contexts (Brossard & Sallée, 2019; see section 3.6.1 for further discussion of complex behavioural interventions).

Psychology and sociology heavily overlap and share similar epistemologies, likely a result of the interrelationship between individuals and societies. Individuals and societies are interdependent; just as there is no single detached or autonomous individual, societies exist only as long as individuals take actions towards, and establish relationships and bonds with others (Sztompka, 2008). There has been an emergence of fields that marry the two; for example, social psychology has been defined as the science of explaining how thoughts, feelings, and behaviours of individuals are influenced by the presence of others, whether actual, imagined, or implied (Allport, 1954). Fields and paradigms that draw from both disciplines incorporate this notion that there are no sharp divisions between what goes on within an individual and what goes on without. Instead, it may be argued that human actions and behaviours are a product of both internal individual processes *and* external social contexts and interactions. As such, psychological and sociological approaches can be productively combined. This way of thinking informed the nature of research presented in this thesis. However, in practice, combining disciplines presented significant challenges and was not found to be straightforward (see Chapter Eight, section 8.6 for a reflection on the process of interdisciplinary research).

The following sections will describe the various methods used throughout the studies reported in this thesis, however specific methodological information for each study will be presented in their respective chapters.

3.3 Digital Methods

Study one (Chapter Four) used digital methods to assess representations of LNM diets on Twitter, in order to address research question one. The use of social media data for research purposes has become increasingly common, due to the insight such data provide into socialisation, social interaction, and information exchange (see Chapter Two, section 2.2.1.1). Social media data is unprecedented in size and scope, allowing for academic exploration into a range of topics. Following the discussion on interdisciplinary research and the interrelationship between the individual and the social (section 3.2), Yeung (2018) suggests that social media data are "both communal (i.e. containing shared ties and social connections) *and* individualistic (i.e. highly granular)" (p. 2). These characteristics mean that social media data offer a wealth of opportunities for research.

Social media data offers unique insight into social phenomena and society at large (Bruns, 2015). However, handling and analysing this kind of 'big and broad data' presents methodological challenges, succinctly summarised by Williams et al. (2016) as the 6 Vs; *volume, velocity, variety, veracity, virtue,* and *value*. *Volume* describes the quantity of data that is continuously produced on social media. Twitter (2015) reported that around 500 million tweets are produced by users every day, and the collection, storage, and filtering of such data volumes is challenging. Relatedly, *velocity* refers to the speed at which social media data is generated, especially during live conversation about real world events. The velocity of social media data generation necessitates the use of automated tools for data collection. *Variety* refers to the many different forms of social media data. Depending on the platform, social media data could include text, imagery, video, audio, or any combination thereof, and analytical methods and tools should be able to handle these varying data forms. Social media data often lacks information about the authors' demographic characteristics and identity, and the content produced for social media may not reliably reflect real world users, views, or events. This is *veracity*, which concerns the accuracy, reliability, and quality of social media data for research. *Virtue* refers to ethical considerations such as anonymity, consent, and data use, and how these relate to social media data (see section 3.7.3 for further discussion). Finally, *value* describes the capacity of social media data to contribute to our understanding of the social world.

Taken together, these challenges have necessitated the development of innovative approaches for the capture, collation, analysis, and interpretation of social media data. Such approaches are required to navigate the many complexities of social media and the data derived from them. These include democratising access to data, processing vast amounts of content, filtering noise, and applying traditional social scientific principles to online social networks (Quan-Haase & Sloan, 2017). Approaches to researching social media and other digital data are sometimes referred to as digital methods. Rogers (2019) defines digital methods as techniques for sociological study that make use of "digital objects" (such as hyperlinks, tags, likes, shares, retweets, and timestamps) and how these objects are treated by dominant social media platforms. Digital methods are varied, encompassing a range of tools to assist with data acquisition (e.g. Search Engine Scraper, YouTube Data Tools), data analysis and visualisation (e.g. Gephi, Voyant Tools), or any combination thereof (e.g. 'R', DMI-TCAT). The platform most widely represented in social media research is Twitter (Highfield & Leaver, 2015), and this was the platform used for the empirical study reported in Chapter Four. Therefore, the remaining discussion in this section will focus on Twitter.

3.3.1 The Twitter Platform

Twitter is a micro-blogging platform where users communicate in tweets of 280 characters or less. These "tweets" are shared as a live feed with a network of others, some who are reciprocal followers and some who are not. These others can interact with tweets by "liking" them, replying to them (using "@" to address the original poster, or not), or retweeting them (sharing the tweet to their own network, with attribution; Burgess & Baym, 2020). The use of hashtags (#) adds a further dimension to Twitter content, where users may choose to add a # identifier to their tweet to denote key subjects or contexts in order to connect it with other topically-relevant tweets (e.g. #auspol for Australian politics; Bruns & Highfield, 2013). Twitter began as an avenue for sharing relatively personal, mundane status updates, but became a platform for sharing broader political or social news or dialogue, a process referred to as the "debanalisation" of Twitter by Rogers (2014). In the UK, Twitter users tend to be younger, more highly educated, more liberal, and have a higher income than the general UK population (Mellon & Prosser, 2017). Therefore, while not necessarily a 'representative' platform, Twitter is host to vast amounts of social interaction data, opinions, and self-reported behaviours.

Often, the first step of social media data analysis for social research is the acquisition of the data itself. Social media data is usually acquired using Application Programming Interfaces (APIs), systems that allow other computer software, such as third-party data collection software, to access platform data directly. There are several limitations to Twitter data acquisition using APIs, including limitations surrounding the volume of data they may capture, and their inability to capture data older than nine days (see Janetzko, 2017 for an overview of Twitter APIs). However, the tool used to acquire Twitter data in study one was the Web Data Research Assistant (WDRA; Web Science Institute of the University of Southampton), which operates as a browser extension and does not use an API. The WDRA scrapes the results of searches and converts them into a workable dataset. In this way, researchers can use Twitter's native advanced search function and input any desired parameters (e.g. search terms to include, search terms to exclude, specified timeframes). The WDRA extension may then be activated to scrape the search results, working automatically until stopped by the researcher. When stopped, the tool automatically converts the scraped dataset into an HTML file, which may then be opened with spreadsheet software (e.g. Microsoft Excel) to conduct further analysis. The WDRA bypasses the limitations of both streaming and search APIs by utilising Twitter's native search, however it comes with its own set of limitations. Most importantly, it is unclear what criteria is used by Twitter to select results via its native search function, and the data may not necessarily be random or representative (Kim et al., 2013). The WDRA can also be cumbersome when collecting large amounts of data, since the data that is captured is limited to that which is visible on the web page. On the other hand, the WDRA is simple and free to use, with no required programming expertise. It is also one of the only Twitter data scraping tools capable of capturing historical tweets, which may then be compared over time. Historical comparison was used in study one to explore Twitter representations of LNM diets in 2015 and 2020.

When drawing conclusions from social media data, there are several factors that must be considered. Among the most important is content mediation – by users and platforms alike. Users heavily mediate how they choose to present themselves on social media platforms, and this influences the content that they put on their social media channels. Mediated self-presentation

predates social media. According to Goffman's (1959) dramaturgical model, social situations are akin to a drama performance, in which individuals are actors who present a desired image of themselves dependent on their audience and context. This holds true for many social situations, and carries over into the social media age. Individuals may selectively add or omit, emphasise or de-emphasise, or favour agreeable content over disagreeable content. This may be done to appeal to an 'imagined audience', which – according to Twitter users in one study - ranges from friends and family to interested strangers (Marwick & boyd, 2010). This type of 'impression management' results in a tendency for users to present an image or representation of themselves.

Platforms also mediate what is said and seen. Platform affordances describe the various features of and possibilities in platforms. These may range from communicative practices enabled or constrained by platforms (e.g. visibility, replicability), to technical features such as buttons denoting social interaction or engagement (e.g. "retweets", "likes") or content character limits (Bucher & Helmond, 2018; Treem & Leonardi, 2012). With regard to Twitter, tweet character limits, the format and presentation of Twitter feeds on the home page, and the engagement functionalities (likes, retweets, replies) simultaneously afford and constrain how users post, and how they interact with other posts (boyd, 2010). Platform algorithms underlie and determine how tweets are presented to users, and thus shape the content we see without being directly perceivable themselves (Nagy & Neff, 2015). Examples of this effect include Promoted Tweets which have been paid for by companies, as well as tweets from accounts with large followings, both of which are pushed by the platform and made more visible to users. This is described by Treem and Leonardi (2012) as *visibility affordance*. In other words, Twitter's algorithms selectively afford more visibility to some tweets over others, sorting and ranking content based on "accounts you interact with most, Tweets you engage with, and much more" (About your Twitter timeline, n.d.). Precisely how this is determined is not openly disclosed by the platform (Driscoll & Walker, 2014), and so caution should be taken when drawing conclusions about issue sentiment or influence of social media content.

Despite these points, Twitter was used as the platform of choice in study one due to its content simplicity and consistency (character-limited, textual data with standardised measures of engagement in the form of likes and retweets), accessibility, and standardised data collection approaches compared to other social media platforms like Facebook or YouTube (Highfield & Leaver, 2014). The Twitter data collected in study one was interpreted using thematic analysis, described in the next section.

3.4 Thematic Analysis

Thematic analysis was used to interpret the Twitter data obtained in study one (Chapter Four) of this thesis. Thematic analysis is a method used to identify themes, or patterns of meaning, within qualitative (i.e. non-numeric) data. Thematic analyses are characterised for being theoretically flexible, and adaptable to different disciplines, fields, datasets, and research questions (Braun & Clarke, 2006). There are several approaches to thematic analysis. They may be more "bottom-up" or inductive, where meaning in the data is identified and derived without pre-existing ideas or frames. Alternatively, they may be more "top-down" or deductive, where pre-existing ideas and frames inform and shape interpretation of the data (Braun et al., 2019).

Regardless of the approach, Braun and Clarke (2006) outline six phases in their process of reflexive thematic analysis (see Table 3.2). The first, *Familiarising yourself with the data*, generally involves thorough immersion in the data, by careful reading and noting down of initial ideas, patterns, or meanings that arise. This thorough understanding of the text is an important first step of the analysis. Once this has been done the second phase; *Generating initial codes,* may begin. In this phase, the researcher produces a list of initial codes that each identify a distinct feature of the data. This feature may be semantic or latent, depending on the chosen approach. Codes are the most basic element of the raw data (Boyatzis, 1998), and generating codes is the first step in organising the data into groups, that will eventually lead to broader themes. Consolidation into themes is the focus of phase three; *Searching for themes*. Themes are patterns of shared meaning, organised around a core concept or idea (Braun et al., 2019), and may incorporate and combine several different codes or the relationships between them. By the end of this phase, the researcher should have a list of candidate themes and extracts of data coded under them. Candidate themes and subthemes are further reviewed and refined in phase four; *Reviewing themes*. Reviewing themes entails checking that the coded data under each theme shares a meaningful and coherent pattern, and that the themes accurately reflect the inherent story of the dataset as a whole. During this phase, it is often helpful to generate a thematic map to conceptualise the themes, their significance, and links between them. Following this, themes may be combined, separated, or discarded. Themes are named and defined in phase five; *Defining and naming themes*. Names should concisely describe and encompass the scope and content of each theme. Finally, phase six; *Producing the report,* involves telling the story of the data in a coherent, logical, and compelling account of the analysis.

Table 3.2. Phases of Reflexive Thematic Analysis (from Braun & Clarke, 2006).

Phase	Description of the process
1. Familiarising yourself with your data:	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
2. Generating initial codes:	Coding interesting features of the data in a systematic fashion across the entire dataset, collating data relevant to each code.
3. Searching for themes:	Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes:	Checking if the themes work in relation to the coded extracts (Level 1) and the entire dataset (Level 2), generating thematic 'map' of the analysis.
5. Defining and naming themes:	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme.
6. Producing the report:	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

A distinguishing aspect of this method of analysis is that is iterative and flexible, rather than rigid and fixed. Codes and themes may change, evolve, combine, or be split during the analysis to better capture the researcher's developing conceptualisation of the data. For this reason, Braun et al. (2019) emphasise that this is a recursive method, whereby the phases of the analysis are not to be followed in a linear fashion but involve back and forth movement with reflection and revision as needed. This is to facilitate rigorous engagement with the data that evolves over the course of analysis.

Thematic analysis was used to interpret the data obtained using digital methods (see section 3.3) in study one (Chapter Four). As the aim of this thesis is to assess the normality of LNM diets, the decision was made to approach the thematic analysis deductively, seeking thematic content related to conceptions of "normal" (see Chapter Two, section 2.1). The six-stage method of Braun and Clarke (2006) was used to assess the normality of LNM diets as they are represented on Twitter. However, to assess perceptions of those who practice these diets, two online experiments were conducted (studies two and three; Chapter Five). The design and methods used in these experiments are discussed in the following sections.

3.5 Online Experimental Design

Online experiments were used in studies two and three (Chapter Five) of the thesis in order to assess perceptions towards meat reducers and address research question one. The online experiments were generated and delivered using the Qualtrics (Provo, UT) survey software. There are several logistical advantages to conducting psychological experiments on online platforms such as Qualtrics. First, online studies minimise time and costs, such as those associated with scheduling participants. Instead, online experiments automate data collection, offering fast results and widening the scope for participant recruitment (Crump et al., 2013). Online experiments can gather data from multiple participants concurrently and at any time while the experiment remains open. Finally, online experiments facilitate replication by greatly simplifying the sharing and adoption of methods by other researchers (van Steenbergen & Bocanegra, 2015). All of this simplifies the job for researchers, however there is still a need for the data to undergo quality control processes (e.g. screening responses; discussed in more detail below).

There is immense freedom in the design of online experiments. For example, participant randomisation into groups exposed to different tasks or questions is easily achieved on online platforms through inbuilt randomisation features. These may be used to randomise participants into groups, presenting them with different sets of questions accordingly. Most survey platforms are intuitive and user-friendly, offering a variety of question types ranging from multi-choice and drop-downs to more complex ranking tasks and hot-spot features. Together, these factors allow for ample possibilities in experimental design.

For all these advantages, there are several limitations to online experiments. First, the physical absence of the researcher relinquishes control over the setting in which the experiment is conducted. Since online experiments are accessible anywhere there is an internet connection, participants may be in settings that are loud, distracting, or otherwise compromise their full

attention. Lack of researcher presence, oversight, and support may also lead to the misinterpretation of questions or tasks, resulting in invalid or inaccurate responses. Additionally, invalid responses may be obtained from participants who submit random responses to questions, more likely when an incentive is offered for participation. Some participants may also make multiple submissions to the same study (Bowen et al., 2008). Inaccurate, random, and repeat responses can lead to large distortions in study results (Credé, 2010). However, these can often be identified and removed using attention checks, screening responses, and checking for duplicate data (e.g. IP addresses). Another limitation, pertaining specifically to food-related online studies, is that there is no way to control for confounding variables that can influence food attitudes or behaviours, such as participants' appetite levels.

Finally, it is important in online experiments to minimise bias. Considering experimental design, questions and tasks must be carefully ordered to prevent biased responses to subsequent questions. However, online experiments also increase the possibility of bias in recruitment. Recruitment for online studies favour those who have the means to access the internet (Gosling & Mason, 2015). Bias is also likely when recruitment is based on self-selection, that is, participants choose to participate on the grounds of incentives or personal interest in the topic. Therefore, when recruiting for online experiments, efforts should be made to recruit samples representative of the target group or population in order to minimise bias. Options to recruit representative samples are available through participant recruitment services such as the Prolific recruitment tool (www.prolific.co), used in study two. Prolific's representative sample recruitment uses UK Office of National Statistics census data to recruit participants across three demographics; age, sex, and ethnicity, that match the proportions of these demographics in the national population. The result is that the recruited sample's age, sex, and ethnic distribution will be similar to that of the national UK population, helping to increase generalisability and reduce the risk of biased samples.

Online experiments were used in the two studies reported in Chapter Five to assess perceptions about meat reducers. In terms of methods, study two used a free association task and study three used vignettes. These are described in the following two sections.

3.5.1 Free Association Tasks

Study two (Chapter Five) used a free association task to gather impressions towards meat reducers. Free association tasks involve asking participants to spontaneously produce expressions that come to their minds upon reading a prompting word or phrase. Free association tasks are considered to be a relatively valid, stable, and useful method for capturing associations among groups (Rozin et al., 2002), especially with the first one or two responses to a prompt (Nelson et al., 2000). Free association tasks are widely used in experimental social psychology research, and are valued for their ability to capture uninhibited responses that bypass participants' tendencies to over-rationalise or censor their answers (e.g. as a result of social desirability bias). Adding a time limit into the free association task can facilitate uninhibited, more authentic associations by limiting the time available to think about what is being reported. The source of these spontaneous responses has been described as lying somewhere *between* explicit and implicit attitudes (Rozin et al., 2002).

Free association tasks are commonly used to explore the semantic content of social representations (SRs). According to Moscovici (2000), SRs are ideas, opinions, and attitudes held by a social group towards a social object. These collectively form socially-constructed realities, based on common understandings of what is acceptable or unacceptable (Moscovici, 2000). These realities, in turn, determine our communication within groups, help us to organise our perceptions, and guide our behaviour, practice, and interactions with the world. Social representations have been used to assess attitudes towards, and perceptions of social others (e.g. Danermark et al., 2014; Linton et al., 2013), and are composed of a central core and peripheral elements. The central core is considered stable and non-negotiable; it contains a small number of important cognitions that determine the entire meaning of the SR, such that the object cannot be recognised without these cognitions (Abric, 1993). Keczer et al. (2016) argue that two social representations differ if their central cores contain different associations. Conversely, the peripheral elements are less stable, may evolve with changing social environments, and generally constitute the largest part of the social representation.

The output of free association tasks can be used to approximate social representations. The structure of these social representations is determined by correlating the frequency and rank of associations gathered using the free association task (Vergès, 1994). Frequency refers to the number of times a construct is cited within a sample, whereas rank describes the average ranked position of a construct after participants are asked to rank them according to prototypicality, or importance to the concept, *a posteriori*. The cross-tabulation of frequency and importance ranking yields a 2 x 2 table, with each of the four cells corresponding to a distinct zone of the SR (Table 3.3). Cell 1, called the central zone, contains constructs that are the most frequently mentioned and the most highly ranked, and are thus likely to constitute the central core of the SR. Cell 2, called the first periphery, contains constructs that are frequently mentioned but less highly ranked, and cell 3, called the contrasting elements, contains constructs that are highly ranked but less frequently mentioned. These zones are potentially destabilising zones that are prone to change (Vergès, 2005). Finally, cell 4, called the second periphery, constitutes unimportant and infrequent constructs.

Table 3.3. Cross-tabulation analysis of frequency and rank of associations used to construct social representations (Abric, 2003).

		Rank	
		High	**Low**
Frequency	**High**	Cell 1 – Central Zone	Cell 2 – First Periphery
	Low	Cell 3 – Contrasting Elements	Cell 4 – Second Periphery

The free association task was used to gather perceptions held towards meat reducers in study two (Chapter Five). This method was chosen to gather implicit impressions, and was favoured over other methods (e.g. implicit association task) due to its validity and relative feasibility to implement in online survey platforms. To gather more explicit impressions, vignettes were used in study three (Chapter Five). Vignettes as a methodological tool are described in the next section.

3.5.2 Vignettes

Study three (Chapter Five) used vignettes to examine explicit perceptions of meat reducers. Vignettes are carefully constructed, short, and often hypothetical stories that incorporate contextual practices or behaviours of interest. Participants in vignette research are directed to read these stories and respond to the questions that generally follow about attitudes, practices, behaviours, or other factors depending on the research topic. When vignettes are used to compare more than one practice or behaviour of interest, effort should be made to standardise the text, ensuring that they differ only in areas relevant to the study aims. This allows for the most robust assessment of the behaviour of interest.

Vignettes have been widely used as a methodological tool to investigate personality impressions, which is relevant to the subject matter of this thesis. For example, Ruby and Heine (2011) gauged personality judgments of vegetarians versus non-vegetarians, focussing specifically on moral values and perceived masculinity. Similarly, vignettes have been used to test the effect of diet on characteristics like physical attractiveness, social appeal, conscientiousness, sensitivity, self-control, intelligence, assertiveness, strength, and masculinity/femininity (e.g. Mooney & Lorenz, 1997; Yantcheva & Brindal, 2013).

There are several advantages to using vignettes in attitudinal research. First, the 'depersonalisation' of scenarios presented in vignettes may alleviate any difficulties involved in expressing true attitudes related to certain sensitive or contentious topics (e.g. euthanasia) (Schoenberg & Ravdal, 2000). This becomes especially important in the domain of behavioural psychology, since unconscious attitudes are arguably as much a determinant of our decision-making, thoughts, and behaviours as are conscious attitudes (Bargh & Morsella, 2008). Second, vignettes allow for the presentation of several factors of interest in a contextual setting, which adds to their realism and validity (Atzmüller & Steiner, 2010). Relatedly, Schoenberg and Ravdal (2000) note that vignettes may be more pleasant and relaxing compared to more conventional interview or survey methods. Finally, vignettes are highly adaptable to a range of fields and populations of interest, making them a particularly useful tool to explore a variety of topics within attitudinal research. However, it is important to note that responses to the questions that follow vignettes can be challenging to analyse and interpret. Like most qualitative approaches, respondents may interpret vignettes in any number of ways, and their interpretation of the vignette in turn requires interpretation by the researcher (Schoenberg & Ravdal, 2000). In order to minimise this limitation, study three chose to present participants with predominantly quantitative questions following the vignette.

Vignettes were used to explore perceived personality attributes of meat reducers in study three (Chapter Five). This method was chosen to complement study two's more implicit free association task, and has also been used in previous research related to the subject matter of this thesis (e.g. Ruby & Heine, 2011). Perceptions towards meat reducers gathered in studies two and three informed the social norms interventions of Chapters Six and Seven, described in the next section.

3.6 Social Norms Interventions

Social norms interventions were used in studies four and five (Chapters Six and Seven) to explore the role of normative LNM perceptions in food choice, addressing research question two. Most social norms interventions follow the same basic process, which has been comprehensively detailed by McAlaney et al. (2010). First, it is important to clearly define the behaviour of interest, how this behaviour is quantified in terms of norms and attitudes, and what the target behaviour change comprises. It is also vitally important to understand the population of interest, to identify any specific factors that may influence the social dynamic or practice of the behaviour. Considering alcohol use among university students as an example, it is important to identify the problem (e.g. high alcohol use), the quantifiers (e.g. typical number of drinks consumed per week, student attitudes towards high alcohol use), and any other contextual factors (e.g. students' exposure to health or social education related to alcohol use). At this point, a referent group should be chosen, which will form the comparative basis of the social norm message. In the example given above, the referent group could comprise other student peers of the university, or another subgroup if conducting the study within a specific subgroup (e.g. hall of residence, sports club). It is important that the referent group is one that the target population identifies with, since social influence is strongest when exerted by socially proximal peers (see Chapter Five).

Social norms interventions generally assess the effect of a normative message regarding a target behaviour on the practice of that behaviour. Whilst all social norms interventions follow this basic design, methodological details vary depending on the target behaviour and context. Interventions could have a pre-post design, where a single sample or setting is used, with an "intervention phase" compared to pre- and post- before and after phases. Alternatively, the design may be control-experimental, where more than one sample or setting are compared – one that is exposed to the intervention (i.e. an intervention condition) and one that is not (Dempsey et al., 2018).

Norms may be communicated through personalised feedback, focus groups, or marketing materials (Miller & Prentice, 2016). Regardless of the mode of delivery, the norms message should be credible, and developed using either pre-existing or gathered data about the target population's beliefs about, and/or practice of the target behaviour (Yamin et al., 2019). In this way, the norms message could be descriptive or injunctive in nature, referring to the commonness of a behaviour (e.g. "Most students at the university do not drink alcohol") or the acceptability or approval of a behaviour among the target population (e.g. "97% of university students think it's okay if their friends don't drink"). As illustrated by these examples, the message may include a general statement, or a numerical average outcome or output (McAlaney et al., 2010). During the intervention phase in pre-post designs, or condition in control-experimental designs, the normative message is disseminated. The target behaviour can then be measured using purchase data, observation, self-reports (e.g. via surveys or food diaries), or other measures relevant to the behaviour being assessed (e.g. weighted food intake) (Yamin et al., 2019). The intervention is considered effective if there is a significant change in the frequency or prevalence of the target behaviour during the intervention phase, or in the intervention condition.

Applied to food choice behaviour, social norms interventions may either take place in the laboratory, or in field (real world) settings where food decisions are made (e.g. food outlets, restaurants). Of the

two approaches, field settings offer more ecological validity – they occur in settings that incorporate the many complexities of food decision-making behaviour (see Chapter Two, section 2.3.3.2). Field interventions are discussed in the next subsection.

3.6.1 Naturalistic Field & Complex Interventions in Food Choice Behaviour

Field social norms studies on food choice and eating behaviour (e.g. Mollen et al., 2013) follow a similar formula to those conducted in the laboratory. Field studies take place in real-world settings where food decisions are made, such as cafeterias, restaurants, food outlets, buffets, or supermarkets, and participants are individuals who purchase, choose, or consume food at that setting. Like laboratory-based studies, field interventions involve displaying normative information about a specific food choice or behaviour. Normative messages may be disseminated directly by researchers, or more naturalistically via marketing materials (e.g. wall posters, signs in front of specific foods, above buffets, or on dining tables, or written information or labels on menus) (Miller & Prentice, 2016) that are strategically placed in ways that are likely to be seen and remembered (Yamin et al., 2019). Sales or consumer data are then analysed for differences between those who were exposed to the message, and those who were not. For the purposes of this method, control data could come from a different, similar setting (i.e. in control-experimental designs) or the same setting during a time when normative information was not displayed (i.e. in pre-post designs). A prominent advantage of field studies is that they take place in real world situations, and so offer a more accurate and applicable analysis of the role of social norms in eating behaviour change, particularly when compared to highly controlled laboratory studies. However, it is important that field interventions occur in settings that have supportive and appropriate infrastructure to enable the behaviour change. For example, social norms interventions aiming to increase fruit and vegetable consumption in a cafeteria should ensure that the cafeteria has an adequate availability and range of fruit and vegetables to support the behaviour change.

To further aid real world efficacy, a complex intervention was used in study five (Chapter Seven). Complex interventions are those that emphasise implementation, acceptability, feasibility, and transferability to real world conditions. They are more pragmatic, flexible, and variable, and therefore, may deviate from absolute scientific fidelity (Craig et al., 2008). Complex interventions generally incorporate properties that differ from more conventional interventions. They may include multiple components, target several different behaviours, consider systems in which behaviours are embedded, or occur across different groups or settings (Skivington et al., 2021). Building upon the social norms intervention conducted in Aotearoa New Zealand (study four, Chapter Six), the social norms intervention conducted in the UK (study five, Chapter Seven) used multiple settings (i.e. three different food outlets) and contained additional avenues and formats for social norms message delivery in the form of social media posts with accompanying text. Study five was also designed and implemented in close collaboration with stakeholders such as university operations and marketing staff, engagement with whom is another important aspect of complex interventions (Skivington et al., 2021). Finally, the incorporation of social media platforms in the delivery of the social norms message draws on the proposition of media, communications, and internet research that social media are integral to everyday life, and therefore should factor in to research on aspects of daily life, such as eating. As discussed in Chapter Two, section 2.2, the use of social media is common in

everyday life, and the design of the social media posts used in Chapter Seven embedded them into standard business practices and adds to this intervention's pragmatism.

To aid in the design of interventions, the APEASE (*acceptability, practicability, effectiveness, affordability, side-effects,* and *equit*y) framework was developed (Michie et al., 2014; see Table 3.4). The APEASE framework outlines key considerations in the design and evaluation of behavioural interventions, including statistical significance and effect size under *effectiveness,* alongside several other factors. Developers of the APEASE framework contend that, whilst these other factors are important, effectiveness should be the focus since if interventions are not effective, the other considerations do not apply. While this seems logical, it has been argued that other APEASE criteria should be considered equally important in gauging the effectiveness of an intervention (Skivington et al., 2021; Sparkman et al., 2020). For example, even if changes in behavioural outcomes (i.e. under *effectiveness*) are moderate, sufficiently meeting all other APEASE criteria is likely to increase the scalability of the intervention. In turn, this could cumulatively increase effectiveness. Thus, researchers employing naturalistic complex interventions should broaden the scope of what constitutes 'success', by assessing outcomes relative to implementation and feasibility. This is congruent with complex interventions and an interdisciplinary approach to applied research, where the complexity of everyday life is acknowledged as equally important as absolute scientific purity.

A limitation of naturalistic interventions is that detailed information about participants is challenging to obtain. For this purpose, post-trial surveys were used in studies four and five, described in the next section.

Table 3.4. APEASE criteria for the design of interventions (adapted from Michie et al., 2014).

Criterion	Evaluation
Acceptability	Is the intervention acceptable to all key stakeholders?
Practicability	Is the intervention able to be easily implemented in its intended context?
Effectiveness	Does the intervention have a significant effect on desired outcomes?
Affordability	Is the intervention affordable and cost-effective at the intended scale?
Side effects & safety	Does the intervention have any unintended positive or negative side-effects?
Equity	Does the intervention affect advantaged and disadvantaged groups differently?

3.6.2 Post-Trial Surveys

Post-trial surveys were used in studies four and five (Chapters Six and Seven) to obtain information about the customers at participating food outlets. Surveys are commonly used to obtain information about thoughts, attitudes, and behaviours pertaining to a variety of topics, including consumer preferences, social attitudes, health issues, or voting intentions. They may incorporate quantitative questions, qualitative questions, or a combination of both, and may be paper based (used in study four) or delivered online (used in study five).

Post-trial surveys aim to identify details about individuals who are the subject of the social norms intervention. The surveys used in studies four and five included a range of demographic questions (e.g. age, sex, ethnicity), questions about participants' dietary habits and environmental beliefs, and questions specific to the intervention (e.g. experience at the food outlet, purchase details), all of which may have influenced food choices behaviours. Post-trial surveys also aim to determine whether customers were aware of, or had noticed the social norms message during the intervention. Exposure to intervention components are key to attaining desired effects (McGuire, 1985), and this has been demonstrated to be the case in social norms interventions (Mollen et al., 2013). As such, post-trial surveys may be used to contextualise intervention results.

It was necessary for all studies to consider and adhere to established ethical guidelines for research. Ethical considerations are discussed in the next section.

3.7 Ethical Considerations

All studies reported in this thesis were reviewed and approved by the following ethics committees: the University of Sheffield Psychology Department Ethics Committee, the University of Sheffield Department of Sociological Sciences Ethics Committee, or the University of Otago Human Ethics Committee. Ethical considerations relevant to all studies are discussed in this section; specific details relevant to each study will be reported in their respective chapters.

3.7.1 Ethical Procedures in Online Experiments

The studies included in this thesis were conducted in accordance with the guidelines outlined by the British Psychological Society. All recruitment approaches specified the ethics committee approval number, and provided participants with information including study procedure, incentives, researcher contact details, and the requirements and expected duration of participation. Where possible, informed consent was obtained from all participants prior to participation. The clauses in the consent form were included with guidance from the British Psychological Society's Code of Human Research Ethics (2014) and the University of Sheffield's departmental guidelines. Participants were not asked for their name or any identifying information during survey or recruitment processes. At the conclusion of these studies, participants were presented with a debrief that specified the researcher's contact details and contained a link to mental health support pages in the event that participation caused any distress. Participants in all studies were also given the opportunity to input their email address to enter prize draws. Email addresses were gathered using a separate form, in order keep them separate from the survey data and so ensure participant anonymity.

3.7.2 Ethics in Naturalistic Social Norms Interventions

The social norms interventions reported in Chapters Six and Seven adhered to the same ethical guidelines described in section 3.7.1, however, there were a few additional factors to be considered. Food outlet purchase data was used to assess the effect of the social norms interventions. Purchase

data was anonymous and acquired for all customers making purchases at the participating food outlets. Given the anonymity, informed consent was not obtained for purchase data, however a debrief information notice was displayed at participating outlets at the end of the intervention period for transparency. Additionally, purchase data of this type is routinely recorded by food outlets as standard practice.

As in studies two and three, the survey used in studies four and five included an information sheet and consent form. All prospective participants were required to read and accept these documents prior to participation. Participants were provided with a debrief and opportunity to enter a prize draw at the survey's conclusions. Again, email addresses collected for the purpose of the prize draws were kept separate from the survey data in order to maintain anonymity.

3.7.3 Ethics in Social Media Research

The Twitter study reported in Chapter Four presented additional ethical considerations. This study involved scraping data from the social media platform, Twitter, using a third-party data scraping tool. Due to the nature of social media data (especially when using open platforms such as Twitter), obtaining informed consent is not feasible. Some researchers maintain that obtaining informed consent is unnecessary for studies of this nature, since using social media platforms involves agreeing to platform terms and conditions, which usually state that data will be available to and used by third parties, including researchers (e.g. Thelwall, 2010). Guidelines from 2013 by the British Psychological Society (2013) state that consent from participants in internet-mediated research is generally not required when the research is conducted in "public" places where observation by strangers may be expected, such as open social media platforms. More recent guidelines recognise that the distinction between public and private spaces is blurred in online settings (The British Psychological Society, 2021), making it difficult to interpret how to implement guidelines related to consent and confidentiality in research practices. However, other commentators argue that this does not necessarily justify the use of data, and ethical research processes should still be used (e.g. boyd & Crawford, 2012), especially given that many social media users do not read the terms and conditions. The guidelines set out by the Association of Internet Researchers (AoIR; franzke et al., 2020) emphasise that steps must be taken to mitigate risk to research subjects, since acquiring informed consent is often impractical. They recommend obtaining informed consent where possible, but outline other strategies for risk minimisation such as pseudonymisation and removing identifiable information from social media data presented in articles or scholarly presentations.

There are also differing opinions among social media users about the use of their posts and content for research purposes. Some believe that there is no need for informed consent to use posts as research data, because it is the responsibility of the individuals to moderate what they post, and that posting to an internet website implies consent (Beninger et al., 2014). A survey of Twitter users revealed a general lack of concern about their data being used for research purposes, especially if used for university research (Williams et al., 2017), however other surveys have identified concerns (e.g. Evans et al., 2015). The ethics of social media research is widely debated, however there seems to be a general consensus among both researchers and users that the use of data is acceptable when it is sourced from open, public platforms (e.g. Twitter; Townsend & Wallace, 2016). It is also believed

to be more acceptable to use data without informed consent when considering low sensitivity topics (i.e. topics unrelated to sensitive, personal issues such as political beliefs, personal health, or trauma; Beninger et al., 2014). Regardless, care must be taken to ensure anonymity and confidentiality. To compensate for the lack of informed consent in this study, all collected data was anonymised (with account names and Twitter handles removed from the dataset). Since quoting Tweets may be traced back to user's pages (Moreno et al., 2016), reproduced Tweets were also paraphrased to obscure identification. Whilst modifying tweets for use in secondary material goes against the platform's terms and conditions, the decision to paraphrase was made in an attempt to balance legal and ethical requirements, and is often used in social media research.

3.8 Open Science Practices

Poor research practices and associated difficulties in research replication have become an increasing concern in recent years, leading to an "open science" movement. Open science describes a set of practices that seek to alleviate these issues by promoting research transparency and accessibility (Zee & Reich, 2018). It also ascribes particular importance to research reproducibility and replicability. Reproducibility is the ability of another researcher to arrive at the same findings given the same dataset, whereas replicability concerns the repeatability of a study's findings with new data (Crüwell et al., 2018).

Open science practices include preregistration, open data, and open access. Preregistration has recently become common practice in psychology, and describes the online and public registration of a study protocol before data collection begins. The study protocol typically includes research questions, hypotheses, planned experimental design, and intended methods for data analysis. Whilst it is possible to deviate from this protocol during data collection and analysis, these changes must be documented and justified in any research outputs. Following publication, and in the absence of issues related to confidentiality or ownership, any data and code should also be made publicly available in order to facilitate transparency and reproducibility of findings. For the same reason, research outputs (i.e. journal articles) should be made open access, or freely available to the public. All of the studies conducted as part of this thesis were pre-registered to the Open Science Framework (OSF; osf.io). Details about these pre-registrations are included in the methods sections of each empirical chapter. Where possible, study data will be made publicly available following publication.

This chapter has detailed the various methods used in the empirical studies presented in this thesis. These studies are reported in the four chapters to follow.

4 The increasing normality of low or no meat diets: an exploration of descriptive and injunctive norms in Twitter content

4.1 Introduction

The production and consumption of animal-based foods (e.g. meat, dairy, eggs, fish) are associated with a range of issues related to public health, the environment, food security, and animal welfare (see Chapter One). Alleviating these issues necessitates a shift away from current eating patterns rich in animal products, predominantly in higher income countries (Springmann et al., 2018; Willett et al., 2019). Whilst the consumption of animal products is a social norm in many of these countries, alternative low or no meat diets (LMN diets, including meat reduction, flexitarianism, pescetarianism, vegetarianism, and veganism) are growing in popularity and presence (Dagevos, 2021), indicative of a shifting social norm.

Social norms are comprised of descriptive and injunctive norms; descriptive norms are perceptions of the prevalence of a specific behaviour (i.e. “what other people do”), and injunctive norms are perceptions of what behaviours are approved of and/or expected (i.e. “what other people think should be done”; Cialdini et al., 1990; see Chapter Two, section 2.1). The “commonness” and “idealness” of a phenomenon, related to descriptive and injunctive norms respectively, influence the perceived normality of that phenomenon. For example, Bear and Knobe (2017) demonstrated that people's perceptions of "normal" behaviours are often determined by what is believed to be common (descriptive norm) and what is believed to be ideal (injunctive norm). If a behaviour is perceived as “normal”, it is generally more socially acceptable to practice, in turn increasing people’s propensity to adopt or practice it (Cialdini et al., 1990). Indeed, social norms have been identified as influencing factors under most contemporary models of behaviour, including the COM-B model (Michie et al., 2014; see Chapter Two, section 2.3.1).

A main factor used to rationalise meat consumption is that it is a ‘normal’ behaviour – it is what most people do and what most people expect (Piazza et al., 2015; see Chapter One). The influence of this “normalness” on meat consumption patterns has been empirically demonstrated. In an online survey, Sharps et al. (2021) assessed perceived meat consumption norms among different social groups (i.e. friends, family, significant other), as well as self-reported meat- and plant-based meal intake. Participants generally reported higher meat consumption when they perceived a high injunctive norm, that is, a high approval for meat consumption among friends and significant others. In the same study, participants reported higher plant-based meal intake when family, friends, and significant others were perceived to frequently eat plant-based meals (i.e. a high perceived descriptive norm), suggesting that social norms may be effective at encouraging meat reduction.

According to norm theory, the more a phenomenon is encountered, the more it becomes available for retrieval upon observing similar phenomena, and the more “normal” it appears to be (Kahneman

& Miller, 1986; see Chapter Two, section 2.2.2). Many everyday experiences act as sources for norm acquisition, and this is likely to include content that is seen on social media. Social media have become embedded in the everyday experiences of many. There were approximately 4.62 billion social media users worldwide in January 2022, spending an average of 2 hours and 27 minutes on social media daily (DataReportal, 2022). As such, social media comprises the largest share of our daily media time (DataReportal, 2022) and are often used as a way of "killing time" (Goyanes & Demeter, 2022). The ways in which users encounter, process, and interpret social media content varies; it may be ignored, avoided, superficially checked, or fully read and understood (Goyanes & Demeter, 2022; see Chapter Two, section 2.2.2.1 for further discussion). Despite this variability, the ubiquity of social media makes it a central aspect of many people's everyday social experiences, and thus it may influence attitudes, behaviours, and perceived norms.

Social media content may induce actions and behaviours, including further reading and learning about a topic, civic participation (e.g. voting), or collective action (e.g. protesting) (Boulianne, 2015). Social media content is also capable of influencing perceived norms and behaviour related to consumption (e.g. alcohol; see Moreno et al., 2016). Related to eating behaviour, Hawkins et al. (2020) demonstrated that perceived descriptive norms of Facebook users' fruit and vegetable consumption (that is, the amount of fruit and vegetables individuals perceive typical Facebook users to consume) predicted individuals' own, self-reported fruit and vegetable consumption (Hawkins et al., 2020). A survey by Arla Foods (2022) also revealed that nearly half of the UK participants stated that they would make changes to their diets based on what they had seen on social media. As social media content may influence users' attitudes and behaviours in this way (see Chapter Two, section 2.2.2.1 for further detail), it is a valuable source of data for social researchers interested in this topic.

Since media is a possible source of norm acquisition, it is important to assess how LNM diets are framed. Traditional media (e.g. newspapers) have previously presented LNM diets as 'untenable asceticism' and unachievable for 'normal' people (Cole & Morgan, 2011; Mastermann-Smith et al., 2014). A more recent analysis of LNM diets in UK media revealed a slightly more positive framing (Morris, 2018). However, there has been limited research that analyses content about LNM diets on *social media*. Market research of vegan-related search queries on Twitter revealed a mix of supportive and negative or critical content (Aleixo et al., 2021), and an investigation into the #eatlessmeat hashtag on Twitter revealed that meat reduction is most commonly framed positively, as a solution to climate change (Maye et al., 2021). These studies suggest a mixed framing of LNM diets on social media. However, to the authors' knowledge, there has been no research that specifically examines the extent to which LNM diets are constructed as normal on social media. Given that social media content may influence norm perceptions and behaviour, it is important to explore how LNM diets are discussed on social media platforms, especially as meat-eating norms appear to be shifting.

Twitter is the platform most widely studied in social media research (Highfield & Leaver, 2015). It is a valuable source of insight into food-related perceptions and behaviours considering its common use for sharing daily or routine behaviours such as eating and drinking (Vidal et al., 2015; see Chapter Three, section 3.3.1 for more detail about the Twitter platform). Twitter is also a particularly promising platform upon which to conduct research about social norms, as content can reflect both descriptive norms (through the prevalence of posts or discussion surrounding a topic) and injunctive

norms (through visible indications of social approval, such as “likes” and “retweets”). The aim of the study discussed in this chapter was to assess the extent to which LNM diets are represented as “normal” on Twitter and the nature of these representations. A secondary aim was to investigate how this may have changed between 2015 and 2020, a period of rising LNM popularity (Dagevos, 2021) and notable environmental events (e.g. the Australian wildfires of 2019-2020 and global climate strikes of 2019). To address these aims, this research utilised a mixed methods approach; a qualitative thematic analysis and quantitative analysis of tweet prevalence and engagement, across two datasets from 2015 and 2020.

4.2 Methods

This study’s sample size, hypotheses, and analyses were preregistered via the Open Science Framework (https://osf.io/ygd8m). This study was approved by University of Sheffield Sociological Studies Ethics Committee (reference 036660; 28/11/2020). Ethical considerations relating to the anonymity of social media data (franzke et al., 2020; see Chapter Three, section 3.7.3 for further detail) were addressed by removing account names and Twitter handles from the dataset, as well as paraphrasing quoted Tweets. The data used for this study were from March 2015 and 2020 – prior to, and during the COVID-19 pandemic respectively. The data was analysed in August-September 2021, during the COVID-19 pandemic.

4.2.2 Data Collection

This study analysed Twitter data related to LNM diets from 2015 and 2020. The datasets used in this study were collected using the Web Data Research Assistant (WDRA; Web Science Institute of the University of Southampton), which scrapes the results of searches from Twitter’s native search function (see Chapter Three, section 3.3 for more detail about the WDRA).

Search terms were derived from pilot searches to identify commonly used keywords and hashtags for inclusion. Pilot searches for the keywords [vegetarian], [vegan], [pescetarian], and [flexitarian] were conducted using the Mozdeh tool (Thelwall, 2005), which shows the top keywords and hashtags that occur within each search. No geographical or temporal limitations were specified in this pilot search. Since there was considerable overlap in the keywords and hashtags that occurred across the searches (vegetarian, vegan, pescetarian, and flexitarian), the decision was made to combine these diets into one (comprising *low or no meat* [LNM] diets as a whole). The most common terms and derivatives related to LNM diets to be used as search queries in the analysis are included in Table 4.1. One of these common terms, [meat/#meat], was not included as it was associated with mostly irrelevant, non-diet related content in the pilot searches.

Using Twitter’s advanced search function, searches were conducted for English language tweets containing the hashtags and keywords outlined in Table 4.1, for seven days in 2015 and 2020 (25th – 31st March). During this week in 2020, most countries were at the height of the COVID-19 pandemic and in various state of lockdown or similar containment measures; for instance, the UK entered national lockdown during this week. Nonetheless, this specific week was chosen to assess whether

and how COVID-19 was talked about in the context of meat consumption. Whilst LNM-related content within the 2020 dataset may not be entirely representative, the volume of collected tweets are likely to mitigate this effect. The search was limited to one week to prevent the size of the datasets from becoming too large. There was no differentiation between account type, therefore all types of accounts (e.g. organisations and individual users) were included in the results. "Top" search results, or tweets that are deemed by Twitter's algorithm as most popular, including those most interacted with, retweeted, and replied to (Twitter, 2021) were scraped using the WDRA. "Top" results (rather than "Latest" results) were used based on rationale that heavily retweeted content not only warranted viewing, but also motivated others to share or re-circulate (Hjorth & Burgess, 2014). In this way, "Top" results were considered indicative of social norms.

Table 4.1. Search queries for analysis.

[#vegan]/[vegan]	[#veggie]/[veggie]
[#vegetarian]/[vegetarian]	[#meatlessmonday]/[meatless Monday]
[#flexitarian]/[flexitarian]	[#eatlessmeat/[#lessmeat]
[#plantbased]/[#plantbaseddiet]/[plant-based]/[plant based]	[#eatmoreplants]
[#reducetarian]/[reducetarian]	[#govegan]/[go vegan]
[#pescetarian][pescetarian]	[#veganaf]
[#meatfree]/[meat free]	[#plantpowered]/[plant powered]

4.2.3 Data Cleaning

In total, 1453 tweets were gathered from 2015, and 1492 tweets were gathered from 2020. To increase relevancy, the datasets were first cleaned. This entailed manually removing tweets that were wholly comprised of hashtags, and those that occurred multiple times from the same user. Next, tweets that were related to cosmetics, fashion, or otherwise unrelated to diet, the focus of this research, were removed. Adding non-dietary use of animal products, and related narratives about "veganism as a lifestyle" was deemed incongruent with the other components of this thesis, since choosing vegan fashion or cosmetic products is less effortful and personally costly compared to ongoing dietary change. Following data cleaning, 857 tweets remained from 2015, and 1072 tweets remained from 2020. Cleaned samples were used in the following analyses.

4.2.4 Data Analysis

For the quantitative component of the analysis, "normal" was operationalised as prevalence (the number of tweets, suggestive of descriptive norms) and level of engagement (the number of "likes" and "retweets", suggestive of injunctive norms). Replies were not included as an indicator of engagement, as the sentiment of replies is not always aligned with the sentiment of the original tweet. Assessing the replies to tweets lay beyond the scope of this study.

To account for tweet context, all tweets were first coded into one of three groups (pro-LNM, neutral, anti-LNM) based on general tone. For example, a tweet that read "I hate #vegans" was categorised as anti-LNM, a tweet that read "Whether #vegan, #vegetarian or #flexitarian, #LessMeat is the way" was categorised as pro-LNM, and a tweet that read "Word of the Day: flexitarian, flek-si-tair-ee-uhn, noun: a person whose diet is mostly vegetarian but sometimes includes meat/fish/poultry" was categorised as neutral. Tweets were categorised manually in order to ensure an accurate interpretation of sentiment expressions (e.g. irony, sarcasm). Ten percent of the data was independently coded by a second coder to assess consistency; intercoder reliability tests confirmed significantly high agreement, $\kappa = 0.83$ (95% CI 0.59, 1.06), $p < 0.001$. Though visual and embedded content (e.g. images, links, and videos) were not specifically analysed in this study due to time constraints, they were used in some instances to contextualise the text and assist in categorisation.

Assessing sentiment in social media content can be difficult given that many Twitter users self-censor their tweets (Marwick & boyd, 2010; see Chapter Three, section 3.3), and so what is expressed may not necessarily reflect offline opinions, beliefs, or behaviours. Categorising tweets therefore seems a relatively simplified interpretation of psychologically complex expressions. However, the main purpose of categorisation in this study was to allow the cumulative prevalence and level of engagement of pro-LMN, anti-LMN, and neutral categories to be quantified and compared. A total engagement score was obtained for each category by summing the number of likes and retweets. This score was compared between datasets using two-sample t-tests. For these, the significance level was $p < 0.05$, and the effect size (ηp^2) was interpreted as small (0.01), medium (0.06), or large (0.14; per Cohen, 1988).

To assess textual content, reflexive thematic analysis was conducted using the reiterative six-phase process proposed by Braun and Clarke (2006; see Chapter Three, section 3.4). Phase one of the thematic analysis involved data familiarisation, during which the data was carefully read to obtain an overall picture of ideas and patterns present. Following this, each tweet was coded for meaningful and common ideas related to the research topic in phase two. Examples of codes used during this stage of analysis were "LNM diets as healthy", "LNM diets as ethical", and "anti-LNM humour", and tweets could be assigned any number of codes. Once the entire dataset was coded in this way, codes were consolidated into broad, provisional themes and subthemes as part of phase three. These themes each related to conceptions of "normal". In phase four, themes and sub-themes were developed and refined with systematic and ongoing reflection of the data. A thematic map was developed showing the nature and relationship of themes and sub-themes. Themes were checked against the data to ensure that they accurately reflected tweet content. This process led to phase five, the eventual naming and definition of each theme. The sixth and final phase involved exploration of the narrative within, and between each theme, and how they related back to the research question. Paraphrased extracts from the dataset were used to illustrate these narratives (see Chapter Three, section 3.7.3 for a discussion about ethical considerations pertaining to Twitter data). This analysis was conducted independently for 2015 and 2020 datasets using Microsoft Excel.

4.3 Results

Word clouds of the two datasets made using Voyant Tools (Figures 4.1 and 4.2) show considerable similarity. Positive words (e.g. “great”, “delicious”) occurred frequently, whilst negative words were scarce. This is reflective of the results of the qualitative analyses, presented in section 4.3.2.

Figure 4.1. Word cloud of the 2015 corpus. Word size is relative to frequency within the corpus; larger words occurred more frequently in the dataset

Figure 4.2. Word cloud of the 2020 corpus. Word size is relative to frequency within the corpus; larger words were more frequently in the dataset.

4.3.1 Quantitative Analysis: Tweet Prevalence and Engagement

Table 4.2 shows an overview of the prevalence and engagement of tweets within each category across both datasets. Categorisation of tweets as part of the quantitative analysis revealed that a majority of LNM-related Twitter content was positive, with over 90% of tweets across both datasets expressing pro-LNM sentiment. Across both datasets, pro-LNM content also comprised the highest level of engagement in both indicators (likes and retweets) compared to neutral and anti-LNM content. No significant differences were found in prevalence of pro-LNM, neutral, and anti-LNM (p = 0.16, ηp^2 = 0.001) between years. However, a significant difference was identified in engagement score between years, where the 2020 dataset had a significantly higher engagement score (i.e. average number of likes and retweets per tweet) than the 2015 dataset ($p < 0.001$, ηp^2 = 0.003).

Table 4.2. Prevalence and engagement related to pro-LNM, neutral, and anti-LNM content scraped from Twitter in 2015 and 2020.

	2015 (n=857)				2020 (n=1072)			
	Pro-LNM[a]	**Neutral**	**Anti-LNM**	**Total**	**Pro-LNM**	**Neutral**	**Anti-LNM**	**Total**
Prevalence	780 (91%)	26 (3%)	51 (6%)	857	986 (92%)	44 (4%)	42 (4%)	1072
Likes	9,181 (96%)	99 (1%)	319 (3%)	9,599	45,727 (93%)	976 (2%)	2,458 (5%)	49,161
Retweets	5,091 (98%)	27 (1%)	78 (2%)	5,196	12,556 (93%)	137 (1%)	856 (6%)	13,549
Engagement Score[b]	18.3	4.85	7.94	17.28	59.17	25.3	78.9	58.55

$p < 0.05$

[a] LNM = low to no meat diets

[b] Score is presented as average per tweet

4.3.2 Thematic Analysis of Tweets

The thematic analysis revealed that content across both datasets were relatively similar. However, some differences were observed, evident in Table 4.3, and discussed in section 4.4.

During phase four of Braun and Clarke's (2006) process of reflexive thematic analysis, a broad thematic map was generated (Figure 4.3). The mapping process allowed for the clear visualisation of links between codes, and facilitated the generation of provisional themes. Following through subsequent phases of thematic analysis, four key themes were generated across both datasets relating to the perceived normality of LNM diets. The four themes were *Enabling dietary shift; Aspirational properties of LNM diets; Challenges of LNM diets;* and *Opposition to LNM diets.* Table 4.3 details the themes and subthemes that occurred across each dataset, including descriptive coding, examples, and frequency of tweets per theme. While themes are presented as discrete, most tweets were assigned multiple codes, and were thus categorised into more than one theme. Each theme is discussed in more detail in the following sections.

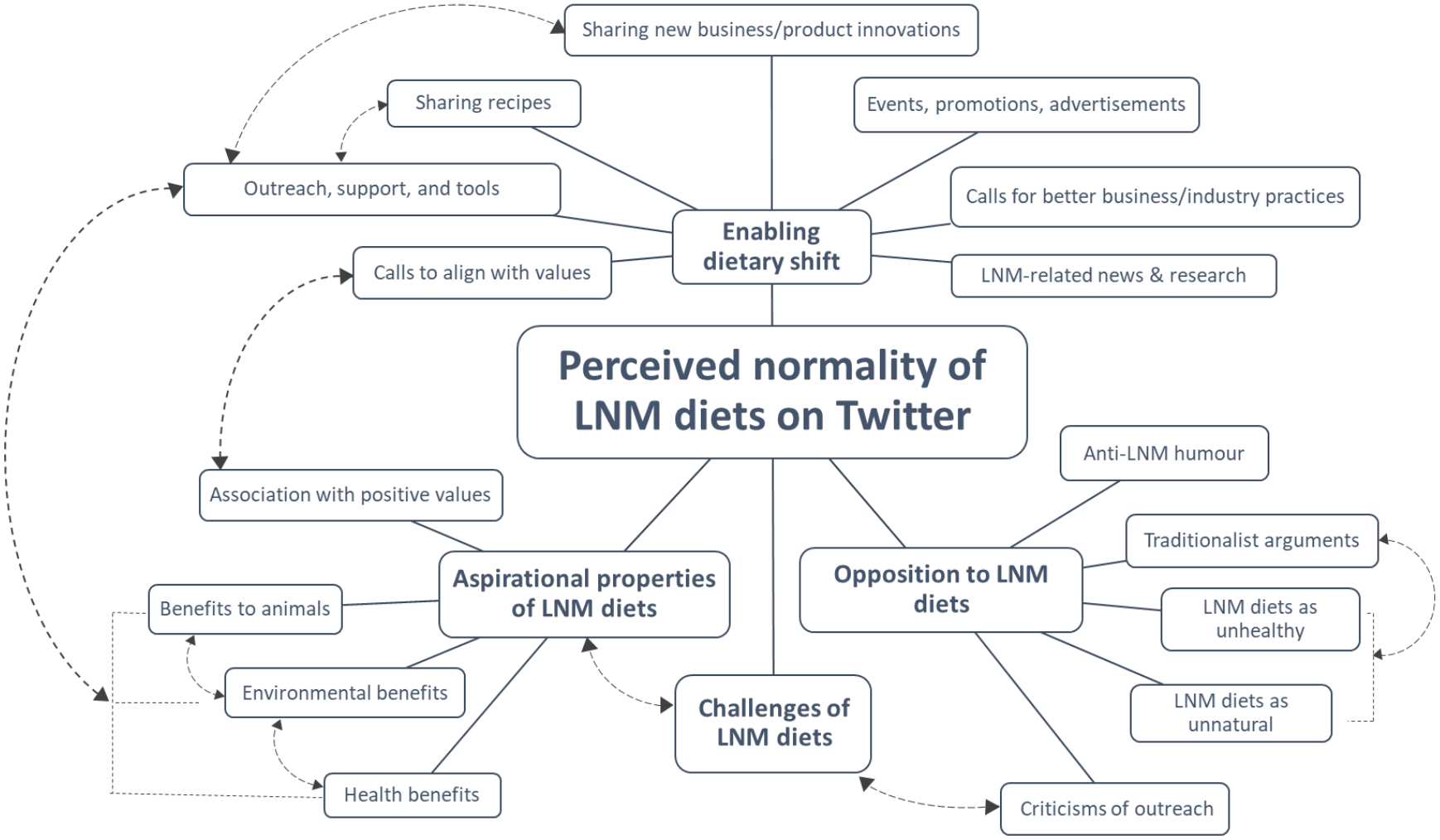


Figure 4.3. Preliminary thematic map generated during phase four of the thematic analysis process. Arrows denote various links observed between themes and subthemes.

Table 4.3. Themes, subthemes, examples, and frequencies shown across 2015 (n=857) and 2020 (n=1072) datasets. Percentages denote the proportion of each dataset that contains tweets coded into respective themes and subthemes.

Theme & description	% (2015)	% (2020)	Subtheme	% (2015)	% (2020)	Example tweet
Aspirational properties of low or no meat (LNM) diets *Sharing positive or aspirational properties of LNM diets to act as rationale for adoption.*	21.12	30.13	Health benefits (personal & population)	8.98	16.14	It is more crucial than ever to get and remain healthy. #COVID19 Heart disease, cancer, diabetes, and high blood pressure can all be reduced by eating balanced, healthful vegan meals. Eat plants to keep your body healthy!
			Environmental benefits	2.57	3.45	Alternative meat is one of the most effective ways to reduce beef-related emissions. Ground beef may be replaced with #plantbased meat, resulting in a 1/6 reduction in GHG emissions from US agriculture.
			Benefits to animals	13.07	13.34	We won't be able to visit #tulipmeats today to see the young pigs that will be slaughtered tomorrow morning. Pigs are smarter than dogs and have the intelligence of four to five-year-old children. Please join us in #govegan for a #virtualvigil to support all #animalrights.
			Association with positive values	5.95	7.65	I used to be a big fan of #meatandpotatoes. Anyone can become a beans and potatoes person and #GoVegan if I can! Please choose #vegan and #compassion. Let's remove #violence from our plates and lives. #ClimateActionNow #ClimateEmergency #FridayThoughts
Enabling dietary shift *Sharing developments, strategies, appeals, or anecdotes to encourage and enable the shift towards LNM diets.*	85.65	84.14	Encouraging LNM diet uptake	45.04	27.15	Try a vegan diet for 22 days. Mentors and professional dietitians will provide you with delicious dishes and personalised advice. #GoVegan #PlantBased #Vegan https://challenge22.com/challenge22/
			Sharing food recipes & ideas	47.02	61.47	Vegetarian Singapore noodles! Bell peppers, snow peas, bean sprouts, curry powder, and turmeric are all used in this dish. #glutenfree #vegetarian
			Personal change anecdotes	3.73	2.71	During this quarantine, as a side effect of being cost conscious, I'm becoming more and more vegetarian. To the point where I felt unwell after eating a hamburger with bacon the other day. :-(I'm still eating meat, but not in large quantities? Anyway, kudos #quarantinediet

Theme & description	% (2015)	% (2020)	Subtheme	% (2015)	% (2020)	Example tweet
			Events & advertisements	10.85	9.52	Tofu fried rice is a new addition to our menu. More #vegetarian & #vegan dishes, such as crispy tofu #springrolls with tamarind peanut sauce, have been added. All @braverychefhall concepts accept online orders for safe & secure pickup/delivery
			Industry, economy, & business	9.92	8.02	To feed the world's population in 2050, food output will have to increase by 70%. Our existing system isn't designed to handle that. That is why it is critical to invest in #culturedmeat and #plantbasedprotein innovation.
			News & research	1.28	4.38	According to a study published in the European Journal of Nutrition, eating eggs increases the risk of death from all causes and cardiovascular disease. In a study of 20,562 people, researchers looked at the relationship between egg consumption and mortality risk... #plantbased #vegan
			Humour (in favour of LNM diets)	1.75	2.89	For those of us who don't want to eat meat but still want to have diarrhoea, they have a vegetarian hot pocket.
Challenges of LNM diets *Tweets by LNM adherents expressing difficulties due to their abnormality, e.g. food availability, impact on interpersonal relationships.*	3.38	4.57		3.38	4.57	For my entire vegetarian childhood, I was teased for eating tofu, and now you're all hoarding it. No tofu to be found in Baltimore. While I don't begrudge you the pleasure of quarantine tofu, I'd best never spend another Thanksgiving being mocked over tofu turkey.
Opposition to LNM diets	4.78	3.45	Personal health anecdotes	0.82	1.31	I experienced so many "mystery" ailments while I was a #vegan! Strange skin illnesses, fungal infections, bruising, gushing, bleeding, boils, bleeding cuts, miscarriages... #VEGANISM = MALNUTRITION!

Theme & description	% (2015)	% (2020)	Subtheme	% (2015)	% (2020)	Example tweet
Criticising some aspect of LNM diets or their advocates.			Humour (against LNM diets)	1.75	1.31	Top Tip For Social Distancing: “Hi, I’m vegan!”
			Criticism of outreach	0.23	0.56	Let people choose what they eat, free choice isn't not immoral or wrong. Shaming, guilt trips, interfering is wrong.
			Criticism of plant-based market	0.23	0.37	There is no such thing as vegan cheese. Please call it something else.

4.3.2.1 Enabling Dietary Shift

'Enabling dietary shift' was the most common theme across both 2015 (84%) and 2020 (86%) datasets. Tweets categorised under this theme raised the profile of LNM diets. They offered social support for transitioning away from meat-eating, discussed skills and knowledge involved in plant-based eating, shared alternatives to meat-based items, or shared personal anecdotes and stories of change. Of the tweets in this theme, those that shared plant-based food recipes were the most prevalent (47.02% of tweets in 2015; 61.47% of tweets in 2020). Examples include:

> *Have you tried making my vegetarian chilli? The ingredients are simple, the taste is anything but. Onion, carrot, celery, and garlic are among the delightful aromatics. For an extra flavourful, smoky taste, I added traditional chilli spices and smoked paprika!* [2020]

> *New! Do you have an abundance of beans and grains in your pantry but no idea what to do with them? WE'VE GOT YOU COVERED. Here are 58 of our favourite bean and rice recipes that are plant-based. #plantbased #pantrystaples They're also incredibly customizable to whatever you have on hand.* [2020]

Tweets that encouraged LNM uptake were also common (45.04% of tweets in 2015; 27.15% in 2020). These tweets contained tips for those transitioning towards LNMs or links to resources, articles, or media promoting LNM diets. These tweets were often accompanied with reasons for adopting LNM diets and thus also coded under the *Aspirational properties of LNM diets* theme:

> *Are you bored at home and want to learn about plant-based eating? We'll match you with a knowledgeable vegan who can answer all of your questions by text, email, or phone. Participate in our Vegan Mentoring Program: http://veganoutreach.org/vegan-mentorship-program/.* [2015]

> *Considering switching to a more plant-based diet? Before you do, have a look at this. On the occasion of our 2nd veganniversary, we're presenting 5 resources you'll need before being vegan or plant-based! #govegan #veganniversary #goplantbased.* [2020]

Also common were tweets advertising or promoting new products, services, or events related to LNM diets (10.85% of tweets in 2015; 9.52% of tweets in 2020). These ranged from the promotion of large-scale events such as vegan festivals, small-scale events such as livestreams or interviews, the announcement of new plant-based offerings at local stores, the promotion of new cookbooks, or personal promotion of small food businesses:

> *This sandwich is on fire! Someone phone the fire department! In their Pink Pepper Sauce, @beleafburgers uses Original #Vegenaise and melts our #DairyFree American Slices on their spicy #vegan chicken patties. Try this sandwich at one of their OC locations.* [2020]

> *@GuPuds has released a new #vegan Salted Caramel Cheesecake, which is now available at @sainsburys' #vegannews #glutenfree.* [2020]

Finally, tweets categorised under this theme also contained personal stories or anecdotes about plant-based eating (3.73% of tweets in 2015; 2.71% of tweets in 2020), links to research or news about LNM diets or novel food developments (1.28% of tweets in 2015; 4.38% of tweets in 2020), and jokes or memes in favour of LNM diets (1.75% of tweets in 2015; 2.89% of tweets in 2020). These codes were relatively less common, but nonetheless occurred across both datasets:

> *I've been vegetarian & even vegan for most of my meals over the past 12 days, with the exception of the pepperonis on the frozen pizza we already had. I have to admit, I feel amazing. I expect this to continue when we reduce our food budget further in the following weeks.* [2020]

> *According to a new poll, more than nine out of 10 Americans are willing to eat more fruits and vegetables, and more than half are willing to forego some red meat in favour of #plantbased meat alternatives.https://theverge.com/2020/2/13/21136515/meat-plant-based-climate-change-impossible-burger-beyond-fruit-vegetables.* [2020]

4.3.2.2 Aspirational Properties of LNM Diets

Whilst *'enabling dietary shift'* focused on the process (or, the 'how') of shifting to LNM diets, tweets characterised under the '*aspirational properties of LNM diets'* theme communicated rationale, or the 'why' of dietary shift. In the 2015 dataset, 21% of tweets contained tweets related to this theme compared to 30% in 2020, a significant difference ($p < 0.001$, $\eta p^2 = 0.01$). The most commonly tweeted rationale for following LNM diets were ethical or animal related (approximately 13% of both datasets). These tweets included those that illuminated animal farming practices and discussed the ethics of eating animals:

> *Sadly, chickens are among the most mistreated creatures on earth. Factory farm chickens suffer from cruel mutilations such as debeaking and being bred to grow at unnatural speeds. They live miserable lives. #EatLessMeat* [2015]

> *I was raised on a farm. Chickens, ducks, geese, rabbits, pigs, and deer were among the animals I slaughtered. It has an effect on you. I've been a vegetarian for 23 years. What is your justification for having others kill for you? If you want to eat animals, kill them yourself.* [2020]

Among the rationale for adopting LNM diets, tweets about health benefits were also relatively common, comprising 9% of tweets in the 2015 dataset and 16% of tweets in the 2020 dataset. These included content about strength, fitness, and weight loss, the nutritional qualities of plant-based foods, and the prevention or mitigation of disease and illness through LNM diets:

> *The majority of animals reared for #meat are given daily doses of antibiotics to help them grow. Antibiotic resistance will kill 10 million people every year by the year 2050. Another compelling argument to go #vegan. #nhs.* [2020]

According to the University of Oxford, red meat (beef, lamb, and pork), as well as bacon, ham, and sausages, kills thousands of people in the United Kingdom every year. #nhs #cancer #bowelcancer #heartdisease #bbc #vegan https://bbc.co.uk/news/uk-46122227. [2020]

In the 2020 dataset, tweets within this category also drew links between meat and pandemics such as COVID-19, SARS, and bird flu, whilst emphasising the preventative qualities of LNM diets. Of the 173 tweets that talked about the positive benefits of LNMs on health in 2020, 64 included reference to COVID-19. A consequence of this is that health-related tweets were significantly more common in 2020 compared to 2015 ($p < 0.001$, $\eta p^2 = 0.035$). For example:

Bird flu, swine flu, mad cow, SARS, and #COVID19 all have something in common. Consumption of animals. If we move to a #plantbased diet, we can prevent these outbreaks, enhance human health, preserve the world from environmentally harmful animal agriculture, and save animals from suffering. [2020]

Coronaviruses, like #COVID19, are zoonotic, which means they spread from animals to people. Such infections endanger the health of humans, animals, and ecosystems, as well as jeopardise economic progress. #coronavirus https://bit.ly/2UTtv9p - via @UNEP [2020]

LNM diets and those who follow them were also associated with values such as compassion, kindness, equality, empathy, and the rejection of violence in society and everyday life. These associations occurred in 5.95% of tweets in 2015, and 7.65% of tweets in 2020:

'You either approve of violence or you don't, and the meat industry is the most violent enterprise on the planet.' #GoVegan. [2020]

My views in equal rights for all didn't add up, so I went vegan. Believing that all beings deserved life had to imply that ALL beings deserved life. I went vegan the next day after the revelation. In my life, I've never met a vegan or vegetarian, I wish more people spoke out against injustice. [2020]

The environmental benefits of LNM diets were less commonly tweeted about across both datasets (2.57% in the 2015 dataset and 3.45% in the 2020 dataset). These tweets usually linked animal agriculture and meat-eating with climate change, and emphasised LNM diets as a way to mitigate these impacts:

Our dietary choices represent a vote for or against the environment. Use your food choices to prevent waste, reduce meat and dairy intake, and investigate plant-based alternatives to reduce CO_2 emissions during your #quarantine. #eatmoreplants. [2020]

Retweet if you're going to start the week off right with a #MeatlessMonday for your health and the planet's! [2015]

4.3.2.3 Challenges of LNM Diets

One of the two less common themes identified across both 2020 and 2015 datasets was '*challenges of LNM diets*' (3% of tweets in 2015; 5% of tweets in 2020). Tweets in this theme expressed the various challenges and frustrations of following LNM diets, tweeted by those who themselves adhere to these diets. These difficulties included challenges faced during outreach and advocacy, or the consequences of following LNM diets on interpersonal relationships:

> *People don't care if you're a "nice" vegan, they care if you're a silent one, and the more I advocate veganism, the more I realise this. It makes no difference how kind you are when you deliver your message. People get vitriolic when you challenge a social norm.* [2020]

> *My mother insists on serving a nonvegan pizza for my birthday dinner, but it's my birthday, and if they serve nonvegan food in front of me, I'm pulling a Gary Yourofsky and walking out, because it's MY birthday, and how difficult is it to leave animals alone for ONE meal?!?* [2020]

4.3.2.4 Opposition to LNM Diets

The final theme, *'opposition to LNM diets'* comprised 3% of tweets from 2015 and 5% of tweets from 2020. Unlike the previous themes, this theme encompassed tweets that criticised or condemned LNM diets by those who likely did not agree with, or partake in LNM diets themselves. Tweets categorised under this theme commonly used humour, making light of the belief systems associated with LNM diets or their negative social or restrictive aspects (1.75% of tweets in 2015; 1.31% of tweets in 2020):

> *Look out for your vegan friends. Never mind, you didn't like them to begin with.* [2020]
> *Are these vegan avocado brownies? Thank you very much for your generosity; I'd love to have some for my garbage can!!* [2020]

Tweets under this theme also criticised the impacts of LNM diets on health. These criticisms were sometimes expressed using personal anecdotes (0.82% of tweets in 2015, 1.31% of tweets in 2020):

> *Because their teeth are falling out and they can't eat anything else, vegans end up mixing vegetables and fruits. Healthy teeth and bones require Omega 3 cod liver oil, D3, K, A, and minerals.* [2020]

> *I was vegetarian throughout school, but I was forced to start eating meat because I had so many deficiencies. For some people, avoiding meat isn't always safe, healthy, or realistic.* [2015]

A small number of tweets criticised attempts to increase the profile and uptake of LNM diets, by activists, industry, and media (0.23% of tweets in 2015, 0.56% of tweets in 2020):

People should be left alone. Allow them to make their own decisions and respect their choices. [2015]

People who took one Netflix documentary created by vegans with a financial stake in vegan-based food production as gospel above many, separate meta-analyses published in the world's most prestigious scientific journals scare me. [2020]

4.4 Discussion

The aim of this study was to explore the extent to which LNM diets are represented as 'normal', and the character of these representations. A secondary aim was to explore how this may have changed between 2015 and 2020. The study used mixed methods quantitative and thematic analyses to identify and categorise Twitter posts that were collected over seven days in 2015 and in 2020.

The quantitative analysis revealed that LNM diets were largely framed positively and favourably across both datasets. Pro-LNM content had by far the highest prevalence and the highest level of engagement across both datasets. Furthermore, the percentage of negative LNM-related content was relatively low across both datasets, challenging the assumption that LNM diets are constructed as "abnormal". Under social norm theory, norms are a function of both the commonness and idealness of phenomena (Cialdini et al., 1990), an idea that has been confirmed empirically (e.g. Bear & Knobe, 2017; see Chapter Two, section 2.1.1). If prevalence is seen as "commonness", and engagement is seen as "idealness", it appears that LNM diets are largely constructed as "normal" on Twitter, and this is likely to affect perceived norms among users. According to norm theory, norms are acquired through repeated exposure to phenomena (Kahneman & Miller, 1986). Applied to this study, it seems plausible to infer that, if an individual is exposed to a high prevalence of favourable posts about LNM diets, as observed in this study, the more "normal" LNM diets will appear to be. Indeed, empirical evidence demonstrates that social media content is capable of influencing perceived norms (e.g. Liu & Shi, 2019). Furthermore, the common integration of Twitter posts into media outside of the platform (e.g. news reports and presentations; Driscoll & Walker, 2014) may increase the salience and influence of content. This becomes important when considering the downstream effects of normality judgements on behaviour and social influence, discussed in detail in Chapter Eight.

The "idealness" of LNM diets manifested in the two most common themes identified across both datasets. The most common theme, containing the greatest volume of tweets was *'enabling dietary shift'.* Tweets categorised under this theme broadly aimed to increase the profile and uptake of LNM diets by sharing ideas, developments, recipes, and support in order to shift prevailing meat-centric norms. Adopting new behaviours is challenging, and this is especially so with regard to habitual meat consumption, given the various social, cultural, and traditional meanings afforded to meat (Stoll-Kleemann & Schmidt, 2017). Reducing or removing meat from one's diet also necessitates the acquisition of knowledge (e.g. of enjoyable plant-based alternatives and nutrition) and skills (e.g. to prepare novel plant-based meals or ingredients), as well as the exploration of novel foods and methods. To prevent regression to meat eating, it is vital to ease this learning curve as much as possible. This is especially important when considering that a lack of skills to prepare or cook plant-

based foods is a commonly-cited barrier to LNM dietary uptake (e.g. Mullee et al., 2017). As social media platforms offer access to a global network of culinary ideas, creativity, combinations, and skills, this type of content may be important in promoting and maintaining transitions to LNM diets.

Another fundamental aspect of the '*enabling dietary shift'* theme was social support. Empirical evidence suggests that low perceived social support may trigger a vegetarian's return to meat consumption (Hodson & Earle, 2018), and it is likely that this effect extends to all forms of LNM diets. Twitter, and social media more generally, may offer spaces which are particularly effective at providing social support by enabling access to individuals or groups that may not be accessible in offline interpersonal networks (Cobb et al., 2011). For example, following accounts or pages related to veganism could expose meat reducers to ongoing vegan-related content, reinforcement, and support. Such interactions may facilitate a sense of community in the absence of likeminded friends or family. A recent systematic review indicated that belonging to, and engaging with online groups can increase perceived social support and motivation to change or maintain a new behaviour (Elaheebocus et al., 2018). Together, these factors suggest that social media content may positively influence the uptake of LNM diets through the provision of social support. Whether it actually does this remains to be tested.

The second most prevalent theme identified across both datasets was *'aspirational properties of LNM diets'*. Tweets categorised under this theme framed LNM diets as aspirational by discussing various rationale for their adoption. Transitions to LNM diets may ameliorate issues caused by meat-rich dietary norms, such as harms to animals, human health, the natural environment, and social outcomes (see Chapter One). There were several forms of rationale for adopting LNM diets identified in the corpora, the most common of which concerned animal rights or welfare. This is consistent with previous research which suggests that moral concern for animals increases openness to LNM diets (Rosenfeld, 2018). Ethical concerns about intensive meat production form the basis of the animal rights and vegan movements, and such movements are often grown, organised, and mobilised using social media (Gerbaudo, 2012). This may have accounted for the prevalence of animal-related rationale for adopting LNM diets identified in the datasets. Environmental benefits were the least commonly referenced rationale for LNM diets, confirming previous research that environmental reasons for meat reduction, and indeed awareness of meat's environmental harms, are low (e.g. Macdiarmid et al., 2016). Health-related rationale was common, echoing previous research that has identified health to be a salient and persuasive motivator for LNM diets (de Boer et al., 2017). Despite the pervasive narrative that meat is essential for human health, many people believe that LNM diets confer personal health benefits (Bryant, 2019). Emerging ideas related to the COVID-19 pandemic about the capacity of LNM diets to prevent zoonotic disease outbreaks was another topical rationale for their adoption. Behaviours, and the groups that practice them, must be deemed aspirational to maximise social influence and uptake among peers (Cruwys et al., 2012), and so sharing multifaceted rationale for LNM diets may widen their appeal and likelihood of adoption.

Despite the fact that LNM diets were constructed as "normal" in terms of commonness and idealness, tweets in the remaining two themes were critical about LNM diets and/or their abnormality in everyday life. Tweets categorised under the *'challenges of LNM diets'* theme discussed the hurdles encountered when attempting to reject meat-centric norms. These were largely social difficulties, ranging from jokes and derogation to outright hostility, exclusion, or

discrimination, all of which have been reported by vegetarians and vegans in previous research (e.g. Markowski & Roxburgh, 2019; see Chapter One). Such treatment arises from the relative uncommonness of LNM diets, as well as the emotive, morally charged nature of meat production. As described in Chapter One, this can increase cognitive dissonance and result in strained social relationships or distancing from the source of the dissonance (in this case, those who follow LNM diets; MacInnis & Hodson, 2017; Rothgerber, 2016). The result is that following LNM diets can be socially costly (Markowski & Roxburgh, 2019). Relatedly, tweets categorised under this theme also discussed the inconveniences faced due to the lack of widespread meatless products or options, especially when dining out or in social situations. This adds another difficulty for those following LNM diets, who may be perceived as "picky" or "difficult" by their peers as a result.

Negative perceptions of LNM diets manifested most strongly in tweets categorised under the final theme; *'opposition to LNM diets'.* These tweets contained anti-LNM rhetoric, including jokes, derogation, and criticism of LNM diets, the rationale for following them, or individuals who follow them. As such, these tweets favoured meat consumption, consistent with previous research that has identified negative representations of meat abstinence, both online (e.g. Aleixo et al., 2021) and offline (e.g. Cole & Morgan, 2011). However, the *'opposition to LNM diets'* and *'challenges of LNM diets'* themes occurred least commonly across both datasets. Given that negative comments to social media content have been shown to induce negative attitudes towards, reduced agreement with, and decreased credibility of that content (Boot et al., 2021), the low number of such tweets in the datasets is promising. Furthermore, unlike previous social media research that has identified a more mixed framing of LNM diets, these findings suggest that the "LNM diets as abnormal" narrative may be losing favour in dialogue about meat consumption – at least in the Twitterverse.

When comparing the two datasets, the 2015 and 2020 corpora shared many similarities, observable in the word clouds in Figures 4.1 & 4.2 and evident in the quantitative (Table 4.2) and thematic (Table 4.3) analyses. Tweets that contained some form of outreach or advocacy, and those that shared new products and recipes, comprised the majority of both datasets. Across both datasets, the benefits to animals were the most commonly tweeted rationale for adopting LNM diets, whereas environmental benefits were the least commonly referenced. Negative tweets, whether expressed by those who follow LNM diets ('*challenges of LNM diets'*) or those who do not (*'opposition to LNM diets'*), comprised the two least common themes across both datasets.

However, some small differences between the 2015 and 2020 datasets were observed. Health-related justifications for LNM diets were significantly more prominent in the 2020 dataset compared to the 2015 dataset. This was largely seen in tweets linking meat consumption to the COVID-19 pandemic, indicating that there was at least a moderate awareness of this link among users. COVID-19-related tweets in 2020 occurred alongside an increase in content discussing the wider health problems related to intensive meat consumption. The attitudes expressed in these tweets may form the basis for shifts towards LNM diets, given previous evidence which suggests that meat reduction behaviour is often motivated by health concerns (see Stoll-Kleemann & Schmidt, 2017). However, further research is required to confirm these effects.

There was also a significantly higher volume of tweets related to rationale, or aspirational properties of LNM diets in 2020, and a higher volume of tweets collected in general compared to 2015. While

this latter observation could be due to the general growth in Twitter's user-base (Dean, 2021), the former observation could reflective of the growing popularity of LNM diets in recent years, including veganism (Ipsos Mori & The Vegan Society, 2016) and flexitarianism (YouGov, 2019). This growth may be due to a number of factors. First, the plant-based food sector has also grown rapidly in recent years (Mintel, 2020), and plant-based alternatives are becoming increasingly accessible. There may have also been a general increase in the salience of global impacts of meat consumption, through factors such as climate-related disasters (e.g. 2019 Australian wildfires), environmental activism, and the COVID-19 pandemic. Together, these factors may have highlighted the urgency for preventative action, possibly accounting for the larger 2020 dataset.

4.4.1 Strengths, Limitations, and Suggestions for Future Research

This study is one of the few that has explored the presentation of LNM diets on social media, and it represents an original assessment of the "normalness" of LNM diets as they are represented on social media. Using content prevalence and engagement indicators (e.g. likes, retweets) as analogues for descriptive and injunctive norms respectively is a novel approach that was devised to explore perceived norms using social media data. There are also several notable strengths in the use of social media data to explore social phenomena, the use of the WDRA (versus other data scraping tools), and the use of thematic analysis. These are discussed in Chapter Three.

However, it should be noted that Twitter users actively seek out content related to LNM diets by searching for hashtags or keywords, or else be exposed to it through accounts that are already being followed. This presents a limitation to study one, since the influence of LNM-related content over attitudes and behaviours, is dependent on each users' network of followed accounts. For instance, if Twitter users in a user's network share a majority "abnormal" or "normal" presentation of LNM diets, that user's attitudes and/or behaviours may be swayed accordingly. This may have an additional 'echo chamber effect', whereby repeated exposure to, and interactions with certain opinions, sources, or peers may reinforce the type of content shown (Cinelli et al., 2021). This could ultimately lead to individuals overestimating the extent to which their beliefs and behaviours are considered 'normal'.

It is also important to note that while pro-LNM content was common in the tweets gathered about LNM diets, this may not be the case on Twitter more generally - beyond the datasets gathered for this study. The datasets used in this study represent a small fraction of Twitter content, and there is no way to determine whether the majority pro-LNM sentiment observed in this study is representative of all LNM-related content on Twitter. Furthermore, it is impossible to determine how much LNM-related content, and the nature of this content, is seen by users. Platforms moderate content on Twitter (see Chapter Three, section 3.3.1), which can result in some content being promoted above other content. "Top" search results were used in this study in an attempt to somewhat ameliorate this effect, by capturing content that Twitter deems to be "most popular"; Twitter, 2021). However, there is a lack of clear information about how these "Top" search results are determined by Twitter and it is therefore unclear how these kinds of tweets are promoted or prioritised by the platform.

Another limitation lies in the timeframe for the 2020 dataset. Following the high-profile publication of the EAT-Lancet report (Willett et al., 2019) in January 2019, considerable backlash emerged with the #Yes2Meat countermovement, which was largely centred, organised, and spread on online platforms. Usage of the Yes2Meat hashtag peaked a few days following the release of the report, and Garcia et al. (2019) found that its usage surpassed that of the official EATLancet hashtag over the remainder of that month. Importantly, the Yes2Meat hashtag was associated with negative expressions about the report. The resulting polarisation of opinion towards reducing meat consumption may have affected the use of the search terms used in this study, specifically in the 2020 dataset.

Finally, due to time constraints, there was no analysis of who was tweeting about these topics. As has been noted, the majority of Twitter users comprise a specific demographic – they tend to be younger, more highly educated, more liberal, and earn a higher income (Mellon & Prosser, 2017). As such, many people (e.g. older individuals, those who come from lower socioeconomic backgrounds, and those who hold conservative views) may not be active on the platform at all. LNM-related content on Twitter may therefore not reach these groups, which is important considering that they may consume meat more heavily or be more resistant to change (e.g. Clonan et al., 2016).

Future research may benefit from a broader and more inclusive dataset, for example, over a period of more than one week, or incorporating visual or non-English content for a fuller picture of LNM-related content on Twitter. One potential area for further exploration is social network analysis, which could be used to identify the most important actors in Twitter content about this topic. this type of analysis could provide insight into which accounts tweet most often about these topics, which accounts are made more visible by the platform, and which accounts are the most commonly shared or retweeted. In doing so, it may provide an indication into which accounts are particularly influential with regard to pro-LNM Twitter content.

To conclude, the results of this study suggest that low or no meat diets are largely represented as positive and favourable on Twitter. Content related to LNM diets are also highly engaged with, indicative of social approval and shifting norms that reflect the real-world growth of LNM popularity. Whilst this is promising with regard to the possibility of behaviour change interventions effectively promoting these diets, it is also important to assess perceptions held towards groups that already practice these diets. This is because perceptions towards groups who practice a desirable behaviour determine their influential power; individuals are less likely to adopt a behaviour if that behaviour is associated with groups deemed undesirable (e.g. Berger & Rand, 2008). Perceptions held towards vegetarians and vegans have been empirically explored (e.g. MacInnis & Hodson, 2017). However, it remains to be seen what perceptions are held towards meat reducers, who are distinct from vegetarians and vegans given that they still consume meat, albeit actively reducing their intake. Perceptions held towards meat reducers will be investigated in the next chapter.

4.5 Key Findings

- LNM diets are framed as “normal” on Twitter, conceptualised by the “commonness” and “idealness” of content.

- The majority of LNM-related content on Twitter was framed as positive.

- Promoting a shifting norm away from meat and towards LNM diets, and the rationale behind this shift, were the dominant narratives in Twitter content about this topic in both 2015 and 2020 datasets.

- Positive framing of LNM diets may have strengthened in recent years due to their growth, as well as events in the socio-political climate (e.g. COVID-19) that call for them.

5 How are meat reducers perceived? Results from two different studies

A note on the inclusion of published work:
The work that forms this chapter has been published during the period of PhD registration. Copyright of these papers resides with the publishers; however, reproduction of papers is permitted in the terms of the copyright agreements with attribution (see Appendix 3):

> **Patel, V.** & Buckland, N. (2021). Perceptions about meat reducers: Results from two UK studies exploring personality impressions and perceived group membership. *Food Quality and Preference, 93*, 104289.

5.1 Introduction

Study one (Chapter Four), which assessed representations of low or no meat (LNM) diets on Twitter, revealed that positive representations of these diets were both common and highly engaged with on the platform. If "commonness" and "idealness" are functions and predictors of norms, as theorised by Cialdini et al. (1990)'s descriptive and injunctive norms and demonstrated empirically by Bear and Knobe (2017), it is reasonable to conclude that LNM diets are being increasingly presented as "normal" on Twitter. This reflects the growing popularity of LNM diets, constituting a shifting norm. However, it is also important to determine how those who practice these diets are perceived; the extent to which they are perceived as "normal" through the nature of traits with which they are commonly associated. These questions will be explored in the two studies presented in this chapter.

Social influence occurs when individuals alter their attitudes or behaviours in response to what others do, or are perceived to do (Burger, 2001). Social influence has been consistently found to influence eating and pro-environmental behaviours (e.g. Cruwys et al., 2015; Farrow et al., 2017; see Chapter Two, section 2.3.3.1 for further detail), and has been identified as a factor that influences behaviour under the COM-B model (Michie et al., 2014; see Chapter Two, section 2.3.1). The degree of social influence that an individual has over another is affected by positive or negative perceptions and perceived ingroup or outgroup membership. Ingroups are social groups with which an individual identifies, and outgroups are social groups with which an individual does not identify (Tajfel & Turner, 1986), and these typically manifest in attitudes and behaviours towards others. Generally, perceived ingroup members are favoured, while perceived outgroup members are derogapted (Hewstone et al., 2002). Peers who are perceived as part of an ingroup exert more social influence and therefore are more likely to encourage more behavioural change or uptake than those perceived as the outgroup. This effect has been demonstrated in empirical research. For example, the association of junk food with an undesirable outgroup within a college setting led to students making healthier food choices in an experimental study (Berger & Rand, 2008). Similar effects were found in a laboratory study, where college students changed their eating behaviour to align with a

perceived ingroup member, but not a perceived outgroup member (Cruwys et al., 2012; see Chapter Two for further discussion). Such studies indicate that the effect of social influence on behavioural uptake is limited if that behaviour is associated with groups that are disliked or perceived as non-aspirational outgroups. Therefore, for social influence to be maximised, the group associated with the behaviour must be perceived positively.

Meat-free diets (e.g. vegetarianism and veganism) and the individuals who follow them have historically been perceived negatively. For example, these diets have been presented as "abnormal" in traditional media (e.g. Cole & Morgan, 2011), and meat eaters have often displayed negative prejudice towards vegetarians and vegans (MacInnis & Hodson, 2017). Relatedly, vegans have long reported ridicule and antagonistic treatment from others (McDonald, 2000). Such negativity may arise because vegetarians and vegans constitute a minority who deviate from social conventions related to food. This may be perceived as a moral threat to others (Minson & Monin, 2012), as it may force meat consumers to confront any underlying mental discomfort they may have related to meat eating (known as cognitive dissonance; see Chapter One for further detail). These negative perceptions contribute to an anticipated stigma, or the biased treatment from others stemming from characteristics considered to be undesirable. This anticipated stigma has been identified by individuals as a deterrent and barrier for personal meat reduction (Lea & Worsley, 2003; Markowski & Roxburgh, 2019).

However, perceptions of LNM diets may be shifting, as a result of their growing popularity and visibility in recent times (e.g. Dagevos, 2021). This has been evidenced in the empirical study reported in Chapter Four, which demonstrates that LNM diets are largely represented as "normal" on Twitter through the prevalence of, and engagement with positive LNM content. Despite these findings, there has been limited research assessing the perceived normality of the *groups* that follow LNM diets, which becomes important when considering the nature of social influence as discussed above, and has implications for social norms behaviour change interventions. Whilst perceptions towards meat abstainers (i.e. vegetarians and vegans) have been previously explored (e.g. Ruby & Heine, 2011; Thomas, 2016), there has been no research assessing perceptions towards meat reducers; a distinct group that represents the shift towards LNM diets. For the purposes of this research, it is possible that the more moderate, accessible, and achievable nature of meat reduction over meat omission may be more amenable to social influence. As such, interventions based around the social influence of meat reducers may be an effective means of encouraging meat reduction among others. Since the degree of social influence is moderated by perceptions of the referent group, it is important to investigate perceptions held about meat reducers in order to evaluate their level of social influence over others.

This chapter reports two studies which aimed to explore perceptions of meat reducers, compared to perceptions of vegetarians and habitual meat consumers. Vegetarians and habitual meat consumers were included as social objects to provide a point of comparison (representing meat abstainers and meat consumers respectively). Whilst study one (Chapter Four) assessed the perceived normality of LNM diets in terms of both descriptive and injunctive norms (see Chapter Two, section 2.1.1 for further detail on norm conceptualisations), the studies reported in this chapter primarily focus on an interpretation of injunctive norms, specifically the nature of perceptions held towards meat reducers and whether these are positive or negative, aspirational or non-aspirational. Information about

perceived descriptive norms, or the commonness of LNM diets and meat reduction among the populations sampled, was also collected to provide the basis of the social norms message to be used in the study reported in Chapter Seven. Since the degree of social influence varies depending on positive-negative perceptions of the referent group, both of the studies reported in this chapter are important precursors to the social norms interventions of Chapters Six and Seven.

Study two used a free association task to gather associations related to meat reducers, vegetarians, and habitual meat consumers from a representative UK-wide sample. These associations were used to construct social representations (see Chapter Three, section 3.5.1 for an in-depth methodological overview of free association tasks and social representations). The specific aims of this study were to use a free association task to, (i) construct and compare social representations for meat reducers, vegetarians, and habitual meat consumers, and (ii) assess differences in association valence (general positivity or negativity) between these social representations. Due to the more moderate nature of meat reduction compared to meat elimination, it was expected that meat reducers may be perceived more positively than vegetarians and habitual meat consumers.

Study three involved participants rating perceived personality traits of hypothetical meat reducers, vegetarians, or habitual meat consumers that were described in vignettes (see Chapter Three, section 3.5.2 for an in-depth methodological overview of vignettes). The specific aims of this study were to assess, (i) perceived personality attributes, and (ii) perceived group membership of hypothetical meat reducers, vegetarians, and habitual meat consumers described in the vignettes. There were two cohorts of participants in this study: University of Sheffield staff and students, and the vignettes described hypothetical peers (i.e. fellow university staff or students). Compared to the UK-wide sample used in study two, university staff and students belong to clearly defined populations which form part of their identity (e.g. university group), allowing for the assessment of perceived group membership. The hypotheses for each personality rating are outlined in Table 5.1, and are based on previous empirical evidence into perceptions about vegetarians or healthy food consumers. It was also expected that the hypothetical person in the meat reducer vignette would be perceived as a similar ingroup member, significantly more so than the hypothetical vegetarian but significantly less so than the hypothetical habitual meat eater. This is because meat reducers do not completely abstain from meat, rather they represent a dietary pattern that lies between the other two along the meat-eating spectrum. Regarding sample type differences, it was expected that participants in the student cohort would rate hypothetical meat reducers and vegetarians significantly less unfavourably than participants in the staff cohort. This is because a higher proportion of students are either themselves vegetarians (e.g. Worsley & Skrzypiec, 1998), open to reduced meat eating patterns (Dibb & Fitzpatrick, 2014), or intending to give up meat (YouGov, 2019).

Table 5.1. Personality traits analysed in study three, with hypotheses and rationale.

Trait Scale	Rationale & Hypothesis
Animal lover – non-animal lover	While vegetarians are seen as more animal loving compared to omnivores (Hartmann et al., 2018), meat reduction still involves the occasional consumption of animals. For this reason, it was expected that animal-loving scores would not significantly differ between meat reducers and habitual meat eaters. On the other hand, it was expected that vegetarians would be perceived as significantly more animal loving compared to meat reducers and habitual meat eaters.
Health conscious – not health conscious	While Marinova and Bogueva (2019) reported that public awareness of the extent of meat's negative health impacts are low, vegetarians are still perceived to be healthier than habitual meat eaters (Hartmann et al., 2018). As such, it was expected that meat reducers would be perceived as significantly more health conscious compared to habitual meat consumers, but significantly less so compared to vegetarians.
Environmentally friendly – not environmentally friendly	Multiple studies have shown that consumer awareness of the severity of meat's environmental impacts is low (e.g. Macdiarmid et al., 2016). However, as evidenced in the findings of Hartmann et al. (2018) and the rise of this topic in media and news coverage, awareness of meat's link with the environment is growing. This awareness may result in those who follow meat-free or low meat diets to be perceived as relatively environmentally friendly. As a result, it was expected that meat reducers would be perceived as more environmentally friendly compared to habitual meat consumers, but significantly less so than vegetarians.
Close-minded – open-minded	As lower meat consumption is positively associated with openness (one of the "Big 5" personality traits; Forestell & Nezlek, 2018; Keller & Siegrist, 2015; Tiainen et al., 2013), it was expected that meat reducers would be perceived as more open-minded than habitual meat consumers. However, since vegetarians completely abstain from meat, it was expected that they would be perceived as significantly more close-minded compared to meat reducers.
Masculine – feminine	As vegetarians are seen as more feminine overall compared to omnivores (Ruby & Heine, 2011), it was expected that meat reducers would be perceived as significantly more feminine compared to habitual meat eaters, but significantly less so than vegetarians.
Moral – immoral	As vegetarians are perceived to be more moral than omnivores (Ruby & Heine, 2011), no significant difference in this attribute was expected between meat reducers and habitual meat eaters. However, it was expected that both meat reducers and habitual meat eaters would be perceived as significantly less moral than vegetarians.

Trait Scale	Rationale & Hypothesis
Intelligent – unintelligent	As people following low-fat diets have been perceived as more intelligent (Fries & Croyle, 1993), it was expected that meat reducers would be perceived as significantly more intelligent compared to habitual meat eaters, but significantly less so than vegetarians.
Attractive – unattractive	As people following healthy diets have been perceived as being more attractive compared to people on unhealthy diets (Stein & Nemeroff, 1995), it was expected that meat reducers would be perceived as significantly more attractive compared to habitual meat eaters, but significantly less so than vegetarians.
Likeable – not likeable	As people following healthy diets have been perceived as being less likeable than those on unhealthy diets (Stein & Nemeroff, 1995), it was expected that meat reducers would be perceived as significantly less likeable compared to habitual meat eaters, but significantly more likeable than vegetarians.
Selfless – selfish	As people following healthy diets have been perceived as being more selfless compared to those on unhealthy diets (Stein & Nemeroff, 1995), it was expected that meat reducers would be perceived as significantly more selfless compared to habitual meat eaters.
Interesting - boring	Vegetarian diets have been considered to be boring and bland (Lea & Worsley, 2003; Povey et al., 2001). However, Hartmann et al. (2018) reported no significant difference between the perception towards vegetarians and habitual meat eaters on this spectrum. It was thus expected that the variety involved in a meat reducer diet may lead them to be perceived as significantly more interesting than both vegetarians and habitual meat eaters.

5.2 Study Two: The Free Association Approach

5.2.1 Methods

5.2.1.1 Design

This study's sample size, hypotheses, and analyses were preregistered via the Open Science Framework (https://osf.io/ke7sd). This study was approved by University of Sheffield Psychology Ethics Committee, and informed consent was obtained from all participants (see Chapter Three, section 3.7 for further detail about ethical procedures). An online experimental, between-subjects design was used. Participants were randomly assigned to one of three conditions (meat reducer, vegetarian, or habitual meat consumer) using the Qualtrics (Provo, UT) survey software. Data collection for this study took place in August 2019, prior to the COVID-19 pandemic.

5.2.1.2 Participants

Calculations using G*Power v.3.1 with a small-to-moderate effect size f=0.175, α=0.05, and a desired power of 0.80 indicated that a sample size of 318 would be sufficient to detect significant differences between groups. Since there is no previous research in this domain on which to base estimates, a conservative effect size was used. To account for an attrition rate of approximately 10%, the targeted total sample size for recruitment was 360 (120 per meat reducer, vegetarian, and habitual meat consumer conditions). Adults (n=371) were recruited from the United Kingdom using a combination of social media (e.g. forums and group pages; n=11) and the Prolific participant recruitment tool (www.prolific.co; n=360). The sample recruited using Prolific were representative of the demographic distribution (age, sex, ethnicity) of the UK, and were paid £0.85 upon completion. Participants recruited through other means were given the opportunity to enter a prize draw for a £50 shopping voucher. All participants were required to be 18 years or over; no further exclusion criteria applied to this study.

5.2.1.3 The Free Association Task

This study used a free association task to assess perceptions towards meat reducers, vegetarians, and habitual meat consumers (for a methodological overview of free association tasks, see Chapter Three, section 3.5.1). Before the measured free association task, a practice trial was presented to participants. The practice task contained a prompt unrelated to the research topic ("people who walk to work") but was otherwise identical to the measured free association task. The measured free association task differed according to the experimental condition. Participants in the meat reducer condition were presented with the prompt "people who are reducing their meat consumption", participants in the vegetarian condition were presented with the prompt "people who are vegetarian", and participants in the habitual meat consumer condition were presented with the prompt "people who eat meat". Beneath the prompt, participants were given five text boxes to list their associations. A 30 second timer was displayed to elicit spontaneous and uninhibited responses. Next, participants rated the valence of their associations on a three-point (positive – neutral – negative) scale. Self-rated valences were sought to minimise ambiguity or misinterpretation by the researcher. Finally, participants were asked to rank their associations according to prototypicality, or

importance to the concept conveyed in the prompt. For this task, participants were able to click and drag each of their responses into a numbered order.

5.2.1.4 Measures

Primary measures: The two primary measures for this study were, (1) the structure of the social representations for meat reducers, vegetarians, and meat consumers, and (2) the valence of associations. These were both measured using the outputs of the free association task.

Secondary measures: Information was gathered about perceived descriptive norms surrounding the prevalence of meat reduction and vegetarianism/veganism among peers (people known to participants as well as the general UK population). These normative perceptions comprised a secondary measure of this study.

Covariates: Participants' self-reported dietary habits were included as a covariate, as perceptions may vary depending on whether the hypothetical peers in the vignettes share participants' own dietary patterns (invoking an ingroup bias). Awareness of sustainability and diet was included as a covariate, as participants' level of environmental awareness may affect how they perceive those who follow low or no meat diets. Finally, sociodemographic information (e.g. age, sex, ethnicity) was collected and used as exploratory covariates (see Appendix 2 for a summary of these measures).

5.2.1.5 Procedure

After providing consent to participate, participants indicated demographic details (age, sex, ethnicity, and nationality) and then proceeded to complete the free association, valence, and ranking tasks. Participants then indicated their dietary habits, environmental awareness, perceived descriptive dietary norms, and postcode (to indicate participants' socioeconomic status via the Index of Multiple Deprivation [IMD]; (Ministry of Housing, Communities, & Local Government, 2019). Information about participants' political inclination, employment status, household income, education, and subjective socioeconomic status (Adler & Stewart, 2007) was also collected to characterise the sample; these were asked at the end of the survey to avoid confounding or bias in responses to the primary measure. Finally, participants were thanked and debriefed.

5.2.1.6 Data Analysis

To construct the social representations, the qualitative association data was first cleaned by excluding associations only listed once. These associations were removed from further analysis as they were considered idiosyncratic and thus inappropriate for the purpose of this research (see Madon, 1997). As this research is about social perceptions, associations that were not related to physical or psychosocial characteristics (e.g. 'vegetables', 'meat') were also removed, as were incomplete and nonsensical responses. Next, associations were categorised into constructs per the synonymy procedure outlined by Danermark et al. (2014), whereby discussion between two coders resulted in the grouping of associations deemed to be synonymous (e.g. 'eco-friendly',

'environmentally friendly', 'green' were grouped). The association valence helped to determine the intended meaning of the associations. Where consensus was not reached by the coders, the associations remained separate. This process yielded 1065 total associations to be included in further analysis (from n=1483). Thirty percent of the data was coded by a third independent coder, with significantly high agreement, $\kappa = 0.843$ (95% CI 0.802, 0.884), $p < 0.001$.

To approximate the social representations, Abric's (2003) modification of Vergès (1994) original rank-frequency method was used. For each condition, the overall frequency of an association was correlated with its average participant-prompted rank, to produce the 2 x 2 table characteristic of this method (Table 3.3; see Chapter Three, section 3.5.1 for more detail). This table was used to indicate the position of associations within each social representation (i.e. central core, peripheries, contrasting elements; see Abric, 2003). The average values of frequency and rank within each social representation provided the threshold for sorting. For example, associations that were mentioned more frequently and ranked more highly than the average frequency and rank within a condition were classified as high frequency and high rank, and thus occupied the central zone of that table.

To investigate differences in valence between the three social objects, a composite valence score for each participant was first created by averaging the self-rated valences of their associations. This composite score had a possible range of -1 (entirely negative associations) to 1 (entirely positive associations). ANOVAs were conducted using the experimental condition as the between-factor (meat reducer, vegetarian, and habitual meat consumers). The more robust Welch statistic was used to account for instances where there was non-normality and heterogenous variance in the data (determined using Levene's and Shapiro-Wilks' tests; Delacre et al., 2019; Srivastava, 1959). Paired post-hoc Games-Howell tests were used to investigate pairwise differences. For all statistical tests, the significance level was $p < 0.05$. For all measures of effect (η_p^2 or est. ω^2 for Welch analyses), 0.01 was considered small, 0.06 was considered medium, and 0.14 was considered large (Cohen, 1988).

5.2.2 Results

5.2.2.1 Participants

Removing participants who submitted incomplete responses (n=4) left a total sample size of 366. The inclusion of participants recruited via social media did not affect the results reported. Participant characteristics are shown in Table 5.2. The respondents in the three experimental conditions (meat reducer, vegetarian, and habitual meat consumer) did not significantly vary in sex, age, ethnicity, IMD Decile, subjective socioeconomic status, environmental awareness, or dietary type ($p > 0.15$; $\eta_p^2 < 0.02$). Therefore, randomisation to experimental condition was successful.

Table 5.2. Participant characteristics (study two, n=366).

	Total Sample (n=366)	**Meat Reducer Condition* (n=124)**	**Vegetarian Condition* (n=121)**	**Habitual Meat Consumer Condition* (n=121)**
Sex, n (%)				
Female	189 (51.6)	67 (54)	58 (47.9)	64 (52.9)
Male	173 (47.3)	56 (45.2)	62 (51.2)	55 (45.5)
Other	2 (0.6)	1 (0.8)		1 (0.8)
Prefer not to say	2 (0.6)		1 (0.8)	1 (0.8)
Age in years, mean (SD)	44.19 (15.16)	44.3 (14.16)	45.6 (15.34)	42.65 (15.94)
95% CI	[42.64, 45.74]	[41.81, 46.8]	[42.86, 48.33]	[42.64, 45.74]
Nationality, n (%) British	318 (86.9)	109 (87.9)	105 (86.8)	104 (86)
Ethnicity, n (%)				
White	288 (78.7)	97 (78.2)	95 (78.5)	96 (79.3)
Asian	30 (8.2)	13 (10.5)	10 (8.3)	7 (5.8)
Black	21 (5.7)	8 (6.5)	7 (5.8)	7 (5.8)
Mixed	18 (4.9)	4 (3.2)	7 (5.8)	6 (5)
Other	6 (1.6)	2 (1.6)	1 (0.8)	3 (2.5)
Prefer not to say	3 (0.8)		1 (0.8)	2 (1.7)
Political Alignment, n (%)				
Labour	93 (25.4)	35 (28.2)	28 (23.1)	30 (24.8)
Conservative	66 (18)	19 (15.3)	22 (18.2)	25 (20.7)
Liberal Democrat	55 (15)	16 (12.9)	23 (19)	16 (13.2)
Green	46 (12.6)	24 (19.4)	8 (6.6)	14 (11.6)
Other	34 (9.3)	8 (6.5)	14 (11.6)	12 (9.9)
None	23 (6.3)	6 (4.8)	8 (6.6)	9 (7.4)
Don't know	34 (9.3)	12 (9.7)	13 (10.7)	9 (7.4)
Prefer not to say	15 (4.1)	4 (3.2)	5 (4.1)	6 (5)
Employment Status, n (%)				
Full Time	145 (39.7)	56 (45.2)	42 (35)	47 (38.8)
Part Time	74 (20.3)	24 (19.4)	29 (24.2)	21 (17.4)
Student	28 (7.7)	7 (5.7)	7 (5.8)	14 (11.6)
Retired	49 (13.4)	15 (12.1)	16 (13.3)	18 (14.9)
Unemployed	22 (6)	6 (4.8)	6 (5)	10 (8.3)
Other	47 (12.9)	16 (12.9)	20 (16.7)	11 (9.1)
Income, n (%)				
Below £10,000	34 (9.3)	6 (4.8)	14 (11.6)	14 (11.6)
£10,001-£20,000	74 (20.2)	22 (17.7)	33 (27.3)	19 (15.7)
£20,001-£30,000	61 (16.7)	21 (16.9)	22 (18.2)	18 (14.9)
£30,001-£40,000	62 (16.9)	23 (18.6)	20 (16.5)	19 (15.7)
Above £40,000	109 (29.8)	42 (33.9)	26 (21.5)	41 (33.9)
Prefer not to say	26 (7.1)	10 (8.1)	6 (5)	10 (8.3)
Education, n (%)				
1-5 GSCSEs or equivalent	63 (17.2)	22 (17.7)	21 (17.4)	20 (16.5)
A-levels	77 (21)	25 (20.2)	24 (19.8)	28 (23.1)
Apprenticeship	13 (3.6)	5 (4)	5 (4.1)	3 (2.5)
Bachelors level	152 (41.5)	51 (41.1)	50 (41.3)	51 (42.2)
Higher education	47 (12.8)	18 (14.5)	17 (14.1)	12 (9.9)

	Total Sample (n=366)	Meat Reducer Condition* (n=124)	Vegetarian Condition* (n=121)	Habitual Meat Consumer Condition* (n=121)
Other	10 (2.7)	2 (1.6)	3 (2.5)	5 (4.1)
None	4 (1.1)	1 (0.8)	1 (0.8)	2 (1.7)
Socioeconomic Status (IMD Decile)[a], mean (SD)	5.41 (2.73)	5.5 (2.63)	5.44 (2.98)	5.29 (2.56)
Subjective Socioeconomic Status[b], mean (SD)	5.72 (1.69)	5.69 (1.63)	5.89 (1.73)	5.59 (1.69)
Diet, n (%)				
Meat consumer (no reduction)	148 (40.4)	47 (37.9)	55 (45.5)	46 (38)
Meat reducer	146 (39.9)	54 (43.6)	45 (37.2)	47 (38.8)
Pescetarian	26 (7.1)	8 (6.5)	11 (9.1)	7 (5.8)
Vegetarian	34 (9.3)	12 (9.7)	7 (5.8)	15 (12.4)
Vegan	12 (3.3)	3 (2.4)	3 (2.5)	6 (5)
Environmental awareness score[c], mean (SD)	5.16 (1.11)	5.22 (1.04)	5.04 (1.14)	5.24 (1.15)
95% CI	[5.05, 5.28]	[5.03, 5.4]	[4.83, 5.24]	[5.04, 5.44]

[*] No significant differences were found in any of the items between conditions.

[a] Index of Multiple Deprivation Decile possible range: 1=most deprived, 10= least deprived

[b] Subjective socioeconomic status possible range: 1=least well off, 10=most well off

[c] Environmental awareness possible range 1 = lowest environmental awareness, 7 = highest environmental awareness

5.2.2.2 Social Representations

Consolidating the associations using the synonymy process (see Appendix 2 for examples) resulted in 85 different categories (see Table 5.3). Overlap in these categories occurred between conditions (e.g. “healthy”-related constructs occurred across all three dietary types).

Social representations for meat reducers, vegetarians, and habitual meat consumers (see Tables 5.4, 5.5, 5.6) were largely distinct from one another. However, overlap did occur between the central zones; for example, both meat reducers and vegetarians were considered to be ‘animal lovers’; meat reducers, vegetarians, and habitual meat consumers were all considered to be ‘healthy’. The most important associations attributed to meat reducers (based on frequency and rank) were ‘healthy’, ‘animal lovers’, ‘eco-friendly’, ‘thoughtful’, and ‘conscious’. The central zone of vegetarians included ‘healthy’, ‘animal-lovers’, and ‘ethical’, and the central zone of habitual meat consumers included ‘normal’, ‘healthy’, ‘unhealthy’, and ‘hungry’.

Table 5.3. Summary of category constructs expressed, and frequencies of participants who included these constructs in their association lists, per experimental condition.

Meat reducers	#	%	Vegetarians	#	%	Habitual meat consumers	#	%
1. Healthy	79	63.71	1. Healthy	69	57.02	1. Normal	36	29.75
2. Eco-friendly	60	48.39	2. Eco-friendly	36	29.75	2. Healthy	33	27.27
3. Conscious	17	13.71	3. Animal lovers	35	28.93	3. Unhealthy	27	22.31
4. Frugal	14	11.29	4. Ethical	15	12.40	4. Fat	17	14.05
5. Fit	14	11.29	5. Unhealthy	14	11.57	5. Hungry	15	12.40
6. Animal lovers	14	11.29	6. Fussy	13	10.74	6. Fit	13	10.74
7. Thoughtful	13	10.48	7. Judgemental	12	9.92	7. Masculine	12	9.92
8. Caring	12	9.68	8. Slim	12	9.92	8. Enjoyable	11	9.09
9. Happy	11	8.87	9. Pretentious	11	9.09	9. Strong	10	8.26
10. Intelligent	10	8.06	10. Boring	10	8.26	10. Balanced	10	8.26
11. Kind	9	7.26	11. Hippies	10	8.26	11. Not eco-friendly	9	7.44
12. Eco-conscious	9	7.26	12. Strange	9	7.44	12. Cruel	8	6.61
13. Good	8	6.45	13. Caring	9	7.44	13. Ignorant	8	6.61
14. Concerned	6	4.84	14. Conscious	8	6.61	14. Happy	7	5.79
15. Trendy	6	4.84	15. Fit	7	5.79	15. Inconsiderate	7	5.79
16. Health conscious	6	4.84	16. Different	6	4.96	16. Selfish	6	4.96
17. Ethical	6	4.84	17. Health conscious	6	4.96	17. Good	6	4.96
18. Slim	4	3.23	18. Kind	6	4.96	18. Bad	5	4.13
19. Fat	4	3.23	19. Religious	5	4.13	18. Ok	5	4.13
20. Trying	3	2.42	20. Happy	5	4.13	20. Old fashioned	4	3.31
21. Disciplined	3	2.42	21. Idiots	5	4.13	21. Rich	3	2.48
22. Activists	3	2.42	22. Limited	5	4.13	22. Greedy	3	2.48
23. Young	3	2.42	23. Intelligent	4	3.31	23. Immoral	3	2.48
24. Careful	3	2.42	24. Annoying	4	3.31	24. Cool	2	1.65
25. Pretentious	3	2.42	25. Awkward	4	3.31	25. Unethical	2	1.65
26. Unhealthy	3	2.42	26. Trendy	4	3.31	26. Foodie	2	1.65
27. Sensible	3	2.42	27. Thoughtful	4	3.31	27. Western	2	1.65
28. Left-wing	3	2.42	28. Young	3	2.48	28. Full	2	1.65
29. Hippies	3	2.42	29. Eco-conscious	3	2.48	29. Older	2	1.65
30. Positive	2	1.61	30. Hungry	3	2.48			
31. Ok	2	1.61	31. Normal	3	2.48			
32. Proactive	2	1.61	32. Moral	3	2.48			
33. Responsible	2	1.61	33. Misunderstood	2	1.65			
34. Poor	2	1.61	34. Fad	2	1.65			
35. Crazy	2	1.61	35. Nice	2	1.65			
36. Adaptable	2	1.61	36. Conscientious	2	1.65			
37. Militant	2	1.61	37. Snob	2	1.65			
38. Moral	2	1.61	38. Committed	2	1.65			
			39. Concerned	2	1.65			
			40. Sad	2	1.65			
			41. Good	2	1.65			
			42. Sensible	2	1.65			
			43. Activists	2	1.65			
			44. Left-wing	2	1.65			

Table 5.4. Meat reducer social representation, showing the most frequently mentioned and highly ranked constructs associated with meat reducers.

	High mean rank <2.5	**Low mean rank >2.5**
High mean frequency >9.2	Healthy Eco-friendly Conscious Animal lovers Thoughtful	Fit Frugal Caring Happy Intelligent
Low mean frequency <9.2	Eco-conscious Health conscious Ethical Pretentious Left-wing Trying Responsible	Kind Good Concerned Trendy Slim Fad Disciplined Activists Young Careful Unhealthy Sensible Hippies Ok Proactive Poor Crazy Militant

Table 5.5. Vegetarian social representation, showing the most frequently mentioned and highly ranked constructs associated with vegetarians.

	High mean rank <2.6	**Low mean rank >2.6**
High mean frequency >8.4	Healthy Animal lovers Ethical	Eco-friendly Unhealthy Fussy Judgemental Slim Pretentious Boring Hippies Caring Strange
Low mean frequency <8.4	Conscious Health conscious Idiots Religious Thoughtful Eco-conscious Hungry Normal Sensible Misunderstood Fad Committed Activists	Fit Different Kind Happy Limited Intelligent Annoying Awkward Trendy Young Moral Nice Conscientious Snob Concerned Sad Good Left-wing

Table 5.6. Habitual meat consumer social representation, showing the most frequently mentioned and highly ranked constructs associated with habitual meat consumers.

	High mean rank <2.6	**Low mean rank >2.6**
High mean frequency >9.8	Normal Healthy Unhealthy Hungry	Fat Fit Enjoyable Masculine Strong Balanced
Low mean frequency <9.8	Not eco-friendly Ignorant Cruel Selfish Full Unethical Cool Older	Happy Inconsiderate Good Bad Ok Old-fashioned Greedy Rich Immoral Foodie Western

5.2.2.3 Valence of Associations

There was a statistically significant difference in valence between conditions, Welch F(2,233) = 35.40, $p < 0.001$, est. $\omega^2 = 0.166$. This difference remained significant after controlling for age, sex, ethnicity, socioeconomic status (IMD Decile), subjective socioeconomic status, level of environmental awareness, and participant diet, F(2,297) = 34.45, $p < 0.001$, $\eta_p^2 = 0.188$ (Figure 5.1). Paired post-hoc tests with adjusted means revealed that the valence was significantly more positive for the meat reducer condition compared to the vegetarian ($M_{diff} = 0.3$, SE = 0.07, $p < 0.001$, 95% CI 0.13, 0.48) and habitual meat consumer conditions ($M_{diff} = 0.61$, SE = 0.07, $p < 0.001$, 95% CI 0.43, 0.78). The vegetarian condition was also significantly more positive compared to the habitual meat consumer condition ($M_{diff} = 0.3$, SE = 0.08, $p = 0.001$, 95% CI 0.12, 0.49).

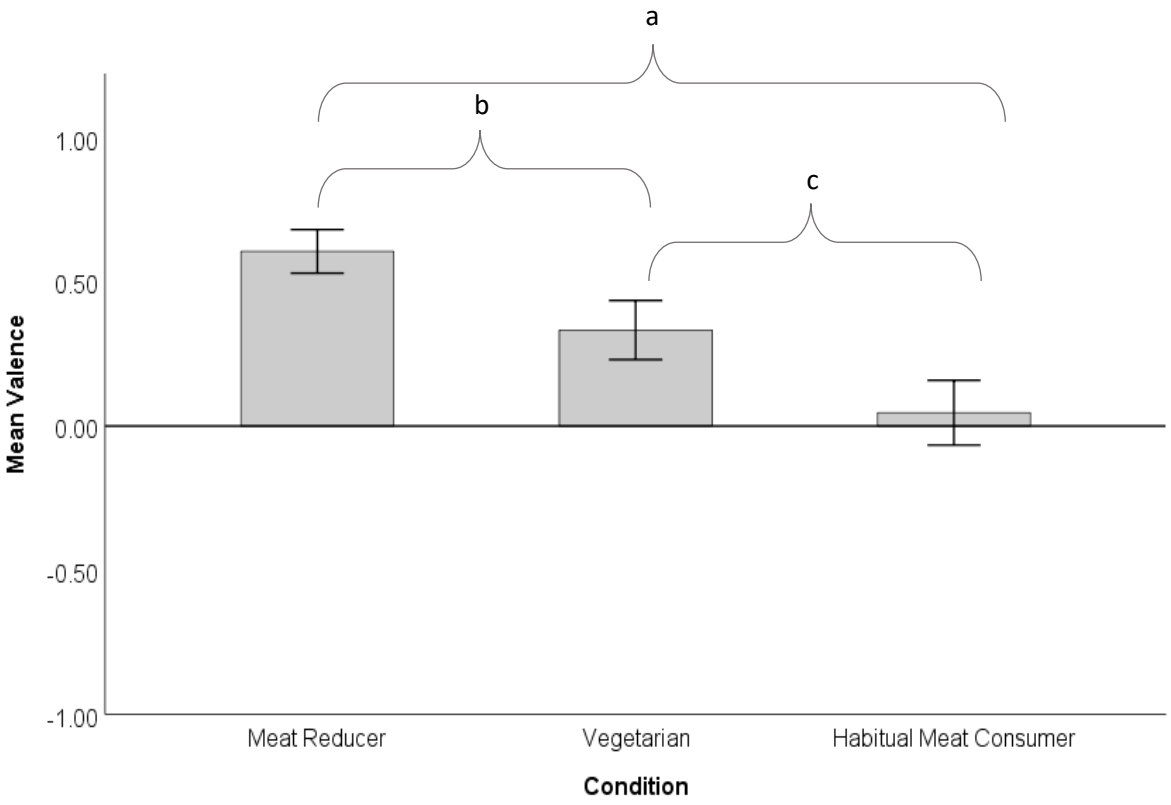


Figure 5.1. Valence (+/- 2 SE) of associations listed towards meat reducers, vegetarians, and habitual meat consumers. Scores ranged from 1 to -1. A higher score indicates more positive valence. Different letters denote significant differences ($p < 0.001$). Covariates appearing in the model are evaluated at the following values: Age = 44.2117, Sex = 1.5407, Ethnicity = 1.4984, Participant Diet = .9251, Environmental Awareness Score = 5.1831, Subjective Socioeconomic Status = 5.7199, IMD Decile (Low = Deprived) = 5.4202.

5.2.2.4 Perceived and Actual Descriptive Norms

Perceived and actual dietary norms are outlined in Table 5.7. On average, the perceived prevalence of vegetarianism and veganism among both socially-proximal individuals and the UK population exceeded the actual prevalence among participants sampled. Similar results were found related to the reduction of white meat and fish, however participants *underestimated* the prevalence of red meat reduction in both socially proximal individuals and the UK population.

Table 5.7. Perceived versus actual descriptive norms among UK sample (study two)

	Perceived norms (people known; %)	**Perceived norms (UK population; %)**	**Actual norms (%)**
Vegetarian or vegan	23.94	27.52	12.57
Reducing red meat	31.97	34.78	36.89
Reducing white meat	18.49	22.24	12.57
Reducing fish	13.7	17.37	10.93

5.3 Study Three: The Vignette Approach

5.3.1 Methods

5.3.1.1 Design

This study's sample size, hypotheses, and analyses were preregistered via the Open Science Framework (https://osf.io/2zsu7). This study was approved by University of Sheffield Psychology Ethics Committee, and informed consent was obtained from all participants (see Chapter Three, section 3.7 for further detail about ethical procedures). This study comprised an experimental, between-subjects 3 (experimental conditions: meat reducer, vegetarian, or habitual meat consumer) x 2 (participant cohort: University of Sheffield staff, University of Sheffield students) design. Participants were randomly assigned to experimental condition using the Qualtrics (Provo, UT) survey software. Data collection for this study took place in November 2019, prior to the COVID-19 pandemic.

5.3.1.2 Participants

Calculations using G*Power v.3.1 with a small-to-moderate effect size f=0.175, α=0.05, and a desired power of 0.80 showed that a sample size of 318 would be sufficient to detect significant differences between conditions and between groups. Since there was no previous research to base estimates on, a conservative effect size was used. To account for an attrition rate of approximately 10%, the targeted total sample size for recruitment was 360 (180 per cohort, 60 per condition).

To be eligible to participate, participants needed to be either students or non-academic staff (at paygrade 5; £28,331 annual salary or under) based at the University of Sheffield. The rationale for recruiting staff in lower and intermediate roles was that these occupations have been associated

with higher levels of meat consumption, compared to those in higher managerial or professional occupations (Clonan et al., 2016). There is a socioeconomic gradient in meat consumption, whereby those lower in all indicators of socioeconomic status (SES; i.e. household income, education, and occupation) consume more meat than those of higher SES (Maguire & Monsivais, 2015). Furthermore, those lower in subjective SES (the socioeconomic status that people perceive they have relative to others, rather than objectively measured SES) have been found to consume more meat due to the social ideas attached to it (Chan & Zlatevska, 2019). Together, these studies suggest that focussing on lower SES groups would be most beneficial in maximising the influence of socially normative messaging to reduce meat consumption among high consumers. Therefore, only University of Sheffield staff at pay grade 5 and below were recruited since grades ≥6 encompass academic, higher managerial, administrative and professional occupations.

The data collection for study three took place during September and November, 2019. In total, 287 staff and 208 students were recruited from university voluntary study email lists. Participants were required to be aged 18 years or over, and incomplete or duplicate responses were excluded from further analysis. Upon completion of the survey, participants were given the opportunity to enter a prize draw for a £100 shopping voucher (one prize per cohort).

5.3.1.3 Vignettes and Rating Tasks

This study used vignettes to assess perceptions towards meat reducers, vegetarians, and habitual meat consumers (for a methodological overview of vignettes, see Chapter Three, section 3.5.2). The vignettes used in this study (see Table 5.8), adapted from similar vignettes used by Thomas (2016) and Ruby and Heine (2011), described a typical day in the life of a fellow colleague or student. Efforts were made to standardise the vignettes so that they only differed in areas relevant to the study aims (i.e. meal choices at lunch time). The hypothetical person in the vignette was unnamed with no reference to their sex; these design decisions aimed to prevent bias and ensure that these factors did not influence the personality impressions that followed (see Mooney & Lorenz, 1997 for a review on how food consumption stereotypes are affected by sex).

After reading the vignette, all participants were asked to rate the hypothetical person on a series of eleven personality attribute pairs (Table 5.10) on bipolar, 100-point visual analogue (VAS) scales that were presented in a randomised order. The trait pairs were selected based on theoretical considerations and established literature about perceived morality and masculinity of vegetarians (Ruby & Heine, 2011), impressions of healthy food eaters (e.g. Fries & Croyle, 1993; Stein & Nemeroff, 1995), the relationship between food intake/choice and the 'Big Five' personality traits (Keller & Siegrist, 2015), and impressions of insect eaters (which included impressions of vegetarians as an experimental condition; Hartmann et al., 2018).

To assess ingroup membership, participants were then asked to rate the extent to which they agreed to three statements on 100-point VAS (1 = Strongly Disagree, 100 = Strongly Agree). The three items were, *I feel that this person is similar to me, I would like this person as a friend,* and *I would respect this person.* Similarity is a central premise of group membership, and so was included as part of this measure. The second and third questions were adapted from Bolderdijk et al. (2018) and Monin et

al. (2008). Furthermore, Vartanian et al. (2007) suggest that such inquiries (i.e. about a participant's desire to interact with a target) are better indicators of social appeal compared to explicit ratings on personality characteristics. Due to the moderate reliability of the group membership scale (Cronbach's $\alpha = 0.78$) and to enable a fuller understanding of perceptions of social appeal, each item was assessed independently and as part of a composite "group membership score" per participant (obtained by averaging their responses to each item of this measure).

Table 5.8. Vignettes used per condition (study two, n=420). Square brackets indicate differences between staff and student participant cohorts [staff/student].

Condition	Vignette
Meat Reducer	*Imagine a fellow* [colleague/student] *at the University of Sheffield. On a typical day, this* [person goes to work/student attends classes] *and either eats a packed lunch or picks something up from a café at the Student Union. Once a week they have lunch with friends, and try to suggest a cheap bar or café with a variety of options. At these lunches, they prefer vegetarian options like a veggie burger or a grilled veggie wrap, if they are available. This is because they have recently begun to reduce their meat intake. At the end of each day, they eat dinner at home, and might go for a walk in the park if the weather is nice. They spend the rest of the night either* [browsing the internet or watching TV with family/catching up with friends, watching TV, browsing the internet, or working on assignments].
Vegetarian	*Imagine a fellow* [colleague/student] *at the University of Sheffield. On a typical day, this* [person goes to work/student attends classes] *and either eats a packed lunch or picks something up from a café at the Student Union. Once a week they have lunch with friends, and try to suggest a cheap bar or café with a variety of options. At these lunches, they prefer options like a veggie burger or a grilled veggie wrap. This is because they have recently become a vegetarian. At the end of each day, they eat dinner at home, and might go for a walk in the park if the weather is nice. They spend the rest of the night either* [browsing the internet or watching TV with family/catching up with friends, watching TV, browsing the internet, or working on assignments].
Habitual Meat Consumer	*Imagine a fellow* [colleague/student] *at the University of Sheffield. On a typical day, this* [person goes to work/student attends classes] *and either eats a packed lunch or picks something up from a café at the Student Union. Once a week they have lunch with friends, and try to suggest a cheap bar or café with a variety of options. At these lunches, they prefer* options like a beef burger or grilled chicken wrap. *At the end of each day, they eat dinner at home, and might go for a walk in the park if the weather is nice. They spend the rest of the night either* [browsing the internet or watching TV with family/catching up with friends, watching TV, browsing the internet, or working on assignments].

5.3.1.4 Measures

Primary measures: The two primary measures for this study were, (1) perceived personality attributes, and (2) perceived group membership of meat reducers, vegetarians, and habitual meat consumers.

Secondary measures: Information was gathered about perceived descriptive norms surrounding the prevalence of meat reduction and vegetarianism/veganism among fellow staff/students. These normative perceptions comprised a secondary measure of this study.

Covariates: The covariates used in this study and means of collecting this information was identical to those used in study two (see Appendix 2).

5.3.1.5 Procedure

This study's procedure was identical to that used in study two. However, in place of the free association task, participants completed the vignette task and associated primary measures.

5.3.1.6 Data Analysis

To investigate between-condition differences, two-way independent ANOVAs were conducted. The more robust Welch statistic was used to account for instances where there was non-normality and heterogenous variance in the data. To investigate pairwise differences, Games-Howell tests were used where there were heterogenous variances, and Gabriel tests were used where variances were homogenous.

For all statistical tests in this study, the significance level was $p < 0.05$. For all measures of effect (η_p^2 or est. ω^2 for Welch analyses), 0.01 was considered small, 0.06 was considered medium, and 0.14 was considered large (per Cohen, 1988).

5.3.2 Results

5.3.2.1 Participants

Removing incomplete (n=74) and duplicate (n=1) responses left a total sample size of 420 (staff n=214, student n=206). Excluded participants did not significantly differ from included participants in age, sex, or ethnicity (all *ps* > 0.5); included participants' characteristics are displayed in Table 5.9. The respondents in the three experimental conditions (meat reducer, vegetarian, and habitual meat consumer) did not vary significantly in sex, age, education, ethnicity, or nationality ($p > 0.05$). Additionally, the three conditions did not significantly differ by dietary type, level of environmental awareness, or subjective socioeconomic status ($p > 0.05$). Therefore, randomisation to condition was successful.

Table 5.9. Participant characteristics (study three, n=420).

		Staff (n=214)			Students (n=206)		
	Total Sample (n=420)	**Meat Reducer Condition* (n=72)**	**Vegetarian Condition* (n=73)**	**Habitual Meat Consumer Condition* (n=69)**	**Meat Reducer Condition* (n=71)**	**Vegetarian Condition* (n=68)**	**Habitual Meat Consumer Condition* (n=67)**
Sex, n (%)							
Female	304 (72.4)	54 (75)	50 (68.5)	52 (75.4)	43 (60.6)	52 (76.5)	53 (79.1)
Male	108 (25.7)	15 (20.8)	22 (30.1)	1, (23.2)	26 (36.6)	16 (23.5)	13 (19.4)
Other	5 (1.2)	3 (4.2)	1 (1.4)		1 (1.4)		
Prefer not to say	3 (0.7)			1 (1.4)	1 (1.4)		1 (1.5)
Age in years, mean (SD)	30.8 (12.14)	37.25 (11.57)	39.1 (11.83)	37.8 (11.06)	24.72 (7.97)	22.04 (5.93)	22.71 (7.16)
95% CI	[29.64, 31.96]	[34.58, 39.92]	36.38, 41.81]	[35.19, 40.41]	[22.86, 26.57]	[20.63, 23.45]	[20.98, 24.44]
Nationality, n (%) British	323 (76.9)	64 (88.9)	69 (94.5)	62 (89.9)	44 (62)	44 (64.7)	40 (59.7)
Ethnicity, n (%)							
White	346 (82.4)	65 (90.3)	71 (97.3)	63 (91.3)	49 (69)	50 (73.5)	48 (71.6)
Asian	42 (10)	3 (4.2)	2 (2.7)	1 (1.5)	15 (21.1)	11 (16.2)	10 (14.9)
Black	5 (1.2)			1 (1.4)	1 (1.4)	2 (2.9)	1 (1.5)
Mixed	15 (3.6)	1 (1.4)		2 (2.9)	5 (7)	3 (4.4)	4 (6)
Other	9 (2.1)	1 (1.4)		1 (1.5)	1 (1.4)	2 (2.9)	4 (6)
Prefer not to say	3 (0.7)	2 (2.8)		1 (1.5)			
Political Alignment, n (%)							
Labour	151 (36.2)	24 (33.3)	30 (41.1)	30 (43.5)	19 (27.5)	26 (38.2)	22 (33.3)
Conservative	20 (4.8)	7 (9.7)	3 (4.1)	3 (4.4)	2 (2.9)	2 (2.9)	3 (4.6)
Liberal Democrat	50 (12)	8 (11.1)	9 (12.3)	5 (7.3)	13 (18.8)	5 (7.4)	10 (15.2)
Green	55 (13.2)	17 (23.6)	5 (6.9)	13 (18.8)	8 (11.6)	7 (10.3)	5 (7.6)
Other	16 (3.8)	4 (5.6)	1 (1.4)	2 (2.9)	3 (4.4)	4 (5.9)	2 (3)
None	56 (13.4)	5 (6.9)	13 (17.8)	10 (14.5)	7 (10.1)	10 (14.7)	11 (16.7)
Don't know	52 (12.5)	6 (8.3)	7 (9.6)	4 (5.8)	14 (20.3)	11 (16.2)	10 (15.2)
Prefer not to say	17 (4.1)	1 (1.4)	5 (6.9)	2 (2.9)	3 (4.4)	3 (4.4)	3 (4.6)

		Staff (n=214)			Students (n=206)		
	Total Sample (n=420)	**Meat Reducer Condition* (n=72)**	**Vegetarian Condition* (n=73)**	**Habitual Meat Consumer Condition* (n=69)**	**Meat Reducer Condition* (n=71)**	**Vegetarian Condition* (n=68)**	**Habitual Meat Consumer Condition* (n=67)**
Employment Status, n (%)	125 (30.1)	40 (55.6)	37 (51.4)	40 (58)	1 (1.5)	2 (3)	5 (7.6)
Full Time	102 (24.6)	29 (40.3)	31 (43.1)	24 (34.8)	5 (7.3)	7 (10.5)	6 (9.1)
Part Time	168 (40.5)				61 (88.4)	56 (83.6)	51 (77.3)
Student	17 (4.1)	3 (4.2)	4 (5.6)	4 (5.8)	2 (2.9)	2 (3)	2 (3)
Other	2 (0.5)						2 (3)
Unemployed							
Income, n (%)							
Below £10,000		1 (1.4)					
£10,001-£20,000		14 (19.4)	10 (13.9)	10 (14.5)			
£20,001-£30,000		20 (27.8)	19 (26.4)	19 (27.5)			
£30,001-£40,000		14 (19.4)	10 (13.9)	9 (13)			
Above £40,000		20 (27.8)	27 (37.5)	27 (39.1)			
Prefer not to say		3 (4.2)	6 (8.3)	4 (5.8)			
Education, n (%)							
1-5 GSCSEs or equivalent	25 (6)	5 (6.9)	10 (13.9)	9 (13)			1 (1.5)
≥2 A-levels	138 (33.3)	13 (18.1)	8 (11)	8 (11.6)	32 (46.4)	42 (61.8)	35 (53)
Apprenticeship	4 (1)	3 (4.2)	1 (1.4)				
Bachelors level	173 (41.7)	34 (47.2)	41 (56.9)	34 (49.3)	27 (39.1)	15 (22.4)	22 (33.3)
Higher education	58 (14)	16 (22.2)	8 (11.1)	15 (21.7)	8 (11.6)	5 (7.5)	6 (9.1)
Other	14 (3.4)		3 (4.2)	2 (2.9)	2 (2.9)	5 (7.5)	2 (3)
None	2 (0.5)	1 (1.4)	1 (1.4)				
Prefer not to say	1 (0.2)			1 (1.5)			
Socioeconomic Status (IMD Decile[a]), mean (SD)	6.24 (2.8)	6 (1.8)	5.7 (1.43)	5.67 (1.53)	4.94 (1.54)	5.03 (1.61)	5.11 (1.74)

		Staff (n=214)			Students (n=206)		
	Total Sample (n=420)	**Meat Reducer Condition* (n=72)**	**Vegetarian Condition* (n=73)**	**Habitual Meat Consumer Condition* (n=69)**	**Meat Reducer Condition* (n=71)**	**Vegetarian Condition* (n=68)**	**Habitual Meat Consumer Condition* (n=67)**
Subjective Socioeconomic Status[b], mean (SD)	5.42 (1.7)	5.58 (2.98)	5.85 (2.54)	6.24 (2.7)	6.83 (2.73)	6.72 (2.75)	6.3 (2.87)
Diet, n (%)							
Meat consumer (no	126 (30)	21 (29.2)	21 (28.8)	20 (29)	20 (28.2)	21 (30.9)	23 (34.3)
reduction)	190 (45.2)	33 (45.8)	31 (42.5)	35 (50.7)	31 (43.7)	29 (42.7)	31 (46.3)
Meat reducer	25 (6)	1 (1.4)	10 (13.7)	7 (10.1)	1 (1.4)	3 (4.4)	3 (4.5)
Pescetarian	54 (12.9)	8 (11.1)	8 (11)	5 (7.3)	16 (22.5)	9 (13.2)	8 (11.9)
Vegetarian	25 (6)	9 (12.5)	3 (4.1)	2 (2.9)	3 (4.2)	6 (8.8)	2 (3)
Vegan							
Environmental awareness score[c], mean (SD)	5.62 (1.03)	5.68 (0.84)	5.58 (1.13)	5.7 (1.03)	5.69 (0.98)	5.69 (1.04)	5.41 (1.12)
95% CI	[5.53, 5.72]	[5.48, 5.87]	[5.33, 5.84]	[5.46, 5.94]	[5.46, 5.92]	[5.44, 5.93]	[5.13, 5.68]

* No significant differences were found in any of the items between conditions.

[a] Index of Multiple Deprivation Decile possible range: 1=most deprived, 10= least deprived

[b] Subjective socioeconomic status possible range: 1=least well off, 10=most well off

[c] Environmental awareness possible range 1 = lowest environmental awareness, 7 = highest environmental awareness.

5.3.2.2 Personality Impression Ratings

ANOVAs conducted for each of the eleven personality traits (Table 5.10) revealed significant main effects of condition on the ratings for animal lover, care for the environment, health consciousness, morality, selflessness, intelligence, open-mindedness, and femininity traits. These remained significant after controlling for demographic covariates (age, sex, socioeconomic status, subjective socioeconomic status, and level of environmental awareness). Post-hoc tests showed that the hypothetical vegetarian and meat reducer were both rated to be significantly more animal loving, environmentally friendly, health conscious, open-minded ($p < 0.001$), and intelligent ($p < 0.05$) compared to the hypothetical habitual meat consumer. Furthermore, the hypothetical vegetarian was rated to be more feminine, moral, and selfless compared to the hypothetical habitual meat consumer ($p < 0.05$). There was no significant effect of condition on likeability, interest, or attractiveness. No main effect of cohort was identified on any of the traits ($p > 0.05$, $\eta_p^2 < 0.01$), indicating that staff and students did not differ in their ratings of the three hypothetical persons. There was also no significant interaction between cohort (staff or student) and condition (vegetarian, meat reducer, habitual meat consumer) on each of the traits ($p > 0.05$, $\eta_p^2 < 0.01$).

5.3.2.3 Perceived Group Membership

No significant main effects or interactions between cohort and experimental condition were identified on the composite group membership score when demographic covariates (age, sex, ethnicity, IMD Decile) were controlled for. When analysing each of the group membership items separately (*I feel that this person is similar to me, I would like this person as a friend,* and *I would respect this person*), a significant main effect was identified of cohort on all three items, however these significant effects did not remain when controlling for demographic covariates. A significant main effect of condition was also identified on the respect item only ($F[2,410]=5.4$, $p = 0.05$, $\eta_p^2=0.03$) between the meat reducer (65.79, SD=17.07) and habitual meat consumer conditions (60.24, SD=19.44); $M_{diff} = 5.86$, $p = 0.018$, 95% CI 0.75, 10.96, and the vegetarian (66.14, SD=17.4) and habitual meat consumer conditions; $M_{diff} = 6.34$, $p = 0.01$, 95% CI 1.19, 11.46. No significant interaction effects were found between cohort and experimental condition on any of three items (perceived similarity $p = 0.64$; willingness to befriend $p = 0.78$; afforded respect $p = 0.95$).

5.3.2.4 Perceived and Actual Descriptive Norms

Perceived and actual dietary norms are outlined in Table 5.11. For the university staff cohort, the average perceived prevalence of vegetarianism and veganism among peers exceeded the actual prevalence of these diets among the staff sampled. Similar effects were identified related to the reduction of white meat and fish, however staff underestimated the prevalence of red meat reduction among their peers. For the university student cohort, red meat and fish reduction were underestimated among peers; in all other variables, perceived norms exceeded actual norms.

Table 5.10. Mean values, standard deviations, and ANOVA for the traits used to evaluate the hypothetical persons between conditions (study three, n=420)

.

	Condition										
	Meat reducer (n=143)			**Vegetarian (n=141)**			**Habitual meat consumer (n=136)**			**ANOVA**	
Personality trait impressions:	*M*	*SD*	*95% CI*	*M*	*SD*	*95% CI*	*M*	*SD*	*95% CI*	*F*	η_p^2
not an animal lover – an animal lover	68.54[a]	19.57	[65.3, 71.77]	73.13[a]	18.62	[70.04, 76.23]	50.34[b]	18.71	[47.16, 53.51]	55.54*	.212
does not care about the environment – does care about the environment	70.28[a]	19.97	[66.98, 73.58]	73.40[a]	17.72	[70.45, 76.51]	53.57[b]	18.49	[50.44, 56.71]	44.34*	.176
not health conscious – health conscious	72.62[a]	18.59	[69.55, 75.86]	71.49[a]	18.83	[68.35, 74.62]	52.05[b]	20.37	[48.6, 55.51]	49.33*	.192
immoral - moral	67.24[ab]	21.07	[63.76, 70.73]	71.01[a]	18.35	[67.95, 74.06]	64.43[b]	18.33	[61.33, 67.54]	4.07*	.019
not likeable – likeable	69.27	20.34	[65.9, 72.63]	72.33	17.26	[69.46, 75.21]	67.19	18.86	[63.99, 70.39]	2.56[ns]	.012
boring - interesting	57.12	20.47	[53.74, 60.5]	56.88	20.03	[53.55, 60.21]	53.17	19.90	[49.79, 56.54]	1.66[ns]	.008
selfish - selfless	60.41[ab]	19.93	[57.12, 63.71]	62.44[a]	18.94	[59.29, 65.59]	55.70[b]	17.03	[52.81, 58.59]	4.73*	.022
unintelligent – intelligent	69.15[a]	18.37	[66.12, 72.18]	70.50[a]	16.90	[67.68, 73.71]	63.71[b]	17.82	[60.68, 66.73]	5.64*	.027
close-minded – open-minded	64.40[a]	19.54	[61.17, 67.63]	65.28[a]	19.38	[62.05, 68.5]	54.67[b]	20.90	[51.12, 58.21]	11.95*	.055
masculine – feminine	52.17[ab]	18.30	[49.15, 55.2]	56.70[a]	18.67	[53.59, 59.81]	50.13[b]	17.69	[47.13, 53.12]	4.7*	.023
unattractive – attractive	54.37	17.63	[51.46, 57.28]	58.14	17.84	[55.17, 61.11]	53.68	14.99	[51.13, 56.22]	2.77[ns]	.014

*$p < 0.05$; [ns] = not significant at $p < 0.05$ level; letters denote significant differences between conditions. Mean values have been collapsed across cohort as all main effects of cohort and condition x cohort interactions were non-significant. Higher values indicate higher ratings in the given traits (possible range 1-100).

Table 5.11. Perceived and actual descriptive norms among university staff and students (study three)

	Staff cohort (n=214)		Student cohort (n=206)	
	Perceived norms (%)	**Actual norms (%)**	**Perceived norms (%)**	**Actual norms (%)**
Vegetarian or vegan	38.08	16.36	36.53	21.36
Reducing red meat	41.74	60	42.03	52.29
Reducing white meat	27.27	26.88	26.71	24.84
Reducing fish	20.61	13.75	21.27	23.53

5.4 Discussion

These studies explored perceptions towards meat reducers using a free association task to approximate social representations and vignettes to assess perceived personality traits and group membership, compared to vegetarians and habitual meat consumers. These studies were among the first to explore perceptions of meat reducers as a distinct social group.

The social representations of meat reducers, constructed in study two, had a central zone comprised of *healthy*, *eco-friendly*, *animal lovers*, *thoughtful*, and *conscious* associations. The appearance of *healthy* and *animal lovers* in the meat reducer central zone aligns with the two most commonly cited reasons for individual meat reduction or elimination (Fox & Ward, 2008). The appearance of *eco-friendly* indicates that awareness of meat reduction as an environmentally beneficial behaviour is on the rise, after historically remaining relatively low (e.g. Macdiarmid et al., 2016). This inference is supported by the fact that 48% of participants in the meat reducer condition included a construct related to *eco-friendly* in their associations. The *conscious* and *thoughtful* associations imply a level of awareness or empathy, and have previously been associated with vegetarianism (Minson & Monin, 2012).

While the free association task and resultant social representations reveal *what* the perceptions are, the valence (or the positivity or negativity of these perceptions) indicate *how* they manifest in our ideas, attitudes, and treatment of these groups. The associations in the meat reducer central zone (*healthy*, *eco-friendly*, *animal lovers*, *thoughtful*, and *conscious*) may be considered entirely positive and aspirational traits. The central zone of the vegetarian social representation shared this configuration, containing *healthy, animal lovers,* and *ethical.* Generally, this indicates that both meat reducers and vegetarians generate positive first impressions, building upon the results observed on Twitter in Chapter Four. However, the distinction between vegetarian and meat reducer social representations is less clear, with many of the same associations occurring in their central zones. For example, both the meat reducer and vegetarian central zones contain the *healthy* and *animal lovers* associations. Furthermore, some of the traits that appear in the peripheries of the meat reducer social representation have been commonly associated with vegetarians (e.g. *pretentious, left-wing*: Minson & Monin, 2012). It is possible that this level of overlap between the two social representations may mean that "meat reduction" as distinct from vegetarianism (or meat elimination) is not yet entirely salient in the public conscience. A similar confounding effect of vegetarians and meat reducers has been previously identified by Rosenfeld et al. (2019). In this

study, meat-reducers routinely self-identified as vegetarians (Rosenfeld et al., 2019). Such discrepancies between dietary identities and behaviours may also occur in perceptions of these diets in others, which may explain the overlap in associations.

While the central zones for meat reducers and vegetarians were comprised of entirely positive and aspirational traits, the central zone for habitual meat consumers contained a mixture of positive and negative traits (*normal, unhealthy, healthy,* and *hungry*). As two social representations are considered different if their central zones are semantically distinct, it may be concluded that the habitual meat consumer social representation is semantically different to that of meat reducers and vegetarians. The mixed perceptions towards habitual meat consumers may be due to the widespread "meat paradox" and associated cognitive dissonance. A large proportion of people who consume meat do so despite being concerned with some aspect of it (Loughnan et al., 2014). This incongruence and resultant negative affect may manifest in the disapproval of meat-eating behaviour among meat consumers, even though meat is still being consumed by this group. This may have accounted for the mixed associations in the habitual meat consumer central zone.

An advantage of the free association task is that it captures attitudes that lie in the middle of the spectrum of implicit-explicit attitudes (Rozin et al., 2002), without suggesting specific traits. However, these perceptions were collected in response to a general label, that of "people who are reducing their meat consumption". It would be useful to replicate these findings within a more realistic context. Therefore, this was investigated in study three, which used vignettes to explore personality trait impressions and perceived group membership of hypothetical meat reducers, vegetarians, and habitual meat consumers among university staff and students.

The vignettes used in study three were standardised except for differences in the dietary habits of the hypothetical people. This allowed for a robust, experimental comparison of perceived personality traits between dietary habits. The results of this study revealed several significant effects. First, the hypothetical vegetarian and hypothetical meat reducer were rated significantly higher on *animal loving, environmentally friendly, health conscious, morality, intelligence,* and *open-mindedness* traits, compared to the hypothetical habitual meat consumer. This reflects previous literature about vegetarians being perceived as more animal loving, environmentally friendly, health conscious, and more moral or virtuous than meat eaters (Hartmann et al., 2018; Minson & Monin, 2012; Ruby & Heine, 2011), and extends these effects to meat reducers. There has been no previous research exploring the link between perceived intelligence and meat consumption, however Fries and Croyle (1993) suggest that people on low-fat diets are perceived to be more intelligent than those on high-fat diets. It may be that the recognition of meat reduction and vegetarianism as relatively lower-fat lifestyles resulted in their higher perceived intelligence in this study. Intelligence may also be related to the 'conscious' and 'thoughtful' traits that were associated with meat reducers in study two. There has been no prior research on perceptions of open-mindedness and meat consumption, however high meat consumption has been positively associated with close-mindedness (Keller & Siegrist, 2015), and vegetarians have been found to score higher in openness compared to omnivores (Forestell & Nezlek, 2018). The results of the current study suggest that this correlation also extends to perceptions of social others who follow different meat-eating habits.

No differences were observed in the ratings of attractiveness and likeability between meat reducers, vegetarians, and habitual meat consumers. Unlike the other traits explored in this study, which may be construed as more personal characteristics, attractiveness and likeability are closely related to social desirability or appeal (Vartanian et al., 2007). Indeed, no differences were observed in two of the three group membership items which focus on social appeal; perceived similarity to, and willingness to befriend meat reducers, vegetarians, and habitual meat consumers. Furthermore, there were no differences in the overall group membership score afforded to the three dietary types. However, meat reducers and vegetarians were afforded more respect than habitual meat consumers. Previous evidence on these perceived traits as they relate to diet is limited. Those with healthier diets have been perceived to be more attractive but less likeable than those with unhealthy diets (Stein & Nemeroff, 1995). However, this reasoning does not apply in this study as no significant differences were found. Together, these results suggest that social desirability or willingness to interact is not influenced by diet, meat-eating status, or the perceptions associated with them.

For the morality, selflessness, and femininity traits, the hypothetical vegetarian was rated more highly (and more feminine in the case of the femininity trait) than both the hypothetical meat reducer and the hypothetical habitual meat consumer. Again, this aligns with previous research that suggests that vegetarians are perceived to be more feminine and moral compared to non-vegetarians (Ruby & Heine, 2011). No prior research has explored perceptions of selfishness as they related to meat versus meatless diets, however there is evidence that those following healthy diets are perceived as more selfless compared to those following unhealthy diets (Stein & Nemeroff, 1995). Since meat reduction seems to be perceived as healthy, it seems feasible to apply this reasoning to the higher perceived selflessness observed in vegetarians in the current study.

Similar to the results observed in study one (Chapter Four), a possible reason behind the positive perceptions afforded to both meat reducers and vegetarians may be the increasing awareness of health, ethical, or environmental impacts of meat eating. In particular, the link between meat and environmental degradation has recently been illuminated via environmental and climatic events and the mobilisation of the environmental movement. Together, these have helped to bring this issue to the mainstream, increasing its salience and highlighting the urgency for immediate preventative action. A cause and effect of this is the growth in popularity and presence of LNM diets, constituting a shifting norm and likely accounting for the more positive perceptions of these diets observed in these studies.

5.4.1 Strengths, Limitations, and Suggestions for Future Research

Studies two and three are among the first empirical assessments of perceptions of meat reducers; a growing, important group representing a dietary transition towards healthier and more sustainable lower meat diets. A significant strength of these studies is the samples employed. Study two used a sample that was representative of the age, sex, and ethnic distribution of the UK population, and study three used students, and staff of a lower pay grade than is typical of university staff. These samples were used to broaden the scope and applicability of results, and they extend previous social influence and diet studies (e.g. Mollen et al., 2013; Robinson et al., 2014) that have tended to focus

on university students only. The low dropout rate of participants in both studies added further strength to the results and reduced the risk of compromised validity (Morton et al., 2012). Study three used targeted samples (university staff and students) in order to standardize the social environment of both cohorts and to ensure they belonged to a comparably defined and identifiable group. As a result, this study is particularly useful as a pre-cursor to social norms interventions, such as the one reported in Chapter Seven, as it allowed for the examination of perceptions as a function of ingroup norms (see Chapter Eight for a full discussion about the implications of this study on social influence and behaviour change).

Another significant strength of these studies is that they used two different means of assessing perceptions; one that captured more explicit perceptions (vignettes) and one that captured less explicit, more implicit perceptions (free association task). This combined approach was used to gather a more complete picture of perceptions towards meat reducers.

However, these studies had several limitations. One that spanned both was the difficulty in operationalising the concept of "meat reduction" as distinct from vegetarianism. The wording "people who are reducing their meat consumption" was used in the free association task, and "*… begun to reduce their meat intake"* was used in the meat reducer vignette. It is possible that these sentences may have been interpreted as vegetarianism, which could explain some of the observed overlap between the vegetarian and meat reducer results. Future research seeking to explore perceptions towards individuals who are shifting towards LNM diets should investigate the most appropriate and accessible terminology to use to capture "meat reducers".

For study two, the results of the free association task only provide a loose indication of the underlying social representation, which should not be considered definitive. More studies are required using different methodologies to fully explore the social representation of meat reducers. In particular, qualitative focus groups may provide more in-depth insights. The university context of study three may be another limitation, whereby observed results may be specific to staff and students at the University of Sheffield. The University of Sheffield has an ambitious sustainability strategy that is focussed around several UN Sustainable Development Goals (see Cameron et al., 2018). The University's focus on sustainability may therefore influence the attitudes and behaviours of its staff and students; they may practice more eco-friendly behaviours, or have a higher environmental awareness compared to staff and student bodies at other universities. While there is a growing number of universities with sustainability initiatives, the nature and practice of these vary. Therefore, further research is needed to confirm that the results reported here extend to other university and non-university populations.

Overall, the results of this set of studies suggest that meat reducers are seen as a positive and aspirational referent group. Vegetarians are perceived similarly, whereas habitual meat consumers elicit more mixed perceptions. These positive perceptions are indicative of shifting injunctive norms related to meat eating, whereby meat reduction is becoming increasingly perceived as positive, aspirational, and normal. With study one (Chapter Four), which demonstrated the perceived normality of low or no meat diets on Twitter, it appears that both LNM diets *and* individuals who are shifting toward them, are perceived in this way. This is promising for interventions that use social influence and norms to influence consumer behaviour in food choice settings. The effect of meat

reduction social norm messages on food choice behaviour in real-world settings will be explored in studies four and five (Chapters Six and Seven) of this thesis.

5.5 Key Findings

- Individuals comprising both university staff and students and representative of the UK population generally hold positive perceptions of meat reducers.

- Perceptions held towards meat reducers tend to be more positive than those held towards vegetarians and habitual meat consumers.

- There was no overall difference in perceived group membership between meat reducers, vegetarians, and habitual meat consumers, suggesting that social desirability or willingness to interact is not influenced by diet, meat-eating status, or the perceptions associated with them. However, meat reducers and vegetarians were afforded more respect than habitual meat consumers.

- These results confirm that meat reducers are an appropriate referent group in future interventions aiming to reduce meat consumption using social influence or norms messaging (see Chapters Six and Seven).

6 Investigating the effect of a meat reduction social norms message on meat and meatless food purchases at an Aotearoa New Zealand university food outlet

6.1 Introduction

The research presented in this thesis thus far suggests that low or no meat (LNM) diets and people who follow them are largely perceived as normal, in both senses of how 'normal' is commonly understood (i.e. widespread and desirable, see Chapter Two, section 2.1). Study one (Chapter Four) assessed the normality of LNM diets on online (Twitter) content, revealing that the vast majority of LNM-related content was framed as positive. Further, the two empirical studies presented in Chapter Five indicated that meat reducers and vegetarians were perceived to be positive and aspirational ingroup members, more so than habitual meat consumers. Taken together, these findings suggest that LNM diets and their adherents are perceived as normal, under the various concepts that "normal" entails. The remaining studies reported in this thesis sought to assess whether it is possible to mobilise perceptions of LNM diets as normal in interventions seeking to reduce meat consumption. As such they sought to address the second research question; *Can information about LNM-related norms change food choice behaviour?* To answer this question, social norms interventions were employed in university food outlets in Aotearoa New Zealand and the United Kingdom. The study conducted in Aotearoa is reported in this chapter.

To improve human and environmental health, meat consumption must be reduced - especially in the Global North (Springmann et al., 2016; Willett et al., 2019; see Chapter One). Meat eating is an entrenched social norm, and shifting meat eating behaviour at the scale required necessitates concerted and sustained behaviour change efforts (Marteau, 2017). However, dietary change is challenging to achieve, due to various complex and interacting factors, such as taste preferences, habits, and the cultural and social status of meat (Stoll-Kleemann & Schmidt, 2017). These factors present significant barriers to most behaviour change efforts that rely on education or information sharing (see Chapter Two, section 2.4.1). As such, alternative behaviour change strategies are required to bypass these barriers. Those that target faster and more unconscious aspects of human decision-making under dual process models (Kahneman, 2011; see Chapter Two, section 2.3.2), and which are low cost and feasible for businesses to implement, may be particularly effective.

One such strategy is the social norms intervention. Social norms are perceptions about how our peers behave, and are a relatively untapped yet promising tool for promoting meat reduction given their demonstrated influence in encouraging people to adjust to pro-environmental and eating behaviours (see Cruwys et al., 2015; Farrow et al., 2017; Chapter Two, section 2.3.3). Generally, social norms interventions involve exposing participants to normative messages about a behaviour of interest. Participants' own behaviours or choices are then monitored and compared to those who were not exposed to any normative messages (see Chapter Three, section 3.6 for a full methodological overview). Social norms interventions theoretically draw upon the COM-B (Michie et

al., 2014) and dual process (Kahneman, 2011) models of behaviour. The normative messages used in social norms interventions address the *opportunity* aspect of the COM-B model by illuminating the behaviour of others in the target group (see Chapter Two, section 2.3.1). The intervention approach itself targets the automatic system of dual process model (i.e. the system that is focused on quick decision-making) by avoiding substantial deliberation during the decision-making process (see Chapter Two, section 2.3.2).

When applied to eating behaviour and food choice, social norms interventions are often employed in real world settings where food decisions are made. Normative information about a specific food choice or behaviour may be displayed in the form of posters, signs, or labelling. Sales or consumer data is then analysed for differences between those participants or outlets exposed to the message, and those who were not. Social norms interventions are likely to be more effective when groups who practice the desired behaviour are perceived as positive and/or aspirational (e.g. Berger & Rand, 2008). Previous research undertaken for this thesis conducted among UK university staff and students (study three, Chapter Five) suggests that meat reducers are indeed perceived favourably, increasing the potential of this approach.

There have been multiple studies that demonstrate the effectiveness of social norms interventions in altering food choice behaviour, in the laboratory and in field food choice settings (see Chapter Two, section 2.3.3 for more detail). A review of laboratory-based studies revealed a strong and consistent effect (Robinson et al., 2014), however there have been relatively fewer social norms interventions in field settings. One example investigated the role of social norms on vegetable intake in workplace cafeterias. Posters with the message "Most people here choose to eat vegetables with their lunch," were displayed in cafeterias, and the number of meals purchased with a side of vegetables was assessed. Compared to the pre-intervention stage when no posters were displayed, participants that were exposed to the posters were significantly more likely to purchase vegetable sides with their meals (Thomas et al., 2017). Follow-up studies conducted in student canteens using a similar descriptive norms message found similar results, that is, an overall increase in vegetable purchases (Collins et al., 2019). These are just two examples that demonstrate the effect of social norms on eating behaviour.

With regard to meat reduction behaviour, social norms interventions in field settings have yielded mixed results. The earliest, conducted by Sparkman and Walton (2017) aimed to assess whether dynamic, or changing meat consumption norms affected food choice selection at an American college cafeteria. The dynamic meat reduction norms message read:

> "Some people are starting to limit how much meat they eat. This is true both nationally and here at Stanford. Specifically, recent research has shown that, over the last 5 years, 30% of Americans have started to make an effort to limit their meat consumption. That means that, in recent years, 3 in 10 people have changed their behavior and begun to eat less meat than they otherwise would".

Customers waiting in the queue to the cafeteria where randomly given either this dynamic message, a static norms message, or an unrelated control message by the researcher. The static norms message read:

> "Some people limit how much meat they eat. This is true both nationally and here at Stanford. Specifically, recent research has shown that 30% of Americans make an effort to limit their meat consumption. That means that 3 in 10 people eat less meat than they otherwise would".

It was found that participants given the dynamic norms message were significantly less likely to purchase meat-based meals, compared to those given the static norms or control message. A further set of more naturalistic field studies by the same authors revealed that dynamic norm messages placed on restaurant menus resulted in modest (1–2.5 percentage points) increases of vegetarian orders in most of the settings assessed (Sparkman et al., 2020).

Other social norms experiments have been ineffective at changing meat purchasing behaviours. Çoker et al. (2022) conducted an intervention in retail café settings. Dynamic descriptive norms messages, similar to those used by Sparkman et al. (2020), were displayed on menu and information screen boards for a two-week intervention period. However, there were no significant differences in meat or vegetarian purchases as a result of the intervention. It is likely that the multiple, proximal distractions that abound in real world food settings (e.g. conversation, pressure to make decisions quickly) limit awareness or processing of social norms messages (Sparkman et al., 2020), a fundamental aspect of this intervention's success. Nevertheless, these studies demonstrate the mixed potential of social norms interventions to steer food choices in healthier or more sustainable directions, and more research is required to robustly evaluate this approach in different settings and contexts. To this end, the study reported in this chapter evaluated the effects of a social norms intervention in an Aotearoa New Zealand context. This study was conducted here due to circumstances related to COVID-19; the primary researcher is from Aotearoa New Zealand and was there for a period of time due to the pandemic.

6.1.1 Study Context

Aotearoa New Zealand is small, developed archipelago in the south Pacific Ocean, to the south-east of Australia and with a population of approximately 5 million in 2020. Aotearoa was colonised by the British Crown in the mid 19th century, and, following extensive settlement, aspired to become a "Britain of the South" (Barker, 2012). Idyllic countryside became desirable, and quickly replaced the native forests, wetlands, and other natural habitats prized by the indigenous Māori people. This facilitated the meat and dairy industries, and land devoted to farming was estimated in 2008 to comprise approximately half of the country's total area (Haggerty & Campbell, 2008).

Alongside this dominant form of land use arose a national identity as a rural or agricultural nation. Early settlers were praised for converting natural bushland into productive farmland, and hard-working farmers became a source of national pride and support (Barker, 2012). This narrative placed meat and dairy production firmly at the centre of Aotearoa's cultural identity, aided by the immense economic role played by the meat and dairy industries historically and in modern day. Dairy is often considered the 'backbone of New Zealand's economy', and is valued at approximately 13.6 billion NZD annually, making it New Zealand's largest goods export sector (Ballingall & Pambudi, 2017).

Similarly, New Zealand's export of red meat products exceeded NZD 6.7 billion in 2017-2018 (NZTE, 2018). This focus on meat and dairy is reflected in national per capita consumption. Aotearoa had the 6th highest per capita meat consumption rate in the world in 2013 (Food and Agriculture Organization of the United Nations, 2013), and consumption levels of poultry, beef, veal, sheep meat, and pork meat all exceeded global averages in 2022 (OECD, 2022; see Chapter One). As a result, meat eating may be considered descriptively normal at a nation level. Conversely, meat-free diets such as vegetarianism and veganism are in the minority, and have been previously perceived as "unpatriotic" or contrary to "kiwi" ideals (Potts & White, 2008). This has, in turn, resulted in a typical "meat and three veg" meal pattern (Kemper, 2020) and a relative lack of meatless alternatives or variation available at general food outlets.

In recent years, however, low-meat and meat-free lifestyles have become more common. Approximately 34% of New Zealanders had either reduced, limited, or eliminated meat from their diets in 2019 (Colmar Brunton, 2019), and a summary report from Beef & Lamb New Zealand (2018) revealed a 42% reduction in per capita red meat consumption from 2007-2017. Health reasons have been cited as the main motivator for reduced meat consumption, followed by environmental, animal welfare, and financial reasons (Colmar Brunton, 2019). Similarly, Lentz et al. (2018) identified health and financial costs as the main motivator for reduced meat consumption among New Zealanders. There has been a general increase in reports linking meat and dairy intake to human health problems, such as bowel cancer (Bradbury et al., 2020), and New Zealand's Ministry of Health recently revised its eating guidelines toward largely plant-based recommendations (Ministry of Health, 2020). Similarly, increasing coverage of meat and dairy's environmental impacts may have been especially poignant in a nation that places great value and pride in its natural environments, and in which pro-environmentalism is a fundamental aspect of national identity (Milfont et al., 2020). Approximately 50% of national greenhouse gas emissions come from agricultural production (Ministry for the Environment, 2022), and dairy intensification has been increasingly linked to environmental degradation, especially of freshwater habitats (e.g. Foote et al., 2015). Concerns related to ethics and animal welfare in farming practices have also become more frequent, with the recent examples of winter cropping and live export controversies. Aotearoa's strong historical, cultural, and economic ties to animal agriculture warrant interventions aiming to reduce meat consumption in order to address effects on the environment and national public health, especially considering that meatless options are generally less commonly available compared to the UK.

6.1.2 Study Aim

The aim of this study was to assess whether social norm messages about meat reduction reduce meat item purchases in an Aotearoa university food outlet. Given previous research suggesting positive and favourable perceptions towards those reducing their meat consumption (see study three, Chapter Five), it was expected that the intervention would reduce meat item purchases.

6.2 Methods

This study's design, hypotheses, and analyses were preregistered on the Open Science Framework (osf.io/ku35z). The study procedures were initially approved by the University of Sheffield Psychology Ethics Committee (reference 032636). Adjustments to the design and procedure according to the new study setting were approved by the University of Otago Human Ethics Committee (reference 21/04B). Informed consent was obtained from all survey participants. Data collection for this study took place between 3-23 May, 2021, during the COVID-19 pandemic. However, there were no COVID-related restrictions in effect in Aotearoa New Zealand at this time.

6.2.1 Research Setting

This study was conducted at The University of Otago, a prominent university that was recently ranked 23rd in the World University Rankings for its alignment with the United Nations' Sustainable Development Goals (Times Higher Education, 2020). The research setting was a café, centrally located at a busy throughway between several lecture theatres, and which typically serves university staff, students, and workers not affiliated with the university. The café (Figure 6.2) serves an array of food items including cakes, slices, scones, plain and filled croissants, sandwiches, sushi, toasted or fresh paninis and wraps, hot pies, salads, and packaged goods (e.g. lasagne, confectionary). For the purposes of this research, savoury items were analysed, including sandwiches, wraps, paninis, calzones, sushi, pies, and packaged lasagne and noodles. On average, 73% of offerings on any given day during the research period contained meat or fish, and 27% of offerings were vegetarian; they did not contain meat or fish, but may have included eggs and/or dairy. Equivalent meat and meatless foods were priced identically. On average, approximately 53% of items were offered every day during the research period.

6.2.2 Design

The study period was split into three phases: a pre-intervention, intervention, and post-intervention, each lasting one week. During the intervention phase, a social norms poster was displayed in the research setting. The poster contained a descriptive norms message related to national meat reduction based on Colmar Brunton (2019) and Beef & Lamb (2018) data. The message (Figure 6.1) read "Many people in New Zealand have reduced or stopped eating meat for health, environmental, or animal welfare reasons", and was adapted from similar messaging used by Thomas et al. (2017) and with guidance from McAlaney et al. (2010) and Miller and Prentice (2016). A descriptive norms message was used, since it has been suggested that they are more effective than injunctive norms when applied to eating, pro-environmental, and health behaviours (Farrow et al., 2017; Robinson et al., 2014). Meat reduction rationale (i.e. "…for health, environmental, or animal welfare reasons.") was included, as norm messages may be more effective if attention is drawn to the significance of, or motivation for peer behaviour (van der Linden, 2015). The poster was designed to be read as clearly as possible, with a simple colour scheme and font choice. It was A4-sized and placed in a clear, plastic display atop the hot food cabinet (see Figure 6.2) during the intervention phase. During the pre- and post-intervention phases, this social norms signage was not displayed anywhere in the research setting, and there were no other campaigns, initiatives, or events taking place.

Figure 6.1. Social norms signage, displayed during the intervention phase.

Figure 6.2. Research setting, including social norms signage atop food cabinet (left) during the intervention phase.

During each of the three study phases, a survey was administered to customers to gain insight into customer characteristics (e.g. demographics, dietary habits) and purchase experience (see section 6.2.3). This customer characteristics survey also assessed whether participants had noticed the social norms message during the intervention phase. Surveys were conducted with a small sub-sample of customers who had made a purchase at the outlet. Accounting for the fact that some customers may not wish to participate in a survey, the target recruitment was approximately 50% of total patrons.

Participants were required to be aged 18 or over; no further eligibility criteria applied. For one day during each phase, the researcher approached these customers, inviting them to participate in the survey for the chance to win a $50 supermarket voucher via a prize draw. The survey was initially pre-tested by academic students (n=3), where it was determined to take 2-4 minutes to complete. This time commitment, along with the prize draw incentive, was verbally communicated to potential participants during recruitment. Surveys, consent forms, and participant information sheets (see Appendices 1 and 2) were made available to participants as paper copies. Survey participation was anonymous, and email addresses for the purposes of the prize draw were collected on a separate email recording sheet to maintain anonymity. The debrief of the survey outlined the study aims, but was kept brief to prevent biased responses or altered behaviours for the remaining duration of the experiment. However, participants were given the option to email the researcher at a later stage to request further details if desired.

6.2.3 Measures

Primary measure: Daily purchase data was collected from the outlet for the duration of the trial. The data collected for this measure included itemised quantities sold and corresponding financial figures from all customers who purchased an item during the trial, and was recorded by outlets as standard practice. Purchase data were collected from the university operations manager at the end of the three-week period.

Secondary measure: The customer characteristics survey consisted of 11 questions aiming to identify outlet customer demographics, purchase experience, and dietary habits (see Table 6.2; adapted from Papies & Hamstra [2010] & Thomas et al. [2017]). Demographic items included age, sex, ethnicity, nationality, and staff/student status. This was followed by a series of questions about participants' purchases, including what was purchased, factors that influenced the purchase, frequency of outlet visitation, and whether the social norms messaging was noticed (during the intervention week only). The survey concluded with two questions aiming to discern participants' dietary habits and whether they were reducing their meat consumption.

6.2.4 Data Analysis

The data analysis was conducted using SPSS version 28 (IBM Corp, 2021). Due to the format of the data obtained from the food outlet, Pearson's chi squared tests were used to explore differences in purchases, diverging from the pre-registration. Based on their ingredients and composition, food items were coded as either *meat* (0) or *meatless* (1). The number of meat and meatless items sold were compared, (a) between pre-intervention and intervention phases, (b) between intervention

and post-intervention phases, and (c) between pre-intervention and post-intervention phases. For all tests, the significance level was corrected to $p < 0.017$ and measures of effect were estimated using odds ratios. Survey data was used to characterise customer demographics across the three study phases.

6.3 Results

6.3.1 Differences in Meat and Meatless Purchases Between Time Phases

On average, 1534 items were sold per trial phase (see Table 6.1 for a breakdown of sales per trial phase). No significant differences were identified in average sales per phase, $p = 0.96$, $\eta p^2 = 0.007$. Pearson's chi squared tests revealed that the social norms intervention was not associated with a difference in meat or meatless items purchased, compared to the pre-intervention phase; χ^2 (1) = 0.002, $p = 0.96$, OR = 1, 95% CI [0.86, 1.17], and post-intervention phase; χ^2 (1) = 0.207, $p = 0.65$, OR = 1.04, 95% CI [0.89, 1.21]. There were also no significant differences identified between pre-intervention and post-intervention phases; χ^2 (1) = 0.257, $p = 0.61$, OR = 1.04, 95% CI [0.89, 1.21].

Table 6.1. Items sold by trial phase.

	Phase*			
	Pre-intervention	**Intervention**	**Post-intervention**	**Total**
Total items sold	1539	1521	1541	4601
Meatless items sold (%)	31.1	31.1	31.9	31.3

* Each phase was one week in duration.

6.3.2 Customer Characteristics Survey

In total, 66 customers completed the customer characteristics survey, and distribution of participants across the three trial phases was similar. Participant characteristics and responses are shown in Table 6.2. Notably, approximately 26% of participants noticed the social norms poster during the intervention phase. Additionally, the majority of customers (approximately 83% in total) were meat consumers, and 8 of 55 of these were currently reducing their meat intake.

Table 6.2. Customer characteristics across the three trial phases.

	Trial Phase			
	Pre-intervention Phase (n=23)	**Intervention Phase (n=23)**	**Post-intervention Phase (n=20)**	**Total (n=66)**
Age in years, mean (SD)	26.6 (12.9)	27.9 (10.8)	26.3 (7.3)	27 (10.6)
Sex, n (%)				
Female	18 (78.26)	12 (52.17)	13 (65)	43 (65.16)
Male	5 (21.74)	11 (47.83)	7 (35)	23 (34.85)
Other	0	0	0	0
Nationality, n (%) New Zealander	19 (82.6)	18 (78.2)	16 (80)	80.3
Ethnicity, n (%)				
NZ European	13 (56.52)	17 (73.91)	13 (65)	43 (65.15)
NZ European, Māori	4 (17.39)	2 (8.7)	2 (10)	8 (12.12)
Indian	1 (4.35)	0	1 (5)	2 (3.03)
Samoan	0	1 (4.35)	0	1 (1.52)
Chinese	0	0	1 (5)	1 (1.52)
Other	5 (21.74)	3 (13.04)	3 (15)	11 (16.67)
Diet, n (%)				
Meat consumer	21 (91.3)	17 (73.91)	17 (85)	55 (83.33)
Pescetarian	0	1 (4.35)	0	1 (1.52)
Vegetarian	1 (4.35)	4 (17.39)	2 (10)	7 (10.61)
Vegan	1 (4.35)	1 (4.35)	1 (5)	3 (4.55)
Reducing Meat Consumption (n)	1	4	3	8
Staff/Student Status, n (%)				
Undergraduate student	11 (47.83)	12 (52.17)	9 (45)	32 (48.48)
Postgraduate student	3 (13)	6 (26.09)	4 (20)	13 (19.7)
University Staff	4 (17.39)	5 (21.74)	4 (20)	13 (19.7)
Other	5 (21.74)	0	3 (15)	8 (12.12)

	Trial Phase			
	Pre-intervention Phase (n=23)	**Intervention Phase (n=23)**	**Post-intervention Phase (n=20)**	**Total (n=66)**
Café Visit Frequency, n (%)				
Daily	2 (8.7)	3 (13.04)	3 (15)	8 (12.12)
Several times a week	2 (8.7)	8 (34.78)	5 (25)	15 (22.73)
Once a week	5 (21.74)	6 (26.09)	2 (10)	13 (19.7)
Several times a month	3 (13.04)	1 (4.35)	4 (20)	8 (12.12)
Once a month	2 (8.7)	2 (8.7)	2 (10)	6 (9.09)
Several times a year	2 (8.7)	1 (4.35)	1 (5)	4 (6.06)
Rarely	3 (13.04)	1 (4.35)	2 (10)	6 (9.09)
Never	2 (8.7)		1 (5)	3 (4.55)
Other	2 (8.7)	1 (4.35)		3 (4.55)
Poster Noticed, n (%) Yes	N/A	6 (26.09)	N/A	N/A

6.4 Discussion

This study investigated the effect of meat reduction social norms message on meat and meatless purchases in an Aotearoa New Zealand university food outlet using a social norms intervention. This study was the first to investigate social norms messaging related to meat reduction in an Aotearoa context.

There were no significant differences identified in meat or meatless purchases in the intervention phase, compared to the pre- and post-intervention phases. These results add to a body of previous research that demonstrate the mixed effectiveness of social norms interventions in food choice settings. Social norms interventions have been effective at increasing vegetable consumption and produce purchases at workplaces and supermarkets (Payne et al., 2015; Thomas et al., 2017), as well as increasing healthy food purchases at university food outlets (Mollen et al., 2013; descriptive norms only). In terms of promoting meatless choices, dynamic social norms have been demonstrated to influence the selection of meatless choices through researcher-delivered norm messages (Sparkman & Walton, 2017). However, more naturalistic experiments without researcher involvement have yielded mixed results (Çoker et al., 2022; Sparkman et al., 2020). A main difference between the current study and these previous studies lay in the wording of the social norms message. The social norms messages used in the previous studies were prescriptive – they *encouraged* rather than discouraged choice (see Chapter Two, section 2.1.1 for further detail about prescriptive and proscriptive norms). Thomas et al. (2017) and Payne et al. (2015) used norm messages to promote vegetable choices, Mollen et al. (2013) promoted healthy choices, and Sparkman et al. (2020) and Çoker et al. (2022) promoted vegetarian choices. However, the message used in the current study was more proscriptive in nature, specifying meat *reduction*. Though this may imply the promotion of meatless items, this was not made explicit in the message itself, and thus it is possible that social norms interventions are less effective when being used to *reduce* food intake or discourage choices. More research is required in order to robustly evaluate this approach applied to food choice, and specifically meat consumption behaviour.

Another possible explanation for the results obtained in this study is related to customer behaviour and sign awareness. Observations of customer behaviour by the researcher revealed that many customers seemed to already know what they had planned to purchase – they made their orders with the cashier without browsing the cabinet or observing any surrounding signage. These observations were echoed by informal conversations with café staff and operations management, who independently expressed their own observations that their customers tend not to read any signage or promotional marketing on display in the premises. This may be indicative of regular or returning customers, who are less inclined to browse for new options (Sparkman et al., 2020) and who may be especially common in university settings. Additionally, due to the size of the food outlet and the limited available space, only one A4-sized norms message was displayed during the intervention phase. Together, these factors are likely to have resulted in the relatively small percentage of individuals who reported that they noticed the sign during the intervention phase. Mollen et al. (2013) reported a low awareness of the social norms message in their study, despite several signs being placed in different locations around the university food court. Importantly, the social norms message was only effective at influencing food choice among participants who had reported seeing it, reinforcing McGuire's (1985) assertion that exposure is key to attaining desired

effects. Similarly, Sparkman et al. (2020) note that people are generally not obliged to look at norms messages given that they act as a distraction from their primary goal, at that time, to view and select food options. The potentially limited exposure to norms messages highlights a trade-off inherent in naturalistic field studies. Whilst ecological validity is maximised, there is no way to ensure exposure to the norms message, especially since customers may be distracted by more proximal cues that are controlled for in laboratory-based studies. It is possible that customer behaviour and awareness of signage may be different in other food contexts such as supermarkets, where signs can be placed in other locations that may be more visible (e.g. on grocery trolleys; Payne et al., 2015).

However even if visibility was maximised, the possibility remains that that the norms message may have been ineffective. First, due to time and logistical constraints given the circumstantial nature of this study, it was not possible to conduct preliminary research among staff and students at the University of Otago about beliefs, behaviours, and perceived norms related to meat consumption, as was conducted at the University of Sheffield in study three (Chapter Five). Thus the decision was made to use "people in New Zealand" as the referent group in the social norms message of this study. Whilst national identity is a fundamental aspect of social identity (Milfont et al., 2020), it is possible that this referent group was too general and did not facilitate enough of a social connection or identification with customers at the food outlet. As such, the effect of the norms message may have been overpowered by more proximal social norms, for example, the choices made by fellow diners or friends.

Second, it is possible that the credibility of the norms message was doubted, particularly in context of Aotearoa New Zealand. It is important for norms messages used in social norms interventions to be credible, as they are otherwise unlikely to be acted upon (Burchell et al., 2012; see Chapter Three, section 3.6). Credibility of the social norms message has also been identified as one of Yamin et al. (2019)'s key recommendations for social norms intervention designs (see Table 7.2, Chapter Seven). Whilst Aotearoa prides itself on its pro-environmentalism, there is evidence to suggest a concurrent perception of meatless options and lifestyles as an "un-Kiwi" threat to the national identity (Potts & White, 2008). If this holds true today, the effect on behaviour may have been compromised.

Relatedly, the limited range of meatless options available for purchase may have inhibited behaviour change. The availability of appealing, palatable meatless alternatives is an important part of any intervention aiming to encourage meatless purchases. This recalls the COM-B model's *opportunity* factor, highlighting the importance of an enabling physical environment to support behaviour change (see Chapter Two, section 2.3.1). Similarly, Stoll-Kleemann and Schmidt's (2017) model of influences on meat eating behaviour (see Chapter Two, section 2.4.1) includes appropriate "plant-based diet friendly" infrastructure as a key external incentive to reduced meat consumption. Related to Aotearoa's meat-centric culture, there is generally a limited number of meatless options available at food outlets. Meatless offerings at the research setting comprised 27% of total savoury offerings on average. This figure varied by product type: for example, six of eight bakery offerings were meatless, but only one of fourteen pie options were. The meat-free scene in Aotearoa is growing (Colmar Brunton, 2019), and the country has recently been ranked among the top five vegan-friendly countries in a recent study analysing Google Trends (Chef's Pencil, 2020). However, the number and variety of available vegetarian and vegan options in food outlets seems to nonetheless lag behind

other countries such as the UK, perhaps in part due to the nation's isolation. Alongside the dominant and pervasive meat-heavy narrative of Aotearoa's culture and identity, this may also sow doubt in the credibility of the displayed norms message. The limited range of meatless options remains an unavoidable aspect of conducting such research in Aotearoa university settings at this time. However, the rise of meatless popularity and sustainability focus across the country may change this in the near future.

6.4.1 Strengths, Limitations, and Suggestions for Future Research

To date, study four is the first of its type to be conducted in an Aotearoa New Zealand setting, and adds to a limited but growing body of literature using this approach to reduce meat consumption. A strength of this study lies in its design. In a systematic review of 92 applied social norms interventions targeting sustainable behaviours, the majority were remote (i.e. the intervention was applied in a different context to that in which the target behaviour occurs) (Yamin et al., 2019). Study four joins the minority in this review that were situated, or applied in the same context that the target behaviour occurred. Whilst there are advantages to remote interventions, situated interventions rely on the assumption that immediate, contextual factors influence behaviour. Therefore, they may be particularly effective in influencing food choice decisions, which are often made quickly in real-world settings (Milosavljevic et al., 2011). Furthermore, only approximately 30% of studies reviewed by Yamin et al. (2019) used outcome measures that were not based on self-reports. Study four added to this limited body of research in not using self-reported data, instead using purchase data as the outcome measure for behaviour. Given that self-reported data may be unreliable, the use of purchase data offers a more objective assessment of purchasing behaviour.

However, there were several limitations to this study, many of which were related to the challenges of conducting applied research in real-world contexts during the COVID-19 pandemic. Prior to COVID-19, preparatory studies were conducted for a planned social norms intervention at the University of Sheffield. The studies reported in Chapter Five assessed the perceived normality of meat reducers, specifically in the UK and at the University of Sheffield (Patel & Buckland, 2021). These studies were intended to inform the planned social norms intervention, given that perceptions of the referent group are an important moderator of social norms interventions (Berger & Rand, 2008). These results were unable to be used to inform the study in Aotearoa, and time constraints prevented a similar study being conducted in this context. As such, a more general message referring to "people in New Zealand" was used in the social norms poster. As previously noted, it is possible that this more general referent group may not have elicited as much of a social connection among customers, and may have reduced the impact of the norms message. The circumstantial nature of this study, again related to the COVID-19 pandemic, also limited the choice of research setting, since collaborative relationships with relevant university stakeholders had to be established from scratch with significant time constraints. This study would have benefited from more planning time, allowing the possibility for exploratory research to determine dietary behaviours and perceived norms within this context prior to the intervention.

Another limitation was the low numbers of customers completing the customer characteristics survey. This was attributed to several factors. First, the locale of the research site in a throughway

resulted in many customers making takeaway orders. These customers did not stay on the premises for long, and thus could not be recruited for the customer characteristics survey. Furthermore, since only one researcher was available for survey recruitment, the number of customers recruited were limited. Due to low participant numbers, the information drawn from the survey results (i.e. percentage of customers that noticed the signage, demographic characteristics of customer base) cannot be considered representative of the customer base at the research setting. The surveys do, however, provide a valuable snapshot or indication of customer characteristics that nonetheless provided some insights.

Future social norms interventions should optimise study design to maximise effect. First, careful consideration should be paid to Yamin et al. (2019)'s recommendations for effective applied interventions. Specifically, norms messages should be credible and ideally developed using data from the same target referent group. Second, messages should be designed and strategically placed for maximum visibility or accessibility, and different communication avenues and message types (e.g. social media) should be used where possible. Third, the feasibility and implementation of complex interventions are important considerations. Despite some challenges (see Chapter Eight), study four provides evidence that it is possible to work with stakeholders towards promoting healthy and sustainable diets on campus. As previously discussed, it is vital that any applied interventions be designed and conducted in close consultation with stakeholders at all stages of the process. Prior to the intervention, it is important to first lay the groundwork so that stakeholders understand the importance of the issue and why it requires their investment and involvement (Graham et al., 2020). Future social norms interventions should endeavour to lay this groundwork, since only when interventions are acceptable and feasible for stakeholders will they be sustainable for long term implementation.

To conclude, the social norms message used in this study did not influence food purchases. However, these results may be speculatively explained by the limited awareness or acceptance of the social norms message, or the relatively limited number and variety of meatless options available for purchase at the study setting. Future social norms interventions may benefit from a revised design that increases the visibility of the social norms message (by factors such as size and location of the messages), uses a more specific referent group, and that is conducted in a food choice setting with a larger variety and number of meatless alternatives. These considerations were incorporated into the design of the study conducted at the University of Sheffield, reported in the next chapter (Chapter Seven).

6.5 Key Findings

- A three-week trial testing the effect of a meat reduction social norms poster in an Aotearoa New Zealand university café yielded no significant differences in meat versus meatless food purchases.

- A survey conducted with café customers revealed that 83% were meat consumers, and approximately 14% of these were reducing their meat intake.

- Of the small proportion of customers surveyed, only 26% of customers noticed the social norms poster.

- The Aotearoa food environment is generally relatively limited in the range and availability of meatless options, and this may limit behaviour change.

- Future social norms interventions may benefit from design amendments in order to more robustly test the effectiveness of the approach in reducing meat intake in naturalistic food choice settings.

7 Investigating the effect of meat reduction social norm messages on meat and meatless food purchases in UK university food outlets

7.1 Introduction

Study four (Chapter Six) employed a social norms intervention in an Aotearoa New Zealand university food outlet in an attempt to reduce meat consumption. Study four aimed to answer the research question; *Can information about LNM-related norms change food choice behaviour?* In the current chapter, the same research question is addressed using a social norms intervention in three different food outlets at a UK university.

There is scientific consensus that urgent shifts towards low or no meat (LNM) diets are required in order to address multiple problems related to the environment, animal welfare, and human health (Springmann et al., 2016; Willett et al., 2019). Catering outlets in the public sector (e.g. schools and universities) have been purported as important and potentially effective sites to foster healthy and sustainable dietary behaviours via behavioural interventions (Wahlen et al., 2012). Specifically, social norms interventions have the potential to shift consumer behaviour in desirable directions (Yamin et al., 2019). As discussed in the previous chapter, social norms interventions are behaviour change strategies that fulfil the *Opportunity* element of the COM-B model and operate under the fast system of the dual process model (Kahneman, 2011; Michie et al., 2014). During social norms interventions, participants are exposed to normative messages about a behaviour of interest. The normative message may be descriptive or injunctive in nature, containing information about the prevalence or idealness of a behaviour among peers respectively. A behavioural outcome is then assessed to gauge whether the normative message had any effect, compared to individuals or groups not exposed to any normative message (see Chapter Two, section 2.3.3 and Chapter Three, section 3.6 for more detail about this intervention type).

With regard to food behaviours, naturalistic real-world interventions are particularly useful to assess the potential impact of social norms on consumption. These interventions are employed in settings where food decisions are made (e.g. cafes, supermarkets). For example, in the study conducted in Aotearoa New Zealand (Chapter Six), a poster was displayed for one week which contained a normative message about meat reduction behaviour among New Zealanders. Sales data, containing itemised quantities of meat and meatless sales, was collected for that week, and compared to similar data from one week beforehand and one week following (where the social norms message was not displayed). This study joins several others (e.g. Payne et al., 2015; Thomas et al., 2017) that have assessed the role of social norms in influencing consumer decisions. Importantly, all of these studies focused on real world implementation, naturalistically displaying norm signs without researcher delivery or intervention and outside of the laboratory.

Applied to meat reduction, a study that used researcher-delivered norm messages in food choice settings was effective at reducing meat consumption (Sparkman & Walton, 2017). More naturalistic

interventions that have passively displayed normative messages have had mixed results. For example, a set of studies by Sparkman et al. (2020) revealed that it is possible to reduce meat-based orders in naturalistic, real world settings using normative information placed on menus, even if the effect is moderate.

Conversely, the Aotearoa study (Chapter Six) yielded non-significant results (see Chapters Six and Eight for further discussion), adding to a growing body of literature that casts doubt on the effectiveness of social norms interventions in the context of reducing meat consumption (e.g. Çoker et al., 2022), and sustainable eating more generally (e.g. Richter et al., 2018). However, more research is required to evaluate social norms interventions to reduce meat consumption in naturalistic contexts. This is especially true given the favourability of this type of intervention to food retail stakeholders. Recent evidence suggests that both food outlet caterers and customers favour interventions that retain customer choice, perceiving these to be more feasible to implement, less financially risky, and more acceptable (Graham et al., 2020). The promise of the current study also increases in light of the results of study three (Chapter Five). Positive perceptions of the referent group increase the likelihood of social norms intervention effectiveness (e.g. Berger & Rand, 2008), and the results of study three indicate that peer staff and student meat reducers and vegetarians, in the same context as the current study, were perceived positively (Patel & Buckland, 2021).

To address some of the limitations of the study conducted in Aotearoa New Zealand discussed at the end of the previous chapter, and to increase the likelihood of significant behaviour change, several design changes were made in the current study. These changes were informed by a recent review of naturalistic social norms interventions including, but not limited to food choice (Yamin et al., 2019). The review culminated in several recommendations for optimum intervention design, which were only partially fulfilled in study four (see Table 7.2, section 7.2.2 for full detail on the design differences between the two studies). The current study sought to fulfil these recommendations more completely and in doing so, its design resembled a more complex intervention.

Complex interventions are those that emphasise real world transferability and feasibility over absolute scientific fidelity (Craig et al., 2008; Skivington et al., 2021; see Chapter Three, section 3.6.1 for further detail). An important feature of complex interventions is consideration of, and consultation with stakeholders. Not only does this increase the effectiveness of the intervention, it also brings context-specific insights and expertise, boosting real world transferability. Complex interventions may also involve several components or settings. The current study aligned with these features through the use of several research sites and modes of social norms message delivery (see section 7.2 for further detail). Importantly, social media was used to disseminate the norms message to align with more sociological conceptions of behaviour. As discussed in Chapter Two, section 2.2, the use of social media is common in everyday life, and the results of study one (Chapter Four) suggest that LNM diets are largely framed positively in online content about the topic. As such, the use of social media posts adds to this intervention's pragmatism and may increase its effectiveness.

7.1.1 Study Context

In the UK, per capita meat consumption is higher than the global average (OECD, 2022), with consumption levels exceeding recommendations for optimal human (e.g. NHS, 2018) and planetary health (Willett et al., 2019). However there is evidence to suggest that LNM diets are growing in prevalence (YouGov, 2019), with an attendant decline in meat consumption (Stewart et al., 2021) (see Chapter One for further detail about consumption levels and the uptake of LNM diets in the UK). Whilst this is promising, meat reduction rates are still below what is recommended to meet specific targets (see Chapter One), and this trend must be accelerated to address the issues caused by high per capita meat consumption.

Against this backdrop, UK university food environments nonetheless appear to be less meat-centric, especially compared to those in Aotearoa New Zealand at time of writing. This is evident in the number and range of meatless food items available, and the researcher's lived experience in both settings. Having an adequate variety of available meatless items is important to support any intervention aiming to change food behaviours, including reducing meat consumption (e.g. Stoll-Kleemann & Schmidt, 2017), and it is thus likely that the increased range of meatless items available in UK university food outlets increases the potential of the intervention**.** This difference in food environment and culture between UK and Aotearoa university settings warrants additional social norms interventions, with improved designs, to be conducted.

7.1.2 Study Aim

The aim of this study was to assess whether social norm messages about meat reduction reduce the purchase of meat-based foods in three food outlets at a UK university. Given previous research suggesting positive and favourable perceptions towards those reducing their meat consumption among the same target group (see study three, Chapter Five), it was expected that this intervention would result in a reduction in the purchase of meat items, and an increase in meatless purchases.

7.2 Methods

This study's design, hypotheses, and analyses were preregistered on the Open Science Framework (osf.io/utqaj). The study procedures were initially approved by the University of Sheffield Psychology Ethics Committee (reference 032636) in February, 2020. Design adjustments in light of COVID-19 and the new study period in 2022 were approved in January, 2022. Informed consent was obtained from all survey participants. Data collection for this study took place between 7th -27th February, 2022. There were no restrictions in place at the time of data collection; some measures (e.g. mask wearing) were encouraged but not mandatory.

7.2.1 Research Settings

This study was conducted at The University of Sheffield, a prominent university with an ambitious sustainability strategy (see Cameron et al., 2018) and a 2018 Sustainable Diets Action Plan to, (1)

create a culture of 'vegan-as-normal', (2) educate students about the SSU's vegan range, and (3) increase the demand for, and availability of environmentally-friendly food options (Graham, 2018).

This study was conducted at three food outlets in the University of Sheffield Student Union, a focal point of the university. The three food outlets were chosen based on some basic criteria. First, outlets must have been operated by the University of Sheffield's Student Union. Second, outlets were required to offer an adequate range of meatless items; at least one quarter of all savoury offerings available were required to be meatless. Meatless dishes may have contained non-meat animal products (e.g. milk, cheese) and were not necessarily vegan. Third, the purchase data was to include clear differentiation between meat and meatless purchases. Finally, eligible outlets were discussed and determined following feasibility conversations with university operations and outlet management. Initially, four food outlets that were run by the University's Student Union were to be used, however one (a salad and wrap bar) was unable to differentiate between meat and meatless items in the purchase data, and so was not included in further analysis. The three sites used in this study differed in context and available offerings, and are described as follows:

- **Site A:** A café, serving hot and cold drinks and an array of sweets, snacks, and sandwiches;
- **Site B:** A burger bar, serving burgers, fries, and drinks;
- **Site C:** An express food shop, serving fast hot foods such as toasted sandwiches, noodle pots, nuggets, baked potatoes, and soup with a self-service ordering system.

For the purpose of this research, only savoury items with clear meat and meatless equivalents were included in the analyses. All outlets had a consistent menu that did not differ between days or trial phases. Table 7.1 outlines the relative proportion of meat and meatless offerings available at each of the three food outlets. Equivalent meat and meatless foods were mostly priced identically, with the exception of beef items at the express shop and burger bar, which were priced 50p and £1 extra respectively as part of an ongoing sustainability initiative.

Table 7.1. Number and proportion of meat and meatless offerings available for purchase at the three study sites.

	Meat offerings, n (%)*	**Meatless offerings, n (%)***
Site A: Café	6 (40)	9 (60)
Site B: Burger bar	15 (60)	10 (40)
Site C: Express shop	8 (47)	9 (53)

* Percentages of total savoury meal items, excluding drinks, packaged snacks, sides, and sweets.

7.2.2 Design

Much of the design of this study was similar to that of study four (Chapter Six). To reiterate, the results of study four were speculatively explained in part by limited awareness and acceptance of the social norms message. Therefore, several changes were made in the current study in an attempt to improve upon the design of study four, including the use of a more credible and relevant norms message and different research sites and modes of normative message delivery. These changes are

summarised under Yamin et al. (2019)'s recommendations for situated social norms interventions (see Table 7.2), and were made to increase the effectiveness of the intervention and to align with a more complex intervention approach (see Chapter Three, section 3.6.1).

Table 7.2. Design differences between studies four and five, based on recommendations for situated social norms interventions from Yamin et al. (2019).

Design recommendation	Study Four (Aotearoa)	Study Five (UK)
Create marketing material with group summary information to be distributed in the same context where the target behaviour happens.	Marketing material was displayed in the same context as the target behaviour, however group summary information was at a national level.	Marketing material was displayed in the same context as the target behaviour, and group summary information was derived from the target population.
Include credible and strategic messages with the rates of prevalence and support that the target behaviour (or related ones) have in a certain population (i.e., if you want to reduce drinking rates among students, show how most of them drink less, or that more disapproved heavy drinking, than usually thought).	Message included a descriptive social norm related to meat reduction behaviour, but on a national level. This may have compromised credibility given the meat-heavy cultural context.	Messages included a descriptive social norm related to meat reduction behaviour, with references displayed on the poster to aid credibility.
Choose strategically the marketing materials that are more likely to be seen and remembered by the highest possible number of participants (i.e., posters, fliers, signs, stickers, ads, etc)	One research site was used, with a single message displayed during the intervention week due to the size of the site.	Several research sites were used, with several formats of messages used across different modes of delivery (e.g. physical signage and social media channels).

As in the study conducted in Aotearoa New Zealand (Chapter Six), this study used a three-phase pre-post design (i.e. pre-intervention, intervention, and post-intervention), each with a duration of one week. During the intervention phase, social norms signage was displayed in the three research settings. All signage contained the same descriptive norms message; "Most staff and students here have reduced or stopped consuming meat for health, environmental, or animal welfare reasons". Like the poster used in study four, the message was adapted from previous research and guidance (McAlaney et al., 2010; Miller & Prentice, 2016; Thomas et al., 2017). Again, descriptive norms were used given evidence that they are likely more effective than injunctive norms in this domain (Farrow et al., 2017; Robinson et al., 2014), and rationale (i.e. "…for health, environmental, or animal welfare reasons.") was included to communicate the significance of, or motivation for peer behaviour (van der Linden, 2015). In contrast to the poster used in study four, an asterisk was added to the end of the social norms message which directed the reader to references at the bottom of the poster. These references were included to add credibility to the social norms message, since it was based on data obtained at the same research setting (i.e. The University of Sheffield) as part of study three

(Chapter Five; Patel & Buckland, 2021). All signage used a consistent colour scheme and font choice, and were designed in collaboration with the marketing team at the University of Sheffield. This ensured that norms messages were stylistically consistent and congruent with the usual marketing materials displayed around the SSU. Student Union and Living Labs branding were included at the bottom of the poster at the request of the marketing team.

The size and placement of the signage differed according to each specific research site (see Figure 7.1), and was informed by the feasibility conversations with stakeholders. In site A (café), a large A3-sized poster was placed in a prominent display typically used for marketing. In the site B (burger bar), 16:9 landscape posters were added to circulation on digital screens within the bar (for a duration of ten seconds), and A4-sized posters were placed on individual clipboards holding the menu. Finally, in site C (express shop), small laminated business-card sized signs were attached to the self-serve screens. All signage was displayed from the first day until close-of-business on the final day of the intervention phase. The sign was also posted on the SSU's social media Twitter and Instagram accounts (see Figure 7.2). At the request of the marketing team, the social media posts were accompanied by contextual text that read "Have you tried some of our meat-free options around the SU? We have a range of delicious options to suit a range of dietary requirements! Just head to any of our outlets to find out more". The social media posts were scheduled for the first day of the intervention phase, however due to staff strike action they were not posted until the second day of the intervention. During the pre- and post-intervention phases, no social norms signage was displayed anywhere in the research sites. To comply with ethics requirements, an A4 debrief sign was placed in participating outlets following the post-intervention week.

As in study four, a short survey was administered to customers to gain insight into demographics, dietary habits, experience at the research site(s), and whether they had noticed the social norms poster (see section 7.2.3 for further detail about the customer survey). During the final two days of the post-intervention phase, A4 posters containing QR codes were displayed at each research site. When scanned, these codes lead to an electronic copy of the customer characteristics survey on Qualtrics. Following the participant information and consent forms, screening questions were used to ensure that participants were aged 18 and over; no further eligibility criteria applied. Upon completion, participants were given the opportunity to enter a prize draw for a £50 One4All shopping voucher.

Related to survey recruitment, it is important to highlight two important changes that were made to the design of study four. First, the decision was made to avoid in-person survey participant recruitment, and instead use adverts containing QR codes for this purpose. This was primarily due to COVID-19 and safety concerns. Second, in an attempt to keep surveys temporally close to the intervention whilst minimising effects on purchasing behaviour, the decision was made to recruit for and have the survey live for only the final two days of the post-intervention phase. In light of the design amendments, changes made to the wording and format of survey questions will be discussed in section 7.2.3.

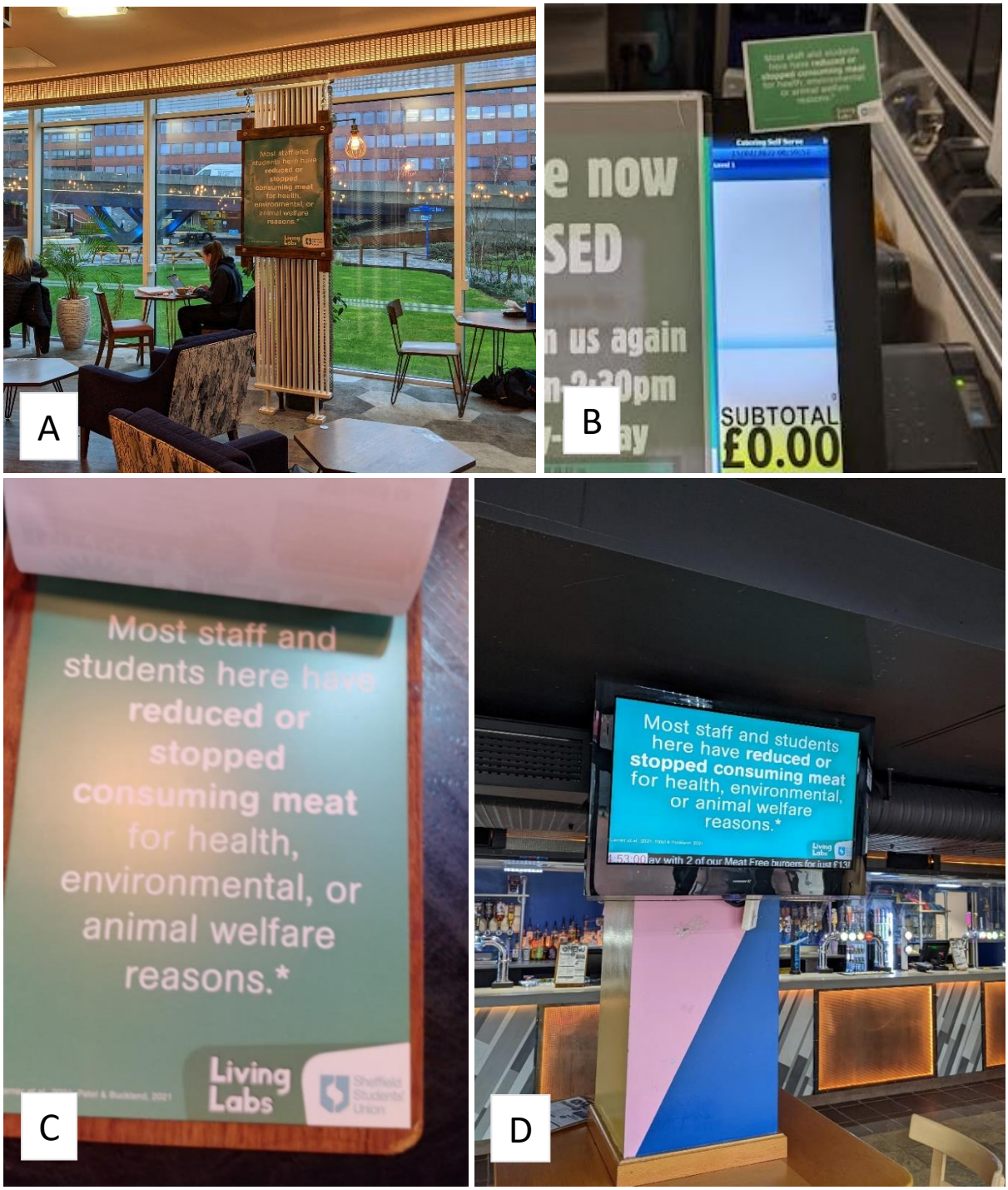


Figure 7.1. The social norms message in the different research settings: (A) at the café, (B) attached to ordering screens at the express food shop, (C) on the menu clipboards in the burger bar, and (D) on digital screens in the burger bar.

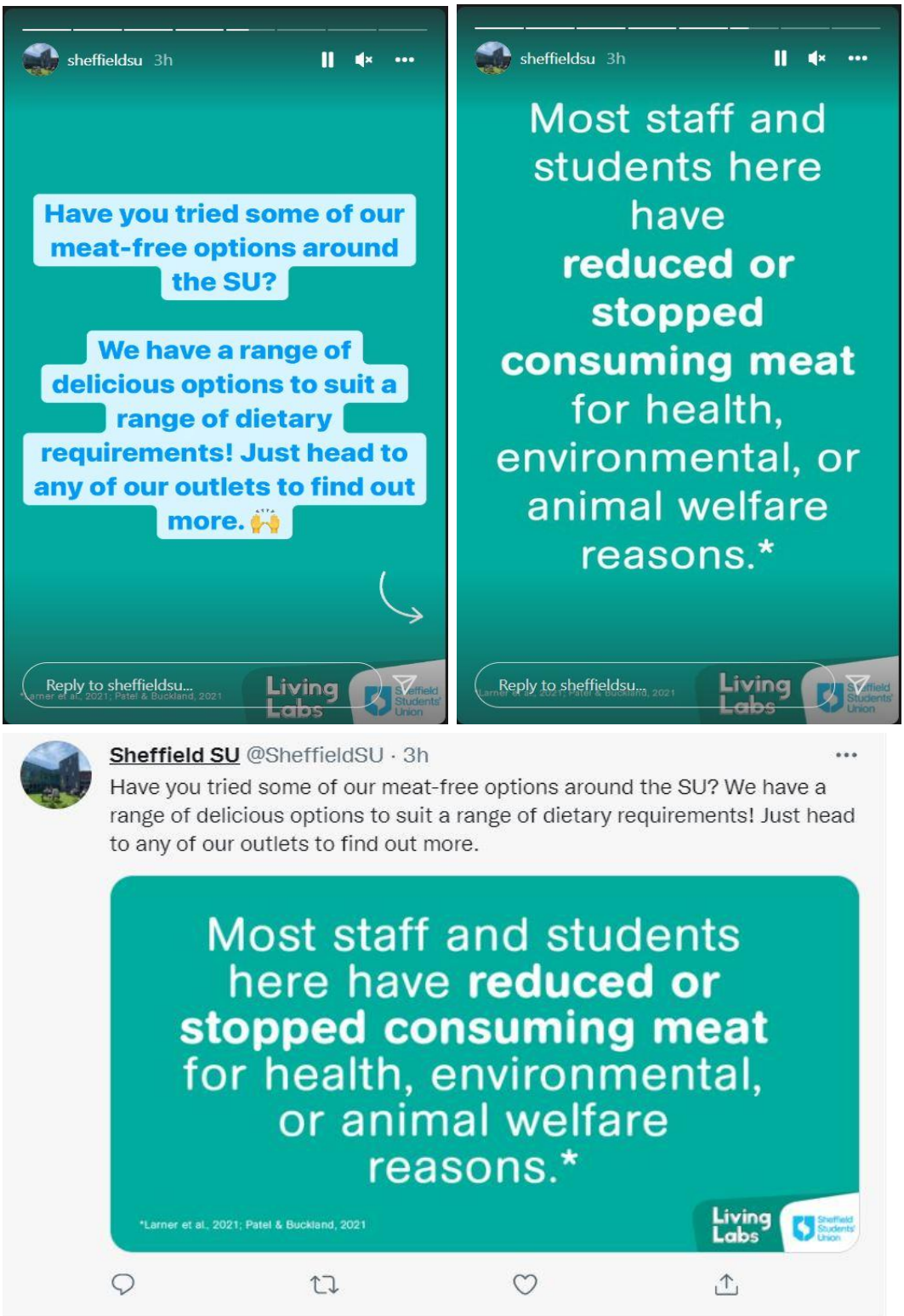


Figure 7.2. The social norms message posted on social media channels, Instagram (top) and Twitter (bottom).

7.2.3 Measures

Primary measure: Daily purchase data was collected from the three outlets for the duration of the trial. The data was recorded by outlets as standard practice, and included itemised quantities sold from all customers who purchased any item during the specified time period. Purchase data were collected from the university operations managers at the end of the three-week period.

Secondary measure: The survey assessed customers' demographics, purchase experience, and dietary habits (see Table 7.3). Demographic items included age, gender, ethnicity, nationality, and staff/student status. This was followed by a question that queried which of the three participating outlets the participant had visited over the past two weeks, with multiple options selectable. Depending on the answers given, participants were then presented with a series of questions pertaining to the outlet(s) selected in the previous question. These questions assessed how often the outlet(s) were visited, and what was purchased at outlet(s) over the past two weeks. Participants were then asked about their dietary habits, including whether or not they were reducing their meat consumption. Finally, all participants were asked whether they recalled seeing the social norms signage over the past two weeks. Those that did recall were then asked in what location and format (i.e. in which of the outlets or social media platforms was the sign viewed), with multiple valid selectable options. The survey concluded with a debrief and the opportunity to enter the prize draw.

7.2.4 Data Analysis

All data analyses were conducted using SPSS version 28 (IBM Corp, 2021). The data was first cleaned by removing items not intended for analysis. These items included drinks, packaged snacks (e.g. crisps, chocolate), sides (e.g. fries, sauces), and sweet treats (e.g. cakes, slices). As such, the food items for analysis were largely savoury meals. Based on their ingredients and composition, food items at each outlet were coded as either *meat* (0) or *meatless* (1). Due to the format of the data obtained from the food outlets, the decision was made to diverge from the pre-registration and use Pearson's chi-squared tests to explore purchase differences per site. For each food outlet, the number of meat and meatless items sold were compared, (a) between pre-intervention and intervention phases, (b) between intervention and post-intervention phases, and (c) between pre-intervention and post-intervention phases. For all tests, the significance level was corrected to $p < 0.017$, and measures of effect were estimated using odds ratios. Survey data was used to assess general customer demographics across the three study phases.

7.3 Results

7.3.1 Differences in Meat and Meatless Purchases Between Trial Phases

In total across the three time phases, 1,121 sales were recorded in site A, 463 sales were recorded in site B, and 950 sales were recorded in site C. However, the total sales varied between the three time phases; across all three sites, sales were lowest during the intervention week.

Per site, Pearson's chi squared tests revealed that the social norms intervention was not associated with a difference in meat or meatless items purchased, compared to the pre-intervention phase; site A: χ^2 (1) = 2.93, p = 0.09, OR = 1.29, 95% CI [0.96, 1.72]; site B: χ^2 (1) = 0.02, p = 0.9, OR = 1.02, 95% CI [0.76, 1.36]; site C: χ^2 (1) = 1.56, p = 0.21, OR = 1.25, 95% CI [0.88, 1.77], or post-intervention phase; site A: χ^2 (1) = 3.26, p = 0.07, OR = 0.75, 95% CI [0.55, 1.03]; site B: χ^2 (1) = 0.13, p = 0.72, OR = 1.05, 95% CI [0.82, 1.34]; site C: χ^2 (1) = 0.22, p = 0.64, OR = 1.09, 95% CI [0.77, 1.54]. Finally, no significant differences were identified between pre-intervention and post-intervention phases; site A: χ^2 (1) = 0.01, p = 0.94, OR = 0.99, 95% CI [0.75, 1.31]; site B: χ^2 (1) = 0.28, p = 0.59, OR = 1.07, 95% CI [0.84, 1.34]; site C: χ^2 (1) = 3.58, p = 0.6, OR = 1.36, 95% CI [0.98, 1.86]. The proportion of meatless items sold for each of the food outlets across the time phases are shown in Figure 7.3.

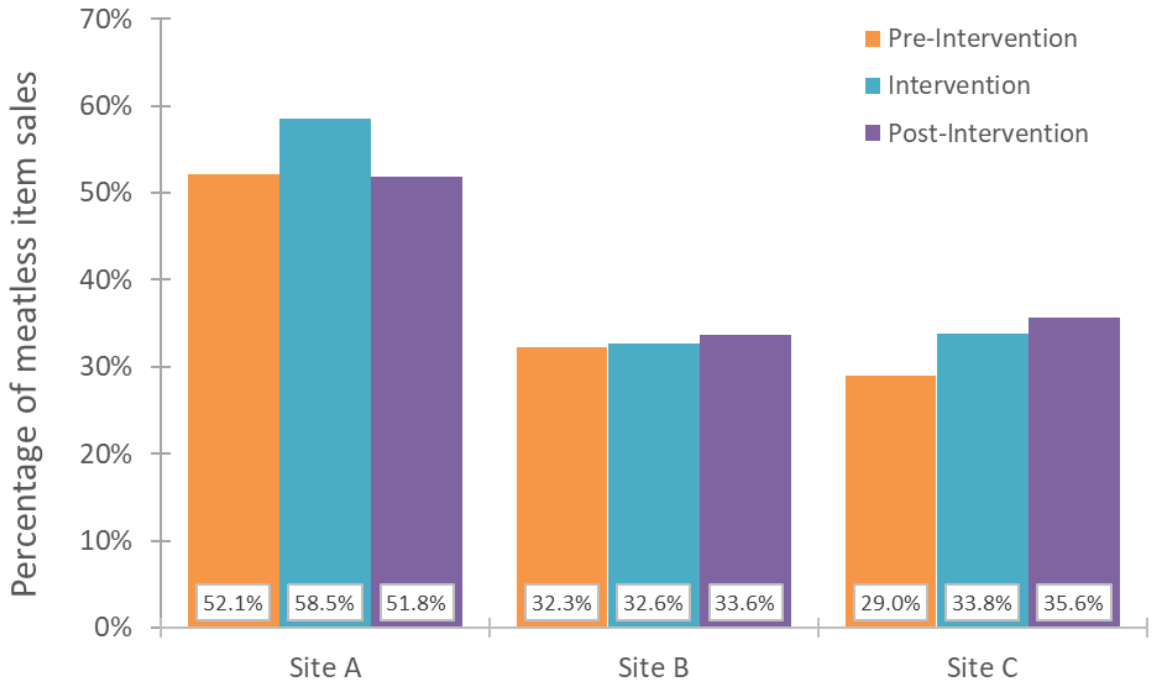


Figure 7.3. Percentage of meatless items sold in each of the three research sites (A: café; B: burger bar; C: express shop) across trial phases.

7.3.2 Customer Characteristics Survey

In total, 13 customers completed the customer characteristics survey, representing a low response rate and sample size. Participant characteristics and responses are shown in Table 7.3. Notably, 6 of the 13 participants reported that they had noticed the social norms signage during the intervention phase. Additionally, approximately half of all participants were meat consumers, with the majority (71.4%) of these participants actively reducing their meat consumption.

Table 7.3. Customer characteristics from survey participants (n = 13).

Age in years, mean (SD)	23.5 (5.1)
Sex, n (%)	
Female	5 (38.5)
Male	7 (53.8)
Prefer not to say	3 (23.1)
Nationality, n (%) British	8 (61.5)
Ethnicity, n (%)	
White	10 (76.9)
Asian or Asian British	2 (15.4)
Other	1 (7.7)
Staff/Student Status, n (%)	
Undergraduate student	4 (30.8)
Postgraduate student	7 (53.9)
University staff	2 (15.4)
Diet, n (%)	
Meat consumer	7 (53.9)
Pescetarian	2 (15.4)
Vegetarian	3 (23.1)
Vegan	1 (7.7)
Reducing Meat Consumption, n (% of meat consumers)	5 (71.4)
Duration:	
6 months or less	2
Over 1 year, up to 3 years	1
Over 3 years	2
Poster Noticed, n (%) Yes	6 (46.2)
Location:	
Site A	2
Site B	2
Site C	1
Social media channels	0

7.4 Discussion

Utilising the norms data obtained in study three (Chapter Five), building upon the methodology of study four (Chapter Six), and incorporating the potential influence of social media (study one; Chapter Four), this study investigated the effect of a complex social norms intervention on meat-based purchases in three food outlets at a UK university.

Norms messages displayed in the outlets and via the Sheffield Student's Union (SSU)'s social media channels did not significantly shift food purchasing behaviour in any of the three participating food outlets. Despite the relatively seamless real-world integration achieved through ongoing consideration of, and collaboration with commercial stakeholders, the results of this intervention

were nonetheless statistically non-significant. With study four (Chapter Six), these results add to a growing body of previous research that demonstrates the mixed effectiveness of social norms interventions in naturalistic food choice settings. For example, naturalistic social norms interventions have been successful in altering food choice in several studies (Payne et al., 2015; Sparkman et al., 2020; Thomas et al., 2017), but unsuccessful in others (Çoker & van der Linden, 2020; Richter et al., 2018) (see Chapter Two, sections 2.3.3 and 2.4.3 for further detail about these, and other studies). Notably, all of these studies differed in their designs. Some were conducted in university food outlets (e.g. Mollen et al., 2013), others in workplaces (e.g. Thomas et al., 2017), others in high end restaurants (e.g. Sparkman et al., 2020), and others still in supermarkets (e.g. Payne et al., 2015). The mode of normative message delivery also differed. Messages have been displayed on individual tables (Thomas et al., 2017), on individual food menus (Sparkman et al., 2020), or on supermarket trolleys (Payne et al., 2015). Finally, all of these studies used descriptive norms in their messaging, some of which were dynamic (i.e. communicated a changing norm). Considering their various designs and outcomes, it sems that there were no common factors among these studies that were associated with either intervention effectiveness, or ineffectiveness.

In part, the negative results obtained in the current study may be explained in the same way as those obtained in study four (Chapter Six). First, it is possible that the use of a proscriptive norm (i.e. wording that discourages, rather than promotes or encourages), is ineffectual in the context of food choice behaviour. This may be the case considering that the naturalistic interventions discussed previously used prescriptive norms; they encouraged or promoted desirable choices. Second, despite efforts to increase social norms message visibility compared to study four (i.e. by using different formats and modes of message delivery, both physical and via social media), it is possible that customers in the current study may have been distracted by more proximal cues. As Sparkman et al. (2020) noted, customers in food choice settings tend to focus on their primary goal, at that time, to view and select food options. As a result, they are less likely to pay attention to distracting cues. Similar to study four, this may have led to a low awareness of the social norms message and contributed to the non-significant results. Overall, whilst this study demonstrates the feasibility of this type of intervention, there was no evidence that the intervention led to any change in purchasing behaviour. More research is required, possibly using other intervention types, to fully explore the potential of naturalistic interventions in reducing meat item purchases.

7.4.1 Strengths and Limitations

There were several strengths to the current study that are worth noting. First, like study four, study five is a situated intervention that has been previously identified by Yamin et al. (2019) to be in the minority, yet are likely to be more influential on food choice decisions since they are employed within the same context. This is especially true given that the design of this study benefited from formative research conducted among the customer base (study three, Chapter Five). This research provided information about the 'referent groups' – staff and students at the University of Sheffield, which was used to develop the norms message. This adds credibility to the message, reducing the likelihood that it will be doubted. It may also facilitate a stronger social connection, compared to the more general message used in Aotearoa New Zealand (study four).

Second, Yamin et al. (2019) outlines recommendations for the optimal design of applied interventions, which were partially fulfilled by study four and more completely fulfilled in study five (see Table 7.2). For example, several research sites were used in the current study. Though these outlets were all located in the SSU and thus shared a customer base, they differed in their offerings and food environment, presenting a wider range of contexts in which this intervention type was tested. Each of the research sites offered a larger number and range of meatless items compared to the site used in study four, notable given the importance of available alternatives to support behaviour change efforts. Finally, the use of social media as a mode of norms message delivery increased its potential reach and visibility (Bruns & Burgess, 2012), as well as its potential influence on norm perceptions and offline behaviours (Quan-Haase & Sloan, 2017; see Chapter Two, section 2.2.2.1). It also added to the realism of the intervention by utilising communications channels that would be typically used by the outlets in everyday life, outside of an intervention context.

Third, the current study was designed and implemented in close consultation with the University of Sheffield's marketing, operations, and catering staff, who had previously demonstrated an appetite for feasible, low-cost food choice interventions (Graham et al., 2020). According to this research, the most acceptable and feasible behaviour change interventions among these same stakeholders were those that were perceived to be least invasive, not financially risky, and relatively easy to implement. Social norms interventions satisfy all of these criteria, and are able to capitalise on existing infrastructure and communications channels (e.g. marketing materials, menus, social media) to further minimise costs to the business. Despite some organisational challenges and the non-significant results, the current study demonstrates the possibility of fruitful, collaborative relationships with stakeholders to promote healthy and sustainable diets.

However like study four, there were constraints and limitations to the current study that should be acknowledged. The intervention week was affected by severe ongoing thunderstorms, as well as university staff strikes. Both of these factors heavily decreased the amount of foot traffic in the Sheffield Student's Union during that week, resulting in fewer overall sales across all research sites. Such factors are impossible to predict and plan for, reflecting the nature of applied research. Regardless, had these events not occurred, the results of the intervention may have been different. Another limitation was the low numbers of customers completing the customer characteristics survey. In an attempt to improve upon the design of study four and to minimise risk to the researcher due to COVID-19, recruitment in study five was via signage displaying QR codes, that linked to an online version of the survey accessible through mobile devices. Unfortunately this method resulted in fewer participant numbers, perhaps in part attributed to reduced general foot traffic in the SSU during those weeks.

To conclude, this complex social norms intervention did not influence meat item purchases. These results add to previous research that demonstrates the mixed effectiveness of such interventions, particularly in the context of meat consumption. More research, which addresses the various limitations of this study, is required to assess the effectiveness of social norms interventions at reducing meat item purchases in naturalistic contexts. Further discussion about the implications of this study will be discussed in Chapter Eight.

7.5 Key Findings

- A naturalistic complex social norms intervention to reduce meat consumption at three food outlets at the University of Sheffield Student's Union found no significant differences in meatless purchases.

- A survey conducted with customers revealed that approximately half were meat consumers, with 5 of 7 meat consumers reducing their meat intake. However, the survey's small sample size limits the generalisability of these results.

- Approximately one quarter of customers surveyed recalled noticing the social norms message.

- Naturalistic social norms interventions may be ineffective at reducing meat purchasing behaviours in these contexts, however more research is required to fully evaluate the approach.

8 General Discussion

8.1 Thesis Aims

There were two primary aims of this thesis. The first was to explore how low or no meat (LNM) diets, and individuals who follow them, are perceived by others. Specifically, studies one, two, and three (Chapters Four and Five) sought to examine perceptions as they relate to various conceptions of "normal". Theoretically, "normal" is conceptualised as "commonness" and "idealness" (Cialdini et al., 1990's descriptive and injunctive norms respectively; see Chapter Two section 2.1.2) as well as related notions (e.g. "aspirational", "every day"). Perceived norms often predict behaviour, in that individuals are frequently highly motivated to conform to what is perceived to be "normal" behaviour (Cialdini et al., 1990). Meat consumption is a social norm in many western countries, and alternative diets (e.g. vegetarianism, veganism) have been historically perceived and framed negatively (e.g. Cole & Morgan, 2011). However, LNM diets, including vegetarianism, veganism, pescetarianism, flexitarianism, and meat reduction, appear to be growing in popularity and presence (see Chapter One), and perceptions may be shifting in turn. As such, studies one, two, and three sought to examine perceptions of LNM diets and their adherents through the lens of perceived norms. These studies used mixed methods in previously unexplored contexts to assess perceived LNM norms, making a novel contribution to contemporary understanding of this topic.

The second main aim of this thesis was to assess whether social norms messages about meat reduction may alter food choice behaviour, specifically in the direction of meatless choices. To investigate this question, social norms interventions were used in university food outlets in Aotearoa New Zealand (Chapter Six) and the UK (Chapter Seven). Previous social norms interventions have been effective at shifting both environmental and health-related behaviours in desirable directions. With regard to naturalistic field behaviour change interventions related to reducing meat consumption, results have been both mixed and limited. Building upon the perceived normality of LNM diets indicated across studies one, two, and three, social norms messages were displayed within food outlets during an intervention period. Purchase data were analysed to assess any differences in meat or meatless purchases as a result of the intervention, compared to pre- and post-intervention phases. To the author's knowledge, there have only been two published studies (i.e. Çoker et al., 2022; Sparkman et al., 2020) that have applied social norms interventions to reduce meat intake in naturalistic contexts. As such, studies four and five of this thesis considerably extend empirical understanding of this area.

8.2 Summary of Thesis Findings

A summary of the main thesis findings are outlined in Table 8.1. These points will be unpacked in the subsections to follow.

Table 8.1. Summary of thesis study findings and links to subsequent studies.

Study	Methods	Summary of Findings	Implications and Links to Subsequent Studies
1	• Twitter data scraping • Quantitative & thematic analysis	• Analyses of tweets about LNM diets revealed a strong prevalence of positive content, indicative of descriptive and injunctive norms among Twitter users talking about these topics.	• The positive and prevalent LNM content on Twitter reflected the growing popularity of LNM diets. • There was a need to assess perceptions towards those practicing LNM diets, since perceptions of referent groups are an important moderator of social norms interventions and wider behavioural uptake.
2	• Free Association Task • Online experiment	• Meat reducers and vegetarians were perceived as positive and aspirational ingroup members, significantly more so than were habitual meat consumers, among a representative UK sample.	• Free association tasks capture more implicit perceptions, and an assessment of explicit perceptions was required for a more complete assessment. • An assessment of perceptions was required among staff and student groups at the University of Sheffield, the planned site of the social norms intervention in study five.
3	• Vignettes • Online experiment	• Hypothetical peer meat reducers and vegetarians were perceived as positive and aspirational ingroup members, significantly more so than hypothetical peer habitual meat consumers, among UK university staff and students. • Approximately 19% of university staff and students reported being vegetarian or vegan, and over half of those identifying as meat consumers were actively reducing their intake.	• Positive perceptions of meat reducers and vegetarians increased the likely effectiveness of the social norms intervention in study five. • The prevalence of meat abstainers and reducers informed the development of the norms message in study five.

4	• Naturalistic social norms intervention • Post-trial survey	• The intervention conducted at a university food outlet in Aotearoa New Zealand did not significantly influence meat or meatless purchases.	• A number of constraints may have contributed to the non-significant results (e.g. message visibility and credibility, availability of meatless options). These design considerations were addressed in study five.
5	• Naturalistic, complex social norms intervention • Post-trial survey	• The intervention conducted in three food outlets at a UK university did not significantly influence meat or meatless purchases. • Despite different avenues of social norms message delivery (e.g. the use of social media to post norms messages), there was low awareness reported by customers during the intervention phase.	• Like study four, no significant changes in purchasing behaviour resulted from the intervention. It is possible that social norms interventions are ineffective when applied to meat reduction behaviour, however more research is required.

8.2.1 The Perceived Normality of LNM Diets and Adherents

Perceptions held towards LNM diets and their adherents were explored through three empirical studies reported in Chapters Four and Five. Study one (Chapter Four) aimed to assess the perceived normality of low or no meat diets on Twitter. Twitter content related to LNM diets was collected during one week in March 2015 and March 2020, and explored using mixed methods quantitative and qualitative analyses. Tweets were categorised according to sentiment (pro-, neutral, and anti-LNM), and the prevalence of, and engagement with these tweets was compared between categories. For this purpose, prevalence was considered an analogue of descriptive norms, and engagement ("likes" and "retweets") was considered an analogue of injunctive norms. Additionally, a thematic analysis (see Chapter Three, section 3.4) of tweets was conducted to explore the types of narratives associated with LNM diets in Twitter content. The results suggested that low or no meat diets are largely represented as favourable and positive on Twitter. The overwhelming prevalence of, and engagement with positive content, compared to neutral or negative content, suggests that these diets are being framed as "normal" in the Twitter datasets collected for this study. Furthermore, positive LNM content from 2020 was more prevalent and engaged with than that from 2015, suggestive of a shifting norm.

While study one explored perceptions of LNM diets, studies two and three explored perceptions towards a specific social group, meat reducers, with vegetarians and habitual meat consumers also investigated to provide points of comparison. Whilst explicit data about perceived descriptive norms were gathered in both studies, the focus was primarily on an interpretation of injunctive norms, or the nature of traits associated with these dietary groups.

Study two used a free association task to elicit and gather spontaneous constructs associated with meat reducers, vegetarians, and habitual meat consumers among a representative UK sample. Associations were used to approximate social representations, or conceptual maps of ideas, opinions, and attitudes held by social groups towards social objects (see Chapter Three, section 3.5.1). Social representations of meat reducers, vegetarians, and habitual meat consumers were then compared. For a more nuanced assessment, vignettes were used in study three to explore explicit perceptions of personality traits, as well as perceived group membership of meat reducers, vegetarians, and habitual meat consumers among university staff and students. Perceived group membership was assessed among these targeted samples since they comprise defined and identifiable social groups, an important factor when exploring group dynamics. Findings from studies two and three suggest that individuals, both from university groups and within a representative UK sample, generally hold positive perceptions of meat reducers. These perceptions tended to be significantly more positive than those of habitual meat consumers, indicative of injunctive norms. Additionally, there was no overall significant difference in perceived group membership between meat reducers, vegetarians, and habitual meat consumers, suggesting that social desirability or willingness to interact is not influenced by diet, meat-eating status, or the perceptions associated with them. However, meat reducers and vegetarians were attributed more respect than habitual meat consumers. Finally, studies two and three collected data related to perceived descriptive meat-eating norms, as well as dietary data from participants. Across both studies, the perceived prevalence of vegetarianism, veganism, and most forms of meat reduction significantly exceeded actual prevalence, among the UK, university staff, and student populations sampled.

Synthesising these findings, positive perceptions may be seen as the "idealness" (or, injunctive norms), and the prevalence or "commonness" of pro-LNM Twitter content may be considered descriptive norms. Additionally, the more explicit assessment of perceived descriptive norms in studies two and three revealed a high perceived prevalence of LNM diets. Taken together, it may be inferred that meat reduction as a practice, as well as meat reducers as a social group, are increasingly perceived as normal.

8.2.2 Investigating the Effect of Social Norms Messages on Meat and Meatless Purchases in Food Outlets

The perceived normality of LNM diets identified in studies one, two, and three informed the social norms interventions of studies four and five. Due to unplanned circumstances caused by COVID-19, a social norms intervention was conducted at the University of Otago in Aotearoa New Zealand (study four; Chapter Six). A collaborative relationship was established with the operations team at the university, and an intervention was designed and conducted at a campus food outlet for three weeks. This three-week period consisted of pre-intervention, intervention, and post-intervention phases, each with a one-week duration. During the intervention week, a social norms message was displayed above a food cabinet. During the pre- and post-intervention weeks, no social norms message was displayed. Food purchase data was analysed to compare meat and meatless purchases between the pre-intervention, intervention, and post-intervention phases, however no significant differences in purchases were identified. Furthermore, surveys conducted with patrons during the three-week period revealed that only a small number of customers noticed the social norms message during the intervention week.

While studies four and five shared similar methodologies, study five (Chapter Seven) addressed some of the methodological limitations derived from the circumstantial nature of study four. Study five was conducted at the University of Sheffield in the UK, with a three-week pre-post design similar to that of study four. However, the relationship with the Sheffield Student Union (SSU) was more well-established than that with the University of Otago, resulting in several changes. First, study five was conducted across three food outlets that differed widely in type and offerings available. Second, the norms message was informed by data from previous research in the same setting (i.e. from study three; Chapter Five), likely adding to its perceived credibility. Third, the message was designed in close consultation with the SSU's marketing team to ensure that it was congruent with their usual marketing design. Finally, the norms message was displayed not only in the three food outlets, but also on the SSU's social media channels. As such, compared to study four, study five comprised a more complex intervention (see Chapter Three, section 3.6.1) that explored the effect of the social norms message, rather than the specific format of its delivery. Despite this, no statistically significant differences were identified in purchases in any of the food outlets as a result of the intervention, and awareness of the social norms message during the intervention week was again low.

Synthesising these findings, it appears that naturalistic social norms interventions to discourage meat-based choices may not yield statistically significant changes in meat purchasing behaviour. However, it is also important to note that there were significant constraints on these studies related

to the limited scale, work capacity, and scope of expertise in the context of a PhD (see section 8.4 for further discussion). Nonetheless, implications of these studies on meat reduction behaviour change efforts will be discussed in the sections to follow.

8.3 Implications of Findings

8.3.1 Norm Perception and Social Influence

Together, the results of the studies reported in Chapters Four and Five suggest that LNM diets, as well as people who follow them, are perceived as positive and aspirational in the contexts studied. Furthermore, positive tweets about LNM diets were vastly more common than neutral or negative tweets, and the prevalence of vegetarians, vegans, and most forms of meat reduction were perceived to be more common than actual self-reported dietary behaviour, among the UK, university staff, and student populations sampled. These findings have important implications related to norm perception, social influence, and behaviour change.

Meat eating is a social norm in many countries of the Global North, and this "normalness" is one of the four main factors used to rationalise or justify the practice (Joy, 2010; Piazza et al., 2015). Furthermore, humans are often highly motivated to follow social norms, in order to ease decision-making, facilitate social ingratiation, and avoid social contempt (see Chapter Two, section 2.1.2). LNM diets are growing in presence, and so the perceived normalness of meat consumption – and consequently, the perceived normalness of alternative LNM diets – may be shifting. Under norm theory, norms are acquired through the retrieval of similar experiences upon observing an event or phenomenon (Kahneman & Miller, 1986; discussed in detail in Chapter Two section 2.2.2). Thus, the more a phenomenon is encountered, the more it becomes available for retrieval upon observing subsequent events, and the more "normal" it appears to be. Similarly, social norm theory posits that "normal" is a function of the commonness and idealness of phenomena, defined as descriptive and injunctive norms respectively (Cialdini et al., 1990). Empirical research into perceptions of "normal" confirms these theories. Bear and Knobe (2017) found that, in many instances, "normal" is determined by what is believed to be average and what is believed to be ideal, and Wysocki (2020) demonstrates that "normal" opinions often fall between what was perceived to be common and what is positively evaluated. Together, these studies reveal that, 1) what we perceive to be a normal behaviour or practice draws upon our perceptions of the "commonness" and "idealness" of that behaviour or practice among those around us, and 2) the extent to which we perceive something as normal often falls in between ideas of what is common and what is ideal.

The findings of studies one, two, and three together suggest that LNM diets and their adherents are perceived positively and as aspirational. There were also findings suggestive of their increasing commonness or prevalence. Applying norm theory and social norm theory to these studies, it seems plausible to infer that normalisation of LNM diets is occurring; that is, the diets and their adherents are increasingly understood and perceived as "normal" in the contexts studied (see Chapter Two, section 2.2.1 for further detail about normalisation). The contexts explored in these studies, social media and university groups, may add to this effect. The ubiquity of social media make them a pervasive aspect of many people's social experience (DataReportal, 2022), and thus a likely source

for norm evaluation. As a result, if an individual is exposed to a high prevalence of favourable posts about LNM diets as observed in this study, the more they become available for retrieval upon observing similar posts, and thus the more "normal" LNM diets may appear to be. Similarly, the use of specific university groups allows perceptions to be assessed as a function of social identity and ingroup-outgroup dynamics. Ingroups are social groups with which an individual identifies, and outgroups are social groups with which an individual does not identify (Tajfel & Turner, 1986). Identification as part of a specific ingroup affects attitudes and behaviours; perceived ingroup members are considered more reliable sources of information about the appropriateness of behaviours compared to perceived outgroup members (Higgs, 2015). Empirical evidence suggests that belonging to the same social group appears important in the modelling of eating behaviour. In a laboratory study, Cruwys et al. (2012) found that participants modelled their eating behaviour after an actor who was presented as an ingroup member (university group), and did not when the actor was presented as an outgroup member. With regard to study three (which assessed perceptions towards meat reducers among a university sample), this may result in perceived university group norms to be more salient and influential than more general norms. However, more research is required to determine the extent of group membership, i.e. the extent to which university staff and students identify as such, in order to confirm this effect.

Across the studies discussed in Chapters Four and Five, LNM diets and their adherents were associated with values such as compassion, kindness, empathy, ethical awareness, and the rejection of violence. These kinds of associations invoke certain moral properties, and thus suggest that perceptions may be changing as a result of moralisation. Moralisation describes the process whereby morally-neutral behaviours acquire moral properties (Rozin, 1999; see Chapter Two section 2.2.1). This can reduce the popularity and prevalence of what may have once been a common or widespread behaviour, which may eventually result in the proliferation of negative attitudes or evaluations of that behaviour (as was the case with smoking behaviour in the USA; Rozin & Singh, 1999). Vegetarianism, and other forms of meat abstinence, have always been inextricably tied to morals and values, given the ethically charged nature of meat production. However, in their assessment of moralisation as it relates to meat eating, Rozin et al. (1997) concluded the small minority of "moral vegetarians" at that time represented a very early stage of moralisation. The proportion of vegetarians and other LNM adherents has undoubtedly grown in the intervening years (e.g. Dagevos, 2021), and many of these individuals follow LNM diets for moral or ethical reasons (Rosenfeld, 2018). It may be that the shift in perceptions towards LNM diets, as observed in the reported studies thus far, results from the progression of widespread meat-eating moralisation. If this is true, we may begin to see the consequences of widespread moralisation in favour of LNM diets, which may include policy and industry action, a shift in the social standing of meat-eating and non meat-eating groups, and the durability and transmission of the alternative behaviour over time (Rozin, 1999).

8.3.2 Reducing Meat Eating Behaviour

It is possible that the perceived normalness of LNM diets, through the majority pro-LNM tweets observed in study one (Chapter Four), may assist in behaviour change. The influence of social norms on behaviour has been incorporated into several behaviour change models (see Cotterill et al., 2019;

Chapter Two, section 2.3.1), including the COM-B model (Michie et al., 2014). According to the COM-B model, behaviour is a product of perceived capability, opportunity, and motivation (see Chapter Two, section 2.3.1). Individuals will perform a behaviour when they have sufficient capability, opportunity, and motivation to do so. All three of these factors are encompassed in the Twitter content observed in study one. For example, content which shares knowledge of meatless food preparation addresses capability, content which prompts the uptake of LNM diets provides *opportunity,* and content about the various harms of meat consumption provide *motivation.* As such, Twitter users who talk about LNM diets may help to facilitate dietary transitions by affecting perceived norms and providing access to resources to initiate or sustain the behaviour change.

The perceived normality of LNM adherents, as observed in studies two and three (Chapter Five), may also be understood through the lens of the COM-B model (Michie et al., 2014). The COM-B model identifies *Opportunity* as a factor that enables behaviour change, which describes the external factors that make the execution of a particular behaviour possible. Social factors are included as part of this, such as cultural or family support, whether the behaviour is seen as normal in an individual's social environment, and whether people in that environment are also practicing the behaviour (Public Health England, 2020). Studies two and three explore perceptions towards people who follow LNM diets, and across both studies these perceptions were found to be largely positive and "normal". Since perceived norms related to meat consumption can predict behaviour (Sharps et al., 2021), normative perceptions of LNM diets may lead to behavioural dietary change by fulfilling the *Opportunity* aspect of the COM-B model.

Finally, studies two and three (Chapter Five) have specific implications for social norms behaviour change interventions to reduce meat item purchases in food retail outlets. Social norms interventions are a behavioural strategy that exposes participants to messages about a behavioural norm, and any effects on participants' own behaviours or choices are subsequently measured (see Chapter Two, section 2.3 & Chapter Three, section 3.6 for a fuller explanation of behaviour change strategies and social norms interventions). Empirical evidence suggests that social norms interventions are more effective when the referent group is perceived as positive, aspirational, as part of an ingroup, or otherwise similar to the target participants (Berger & Rand, 2008; Cruwys et al., 2012). Studies two and three (Chapter Five) revealed that meat reducers, and to a lesser extent vegetarians, are perceived favourably, and study three confirmed this effect among university staff and students. This adds to an emerging body of literature (e.g. Judge & Wilson, 2018) that highlights a fundamental change in the historical perception of these dietary groups, which once tended towards negative (e.g. Minson & Monin, 2012). More importantly, the positive perceptions attributed to meat reducers and vegetarians suggest that they would be useful and effective referent groups in social norms interventions aiming to reduce meat eating behaviour.

Despite this, the social norms interventions (studies four and five) resulted in statistically non-significant changes in meat and meatless purchases. There are a number of possible reasons for these findings. For example, as noted in Chapters Six and Seven, it is possible that social norms interventions in this domain may be less effective when discouraging food behaviours (i.e. using proscriptive norms). If this is true, social norms messages that *encourage* complementary food behaviours (i.e. that use prescriptive norms; see Chapter Two, section 2.1.1) may be more effective. This has been demonstrated in several studies that have used an encouraging, rather than

discouraging norms message (e.g. Payne et al., 2015; Thomas et al., 2017), and suggest the substantial effect that messaging can have on behavioural outcomes. It is also possible that descriptive norms that do not include a dynamic element (i.e. that do not explicitly allude to changing norms) may be ineffective, given that the only previous social norms interventions that have been effective at reducing meat intake (Sparkman et al., 2020) used dynamic messaging. As such, norms messages that explicitly encourage the uptake of meatless meals and highlight the dynamic nature of meat-related dietary change, may yield effective results.

The non-significant results may also be a product of the various limitations of each study (see sections 6.4 and 7.4; Chapters Six and Seven), and suggest that design changes may increase the extent of change in purchasing behaviours to reach statistical significance. However, even when following guidelines (e.g. Yamin et al., 2019) designed to maximise the effectiveness of social norms interventions, previous evidence suggest that other intervention types may be more effective in naturalistic contexts, that not only result in significant changes to consumer behaviour, but are also balanced against the needs and priorities of stakeholders. The APEASE evaluation criteria was developed for this purpose (Michie et al., 2014; see Chapter Three, section 3.6.1), and meeting these criteria increases an intervention's scalability. Possible interventions that may work for these purposes are discussed in section 8.5.

Setting aside social norms interventions and considering social norms more broadly, it is likely that the perceived normality of LNM diets, as indicated in the studies comprising this PhD, is likely to complement other interventions aiming to reduce meat consumption. Indeed, evidence suggests that, a) people are generally more willing to change their behaviours if they knew, or could count on others to do the same, and b) social norms guide behaviour even in the absence of relevant knowledge or motivation (Sparkman et al., 2021). These effects all build upon the intrinsic, influential power of norms (Cialdini et al., 1990, p. 1; see Chapter Two, section 2.1). The perceived normality of LNM diets, as indicated by the findings in this thesis, will act to reduce the social sanction that commonly occurs when practicing behaviours counter to long-prevailing norms (see Chapter Two, section 2.1.2). This may be especially true with regard to meat-eating behaviour, which seems to be heavily influenced by perceived norms and other social factors (Cheah et al., 2020; Lea & Worsley, 2003; Sharps et al., 2021; Wyker & Davison, 2010). For similar reasons, the perceived normality of LNM diets makes it likely that policy and industry efforts to reduce meat consumption will be increasingly accepted (De Groot & Schuitema, 2012; Sparkman et al., 2021), and fulfils social factors in several models for behaviour change (i.e. the *subjective norms* factor of the TPB, and the *opportunity* aspect of the COM-B; see Chapter Two, section 2.3.1). The upward trend in popularity and practice of LNM diets means that these effects will likely only increase with time. Perhaps then, in addition to social norms interventions, the normality of LNMs could underpin, or be harnessed as a contextual factor in other types of interventions. Possibilities for future research to this effect will be discussed in section 8.5, following an evaluation of thesis strengths and limitations.

8.4 Thesis Strengths and Limitations

There were several strengths and limitations to the overall research that are worth noting (study-specific strengths and limitations are discussed in their respective empirical chapters). In assessing behaviour, the studies took a pragmatic approach by using settings outside the laboratory (e.g.

naturalistic food choice settings and online environments). As discussed in Chapter Three, section 3.6.1, studies conducted in the laboratory are highly controlled, allowing the target outcome to be assessed in isolation of other, potentially confounding factors (e.g. subjective appetite, choice availability). However, "real world" eating and food choice behaviours are inherently complex – decisions do not occur in isolation and are often influenced by these other factors. The use of contexts outside the laboratory in this PhD therefore allowed for a more realistically grounded assessment of attitudes and behaviours, that incorporated the many complexities of everyday life. This research also utilised a range of methods, both qualitative and quantitative. For example, qualitative methods were used in two of the studies assessing perceptions of LNM diets and their adherents, and quantitative methods were used in the social norms interventions. Again, the use of mixed methods provided wider insight into the research questions.

One of the main strengths of this research is that it sought to be interdisciplinary, incorporating elements of psychology, sociology, communications, and media studies. Interdisciplinary research is that which crosses disciplinary boundaries, and provides a number of benefits – to researchers as well as practitioners and policy makers (see Chapter Three, section 3.2 for further discussion). As such, it may be better placed to address the complex global challenges humanity now faces.

In particular, this thesis explored perceptions and effects of LNM normality through psychological and sociological lenses. As previously discussed in Chapter Three, section 3.2, the two disciplines share many similarities. However, the traditional divergence of the two has resulted in different methodological approaches to research; psychologists generally favour experimental designs, high scientific fidelity and internal validity, whilst sociologists tend to be more pragmatic and flexible, to account for the complexities of everyday life and behaviour (Brossard & Sallée, 2019). Generally, interdisciplinary research provides strengths and covers the shortfalls of each discipline separately. It may be argued that psychological approaches to research on behaviour focus less on sociological influences (e.g. those related to power structures, cultural histories, or media influence). Similarly, sociological understandings of everyday behaviour may not adequately consider internal processes of cognition, mood, or life history. As noted in Chapter Three, section 3.2, meat consumption is shaped by a large number of factors encompassing several different disciplines. As such, interdisciplinary explorations of this topic may yield more nuanced insights – as demonstrated, to a degree, by the research in this thesis (see section 8.6 for a reflection on the interdisciplinary nature of this thesis).

Inevitably, however, there will be shortfalls to interdisciplinary research that are not addressed or supported by either discipline. Related to this thesis and topic for example, whilst efforts were made to gather sociodemographic information in the surveys of studies four and five, there were limited ways to explore exactly *how* these characteristics may have driven food choice behaviours. Similarly, the use of Twitter content in study one provided insight into general opinions and themes about LNM diets, but little about the characteristics of those who posted them. There are also critiques of certain methods *between* psychology and sociology. For example, when considering social norms interventions from a sociological perspective, it is possible that the negative results stemmed from the model of communication upon which these interventions are based. Social norms interventions operate on a simplistic model of communication, the hypodermic needle model, which posits that communicative messages are directly received, understood, believed, and processed in the same

way by a homogenous, passive audience (Sullivan, 2009; see Chapter Two, section 2.3.3). This model is now widely recognised to be outdated and oversimplified, since individuals actively and heterogeneously process messages depending on factors such as personal background and pre-existing knowledge. Whilst social norms interventions target the fast decision-making system of the dual process model and thus aim to bypass substantial cognitive processing (Kahneman, 2011), it is nonetheless expected that the social norms message would be read, understood, and elicit a certain type of action (i.e. a change in behaviour). There are many competing cues in eating environments, and social norms messages are just one of many that are exposed to individuals. To align with more contemporary theories of communication and media effects, individuals are independent agents that are capable of making decisions about how to utilise the messages they are exposed to. It is possible that these factors contributed to the non-significant results of studies four and five.

There are also some more general limitations to the research. First, there were limitations related to the representativeness of samples. Whilst efforts were made to recruit representative samples (e.g. by opting for representative sample recruitment on Prolific in study two, and keeping broad the scope of tweets collected in study one), it is possible that samples were not entirely representative. This is especially likely in the customer survey samples of studies four and five, which were small and appeared skewed towards certain demographics. For example, of the 66 customers recruited in study four, 43 were New Zealand European. Indeed, the university settings of studies three, four, and five are likely to be skewed towards demographics that tend towards WEIRD; that is, white, educated, industrialised, rich, and democratic (Henrich et al., 2010). The use of WEIRD samples is a common problem in much of the published behavioural science literature; about 96% of psychological research participants in 2003-2007 were from Western and industrialised countries, and most were university samples (Arnett, 2008). This becomes especially problematic when psychological research resulting from such narrow samples are generalised, deemed to provide insights into *human behaviour* (Henrich et al., 2010). This is an inaccurate inference that is often left unchallenged or unacknowledged. Another limitation related to the social norms interventions of Chapters Six and Seven was that there was no assessment of actual food intake. Whilst purchase data was used to represent choice behaviour, a measure of objective meat intake may have yielded different results.

Finally, it is worth noting that the research conducted for this PhD was carried out by a single researcher, with associated constraints on study size, scale, researcher time and work capacity, and scope of expertise. Therefore, the conclusions drawn from this research should be considered in light of these constraints. For example, the non-significant results of the social norms interventions of Chapters Six and Seven, and speculation about the reasons for these results, should not be considered definitive – indeed, it is possible that the studies may have yielded different results if conducted by a larger team with access to wider expertise, increased funding, and time. Organisational support is also an important factor, whereby organisations with existing relationships with researchers, commitment to the intervention and its goal, and a budget to support the intervention may be more amenable to success.

8.5 Suggestions for Future Research

Consumer choice is inherently complex and driven by a range of factors, many of which are difficult to quantify or empirically assess. The perceived normality of LNM diets, as observed throughout this thesis, could be harnessed to complement strategies, interventions, or campaigns to reduce meat consumption. These should be able to be implemented with minimal operational costs by commercial partners, incorporate components that embed the intervention into usual business practices (e.g. the integration of social media and marketing), and have the ability to easily scale. Meeting these criteria increases the speed of real-world implementation and thus the scale of change, but this is challenging, especially within the context of a PhD.

Considering future research, a scoping review of the literature was conducted to explore the features of an emerging body of literature seeking to implement food choice interventions, excluding social norm interventions, to reduce meat choice behaviour in naturalistic field settings. The methods used to conduct this review was based on the Preferred Reporting Items for Systematic Review and Meta-Analyses extension for Scoping Reviews, with guidance from Tricco et al. (2018).

A literature search was conducted on SCOPUS, Web of Science, and PsycINFO using the Title, Abstract, and Keywords search fields, until May 2023. Search terms encompassed factors that comprise the Population Intervention Comparison Outcome and Study Type (PICOS) model, where *population* was defined as adults (18+) in countries of the Global North (i.e. nations of the world which are characterised by a high level of economic and industrial development, aligned with the focus of this thesis), *phenomenon of interest* was reduction in meat consumption, including red meat, white meat, fish, *outcomes* were defined as meat item choice or purchase behaviour, and *study type* included empirical interventions or experiments. As such, the search terms used for each database were (meat AND reduc*) AND (consum* OR choice* OR prefer*) AND (intervention* OR experiment*). Subject filters were applied to narrow each search and increase relevance, and all searches were limited to English language.

The literature search resulted in 337 unique articles. An additional 16 articles were identified from the researchers' electronic library and through the reference lists of relevant articles, resulting in a total of 353 articles. Titles and abstracts, and then full texts were screened against inclusion and exclusion criteria. Articles were included if they, 1) were conducted in human adults over 18 years of age and in countries of the Global North, 2) empirically explored reductions in meat purchasing and/or choice/selection behaviour by way of interventions or experiments conducted either in field settings or online. Articles were excluded if they, 1) did not include empirical experiments or interventions, or were review papers on this topic, 2) were conducted among populations outside of the inclusion criteria, 3) were focused on behaviours or areas unrelated to meat reduction, including increasing meat consumption, or 4) explored changes in attitudes, beliefs, perceptions, behavioural intention, or similar without reporting on actual meat choice behaviour. Finally, studies were required to be relatively feasible to implement in food choice settings at scale, and so interventions that included unfeasible components (e.g. text message interventions) were excluded. Figure 8.1 shows a PRISMA-SCR flowchart that details the process of study review and exclusion. This process yielded 19 articles for inclusion in the review.

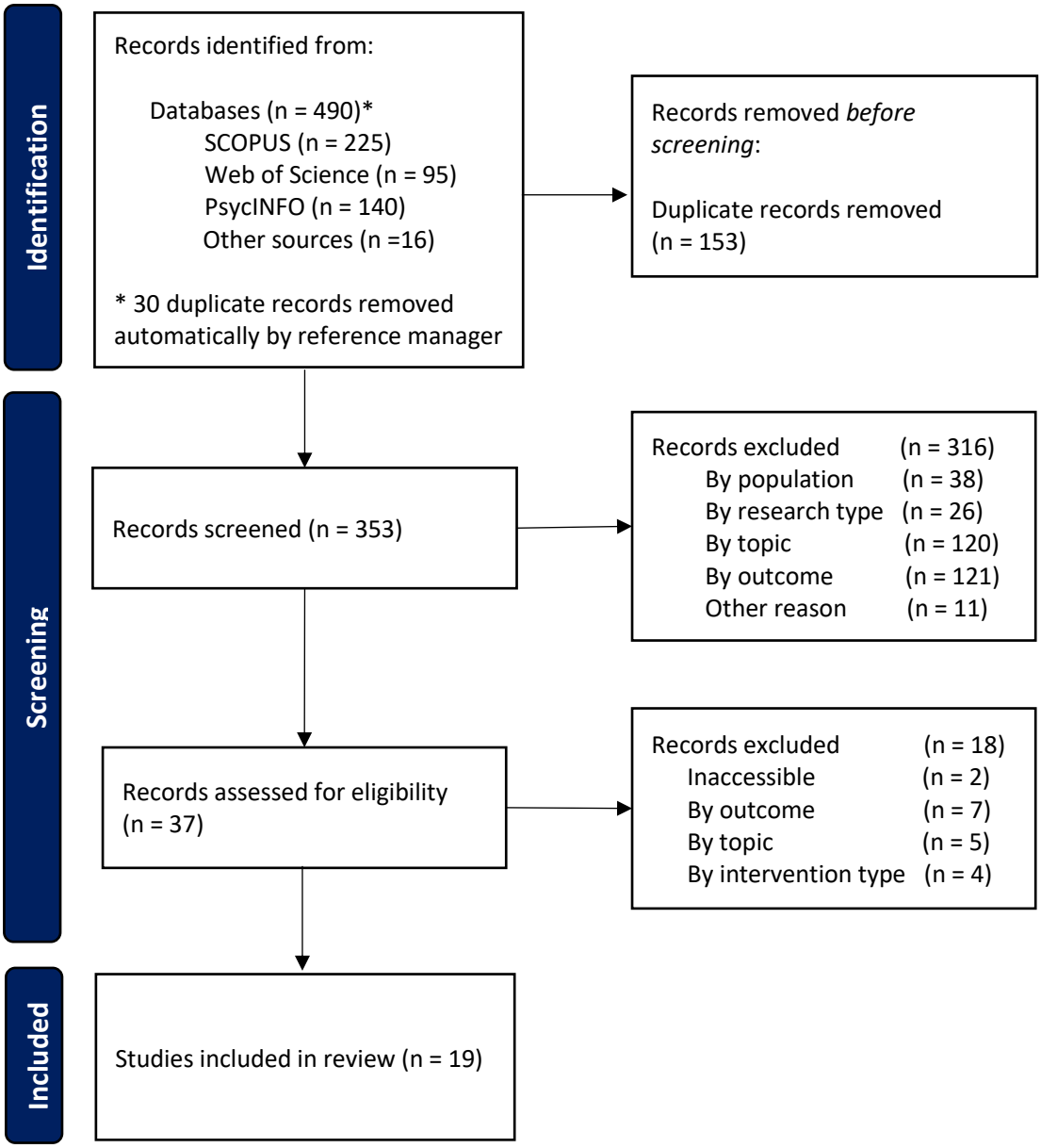


Figure 8.1. PRISMA-ScR flowchart illustrating the process of study selection.

Characteristics of the included studies are summarised in Table 8.2. The majority of articles tested labelling interventions (n=9), while interventions testing the effect of increasing meatless visibility (n=4), availability (n=3), or establishing meatless defaults (n=3), occurred less commonly. A price intervention was tested in one article.

Labelling interventions were the most commonly tested in the area of situational meat reduction. Meatless meals were either labelled to indicate their health or environmental properties, their vegetarian status, or their recommendation (via wording e.g. Dish of the Day). There were mixed effects of these interventions, with 5 of 9 studies reporting positive effects. The results suggest that labelling items using a traffic light system may be effective (Brunner et al., 2018; Larner et al., 2021; Slapø & Karevold, 2019), as is avoiding use of explicit “vegetarian” or “vegan” labels and instead

Table 8.2. Characteristics of articles included in scoping review

Author	Setting	Intervention / experiment strategy	Outcome	Main findings*
Andersson & Nelander (2021)	University cafeteria, Sweden	**VISIBILITY:** On 25 control days, the meat option was placed at the top of the menu. On 25 treatment days, the vegetarian option was placed at the top of the menu.	Food sales	On average, fewer meat options were sold when the vegetarian option was placed at the top of the menu board.
Brunner et al. (2018)	University restaurant, Sweden	**LABELLING:** Traffic-light colour labelling of dishes according to carbon emissions. Six week control phase (no labels) vs seven week experimental phase (labels).	Food sales	The sales of meat dishes (when labelled red) experienced a marginally significant reduction, with associated reductions in GHG emissions from food sales.
Campbell-Arvai et al. (2014)	University dining hall, USA	**DEFAULT:** Tested the effect of meat-free default menus with appealing or unappealing vegetarian options and with or without accompanying information provision, compared to control menus with no differentiation between meat and meat-free items.	Proportion of hypothetical meat-free items chosen	Overall, the default menu increased the probability of selecting meat-free options, and this effect increased (though not significantly) when the default meal options were appealing.
Coucke et al. (2022)	Supermarket retail chain, Europe	**VISIBILITY**: In an experimental store, plant-based alternatives were placed adjacently to three key meat items in the butchery section, as well as in the vegetarian section (their usual locations) for nine months. In the control stores, plant-based alternatives were only placed in their usual locations.	Food sales	On average, sales of plant-based substitutes increased between the pre-intervention and intervention phases in the experimental store.
dos Santos et al. (2018)	Senior care centre, Denmark	**LABELLING:** Older adults (65+) in control and experimental conditions were asked to select between a meat, fish, and veggie meatball dish, however in the intervention condition the veggie dish was labelled 'dish of the day'.	Meal choice selection	No significant differences identified in dish choice between control and intervention groups.
Garnett et al. (2019)	College cafeterias, UK	**AVAILABILITY:** The proportion of available vegetarian meals was increased, and vegetarian sales were compared to alternating fortnightly control periods.	Food sales	Vegetarian sales increased with higher availability. Effect was strongest among diners that had lower prior levels of vegetarian selection. There was little effect on total sales and no rebound effects.
Garnett et al. (2021)	College cafeterias, UK	**PRICE:** During a five week intervention period, vegetarian meals were slightly decreased in price and meat-based meals were slightly increased.	Food sales	Proportion of vegetarian sales increased during the intervention. Effect was strongest among high vegetarian and vegan consumers. There were no significant differences in proportion of meat sales.

Author	Setting	Intervention / experiment strategy	Outcome	Main findings*
Gravert & Kurz (2019)	Restaurant, Sweden	**DEFAULT:** During a three week intervention period, diners were presented with either 1) a menu that stated a vegetarian option was available upon request, or 2) a menu stating that a meat option was available upon request.	Food sales	Sales of vegetarian and fish items increased during the intervention period.
Hansen et al. (2021)	Conference registrations, Denmark	**DEFAULT:** Participants received conference registration forms randomised into either vegetarian default, or non-vegetarian default. Three conferences were tested.	% of veg and non-veg registrations	Participants receiving the vegetarian default form were more likely to choose the vegetarian option compared to those who received the non-vegetarian default form.
Hielkema & Lund (2022)	Online experiment	**LABELLING**: Participants randomly assigned to view a menu containing a dish that was either named neutrally (no indication of its meatless status), or had explicit vegetarian, vegan, plant-based, or meat-free labelling.	Online food selection	Compared to explicit labelling, neutral labelling increased the selection of the target dish among meat eaters.
Krpan & Houtsma (2020)	Online experiment	**LABELLING**: Participants were randomly allocated menus that presented vegetarian options either neutrally (mixed among meat options), or in separate sections framed as either environmental, social, or 'vegetarian'.	Online food selection	The social, environmental, and neutral conditions all increased vegetarian selection compared to the vegetarian condition.
Kurz (2018)	University restaurants, Sweden	**VISIBILITY:** In an experimental restaurant, the vegetarian dish was moved to the top of the menu during a 17 week intervention phase. Vegetarian sales were compared to pre- and post- phases, and with a control restaurant.	Food sales	Vegetarian sales increased as a result of the intervention, and the restaurant's food-related emissions were reduced.
Larner et al. (2021)	University food outlets, UK	**LABELLING**: The impact of low impact labelling (i.e. a logo or separate low impact menu/section) was tested among food outlets during a three-week intervention phase, and compared to the corresponding period a year prior.	Food sales (quantities or weight, depending on food outlet)	There were mixed and moderate effects of the intervention across the different food outlets. At one outlet, medium impact items comprised a higher share of sales versus high impact items in the baseline year, suggesting a positive trend.
Parkin & Attwood (2022)	Online experiments	**AVAILABILITY:** Participants were randomly allocated to menus with different proportions of vegetarian items.	Online food selection	Meat consumers were more likely to choose vegetarian items when presented with higher availability of vegetarian items.

Author	Setting	Intervention / experiment strategy	Outcome	Main findings*
Pechey et al. (2022)	University and worksite cafeterias, UK	**AVAILABILITY**: Study 1: In a university cafeteria, the ratio of available meat-free meals was increased over a 12 week period. Study 2: Across 18 worksite cafeterias, a meat-free Monday initiative was introduced and the range of available meat-free items increased.	Food sales	Study 1: There was a decrease in meat sales when the availability of meat-free meals increased. Study 2: Different analyses revealed mixed findings; any increase in meat-free sales was limited and nonsignificant.
Slapø & Karevold (2019)	University cafeteria, Norway	**LABELLING**: The effects of 1) traffic light labelling, 2) a single green environmental label, and 3) a single red environmental label, were tested during a six week intervention phase.	Food sales	The traffic light label reduced meat sales, but did not affect fish or vegetarian sales. The single green and red labels had no significant effect.
Taillie et al. (2021)	Online experiment	**LABELLING**: Participants were randomly assigned to view images of steak, vegetarian, and chicken burritos with either no labelling, or a health warning, an environmental warning, or both on the red meat option.	Online food selection	The labels had no significant effect on consumer preference for the steak burrito.
Venema & Jensen (2023)	Hospital canteen, Denmark	**LABELLING and VISIBILITY**: For a six week intervention period, the vegetarian sandwich option was labelled with a 'Chef's recommendation' sticker, and promoted via other strategies (e.g. placed on prominent display and packaged aesthetically).	Food sales	Vegetarian sandwich sales increased following during the intervention, most notably among hospital visitors (versus hospital staff).
Zhou et al. (2019)	Senior care centres and restaurants, Denmark, UK, Italy, France	**LABELLING**: Older adults (65+) in control and experimental conditions were asked to select between a meat, fish, and veggie meatball dish, however in the intervention condition the veggie dish was labelled 'dish of the day'.	Meal choice selection	There were no significant differences in choice between control and intervention groups in any country. Participants from the UK and Denmark were more likely to choose the plant-based dish compared to participants from France.

* All reported findings are statistically significant unless otherwise stated.

opting for non-semantic 'V' symbols without menu segregation (Parkin & Attwood, 2022) or more neutral framing (Hielkema & Lund, 2022; Krpan & Houtsma, 2020). Labelling meatless options as *Dish of the Day* was ineffective across two studies (dos Santos et al., 2018; Zhou et al., 2019), however labelling items as '*Chef's Recommendation'* was found to be effective in combination with other promotional strategies (Venema & Jensen, 2023).

The four articles that tested increasing the visibility of meatless options all experienced increased meatless sales (Andersson & Nelander, 2021; Coucke et al., 2022; Kurz, 2018; Venema & Jensen, 2023). Similarly, of the three articles that explored the effect of meatless defaults (Campbell-Arvai et al., 2014; Gravert & Kurz, 2019; Hansen et al., 2019), all were associated with increased vegetarian sales or selections. That these studies were conducted in different contexts (i.e. restaurants, university dining halls, conference registrations) increases the potential of this approach, and provides clear precedents for implementation. As highlighted by Campbell-Arvai et al. (2014), the meatless default options should be appealing and palatable to increase selection further.

Three articles (Garnett et al., 2019; Parkin & Attwood, 2022; Pechey et al., 2022) included studies that increased the availability of meatless options, and all were associated with moderate to high increases in meatless selections, though one of these studies was conducted online and thus did not assess actual food choice. Increasing meatless availability had a particularly strong effect in university settings. When considered together, these results suggest that increasing availability may be an effective route towards reducing meat consumption, however this seems context dependent. Furthermore, this type of intervention may be considered less feasible by caterers, depending on the costs of menu reformulation or the introduction of new dishes. Similarly, whilst the one price intervention was successful at reducing meat consumption (Garnett et al., 2021), this intervention type may be generally less acceptable to caterers (Graham et al., 2020), compromising its scalability.

Considering the results of this review, it seems that some promising avenues for future research are default interventions, labelling, and those that increase the visibility or prominence of meatless options. There is also scope to combine interventions, indeed, one of the reviewed studies combined labelling and visibility approaches with positive effects (Venema & Jensen, 2023). The authors note that this aligns with previous evidence that combined interventions typically have larger effects compared to single interventions (Cadario & Chansdon, 2020). Like social norms interventions, these types of interventions target the fast decision-making system of the dual process model and seek to influence choice without compromising freedom of choice (Kahneman, 2011; Sunstein, 2015). However, they also avoid the limitation inherent in communication-based interventions, whereby messages may not be seen, read, understood, or processed in the desired way. Therefore, a promising way forward for further research could be to employ these alternative interventions in naturalistic contexts, whilst minimising costs to, and considering the needs and concerns of relevant stakeholders.

It is also important to consider broader social relations, power structures, and practices – social phenomena that are the concern of sociology, and that influence and result in observable psychological behaviours. These social phenomena have been incorporated into a modified version of the COM-B model, devised by Millings for Kennedy et al. (2022; Figure 8.2). In this modified model, a societal layer is added to account for inequity and power structures that shape behaviours

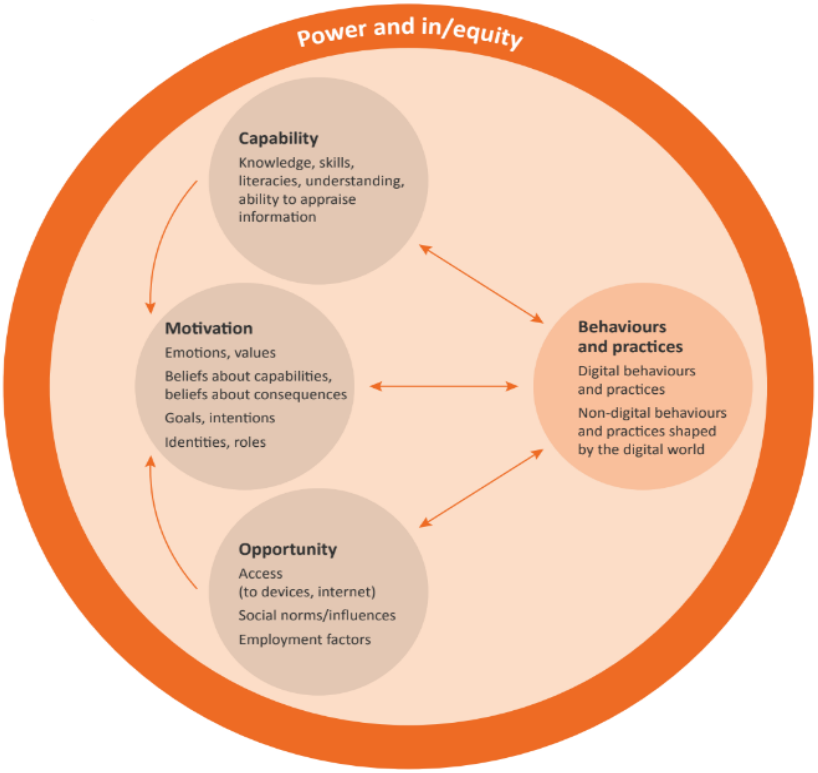


Figure 8.2. Modified COM-B model, incorporating an overarching layer to account for power structures and inequity and facilitate interdisciplinarity (devised by Millings for Kennedy et al., 2022).

and practices. While this modified model was developed to enable interdisciplinary research in relation to a specific topic of inquiry (i.e. digital relationships), it may facilitate interdisciplinarity more generally by bridging power, primarily the concern of sociologists, and behaviour, primarily the concern of psychologists. In turn, the model provides an example of how factors from multiple disciplines could be brought together to inform the design of future research.

There are also opportunities to further this work outside of behavioural interventions and academia. The perceived normality of LNM diets could be incorporated or leveraged to complement initiatives and guidelines, such as the Eat Well plate (Public Health England, 2016). For example, messages about the environmental benefits of plant foods could be included in the guidelines, to evoke an injunctive norm. There is also the potential for outreach or other educational materials to be developed that incorporate normative frames. For example, cooking guides or workshops aiming to increase knowledge about plant-based food preparation could highlight the increasing prevalence of LNM diets. Both of these examples may lower consumers' reliance on meat, which has become especially pressing given governments' relative disregard of the matter. This is especially apparent in the UK government's disregard of Dimbleby (2021)'s most impactful recommendations in its 2022 food strategy (Department for Food, Environment, and Rural Affairs, 2022; see Chapter One for further detail). As such, improvements to the food system seem to be low on the government's agenda making consumer-level change, through these strategies and initiatives, all the more crucial.

8.6 Reflections

The ambitious nature of this PhD presented several challenges. This section is written in a reflective style to detail the challenges faced throughout the journey, and decisions that were made to overcome them.

The PhD involved a steep learning curve. With a background primarily in ecology and science communication, I had limited prior knowledge of theories and practices in psychology, sociology, and media and communications studies. Navigating and balancing the disciplinary differences between the two was an ongoing challenge throughout the research and writing process, one that is common to researchers striving for interdisciplinarity (e.g. Kivits et al., 2019; Macleod et al., 2018). For example, as noted in Chapter Two, section 3.2, psychology focuses on behaviour and behaviour change. Conversely, sociological inquiry is not concerned with behaviour, but instead focuses on broader factors such as power structures and everyday interactions and practices. These were difficult to balance against psychological concepts and norms. Another example is related to different approaches to reporting research. Researchers' recognition of their own positionality is a central aspect of sociological research, and so the use of personal pronouns (e.g. "I", "my") is commonplace and encouraged, alongside reflection on said positionality. However, the use of personal pronouns is both discouraged and uncommon in psychology. As such, while the research presented in this thesis sought to be interdisciplinary, balancing disciplinary differences was challenging in practice. However, the experience was valuable in encouraging me to think about and approach the topic in different ways.

Much of the first year of the PhD was spent reading and learning, alongside participation in the comprehensive training programme provided by the Grantham Centre for Sustainable Futures. Towards the end of the first year, I completed the two studies assessing perceptions towards meat reducers, discussed in Chapter Five, and was in the process of organising the social norms intervention with the Living Labs team at the University of Sheffield. It was at this point that the COVID-19 pandemic shook the world, and the UK went into lockdown. As a result of the pandemic, my plans for the social norms intervention were paused indefinitely and my thesis plan was entirely disrupted. There was, at the time, no indication as to when things would return to "normal". As such, there was no way to conduct any experimental food choice studies, and instead I spent this time rearranging my thesis plan and bringing my social media study forward. Also during this time, I returned home to Aotearoa New Zealand where, compared to the UK, conditions were significantly better (i.e. an initial strict lockdown eliminated all community transmission, allowing all businesses to re-open and operate as normal). With COVID-19 still afflicting the UK and with input from my supervisors, I decided to organise a social norms intervention with a university in Aotearoa.

The process of organising this circumstantial social norms intervention was difficult. Whilst I had established relationships with the relevant stakeholders at the University of Sheffield, this was not the case with any university in Aotearoa. I compiled a research proposal which I sent to academics at several universities across the country. I received two favourable responses, and after several meetings to discuss feasibility with various stakeholders we made the decision to conduct the study at the University of Otago. However, fleshing out the details of the study came with additional challenges. There was some resistance on the part of some stakeholders related to the nature of the

topic – meat consumption. Some stakeholders at the planned research site withdrew from the project, due to concerns about being seen as pushing plant-based foods. This was surprising given that the wording of the social norms message does not explicitly encourage or discourage choice. However as noted in Chapter Six, per capita meat consumption in Aotearoa is high, and meat is also tied to notions of national pride and identity (Potts & White, 2008), which may have facilitated resistance. Nonetheless, alternative arrangements were made to conduct the research at another site on campus, and the study was completed successfully.

Another challenging aspect of the PhD, also related to uncertainty and unanticipated events, which presented during the University of Sheffield intervention. The intervention week was affected by severe thunderstorms and staff strikes, both of which decreased the amount of foot traffic at the research sites. This was discouraging after the organisational efforts that went into the study. However, it reflects the nature of applied field research, and provided some interesting points of discussion in the study report.

To conclude, my PhD journey has presented many logistical and emotional challenges. However, I feel that I have become a more well-rounded, confident, and resilient researcher as a result.

8.7 Conclusion

The research presented in this thesis provides evidence that low and no meat (LNM) diets and their adherents are largely perceived as "normal", reflecting their real-world normalisation in recent years. On this basis, naturalistic social norms interventions to reduce meat consumption were conducted in university food outlets in Aotearoa New Zealand and in the UK. Whilst both interventions did not result in statistically significant changes to meat or meatless purchasing behaviour, this does not invalidate the behaviour change potential of LNM's increasing normality. Since meat consumption is heavily influenced by social factors, the increasing normality of LNM diets aids behaviour change efforts at all levels. This is urgently needed to reduce meat consumption in everyday life, in the face of multiple crises related to animal welfare, climate change, biodiversity loss, and human health.

References

Abric, J. C. (1993). Central System, Peripheral System: Their Functions and Roles in the Dynamics of Social Representations. *Papers on Social Representations*, *2*(2), 75–78. https://psr.iscte-iul.pt/index.php/PSR/article/view/126/90

Abric, J. C. (2003). L'analyse structurale des représentations sociales. In S. Moscovici & F. Buschini. (Eds.), *Les méthodes des sciences humaines* (pp. 375–392). Presses Universitaires de France.

Adler, N. E., & Stewart, J. (2007). *The MacArthur Scale of Subjective Social Status*. Psychosocial Research Notebook. http://www.macses.ucsf.edu/research/psychosocial/subjective.php

Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. *Action Control*, 11–39. https://doi.org/10.1007/978-3-642-69746-3_2

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Aleixo, M. G. B., Sass, C. A. B., Leal, R. M., Dantas, T. M., Pagani, M. M., Pimentel, T. C., Freitas, M. Q., Cruz, A. G., Azeredo, D. R. P., & Esmerino, E. A. (2021). Using Twitter® as source of information for dietary market research: a study on veganism and plant-based diets. *International Journal of Food Science and Technology*, *56*(1), 61–68. https://doi.org/10.1111/ijfs.14743

Allport, G. (1954). The Historical Background of Modern Social Psychology. In G. Lindzey (Ed.), *The Handbook of Social Psychology, Vol. 1* (pp. 3–56). Addison-Wesley.

Amiot, C. E., El Hajj Boutros, G., Sukhanova, K., & Karelis, A. D. (2018). Testing a novel multicomponent intervention to reduce meat consumption in young men. *PLOS ONE*. https://doi.org/10.1371/journal.pone.0204590

Anderson, J. E., & Dunning, D. (2014). Behavioral Norms: Variants and Their Identification. *Social and Personality Psychology Compass*, *8*(12), 721–738. https://doi.org/10.1111/spc3.12146

Andersson, O., & Nelander, L. (2021). Nudge the lunch: A field experiment testing menu-primacy effects on lunch choices. *Games*, *12*(1), 1–19. https://doi.org/10.3390/g12010002

Arla Foods. (2022). *Estimated 28 million people in the UK making critical choices about their diets based on social pressures*. https://news.arlafoods.co.uk/news/estimated-28-million-people-in-the-uk-making-critical-choices-about-their-diets-based-on-social-pressures

Arnett, J. J. (2008). The neglected 95%: Why American psychology needs to become less American. *American Psychologist*, *63*(7), 602–614. https://doi.org/10.1037/0003-066X.63.7.602

Asch, S. E. (1952). Group forces in the modification and distortion of judgments. *Social Psychology.*, 450–501. https://doi.org/10.1037/10025-016

Atkinson, P., & Hammersley, M. (1994). Ethnography and Participant Observation. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (pp. 248–261). SAGE Publications Inc. https://doi.org/10.4324/9780203086490-10

Attwood, S., & Hajat, C. (2020). How will the COVID-19 pandemic shape the future of meat consumption? *Public Health Nutrition*, *23*(17), 3116. https://doi.org/10.1017/S136898002000316X

Atzmüller, C., & Steiner, P. M. (2010). Experimental vignette studies n survey research. *Methodology*, *6*(3), 128–138. https://doi.org/10.1027/1614-2241/a000014

Bajželj, B., Richards, K. S., Allwood, J. M., Smith, P., Dennis, J. S., Curmi, E., & Gilligan, C. A. (2014). Importance of food-demand management for climate mitigation. *Nature Climate Change 2014 4:10*, *4*(10), 924–929. https://doi.org/10.1038/NCLIMATE2353

Ballingall, J., & Pambudi, D. (2017). *Dairy trade's economic contribution to New Zealand.* http://hdl.handle.net/11540/7268

Bandura, A. (1999). Moral Disengagement in the Perpetration of Inhumanities. *Personality and Social Psychology Review*, *3*(3), 209.

Bargh, J. A., & Morsella, E. (2008). The Unconscious Mind. *Perspectives on Psychological Science*, *3*(1), 73–79. https://doi.org/10.1111/j.1745-6916.2008.00064.x

Barker, F. (2012). *New Zealand identity - The land*. Te Ara - the Encyclopedia of New Zealand.
Baumeister, R. F., & Leary, M. R. (1995). The Need to Belong: Desire for Interpersonal Attachments as a Fundamental Human Motivation. In *Psychological Bulletin* (Vol. 117, Issue 3). https://pdfs.semanticscholar.org/3dcc/3d262c08f8f4eb8f766ad72f06d580869309.pdf
Bear, A., & Knobe, J. (2017). Normality: Part descriptive, part prescriptive. *Cognition*, *167*.
Beef & Lamb New Zealand. (2018). *Beef + Lamb New Zealand: EAT-Lancet Report FAQs How are we addressing climate change?*
Béné, C., Fanzo, J., Haddad, L., Hawkes, C., Caron, P., Vermeulen, S., Herrero, M., & Oosterveer, P. (2020). Five priorities to operationalize the EAT-Lancet Commission report. *Nature Food*, *1*, 457–459. https://doi.org/10.1038/s43016-020-0136-4
Beninger, K., Fry, A., Jago, N., Lepps, H., Nass, L., & Silvester, H. (2014). *Research using Social Media; Users' Views*. www.natcen.ac.uk
Berger, J., & Rand, L. (2008). Shifting Signals to Help Health: Using Identity Signaling to Reduce Risky Health Behaviors. *Journal of Consumer Research*, *35*, 509–518. https://doi.org/10.1086/587632
Berlo, D. K. (1960). *The process of communication; an introduction to theory and practice.* Holt Rinehart and Winston.
Bianchi, F., Aveyard, P., Astbury, N. M., Cook, B., Cartwright, E., & Jebb, S. A. (2019). Replacing meat with alternative plant-based products (RE-MAPs): protocol for a randomised controlled trial of a behavioural intervention to reduce meat consumption. *BMJ Open*. https://doi.org/10.1136/bmjopen-2018-027016
Bianchi, F., Dorsel, C., Garnett, E., Aveyard, P., & Jebb, S. A. (2018). Interventions targeting conscious determinants of human behaviour to reduce the demand for meat: a systematic review with qualitative comparative analysis. *International Journal of Behavioral Nutrition and Physical Activity*, *15*(102). https://doi.org/10.1186/s12966-018-0729-6
Bicchieri, C., & Xiao, E. (2009). Do the right thing: But only if others do so. *Journal of Behavioral Decision Making*, *22*(2), 191–208. https://doi.org/10.1002/bdm.621
Bineham, J. L. (1988). A historical account of the hypodermic model in mass communication. *Communication Monographs*, *55*.
Blundell, J., De Graaf, C., Hulshof, T., Jebb, S., Livingstone, B., Lluch, A., Mela, D., Salah, S., Schuring, E., Van Der Knaap, H., & Westerterp, M. (2010). Appetite control: methodological aspects of the evaluation of foodso br_714 251..270. *Obesity Reviews*, *11*, 251–270. https://doi.org/10.1111/j.1467-789X.2010.00714.x
Bolderdijk, J. W., Brouwer, C., & Cornelissen, G. (2018). When Do Morally Motivated Innovators Elicit Inspiration Instead of Irritation? *Frontiers in Psychology*, *8*. https://doi.org/10.3389/fpsyg.2017.02362
Boot, A. B., Dijkstra, K., & Zwaan, R. A. (2021). The processing and evaluation of news content on social media is influenced by peer-user commentary. *Humanities & Social Sciences Communications*, *8*. https://doi.org/10.1057/s41599-021-00889-5
Boulianne, S. (2015). *Social media use and participation: a meta-analysis of current research*. https://doi.org/10.1080/1369118X.2015.1008542
Bowen, A. M., Candice, A. E., Ae, M. D., Williams, M. L., Grayson, A. E., & Baird, L. (2008). *Identifying Multiple Submissions in Internet Research: Preserving Data Integrity*. https://doi.org/10.1007/s10461-007-9352-2
Boyatzis, R. (1998). *Transforming qualitative information: thematic analysis and code development*. SAGE Publications Inc.
Boyd, D. (2010). Social Network Sites as Networked Publics: Affordances, Dynamics, and Implications. In Z. Papacharissi (Ed.), *Networked Self: Identity, Community, and Culture on Social Network Sites* (pp. 39–58). https://doi.org/10.4324/9780203876527-8
Boyd, D., & Crawford, K. (2012). CRITICAL QUESTIONS FOR BIG DATA. *Information, Communication, & Society*, *15*(5), 662–679. https://doi.org/10.1080/1369118X.2012.678878
Boykoff, M., Church, P., Katzung, J., Nacu-Schmidt, A., & Pearman, O. (2021). A Review of Media

Coverage of Climate Change and Global Warming in 2020. In *Media and Climate Change Observatory, Cooperative Institute for Research in Environmental Sciences, University of Colorado*.

Branca, F., Lartey, A., Oenema, S., Aguayo, V., Stordalen, G. A., Richardson, R., Arvelo, M., & Afshin, A. (2019). Transforming the food system to fight non-communicable diseases. *BMJ (Clinical Research Ed.)*, *364*. https://doi.org/10.1136/BMJ.L296

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., Clarke, V., Hayfield, N., & Terry, G. (2019). Thematic analysis. In P. Liamputtong (Ed.), *Handbook of Research Methods in Health Social Sciences* (Issue 2019, pp. 843–860). Springer Nature Singapore. https://doi.org/10.7441/978-80-7454-682-2_4

Brossard, B., & Sallée, N. (2019). Sociology and psychology: What intersections? *European Journal of Social Theory*, *23*(1), 3–14. https://doi.org/10.1177/1368431019844869

Bruckmüller, S., & Abele, A. E. (2010). Comparison Focus in Intergroup Comparisons: Who We Compare to Whom Influences Who We See as Powerful and Agentic. *Personality and Social Psychology Bulletin*, *36*(10), 1424–1435. https://doi.org/10.1177/0146167210383581

Brunner, F., Kurz, V., Bryngelsson, D., & Hedenus, F. (2018). Carbon Label at a University Restaurant – Label Implementation and Evaluation. *Ecological Economics*, *146*, 658–667. https://doi.org/10.1016/J.ECOLECON.2017.12.012

Bruns, A. (2015). Making Sense of Society Through Social Media. *Social Media + Society April-June*. https://doi.org/10.1177/2056305115578679

Bruns, A., & Burgess, J. (2012). Researching News Discussion on Twitter: New methodologies. *Journalism Studies*, *13*, 801–814. https://doi.org/10.1080/1461670X.2012.664428

Bruns, A., & Highfield, T. (2013). Political Networks on Twitter. *Information, Communication & Society*, *16*(5), 667–691. https://doi.org/10.1080/1369118X.2013.782328

Bryant, C. J. (2019). We can't keep meating like this: Attitudes towards vegetarian and vegan diets in the United Kingdom. *Sustainability*, *11*(23). https://doi.org/10.3390/su11236844

Bryant Research. (2022). *Most Brits Find Common Animal Farming Practices 'Unacceptable.'* https://www.bryantresearch.co.uk/insights/acceptability-of-animal-farming-practices

Bucher, T., & Helmond, A. (2018). The Affordances of Social Media Platforms. In J. Burgess, A. Marwick, & T. Poell (Eds.), *The SAGE Handbook of Social Media* (pp. 223–253). Sage Publications.

Burchell, K., Rettie, R., & Patel, K. (2012). Marketing social norms: Social marketing and the "social norm approach." *Journal of Consumer Behaviour*, *12*, 1–9. https://doi.org/10.1002/cb.1395

Burger, J. M. (2001). Social Influence, Psychology of. *International Encyclopedia of the Social & Behavioral Sciences*, 14320–14325. https://doi.org/10.1016/B0-08-043076-7/01805-2

Burgess, J., & Baym, N. (2020). *Twitter: A Biography*. NYU Press.

Cadario, R., & Chandon, P. (2020). Which healthy eating nudges work best? A meta-analysis of field experiments. *Marketing Science*, *39*(3), 465–486. https://doi.org/10.1287/mksc.2018.1128

Camerer, C., & Loewenstein, G. (2004). Behavioral Economics: Past, Present, Future. In C. Camerer, G. Loewenstein, & M. Rabin (Eds.), *Advances in Behavioral Economics* (pp. 3–51). Princeton University Press.

Cameron, D., Wray, T., & Kee, M. (2018). *Sustainability Strategy-Year 1 Principles and direction*.

Campbell-Arvai, V., Arvai, J., & Kalof, L. (2014). Motivating Sustainable Food Choices: The Role of Nudges, Value Orientation, and Information Provision. *Environment and Behavior*, *46*(4), 453–475. https://doi.org/10.1177/0013916512469099

Chan, E. Y., & Zlatevska, N. (2019). Jerkies, tacos, and burgers: Subjective socioeconomic status and meat preference. *Appetite*, *132*, 257–266. https://doi.org/10.1016/j.appet.2018.08.027

Cheah, I., Sadat Shimul, A., Liang, J., & Phau, I. (2020). Drivers and barriers toward reducing meat consumption. *Appetite*, *149*. https://doi.org/10.1016/j.appet.2020.104636

Choi, B. C. K., & Pak, A. W. P. (2006). Multidisciplinarity, interdisciplinarity, and transdisciplinarity in

health research, services, education, and policy: Definitions, objectives, and evidence of effectiveness. *Clinical and Investigative Medicine*, *29*(6), 351–364. http://dx.doi.org/10.1016/j.jaci.2012.05.050

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A Focus Theory of Normative Conduct: Recycling the Concept of Norms to Reduce Littering in Public Places. *Journal of Personality and Social Psychology*, *58*(6), 1015–1026. https://doi.org/10.2307/2037635

Cinelli, M., de Francisci Morales, G., Galeazzi, A., Quattrociocchi, W., & Starnini, M. (2021). The echo chamber effect on social media. *Proceedings of the National Academy of Sciences of the United States of America*, *118*(9). https://doi.org/10.1073/pnas.2023301118

Clonan, A., Roberts, K. E., & Holdsworth, M. (2016). Socioeconomic and demographic drivers of red and processed meat consumption: implications for health and environmental sustainability. *Proceedings of the Nutrition Society*, *75*, 367–373. https://doi.org/10.1017/S0029665116000100

Cobb, N. K., Graham, A. L., Byron, ; M Justin, Niaura, R. S., & Abrams, D. B. (2011). Online Social Networks and Smoking Cessation: A Scientific Research Agenda. *Journal of Medical Internet Research*. https://doi.org/10.2196/jmir.1911

Codagnone, C., Bogliacino, F., Gómez, C., Folkvord, F., Liva, G., Charris, R., Montealegre, F., Lupiañez Villanueva, F., & Veltri, G. A. (2021). Restarting "Normal" Life after Covid-19 and the Lockdown: Evidence from Spain, the United Kingdom, and Italy. *Social Indicators Research*, *158*(1), 241–265. https://doi.org/10.1007/S11205-021-02697-5/TABLES/10

Coggon, J. (2018). *The Nanny State Debate: A Place Where Words Don't Do Justice*. www.fph.org.uk

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. Routledge Academic.

Coimbra, Z. H., Gomes-Jr, L., & Fernandez, F. A. S. (2020). Human carnivory as a major driver of vertebrate extinction. *Perspectives in Ecology and Conservation*, *18*(4), 283–293. https://doi.org/10.1016/J.PECON.2020.10.002

Çoker, E. N., Pechey, R., Frie, K., Jebb, S. A., Stewart, C., Higgs, S., & Cook, B. (2022). A dynamic social norm messaging intervention to reduce meat consumption: A randomized cross-over trial in retail store restaurants. *Appetite*, *169*, 105824. https://doi.org/10.1016/J.APPET.2021.105824

Çoker, E. N., & van der Linden, S. (2020). Fleshing out the theory of planned of behavior: Meat consumption as an environmentally significant behavior. *Current Psychology*. https://doi.org/10.1007/s12144-019-00593-3

Cole, M., & Morgan, K. (2011). Vegaphobia: Derogatory discourses of veganism and the reproduction of speciesism in UK national newspapers. *British Journal of Sociology*, *62*(1), 134–153. https://doi.org/10.1111/j.1468-4446.2010.01348.x

Collins, E. I. M., Thomas, J. M., Robinson, E., Aveyard, P., Jebb, S. A., Herman, C. P., & Higgs, S. (2019). Two observational studies examining the effect of a social norm and a health message on the purchase of vegetables in student canteen settings. *Appetite*, *132*(September 2018), 122–130. https://doi.org/10.1016/j.appet.2018.09.024

Colmar Brunton. (2019). *Hungry for plant-based: New Zeland consumer insights*. *October*.

Cotterill, S., Powell, R., Rhodes, S., Brown, B., Roberts, J., Tang, M. Y., & Wilkinson, J. (2019). The impact of social norms interventions on clinical behaviour change among health workers: Protocol for a systematic review and meta-analysis. *Systematic Reviews*, *8*(176). https://doi.org/10.1186/s13643-019-1077-6

Coucke, N., Vermeir, I., Slabbinck, H., Geuens, M., & Choueiki, Z. (2022). How to reduce agri-environmental impacts on ecosystem services: the role of nudging techniques to increase purchase of plant-based meat substitutes. *Ecosystem Services*, *56*. https://doi.org/10.1016/j.ecoser.2022.101444

Craig, P., Dieppe, O., Macintyre, S., Michie, S., Nazareth, I., & Petticrew, M. (2008). *Developing and evaluating complex interventions*. www.mrc.ac.uk/complexinterventionsguidance

Crandall, C. S., Eidelman, S., Skitka, L. J., & Morgan, S. G. (2008). Status quo framing increases support for torture. *Social Influence*, *4*(1), 1–10. https://doi.org/10.1080/15534510802124397

Credé, M. (2010). Random responding as a threat to the validity of effect size estimates in correlational research. *Educational and Psychological Measurement*, *70*(4), 596–612. https://doi.org/10.1177/0013164410366686

Crump, M. J. C., Mcdonnell, J. V, & Gureckis, T. M. (2013). Evaluating Amazon's Mechanical Turk as a Tool for Experimental Behavioral Research. *PLoS ONE*, *8*(3), 57410. https://doi.org/10.1371/journal.pone.0057410

Crüwell, S., Doorn, J. van, Etz, A., Makel, M. C., Moshontz, H., Niebaum, J., Orben, A., Parsons, S., & Schulte-Mecklenbeck, M. (2018). *7 Easy Steps to Open Science: An Annotated Reading List*. https://doi.org/10.31234/OSF.IO/CFZYX

Cruwys, T., Bevelander, K. E., & Hermans, R. C. J. (2015). Social modeling of eating: a review of when and why social influence affects food intake and choice. *Appetite*, *86*, 3–18. https://doi.org/10.1016/j.appet.2014.08.035

Cruwys, T., Platow, M. J., Angullia, S. A., Chang, J. M., Diler, S. E., Kirchner, J. L., Lentfer, C. E., Lim, Y. J., Quarisa, A., Tor, V. W. L., & Wadley, A. L. (2012). Modeling of food intake is moderated by salient psychological group membership. *Appetite*, *58*(2), 754–757. https://doi.org/10.1016/j.appet.2011.12.002

Dagevos, H. (2021). Finding flexitarians: Current studies on meat eaters and meat reducers. *Trends in Food Science and Technology*, *114*, 530–539. https://doi.org/10.1016/j.tifs.2021.06.021

Dagevos, H., & Voordouw, J. (2013). Sustainability and meat consumption: Is reduction realistic? *Sustainability: Science, Practice, and Policy*, *9*(2), 60–69. https://doi.org/10.1080/15487733.2013.11908115

Danermark, B., Englund, U., Germundsson, P., & Ratinaud, P. (2014). French and Swedish teachers' social representations of social workers. *European Journal of Social Work*, *17*, 491–507. https://doi.org/10.1080/13691457.2013.829803

DataReportal. (2022). *Digital 2022: Global Overview Report*. https://datareportal.com/reports/digital-2022-global-overview-report

de Boer, J., Schösler, H., & Aiking, H. (2017). Towards a reduced meat diet: Mindset and motivation of young vegetarians, low, medium and high meat-eaters. *Appetite*, *113*, 387–397. https://doi.org/10.1016/J.APPET.2017.03.007

De Choudhury, M., Jhaver, S., Sugar, B., & Weber, I. (2016). Social media participation in an activist movement for racial equality. *Proceedings of the 10th International Conference on Web and Social Media 2016*, *2016*, 92–101.

De Groot, J. I. M., & Schuitema, G. (2012). *How to make the unpopular popular? Policy characteristics, social norms and the acceptability of environmental policies*. https://doi.org/10.1016/j.envsci.2012.03.004

Dean, B. (2021). *How Many People Use Twitter in 2021? [New Twitter Stats]*. https://backlinko.com/twitter-users

DEFRA. (2022). *Government food strategy*. www.gov.uk/official-documents.

Delacre, M., Leys, C., Mora, Y. L., & Lakens, D. (2019). Taking Parametric Assumptions Seriously: Arguments for the Use of Welch's F-test instead of the Classical F-test in One-Way ANOVA. *International Review of Social Psychology*, *32*(1), 1–12. https://doi.org/10.5334/irsp.198

Dempsey, R. C., McAlaney, J., & Bewick, B. M. (2018). A critical appraisal of the social norms approach as an interventional strategy for health-related behavior and attitude change. *Frontiers in Psychology*, *9*(NOV), 2180. https://doi.org/10.3389/FPSYG.2018.02180/BIBTEX

Denscombe, M. (2008). Communities of Practice A Research Paradigm for the Mixed Methods Approach. *Journal of Mixed Methods Research*, *2*(3), 270–283. https://doi.org/10.1177/1558689808316807

Deutsch, M., & Gerrard, H. B. (1955). A Study of Normative and Informational Social Influences Upon Individual Judgment. *The Journal of Abnormal and Social Psychology*, *51*(3).

Dhingra, M. S., Artois, J., Dellicour, S., Lemey, P., Dauphin, G., Von Dobschuetz, S., Van Boeckel, T. P., Castellan, D. M., Morzaria, S., & Gilbert, M. (2018). Geographical and historical patterns in the

emergences of novel highly pathogenic avian influenza (HPAI) H5 and H7 viruses in poultry. *Frontiers in Veterinary Science*, *5*(JUN). https://doi.org/10.3389/FVETS.2018.00084

Dhont, K., & Hodson, G. (2014). Why do right-wing adherents engage in more animal exploitation and meat consumption? *Personality and Individual Differences*, *64*, 12–17. https://doi.org/10.1016/J.PAID.2014.02.002

Diaz, R. J., & Rosenberg, R. (2008). Spreading dead zones and consequences for marine ecosystems. *Science*, *321*(5891), 926–929. https://doi.org/10.1126/science.1156401

Dibb, S., & Fitzpatrick, I. (2014). *Let's talk about meat: changing dietary behaviour for the 21st century*. www.eating-better.org

Dimbleby, H. (2021). *National Food Strategy Independent Review*. https://doi.org/10.2307/j.ctt4cgqfz.3

dos Santos, Q., Nogueira, B. M., Rodrigues, V. M., Hartwell, H., Giboreau, A., Monteleone, E., Dinnella, C., & Perez-Cueto, F. J. (2018). Nudging using the 'dish of the day' strategy does not work for plant-based meals in a Danish sample of adolescent and older people. *International Journal of Consumer Studies*, *42*(3), 327–334. https://doi.org/10.1111/ijcs.12421

Driscoll, K., & Walker, S. (2014). Working within a black box: Transparency in the collection and production of big twitter data. *International Journal of Communication*, *8*(1), 1745–1764.

Elaheebocus, S. M. R. A., Weal, M., Morrison, L., & Yardley, L. (2018). Peer-Based Social Media Features in Behavior Change Interventions: Systematic Review. *Journal of Medical Internet Research*, *20*(2). https://doi.org/10.2196/JMIR.8342

Elster, J. (1989). *The Cement of Society: A Survey of Social Order*. Cambridge University Press. https://philpapers.org/rec/ELSTCO-2

Etemadi, A., Sinha, R., Ward, M. H., Graubard, B. I., Inoue-Choi, M., Dawsey, S. M., & Abnet, C. C. (2017). Mortality from different causes associated with meat, heme iron, nitrates, and nitrites in the NIH-AARP Diet and Health Study: population based cohort study. *BMJ*, *357*, 1957. https://doi.org/10.1136/bmj.j1957

Evans, H., Ginnis, S., & Bartlett, J. (2015). *#SocialEthics: A guide to embedding ethics in social media research*.

Everett, J. A. C., Caviola, L., Kahane, G., Savulescu, J., & Faber, N. S. (2015). Doing good by doing nothing? The role of social norms in explaining default effects in altruistic contexts. *European Journal of Social Psychology*, *45*(2), 230–241. https://doi.org/10.1002/EJSP.2080

Farrow, K., Grolleau, G., & Ibanez, L. (2017). Social Norms and Pro-environmental Behavior: A Review of the Evidence. *Ecological Economics*, *140*, 1–13. https://doi.org/10.1016/j.ecolecon.2017.04.017

Festinger, L. (1957). *A Theory of Cognitive Dissonance*. Stanford University Press.

Finger, M. (1994). *From Knowledge to Action? Exploring the Relationships Between Environmental Experiences, Learning, and Behavior*.

Foote, K. J., Joy, M. K., & Death, R. G. (2015). New Zealand Dairy Farming: Milking Our Environment for All Its Worth. *Environmental Management (2015)*, *56*, 709–720. https://doi.org/10.1007/s00267-015-0517-x

Forestell, C. A., & Nezlek, J. B. (2018). Vegetarianism, depression, and the five factor model of personality. *Ecology of Food and Nutrition*, *57*(3), 246–259. https://doi.org/10.1080/03670244.2018.1455675

Foucault, M. (1977). *Überwachen und Strafen: die Geburt des Gefängnisses* (M. Foucault (ed.)). Frankfurt am Main Suhrkamp. https://katalog.ub.uni-leipzig.de/Record/0-1614027927

Fournier, A. K., Hall, E., Ricke, P., & Storey, B. (2013). Alcohol and the social network: Online social networking sites and college students' perceived drinking norms. *Psychology of Popular Media Culture*, *2*(2), 86–95. https://doi.org/10.1037/a0032097

Fox, N., & Ward, K. (2008). Health, ethics and environment: A qualitative study of vegetarian motivations. *Appetite*, *50*, 422–429. https://ac.els-cdn.com/S0195666307003686/1-s2.0-S0195666307003686-main.pdf?_tid=4a38becb-d5ad-40c9-9498-

81ef98853faf&acdnat=1545234461_9caf8eb6a1bd04f51ec6137eeb8ab1d6
Foxcroft, D. R., Moreira, M. T., Almeida Santimano, N. M. L., & Smith, L. A. (2015). Social norms information for alcohol misuse in university and college students. *Cochrane Database of Systematic Reviews*, *2015*(12). https://doi.org/10.1002/14651858.CD006748.pub4
Franzke, A. shakti, Bechmann, A., Zimmer, M., Ess, C., & and the Association of Internet Researchers. (2020). *Internet Research: Ethical Guidelines 3.0*. https://aoir.org/reports/ethics3.pdf
Fries, E., & Croyle, R. T. (1993). Stereotypes associated with a low-fat diet and their relevance to nutrition education. *Journal of the American Dietetic Association*, *93*(5), 551–555. https://doi.org/10.1016/0002-8223(93)91815-8
Galea, S. (2020). Compassion in a time of COVID-19. *The Lancet*, *395*(10241), 1897–1898. https://doi.org/10.1016/S0140-6736(20)31202-2
Garcia, D., Galaz, V., & Daume, S. (2019). EATLancet vs yes2meat: the digital backlash to the planetary health diet. *The Lancet*, *394*(10215), 2153–2154. https://doi.org/10.1016/S0140-6736(19)32526-7
Garnett, E. E., Balmford, A., Marteau, T. M., Pilling, M. A., & Sandbrook, C. (2021). Price of change: Does a small alteration to the price of meat and vegetarian options affect their sales? *JOURNAL OF ENVIRONMENTAL PSYCHOLOGY*, *75*. https://doi.org/10.1016/j.jenvp.2021.101589
Garnett, E. E., Balmford, A., Sandbrook, C., Pilling, M. A., & Marteau, T. M. (2019). Impact of increasing vegetarian availability on meal selection and sales in cafeterias. *PNAS*, *15*(42), 20923–20929. https://doi.org/10.17863/CAM.41328
Gerber, P. J., Steinfeld, H., Henderson, B., Mottet, A., Opio, C., Dijkman, J., Falucci, A., & Tempio, G. (2013). *Tackling Climate Change Through Livestock: A Global Assessment of Emissions and Mitigation Opportunities*. www.fao.org/publications
Godfray, C., Aveyard, P., Garnett, T., Hall, J. W., Key, T. J., Lorimer, J., Pierrehumbert, R. T., Scarborough, P., Springmann, M., & Jebb, S. A. (2018). Meat consumption, health, and the environment. *Science*, *361*. https://doi.org/10.1126/science.aam5324
Goffman, E. (1974). *Frame Analysis: Essays on Face-to-Face Behavior*. Anchor.
Gosling, S. D., & Mason, W. (2015). Internet research in psychology. *Annual Review of Psychology*, *66*, 877–902. https://doi.org/10.1146/annurev-psych-010814-015321
Goyanes, M., & Demeter, M. (2022). Beyond positive or negative: Understanding the phenomenology, typologies and impact of incidental news exposure on citizens' daily lives. *New Media & Society*, *24*(3), 760–777. https://doi.org/10.1177/1461444820967679
Graça, J., Truninger, M., Junqueira, L., & Schmidt, L. (2019). Consumption orientations may support (or hinder) transitions to more plant-based diets. *Appetite*, *140*. https://doi.org/10.1016/j.appet.2019.04.027
Graham, F., Barker, M., Menon, M., & Holdsworth, M. (2020). Acceptability and feasibility of a café-based sustainable food intervention in the UK. *Health Promotion International*, *35*(6), 1507–1518. https://doi.org/10.1093/HEAPRO/DAAA027
Gravert, C., & Kurz, V. (2019). Nudging à la carte: a field experiment on climate-friendly food choice. *Behavioural Public Policy*, 1–18. https://doi.org/10.1017/bpp.2019.11
Griggs, D., Stafford-Smith, M., Gaffney, O., Rockström, J., Öhman, M. C., Shyamsundar, P., Steffen, W., Glaser, G., Kanie, N., & Noble, I. (2013). Sustainable development goals for people and planet. *Nature*, 305–307.
Haggerty, J., & Campbell, H. (2008). *Farming and the environment - A modified landscape*. Te Ara - the Encyclopedia of New Zealand. http://www.teara.govt.nz/en/farming-and-the-environment/page-1
Haidt, J. (2001). The emotional dog and its rational tail: A social intuitionist approach to moral judgment. *Psychological Review*, *108*(4), 814–834. https://doi.org/10.1037/0033-295X.108.4.814
Hansen, P. G., Schilling, M., & Malthesen, M. S. (2019). Nudging healthy and sustainable food choices: three randomized controlled field experiments using a vegetarian lunch-default as a

normative signal. *Journal of Public Health*, 1–6. https://doi.org/10.1093/pubmed/fdz154
Harguess, J. M., Crespo, N. C., & Hong, M. Y. (2020). Strategies to reduce meat consumption: A systematic literature review of experimental studies. *Appetite*, *144*. https://doi.org/10.1016/j.appet.2019.104478
Hartmann, C., Ruby, M. B., Schmidt, P., & Siegrist, M. (2018). Brave, health-conscious, and environmentally friendly: Positive impressions of insect food product consumers. *Food Quality and Preference*, *68*, 64–71. https://doi.org/10.1016/j.foodqual.2018.02.001
Hawkins, L. K., Farrow, C., & Thomas, J. M. (2020). Do perceived norms of social media users' eating habits and preferences predict our own food consumption and BMI? *Appetite*, *149*(104611). https://doi.org/10.1016/j.appet.2020.104611
Henrich, J., & Boyd, R. (1998). The Evolution of Conformist Transmission and the Emergence of Between-Group Differences. *Evolution and Human Behavior*, *19*(4), 215–241. https://doi.org/10.1016/S1090-5138(98)00018-X
Henrich, J., Heine, S. J., & Norenzayan, A. (2010). *The Weirdest People in the World? Working Paper Series*. www.germandataforum.de
Hewstone, M., Rubin, M., & Willis, H. (2002). Intergroup Bias. *Annual Review of Psychology*, *53*, 575–604. www.annualreviews.org
Hielkema, M. H., & Lund, T. B. (2022). A "vegetarian curry stew" or just a "curry stew"?- The effect of neutral labeling of vegetarian dishes on food choice among meat-reducers and non-reducers. *JOURNAL OF ENVIRONMENTAL PSYCHOLOGY*, *84*. https://doi.org/10.1016/j.jenvp.2022.101877
Higgs, S. (2015). Social norms and their influence on eating behaviours ☆. *Appetite*, *86*. https://doi.org/10.1016/j.appet.2014.10.021
Higgs, S., Liu, J., Collins, E. I. M., & Thomas, J. M. (2019). Using social norms to encourage healthier eating. *Nutrition Bulletin*, *44*(1), 43–52. https://doi.org/10.1111/nbu.12371
Higgs, S., & Thomas, J. (2016). Social influences on eating. *Current Opinion in Behavioral Sciences*, *9*, 1–6. https://doi.org/10.1016/j.cobeha.2015.10.005
Highfield, T., & Leaver, T. (2015). A methodology for mapping instagram hashtags. *First Monday*, *20*(1). https://doi.org/10.5210/fm.v20i1.5563
Hirvonen, K., Bai, Y., Headey, D., & Masters, W. A. (2020). Affordability of the EAT–Lancet reference diet: a global analysis. *The Lancet Global Health*, *8*(1), e59–e66. https://doi.org/10.1016/S2214-109X(19)30447-4
Hjorth, L., & Burgess, J. (2014). Intimate banalities: The emotional currency of shared camera phone images during the Queensland flood disaster. *The Routledge Companion to Mobile Media*, 499–513.
Hodson, G., & Earle, M. (2018). Conservatism predicts lapses from vegetarian/vegan diets to meat consumption (through lower social justice concerns and social support). *Appetite*, *120*, 75–81. https://doi.org/10.1016/J.APPET.2017.08.027
How many vegetarians and vegans are in the UK? (2022). Finder UK. https://www.finder.com/uk/uk-diet-trends
Hume, D. (1992). *A treatise of human nature*. Prometheus Books.
Ipsos Mori & The Vegan Society. (2016). *Poll Conducted for The Vegan Society Incidence of Vegans Research*.
Janetzko, D. (2017). The Role of APIs in Data Sampling. *The SAGE Handbook of Social Media Research Methods*, *2017*, 146–160.
Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). *Toward a Definition of Mixed Methods Research*. https://doi.org/10.1177/1558689806298224
Joy, M. (2010). *Why We Love Dogs, Eat Pigs, and Wear Cows*. Conari Press.
Judge, M., & Wilson, M. S. (2018). A dual-process motivational model of attitudes towards vegetarians and vegans. *European Journal of Social Psychology*, *00*, 1–10. https://doi.org/10.1002/ejsp.2386
Kahneman, D. (2011). Thinking, fast and slow. In *Planning Theory* (Issue 4). Farrar, Straus and Giroux.

Kahneman, D., & Miller, D. T. (1986). Norm Theory. Comparing Reality to Its Alternatives. *Psychological Review*, *93*(2), 136–153. https://doi.org/10.1037/0033-295X.93.2.136
Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, *47*(2), 263–292. https://about.jstor.org/terms
Kahneman, D., & Tversky, A. (1984). Choices, values, and frames. *American Psychologist*, *39*(4), 341–350. https://doi.org/10.1017/CBO9780511803475.002
Keczer, Z., File, B., Orosz, G., & Zimbardo, P. G. (2016). Social representations of hero and everyday hero: A network study from representative samples. *PLoS ONE*, *11*(8), 1–17. https://doi.org/10.1371/journal.pone.0159354
Keller, C., & Siegrist, M. (2015). Does personality influence eating styles and food choices? Direct and indirect effects. *Appetite*, *84*, 128–138. https://doi.org/10.1016/J.APPET.2014.10.003
Kemper, J. A. (2020). Motivations, barriers, and strategies for meat reduction at different family lifecycle stages. *Appetite*, *150*, 104644. https://doi.org/10.1016/j.appet.2020.104644
Kennedy, H., Williams, R., Neff, G., Hale, S., Jones, R., Middlemass, R., Millings, A., Ong, J., Patel, R., Richardson, D., & Wajid, S. (2022). *The Digital Good Network: exploring equity, sustainability and resilience in people's relationships with and through digital technologies / grant application*. https://digitalgood.net/
Kim, J. W. (2018). They liked and shared: Effects of social media virality metrics on perceptions of message influence and behavioral intentions. *Computers in Human Behavior*, *84*. https://doi.org/10.1016/j.chb.2018.01.030
Kinzig, A. P., Ehrlich, P. R., Alston, L. J., Arrow, K., Barrett, S., Buchman, T. G., Daily, G. C., Levin, B., Levin, S., Oppenheimer, M., Ostrom, E., & Saari, D. (2013). Social Norms and Global Environmental Challenges: The Complex Interaction of Behaviors, Values, and Policy. *BioScience*, *63*(3), 164–175. https://doi.org/10.1525/bio.2013.63.3.5
Kivits, J., Ricci, L., & Minary, L. (2019). Interdisciplinary research in public health: The "why" and the "how." *Journal of Epidemiology and Community Health*, *73*(12), 1061–1062. https://doi.org/10.1136/jech-2019-212511
Krpan, D., & Houtsma, N. (2020). To veg or not to veg? The impact of framing on vegetarian food choice. *Journal of Environmental Psychology*, *67*(January), 101391. https://doi.org/10.1016/j.jenvp.2020.101391
Krzyżanowski, M. (2020). Normalization and the discursive construction of "new" norms and "new" normality: discourse in the paradoxes of populism and neoliberalism. In *Social Semiotics* (Vol. 30, Issue 4, pp. 431–448). Routledge. https://doi.org/10.1080/10350330.2020.1766193
Kuhn, T. (1962). *The structure of scientific revolutions* (Second Ed.). University of Chicago Press.
Kurz, V. (2018). Nudging to reduce meat consumption: Immediate and persistent effects of an intervention at a university restaurant. *Journal of Environmental Economics and Management*, *90*, 317–341.
Lahire, B. (2019). Sociology at the individual level, psychologies and neurosciences. *European Journal of Social Theory*, *23*(1), 52–71. https://doi.org/10.1177/1368431018809548
Larner, E., Fish, A. L., Way, C. H., Graham, F., Armstrong, B., Patel, V., Knight, D., Jourdain, R., Allen, T., Armstrong, I. G., Collister, J. M., Barnett, O., & Reynolds, C. J. (2021). Reaction to a low-carbon footprint food logo and other sustainable diet promotions in a UK University's Student Union 'Living Lab.' *Future of Food: Journal on Food, Agriculture and Society*, *9*(1), 1–30. https://doi.org/10.17170/kobra-202011192217
Lea, E., & Worsley, A. (2001). Influences on meat consumption in Australia. *Appetite*, *36*(2), 127–136. https://doi.org/10.1006/APPE.2000.0386
Lea, E., & Worsley, A. (2003). Benefits and barriers to the consumption of a vegetarian diet in Australia. *Public Health Nutrition*, *6*(5), 505–511. https://doi.org/10.1079/PHN2002452
Ledford, H. (2015). Team Science. *Nature*, *525*, 308–311.
Legros, S., & Cislaghi, B. (2020). Mapping the Social-Norms Literature: An Overview of Reviews. *Perspectives on Psychological Science*, *15*(1), 62–80.

https://doi.org/10.1177/1745691619866455
Lentz, G., Connelly, S., Mirosa, M., & Jowett, T. (2018). Gauging attitudes and behaviours: Meat consumption and potential reduction. *Appetite*, *127*(April), 230–241. https://doi.org/10.1016/j.appet.2018.04.015
Leroy, F., & Praet, I. (2015). Meat traditions. The co-evolution of humans and meat. *Appetite*, *90*, 200–211. https://doi.org/10.1016/J.APPET.2015.03.014
Linton, A., Germundsson, P., Heimann, M., & Danermark, B. (2013). Teachers' social representation of students with Asperger diagnosis. *European Journal of Special Needs Education*, *28*(4), 392–412. https://doi.org/10.1080/08856257.2013.812404
Litt, D. M., & Stock, M. L. (2011). Adolescent Alcohol-Related Risk Cognitions: The Roles of Social Norms and Social Networking Sites. *Psychology of Addictive Behaviors*, *25*(4), 708–713. https://doi.org/10.1037/a0024226
Liu, J., & Shi, R. (2019). How do Online Comments Affect Perceived Descriptive Norms of E-Cigarette Use? The Role of Quasi-Statistical Sense, Valence Perceptions, and Exposure Dosage. *Journal of Computer-Mediated Communication*, *24*(1), 1–20. https://doi.org/10.1093/JCMC/ZMY021
Loughnan, S., Bastian, B., & Haslam, N. (2014). The Psychology of Eating Animals: *Current Directions in Psychological Science*, *23*(2), 104–108. https://doi.org/10.1177/0963721414525781
Macdiarmid, J. I., Douglas, F., & Campbell, J. (2016). Eating like there's no tomorrow: Public awareness of the environmental impact of food and reluctance to eat less meat as part of a sustainable diet. *Appetite*, *96*, 487–493.
Machovina, B., Feeley, K. J., & Ripple, W. J. (2015). Biodiversity conservation: The key is reducing meat consumption. *Science of The Total Environment*, *536*, 419–431. https://doi.org/10.1016/J.SCITOTENV.2015.07.022
MacInnis, C. C., & Hodson, G. (2017). It ain't easy eating greens: Evidence of bias toward vegetarians and vegans from both source and target. *Group Processes and Intergroup Relations*, *20*(6), 721–744. https://doi.org/10.1177/1368430215618253
Macleod, M. (2018). What makes interdisciplinarity difficult? Some consequences of domain specificity in interdisciplinary practice. *Synthese*, *195*, 697–720. https://doi.org/10.1007/s11229-016-1236-4
Madon, S. (1997). What Do People Believe About Gay Males ? A Study of Stereotype Content and Strength. *Sex Roles*, *37*, 663–685.
Marinova, D., & Bogueva, D. (2019). *Planetary health and reduction in meat consumption*. https://doi.org/10.1186/s42055-019-0010-0
Markowski, K. L., & Roxburgh, S. (2019). "If I became a vegan, my family and friends would hate me:" Anticipating vegan stigma as a barrier to plant-based diets. *Appetite*, *135*, 1–9. https://doi.org/10.1016/j.appet.2018.12.040
Marteau, T. M. (2017). Towards environmentally sustainable human behaviour: targeting non-conscious and conscious processes for effective and acceptable policies. *Philosophical Transactions Royal Society*, *375*. https://doi.org/10.1098/rsta.2016.0371
Marwick, A. E., & Boyd, D. (2010). Article I tweet honestly, I tweet passionately: Twitter users, context collapse, and the imagined audience. *New Media & Society*, *13*(1), 114–133. https://doi.org/10.1177/1461444810365313
Mastermann-Smith, H., Ragusa, A. T., & Crampton, A. (2014). *Reproducing speciesism: a content analysis of Australian media representations of veganism*.
May, S., Romberger, D. J., & Poole, J. A. (2012). Respiratory Health Effects of Large Animal Farming Environments. *Journal of Toxicology and Environmental Health*, *15*(8), 524–541. https://doi.org/10.1080/10937404.2012.744288
Maye, D., Fellenor, J., Potter, C., Urquhart, J., & Barnett, J. (2021). What's the beef?: Debating meat, matters of concern and the emergence of online issue publics. *Journal of Rural Studies*, *84*, 134–146. https://doi.org/10.1016/j.jrurstud.2021.03.008
McAlaney, J., Bewick, B. M., & Bauerle, J. (2010). Social Norms Guidebook: A guide to implementing

the social norms approach in the UK. *University of Bradford, University of Leeds, Department of Health: West Yorkshire, UK*, *June*.
McDonald, B. (2000). “Once you know something, you can’t not know it” An empirical look at becoming vegan. *Society and Animals*, *8*(1), 1–23.
Mellon, J., & Prosser, C. (2017). Twitter and Facebook are not representative of the general population: Political attitudes and demographics of British social media users. *Research & Politics*, *4*(3). https://doi.org/10.1177/2053168017720008
Mesman, M., Hendriks, H., & van den PUTTE, B. (2020). How Viewing Alcohol Posts of Friends on Social Networking Sites Influences Predictors of Alcohol Use. *Journal of Health Communication*, *25*(6), 522–529. https://doi.org/10.1080/10810730.2020.1821130
Michie, S., Atkins, L., & West, R. (2014). *The Behaviour Change Wheel: A Guide to Designing Interventions*. Silverback Publishing.
Michie, S., Richardson, M., Johnston, M., Abraham, C., Francis, J., Hardeman, W., Eccles, M. P., Cane, J., & Wood, C. E. (2013). The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: Building an international consensus for the reporting of behavior change interventions. *Annals of Behavioral Medicine*, *46*(1), 81–95. https://doi.org/10.1007/s12160-013-9486-6
Milfont, T. L., Osborne, D., Yogeeswaran, K., & Sibley, C. G. (2020). The role of national identity in collective pro-environmental action. *Journal of Environmental Psychology*, *72*, 101522. https://doi.org/10.1016/J.JENVP.2020.101522
Miller, D. T., & Prentice, D. A. (2016). Changing Norms to Change Behavior. *Annual Review of Psychology*. https://doi.org/10.1146/annurev-psych-010814-015013
Milosavljevic, M., Koch, C., & Rangel, A. (2011). Consumers can make decisions in as little as a third of a second. *Judgment and Decision Making*, *6*(6), 520–530.
Ministry for the Environment. (2022). *New Zealand’ s Greenhouse Gas Inventory*.
Minson, J. A., & Monin, B. B. (2012). Do-Gooder Derogation: Disparaging Morally Motivated Minorities to Defuse Anticipated Reproach. *Social Psychological and Personality Science 3(2)*, *3*(2), 200–207. https://doi.org/10.1177/1948550611415695
Mintel. (2020). *Plant-based push: UK sales of meat-free foods shoot up | Mintel.com*. https://www.mintel.com/press-centre/food-and-drink/plant-based-push-uk-sales-of-meat-free-foods-shoot-up-40-between-2014-19
Misztal, B. A. (2001). Normality and Trust in Goffman’s Theory of Interaction Order. *Sociological Theory*, *19*(3).
Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., Altman, D., Antes, G., Atkins, D., Barbour, V., Barrowman, N., Berlin, J. A., Clark, J., Clarke, M., Cook, D., D’Amico, R., Deeks, J. J., Devereaux, P. J., Dickersin, K., Egger, M., Ernst, E., … Tugwell, P. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine*, *6*(7). https://doi.org/10.1371/journal.pmed.1000097
Mollen, S., Rimal, R. N., Ruiter, R. A. C., & Kok, G. (2013). Healthy and unhealthy social norms and food selection. Findings from a field-experiment. *Appetite*, *65*, 83–89. https://doi.org/10.1016/j.appet.2013.01.020
Monin, B., Sawyer, P. J., & Marquez, M. J. (2008). The Rejection of Moral Rebels: Resenting Those Who Do the Right Thing. *Journal of Personality and Social Psychology*, *95*(1), 76–93. https://doi.org/10.1037/0022-3514.95.1.76
Mooney, K. M., & Lorenz, E. (1997). The Effects of Food and Gender on Interpersonal Perceptions. *Sex Roles*, *36*(9), 639–653. https://link.springer.com/content/pdf/10.1023%2FA%3A1025622125603.pdf
Moreno, M. A., D’Angelo, J., & Whitehill, J. (2016). Social media and alcohol: Summary of research, intervention ideas and future study directions. *Media and Communication*, *4*(3), 50–59. https://doi.org/10.17645/mac.v4i3.529
Morris, C. (2018). ‘Taking the Politics out of Broccoli’: Debating (De)meatification in UK National and

Regional Newspaper Coverage of the Meat Free Mondays Campaign. *Sociologia Ruralis*, *58*(2), 433–452. https://doi.org/10.1111/soru.12163

Morton, S. M. B., Bandara, D. K., Robinson, E. M., & Carr, P. E. A. (2012). In the 21st Century, what is an acceptable response rate? *Australian and New Zealand Journal of Public Health*, *36*(2), 106–108. https://doi.org/10.1111/j.1753-6405.2012.00854.x

Moscovici, S. (2000). *Social Representations: Explorations in Social Psychology*. Polity Press.

Most Popular Countries and Cities for Vegans in 2020 (Jan-2021 Update) - Chef's Pencil. (2020). Chef's Pencil. https://www.chefspencil.com/most-popular-countries-and-cities-for-vegans-in-2020-jan-2021-update/

Mullee, A., Vermeire, L., Vanaelst, B., Mullie, P., Deriemaeker, P., Leenaert, T., De Henauw, S., Dunne, A., Gunter, M. J., Clarys, P., & Huybrechts, I. (2017). Vegetarianism and meat consumption: A comparison of attitudes and beliefs between vegetarian, semi-vegetarian, and omnivorous subjects in Belgium. *Appetite*, *114*, 299–305. https://doi.org/10.1016/J.APPET.2017.03.052

Na, J., McDonough, I. M., Chan, M. Y., & Park, D. C. (2016). Social-Class Differences in Consumer Choices: Working-Class Individuals Are More Sensitive to Choices of Others Than Middle-Class Individuals. *Personality and Social Psychology Bulletin*, *42*(4), 430–443. https://doi.org/10.1177/0146167216634043

Nagy, P., & Neff, G. (2015). Imagined Affordance: Reconstructing a Keyword for Communication Theory: *Social Media + Society*, *1*(2), 1–9. https://doi.org/10.1177/2056305115603385

National Statistics: English indices of deprivation 2019. (2019). Ministry of Housing, Communities & Local Government. https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019.

Nelson, D. L., Mcevoy, C. L., & Dennis, S. (2000). What is free association and what does it measure? *Memory & Cognition*, *28*(6), 887–899. https://link.springer.com/content/pdf/10.3758/BF03209337.pdf

Noelle-Neumann, E. (1974). The Spiral of Silence a Theory of Public Opinion. *Journal of Communication*, *24*(2), 43–51. https://doi.org/10.1111/J.1460-2466.1974.TB00367.X

Nwabueze, C., & Okonkwo, E. (2018). Rethinking the Bullet Theory in the Digital Age. *International Journal of Media, Journalism and Mass Communications (IJMJMC) Page|*, *4*(2). https://doi.org/10.20431/2454-9479.0402001

O'Riordan, T., & Stoll-Kleemann, S. (2015). The Challenges of Changing Dietary Behavior Toward More Sustainable Consumption. *Environment*, *57*(5), 4–12. https://doi.org/10.1080/00139157.2015.1069093

Obar, J. A., Zube, P., & Lampe, C. (2012). Advocacy 2.0: An Analysis of How Advocacy Groups in the United States Perceive and Use Social Media as Tools for Facilitating Civic Engagement and Collective Action. *Source: Journal of Information Policy*, *2*, 1–25. https://doi.org/10.5325/jinfopoli.2.2012.0001

Obersteiner, M., Walsh, B., Frank, S., Havlík, P., Cantele, M., Liu, J., Palazzo, A., Herrero, M., Lu, Y., Mosnier, A., Valin, H., Riahi, K., Kraxner, F., Fritz, S., & Van Vuuren, D. (2016). Assessing the land resource–food price nexus of the Sustainable Development Goals. *Science Advances*, *2*(9). https://doi.org/10.1126/SCIADV.1501499/SUPPL_FILE/1501499_SM.PDF

OECD. (2022). *Meat consumption (indicator)*. https://www.oecd-ilibrary.org/agriculture-and-food/meat-consumption/indicator/english_fa290fd0-en

Parkin, B. L., & Attwood, S. (2022). Menu design approaches to promote sustainable vegetarian food choices when dining out. *JOURNAL OF ENVIRONMENTAL PSYCHOLOGY*, *79*. https://doi.org/10.1016/j.jenvp.2021.101721

Patel, V., & Buckland, N. J. (2021). Perceptions about meat reducers: Results from two UK studies exploring personality impressions and perceived group membership. *Food Quality and Preference*, *93*, 104289. https://doi.org/10.1016/J.FOODQUAL.2021.104289

Payne, C. R., Niculescu, M., Just, D. R., & Kelly, M. P. (2015). Shopper marketing nutrition

interventions: Social norms on grocery carts increase produce spending without increasing shopper budgets. *Preventive Medicine Reports*, *2*, 287–291. https://doi.org/10.1016/J.PMEDR.2015.04.007

Pechey, R., Bateman, P., Cook, B., & Jebb, S. A. (2022). Impact of increasing the relative availability of meat-free options on food selection: Two natural field experiments and an online randomised trial. *The International Journal of Behavioral Nutrition and Physical Activity*, *19*. https://doi.org/https://dx.doi.org/10.1186/s12966-021-01239-z

Penny, J., Swift, J. A., & Salter, A. (2015). "Meat reducers": meat reduction strategies and attitudes towards meat alternatives in an emerging group. *Proceedings of The Nutrition Society2*.

Perkins, H. W., & Berkowitz, A. D. (1986). Perceiving the community norms of alcohol use among students: some research implications for campus alcohol education programming. *The International Journal of the Addictions*, *21*(9–10), 961–976. https://doi.org/10.3109/10826088609077249

Piazza, J., Ruby, M. B., Loughnan, S., Luong, M., Kulik, J., Watkins, H. M., & Seigerman, M. (2015). Rationalizing meat consumption. The 4Ns. *Appetite*, *91*, 114–128. https://doi.org/10.1016/J.APPET.2015.04.011

Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science*, *360*(6392), 987–992. https://doi.org/10.1126/science.aaq0216

Popkin, B. M. (2006). Global nutrition dynamics: the world is shifting rapidly toward a diet linked with noncommunicable diseases. *The American Journal of Clinical Nutrition*, *84*(2), 289–298. https://doi.org/10.1093/AJCN/84.2.289

Potts, A., & White, M. (2008). New Zealand vegetarians: At odds with their nation. *Society and Animals*, *16*(4), 336–353. https://doi.org/10.1163/156853008X357667

Povey, R., Wellens, B., & Conner, M. (2001). Attitudes towards following meat, vegetarian and vegan diets: an examination of the role of ambivalence. *Appetite*, *37*, 15–26. https://doi.org/10.1006/appe.2001.0406

Prestwich, A., Kellar, I., Conner, M., Lawton, R., Gardner, P., & Turgut, L. (2016). Does changing social influence engender changes in alcohol intake? A meta-analysis. *Journal of Consulting and Clinical Psychology*, *84*(10), 845–860. https://doi.org/10.1037/ccp0000112

Pryor, C., Perfors, A., & Howe, P. D. L. (2019). Even arbitrary norms influence moral decision-making. *Nature Human Behaviour*, *3*(1), 57–62. https://doi.org/10.1038/s41562-018-0489-y

Public Health England. (2016). *The Eatwell Guide*. https://www.gov.uk/government/publications/the-eatwell-guide

Public Health England. (2020). *Achieving behaviour change: A guide for national government*.

Quan-Haase, A., & Sloan, L. (2017). Introduction to the Handbook of Social Media Research Methods: Goals, Challenges and Innovations. *The SAGE Handbook of Social Media Research Methods*, *2017*, 1–9. https://doi.org/10.4135/9781473983847.n1

Rabikowska, M. (2010). Social Identities Journal for the Study of Race, Nation and Culture Negotiation of normality and identity among migrants from Eastern Europe to the United Kingdom after 2004. *Social Identities*, *16*(3), 285–296. https://doi.org/10.1080/13504630.2010.482391

Rawls, J. (2009). *A Theory of Justice*. Harvard University Press. https://doi.org/10.2307/j.ctvkjb25m

Reisch, L. A. (2021). Shaping healthy and sustainable food systems with behavioural food policy. *European Review of Agricultural Economics*, *48*(4), 665–693. https://doi.org/10.1093/ERAE/JBAB024

Richter, I., Thøgersen, J., & Klöckner, C. A. (2018). A Social Norms Intervention Going Wrong: Boomerang Effects from Descriptive Norms Information. *Sustainability 2018, Vol. 10, Page 2848*, *10*(8), 2848. https://doi.org/10.3390/SU10082848

Robinson, E., Thomas, J., Aveyard, P., & Higgs, S. (2014). What everyone else is eating: A systematic review and meta-analysis of the effect of informational eating norms on eating behavior. *Journal of the Academy of Nutrition and Dietetics*, *114*(3), 414–429.

https://doi.org/10.1016/j.jand.2013.11.009
Rogers, R. (2014). Foreword: Debanalising Twitter: The transformation of an object of study. In K. Weller, A. Bruns, J. Burgess, M. Mahrt, & C. Puschmann (Eds.), *Twitter and society* (pp. ix–xxvi). Peter Lang.
Rogers, R. (2019). Positioning Digital Methods. In R. Rogers (Ed.), *Doing Digital Methods* (pp. 3–20). SAGE Publications Inc.
Rosenfeld, D. L. (2018). The psychology of vegetarianism: Recent advances and future directions. *Appetite*, *131*, 125–138. https://doi.org/10.1016/j.appet.2018.09.011
Rosenfeld, D. L., Rothgerber, H., & Tomiyama, A. J. (2019). Mostly Vegetarian, But Flexible About It: Investigating How Meat-Reducers Express Social Identity Around Their Diets. *Social Psychological and Personality Science*, 1–10. https://doi.org/10.1177/1948550619869619
Rosenfeld, D. L., & Tomiyama, A. J. (2020). *Taste and health concerns trump anticipated stigma as barriers to vegetarianism*. https://doi.org/10.1016/j.appet.2019.104469
Rossi, J., Garner, S. A., Rossi, J., & Garner, S. A. (2014). Industrial Farm Animal Production: A Comprehensive Moral Critique. *Journal of Agricultural and Environmental Ethics*, *27*(3), 479–522. https://doi.org/10.1007/S10806-014-9497-8
Rothgerber, H. (2013). Real men don't eat (vegetable) quiche: Masculinity and the justification of meat consumption. *Psychology of Men and Masculinity*, *14*(4), 363–375. https://doi.org/10.1037/A0030379
Rothgerber, H. (2016). Meat-related cognitive dissonance: A conceptual framework for understanding how meat eaters reduce negative arousal from eating animals. *Appetite*, *146*, 1–16. https://doi.org/10.1016/j.appet.2019.104511
Rozin, P. (1999). The Process of Moralization. *Psychological Science*, *10*(3). https://doi.org/10.1111/1467-9280.00139
Rozin, P., Kurzer, N., & Cohen, A. B. (2002). Free associations to "'food:'" the effects of gender, generation, and culture. *Journal of Research in Personality*, *36*, 419–441.
Rozin, P., Markwith, M., & Stoess, C. (1997). *Moralization and Becoming a Vegetarian: The Transformation of Preferences Into Values and the Recruitment of Disgust*.
Rozin, P., & Singh, L. (1999). The Moralization of Cigarette Smoking in the United States. *Journal of Consumer Psychology*, *8*(3), 321–337.
Ruby, M. B. (2012). Vegetarianism. A blossoming field of study q. *Appetite*, *58*, 141–150. https://doi.org/10.1016/j.appet.2011.09.019
Ruby, M. B., & Heine, S. J. (2011). Meat, morals, and masculinity. *Appetite*, *56*, 447–450. https://doi.org/10.1016/j.appet.2011.01.018
Rume, T., & Islam, S. M. D. U. (2020). Environmental effects of COVID-19 pandemic and potential strategies of sustainability. In *Heliyon* (Vol. 6, Issue 9). Elsevier Ltd. https://doi.org/10.1016/j.heliyon.2020.e04965
Rylance, R. (2015). Grant giving: Global funders to focus on interdisciplinarity. *Nature*, *525*(7569), 313–315. https://doi.org/10.1038/525313a
Sachs, J. D., Karim, S. S. A., Aknin, L., Allen, J., Brosbøl, K., Colombo, F., Barron, G. C., Espinosa, M. F., Gaspar, V., Gaviria, A., Haines, A., Hotez, P. J., Koundouri, P., Bascuñán, F. L., Lee, J.-K., Pate, M. A., Ramos, G., Reddy, K. S., Serageldin, I., … Michie, S. (2022). The Lancet Commission on lessons for the future from the COVID-19 pandemic. *Lancet (London, England)*. https://doi.org/10.1016/S0140-6736(22)01585-9/ATTACHMENT/E77C363A-C7B6-4329-BF2F-67B888B4DD7F/MMC1.PDF
Samuelson, W., & Zeckhauser, R. (1988). Status quo bias in decision making. *Journal of Risk and Uncertainty*, *1*(1), 7–59. https://doi.org/10.1007/BF00055564
Savage, L. J. (1954). *The Foundations of Statistics*. Wiley.
Schoenberg, N. E., & Ravdal, H. (2000). Using vignettes in awareness and attitudinal research. *International Journal of Social Research Methodology*, *3*(1), 63–74. https://doi.org/10.1080/136455700294932

Sharps, M. A., Fallon, V., Ryan, S., & Coulthard, H. (2021). The role of perceived descriptive and injunctive norms on the self-reported frequency of meat and plant-based meal intake in UK-based adults. *Appetite*, *167*. https://doi.org/10.1016/J.APPET.2021.105615

Sherman, L. E., Payton, A. A., Hernandez, L. M., Greenfield, P. M., & Dapretto, M. (2016). The Power of the Like in Adolescence: Effects of Peer Influence on Neural and Behavioral Responses to Social Media. *Psychological Science*, *27*(7), 1027–1035. https://doi.org/10.1177/0956797616645673

Simon, H. A. (2000). Bounded Rationality in Social Science: Today and Tomorrow. *Mind & Society*, *1*, 25–39.

Skivington, K., Matthews, L., Simpson, S. A., Craig, P., Baird, J., Blazeby, J. M., Boyd, K. A., Craig, N., French, D. P., Mcintosh, E., Petticrew, M., Rycroft-Malone, J., White, M., & Moore, L. (2021). A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance. *British Medical Journal*, *374*(2061). https://doi.org/10.1136/bmj.n2061

Slade, J., & Alleyne, E. (2021). The Psychological Impact of Slaughterhouse Employment: A Systematic Literature Review. *Trauma, Violence & Abuse*, 15248380211030244. https://doi.org/10.1177/15248380211030243

Slapø, H. B., & Karevold, K. I. (2019). Simple Eco-Labels to Nudge Customers Toward the Most Environmentally Friendly Warm Dishes: An Empirical Study in a Cafeteria Setting. *Frontiers in Sustainable Food Systems*, *3*(May), 1–9. https://doi.org/10.3389/fsufs.2019.00040

Sparkman, G., Howe, L., & Walton, G. (2021). How social norms are often a barrier to addressing climate change but can be part of the solution. *Behavioural Public Policy*, *5*(4), 528–555. https://doi.org/10.1017/bpp.2020.42

Sparkman, G., & Walton, G. (2017). Dynamic Norms Promote Sustainable Behavior, Even if It Is Counternormative. *Psychological Science*, *28*(11), 1663–1674. https://doi.org/10.1177/0956797617719950

Sparkman, G., Weitz, E., Robinson, T., Malhotra, N., & Walton, G. (2020). Developing a scalable dynamic norm menu-based intervention to reduce meat consumption. *Sustainability (Switzerland)*, *12*(6), 1–38. https://doi.org/10.3390/su12062453

Spash, C. L. (2020). 'The economy' as if people mattered: revisiting critiques of economic growth in a time of crisis. *Globalizations*, 1–18. https://doi.org/10.1080/14747731.2020.1761612

Springmann, M., Clark, M., Mason-D'croz, D., Wiebe, K., Leon Bodirsky, B., Lassaletta, L., De Vries, W., Vermeulen, S. J., Herrero, M., Carlson 11, K. M., Jonell, M., Troell, M., Declerck, F., Gordon, J., Zurayk, R., Scarborough, P., Rayner, M., Loken, B., Fanzo, J., … Willett, W. (2018). Options for keeping the food system within environmental limits. *Nature*. https://doi.org/10.1038/s41586-018-0594-0

Springmann, M., Godfray, H. C. J., Rayner, M., & Scarborough, P. (2016). Analysis and valuation of the health and climate change cobenefits of dietary change. *Proceedings of the National Academy of Sciences of the United States of America*, *113*(15), 4146–4151. https://doi.org/10.1073/PNAS.1523119113/SUPPL_FILE/PNAS.1523119113.SAPP.PDF

Springmann, M., Godfray, H., Rayner, M., Scarborough, P., & Martin, O. (2016). Analysis and valuation of the health and climate change cobenefits of dietary change. *PNAS*. https://doi.org/10.5287/bodleian:XObxm2ebO

Srivastava, A. B. L. (1959). Effect of Non-Normality on the Power of the Analysis of Variance Test. *Biometrika*, *46*(1/2), 114. https://doi.org/10.2307/2332813

Stein, R. I., & Nemeroff, C. J. (1995). Moral Overtones of Food: Judgments of Others Based on What they Eat. *Personality and Social Psychology Bulletin*, *21*(5), 480–490. https://doi.org/10.1177/0146167295215006

Stewart, C., Piernas, C., Cook, B., & Jebb, S. A. (2021). *Articles Trends in UK meat consumption: analysis of data from years 1-11 of the National Diet and Nutrition Survey rolling programme*. www.thelancet.com/

Stok, F. M., de Vet, E., de Ridder, D. T. D., & de Wit, J. B. F. (2016). The potential of peer social norms to shape food intake in adolescents and young adults: a systematic review of effects and moderators. *Health Psychology Review*, *10*(3), 326–340. https://doi.org/10.1080/17437199.2016.1155161

Stoll-Kleemann, S., & O'Riordan, T. (2015). The Sustainability Challenges of Our Meat and Dairy Diets. *Environment: Science and Policy for Sustainable Development*, *57*(3), 34–48. https://doi.org/10.1080/00139157.2015.1025644

Stoll-Kleemann, S., & Schmidt, U. J. (2017). Reducing meat consumption in developed and transition countries to counter climate change and biodiversity loss: a review of influence factors. *Regional Environmental Change*, *17*, 1261–1277. https://doi.org/10.1007/s10113-016-1057-5

Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review : An Official Journal of the Society for Personality and Social Psychology, Inc*, *8*(3), 220–247. https://doi.org/10.1207/s15327957pspr0803_1

Sullivan, L. (2009). *The SAGE Glossary of the Social and Behavioral Sciences*. SAGE Publications, Inc. https://doi.org/10.4135/9781412972024 NV - 3

Sunstein, C. R. (2015). Nudges Do Not Undermine Human Agency: A Note. *Journal of Consumer Policy*, *38*(3), 207–210.

Sunstein, C. R. (2018). Misconceptions about nudges. *Journal of Behavioral Economics for Policy*, *2*(1), 61–67.

Sunstein, C. R., & Reisch, L. A. (2019). Trusting Nudges : Toward A Bill of Rights for Nudging. *Trusting Nudges*. https://doi.org/10.4324/9780429451645

Sztompka, P. (2008). The Focus on Everyday Life: a New Turn in Sociology. *European Review*, *16*(1), 1–15. https://doi.org/10.1017/S1062798708000045

Taillie, L. S., Chauvenet, C., Grummon, A. H., Hall, M. G., Waterlander, W., Prestemon, C. E., & Jaacks, L. M. (2021). Testing front-of-package warnings to discourage red meat consumption: A randomized experiment with US meat consumers. *The International Journal of Behavioral Nutrition and Physical Activity*, *18*. https://doi.org/https://dx.doi.org/10.1186/s12966-021-01178-9

Tajfel, H., & Turner, J. C. (1986). The Social Identity Theory of Intergroup Behavior. In S. Worchel & W. G. Austin (Eds.), *Psychology of Intergroup Relations* (pp. 7–24). Hall Publishers.

Tang, K. L., Caffrey, N. P., Nóbrega, D. B., Cork, S. C., Ronksley, P. E., Barkema, H. W., Polachek, A. J., Ganshorn, H., Sharma, N., Kellner, J. D., & Ghali, W. A. (2017). Restricting the use of antibiotics in food-producing animals and its associations with antibiotic resistance in food-producing animals and human beings: a systematic review and meta-analysis. *The Lancet Planetary Health*, *1*(8), e316–e327. https://doi.org/10.1016/S2542-5196(17)30141-9

Taylor, D. G. (1982). Pluralistic Ignorance and the Spiral of Silence: A Formal Analysis. *Source: The Public Opinion Quarterly*, *46*(3), 311–335.

Teddlie, C., & Tashakkori, A. (2009). *Foundations of Mixed Methods Research*. SAGE Publications Inc.

The Behavioural Insights Team. (2020). *A Menu for Change*.

The British Psychological Society. (2021). *Ethics guidelines for internet-mediated research*.

Thelwall, M. (2005). *Mozdeh: Big Data Text Analytics [Software]*.

Thelwall, M. (2010). *Researching the public web - eHumanities.NL*. https://www.ehumanities.nl/researching-the-public-web/

Thomas, J. M., Ursell, A., Robinson, E., Aveyard, P., Jebb, S. A., Herman, C. P., & Higgs, S. (2017). Using a Descriptive Social Norm to Increase Vegetable Selection in Workplace Restaurant Settings. *Health Psychology*, *36*(11), 1026–1033. https://doi.org/10.1037/hea0000478

Thomas, M. A. (2016). Are vegans the same as vegetarians? The effect of diet on perceptions of masculinity. *Appetite*, *97*, 79–86. https://doi.org/10.1016/J.APPET.2015.11.021

Tiainen, A. M. K., Männistö, S., Lahti, M., Blomstedt, P. A., Lahti, J., Perälä, M. M., Räikkönen, K., Kajantie, E., & Eriksson, J. G. (2013). Personality and Dietary Intake – Findings in the Helsinki Birth Cohort Study. *PLOS ONE*, *8*(7), e68284. https://doi.org/10.1371/JOURNAL.PONE.0068284

Tilman, D., & Clark, M. (2014). Global diets link environmental sustainability and human health. *Nature*, *515*. https://doi.org/10.1038/nature13959

Tobler, C., Visschers, V. H. M., & Siegrist, M. (2011). Eating green. Consumers' willingness to adopt ecological food consumption behaviors. *Appetite*, *57*(3), 674–682. https://doi.org/10.1016/j.appet.2011.08.010

Tomasello, M. (2008). *Origins of Human Communication*. MIT Press.

Tomasello, M. (2014). The ultra-social animal. *European Journal of Social Psychology*, *44*(3), 187–194. https://doi.org/10.1002/EJSP.2015

Townsend, L., & Wallace, C. (2016). *Social Media Research: A Guide to Ethics*.

Treem, J. W., & Leonardi, P. M. (2012). Social Media Use in Organizations: Exploring the Affordances of Visibility, Editability, Persistence, and Association. *Communication Yearbook*, *36*, 3.

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., … Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine*, *169*(7), 467–473. https://doi.org/10.7326/M18-0850

Twitter. (2021). *Search results FAQ*. https://help.twitter.com/en/using-twitter/top-search-results-faqs#:~:text=What are %22top%22 Tweets%3F,to care about most first.

Van Der Linden, S. (2015). Exploring Beliefs About Bottled Water and Intentions to Reduce Consumption: The Dual-Effect of Social Norm Activation and Persuasive Information. *Environment and Behavior*, *47*(5), 526–550. https://doi.org/10.1177/0013916513515239

van Steenbergen, H., & Bocanegra, B. R. (2015). Promises and pitfalls of Web-based experimentation in the advance of replicable psychological science: A reply to Plant (2015). *Behavior Research Methods 2015 48:4*, *48*(4), 1713–1717. https://doi.org/10.3758/S13428-015-0677-X

Vartanian, L. R., Herman, C. P., & Polivy, J. (2007). Consumption stereotypes and impression management: How you are what you eat. *Appetite*, *48*, 265–277. https://doi.org/10.1016/j.appet.2006.10.008

Vaughan, D. (1996). *The Challenger Launch Decision: Risky Technology, Culture, and Deviance at NASA. Chicago*. The University of Chicago Press.

Venema, T. A. G., & Jensen, N. H. (2023). We meat again: a field study on the moderating role of location-specific consumer preferences in nudging vegetarian options. *PSYCHOLOGY & HEALTH*. https://doi.org/10.1080/08870446.2023.2182896

Vergès, P. (1994). Approche du noyau central : propriétés quantitatives et structurales. In C. Guimelli (Ed.), *Structures et transformations des représentations sociales* (pp. 233–253). Delachaux et Niestlé.

Vergès, P. (2005). Un programme de recherche au risque d'une démarche cognitive. In N. Ramognino & P. Vergès (Eds.), *Sociologie et cognition sociale* (pp. 143–158). Presses Universitaires de Provence.

Vidal, L., Ares, G., Machín, L., & Jaeger, S. R. (2015). Using Twitter data for food-related consumer research: A case study on "'what people say when tweeting about different eating situations.'" *Food Quality and Preference*, *45*, 58–69. https://doi.org/10.1016/j.foodqual.2015.05.006

Wahlen, S., Heiskanen, E., Aalto, K., Wahlen, S., Heiskanen, E., Aalto, : K, & Aalto, K. (2012). Endorsing Sustainable Food Consumption: Prospects from Public Catering. *Journal of Consumer Policy*, *35*, 7–21. https://doi.org/10.1007/S10603-011-9183-4

Weir, K. (2020, April 1). *Grief and COVID-19: Mourning our bygone lives*. American Psychological Association. https://www.apa.org/news/apa/2020/grief-covid-19

West, P. C., Gerber, J. S., Engstrom, P. M., Mueller, N. D., Brauman, K. A., Carlson, K. M., Cassidy, E. S., Johnston, M., MacDonald, G. K., Ray, D. K., & Siebert, S. (2014). Leverage points for improving global food security and the environment. *Science*, *345*, 325–328. https://doi.org/10.1126/SCIENCE.1246067/SUPPL_FILE/WEST.SM.PDF

Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., Garnett, T., Tilman, D.,

DeClerck, F., Wood, A., Jonell, M., Clark, M., Gordon, L. J., Fanzo, J., Hawkes, C., Zurayk, R., Rivera, J. A., De Vries, W., Majele Sibanda, L., … L Murray, C. J. (2019). The Lancet Commissions Food in the Anthropocene: the EAT-Lancet Commission on healthy diets from sustainable food systems Executive summary. *The Lancet*. https://doi.org/10.1016/S0140-6736(18)31788-4

Williams, M. L., Burnap, P., & Sloan, L. (2016). Crime sensing with big data: the affordances and limitations of using open-source communications to estimate crime patterns. *British Journal of Criminology*, *57*, 320–340. https://doi.org/10.1093/bjc/azw031

Williams, M. L., Burnap, P., & Sloan, L. (2017). Towards an Ethical Framework for Publishing Twitter Data in Social Research: Taking into Account Users' Views, Online Context and Algorithmic Estimation. *Sociology*, *51*(6), 1149–1168. https://doi.org/10.1177/0038038517708140

Winders, D. J., & Abrell, E. (2021). Slaughterhouse Workers, Animals, and the Environment: The Need for a Rights-Centered Regulatory Framework in the United States That Recognizes Interconnected Interests. *Health and Human Rights Journal*, *23*(2).

Worsley, A., & Skrzypiec, G. (1998). Teenage vegetarianism: Prevalence, social and cognitive contexts. *Appetite*, *30*(2), 151–170. https://doi.org/10.1006/appe.1997.0118

Wyker, B. A., & Davison, K. K. (2010). Behavioral Change Theories Can Inform the Prediction of Young Adults' Adoption of a Plant-based Diet. *Journal of Nutrition Education and Behavior*, *42*(3), 168–177. https://doi.org/10.1016/J.JNEB.2009.03.124

Wysocki, T. (2020). Normality : a Two-Faced Concept. *Review of Philosophy and Psychology*, *11*, 689–716.

Yamin, P., Fei, M., Lahlou, S., & Levy, S. (2019). Using Social Norms to Change Behavior and Increase Sustainability in the Real World: a Systematic Review of the Literature. *Sustainability*, *11*(20), 5847. https://doi.org/10.3390/SU11205847

Yantcheva, B., & Brindal, E. (2013). How much does what you eat matter? The potential role of meal size, fat content, and gender on ratings of desirability. *Eating Behaviors*, *14*(3), 285–290. https://doi.org/10.1016/j.eatbeh.2013.05.001

Yeung, D. (2018). Social media as a catalyst for policy action and social change for health and well-being: Viewpoint. *Journal of Medical Internet Research*, *20*(3), 1–12. https://doi.org/10.2196/jmir.8508

YouGov. (2019). *Is the future of food flexitarian?* https://yougov.co.uk/topics/society/articles-reports/2019/03/18/future-food-flexitarian

YouGov. (2021). *The most popular social networks in the UK | Technology | YouGov Ratings*. https://yougov.co.uk/ratings/technology/popularity/social-networks/all

Zee, T. van der, & Reich, J. (2018). Open Education Science: *AERA Open*, *4*(3), 1–15. https://doi.org/10.1177/2332858418787466

Zhou, X., Perez-Cueto, F. J. A., Dos Santos, Q., Bredie, W. L. P., Molla-Bauza, M. B., Rodrigues, V. M., Buch-Andersen, T., Appleton, K. M., Hemingway, A., Giboreau, A., Saulais, L., Monteleone, E., Dinnella, C., & Hartwell, H. (2019). Promotion of novel plant-based dishes among older consumers using the 'dish of the day' as a nudging strategy in 4 EU countries. *Food Quality and Preference*, *75*(December 2018), 260–272. https://doi.org/10.1016/j.foodqual.2018.12.003

Appendices

Appendix 1. Participant Information Sheets & Consent Forms

- **Study Two (Chapter Five) Information and Consent Form:**

Participant Information Sheet

This is a study run by the Department of Psychology at the University of Sheffield.

Before you decide to take part in this study, please take time to read the following information. Contact us if there is anything that is not clear or if you would like more information.

What are the aims of the study?

This study attempts to explore your thoughts and associations of people who follow various types of diets.

What will happen if you agree to take part?

You will be shown a word on screen, and asked to list all thoughts that you associate with this word. You will also be asked a series of demographic questions (e.g. age, sex, ethnicity etc.). This survey should take you no longer than **5 minutes**. Upon completion of the survey you will have the opportunity to be entered into a prize draw to win a £50 One4All voucher.

Participation in this research study is entirely voluntary. You have the right to withdraw at any time or refuse to participate without negative consequences. If you desire wish to withdraw, you can do so by closing your internet browser. Please note, it will not be possible to withdraw your partial or completed response. This is because the data will be kept anonymous so it will not be possible to identify your response at a later date.

Ethics and Confidentiality

The survey has received full ethical approval from the University of Sheffield Psychology Department ethics committee #, date approved: [date]. All data obtained from participants will be kept confidential and will only be reported in an aggregate format (by reporting only combined results and never reporting individual ones). Your responses to the survey may be shared with other researchers or used for future unplanned analysis, but in such events your data will be completely anonymised. This will also apply if the study results are published in an academic journal.

The data collected will be stored in a password-protected file on the University of Sheffield servers and on a secure online Qualtrics database. All questionnaires will be anonymised, and no one other than the researcher and the researcher's supervisors listed below will have access to them.

Please note that the winner of the One4All voucher will need to sign a form and provide their email address to confirm receipt of the voucher. This form will be kept securely in a locked cabinet or as a digital copy for seven years after the end of the project, accessible by the University finance and administrative staff in the event of a financial audit.

Possible benefits and disadvantages to taking part

On completion of this survey, you will be given the chance to enter the prize draw. In terms of disadvantages, there is a very small risk that some questions may cause you distress. If this is the

case, please find support on the NHS Moodzone webpage (here [hyperlink: https://www.nhs.uk/conditions/stress-anxiety-depression/]).

Questions about the Research and Contacting the Research Team

If you have questions regarding this study, you may contact Vibhuti Patel on vpatel5@sheffield.ac.uk**.** If you have questions you do not feel comfortable asking the lead researcher or would like to make a complaint, you may contact the researcher's supervisors, Dr. Nicola Buckland (n.buckland@sheffield.ac.uk) or Professor Helen Kennedy (h.kennedy@sheffield.ac.uk). If the supervisors are unable to resolve your complaint, please contact Professor Glenn Waller at g.waller@sheffield.ac.uk.

***Consent*:**

I understand the nature and purpose of the procedures involved in this study. These have been communicated to me on the information provided above.

I understand that I am free to withdraw from this study at any time by closing my browser.

I understand that once I start the survey I will be unable to withdraw my partially completed or completed response.

I understand and acknowledge that the investigation is designed to promote scientific knowledge and that the University of Sheffield will use the data I provide for no purpose other than research.

I confirm that I have read and understood the above information, and I know who to contact if I have any questions or concerns. Yes/No

- **Study Three (Chapter Five) Information and Consent Form:**

Participant Information Sheet

This is a study run by the Department of Psychology at the University of Sheffield.

Before you decide to take part in this study, please take time to read the following information. Contact us if there is anything that is not clear or if you would like more information.

What are the aims of the study?
This study aims to collect information about personality impressions, diet, and lifestyle.

What will happen if you agree to take part?

You will be shown a short description of a fellow [student/colleague] at the University of Sheffield. After reading the description, you will be asked to rate this person on a series of personality traits. You will also be asked a series of demographic questions and questions about your lifestyle (e.g. your dietary habits). This survey should take you no longer than **10 minutes.** Upon completion of the survey you will have the opportunity to be entered into a prize draw to win a £100 One4All voucher.

Participation in this research study is entirely voluntary. You have the right to withdraw at any time or refuse to participate without negative consequences. If you wish to withdraw, you can do so by closing your internet browser. Please note, it will not be possible to withdraw your partial or completed response. This is because the data will be kept anonymous so it will not be possible to identify your response at a later date.

Ethics and Confidentiality

The survey has received full ethical approval from the University of Sheffield Psychology Department ethics committee #, date approved: [date]. All data obtained from participants will be kept confidential and will only be reported in an aggregate format (by reporting only combined results and never reporting individual ones). Your responses to the survey may be shared with other researchers or used for future unplanned analysis, but in such events your data will be completely anonymised. This will also apply if the study results are published in an academic journal.

The data collected will be stored in a password-protected file on the University of Sheffield servers and on a secure online Qualtrics database. All questionnaires will be anonymised, and no one other than the researcher and the researcher's supervisors listed below will have access to them.

Please note that the winner of the One4All voucher will need to sign a form and provide their email address to confirm receipt of the voucher. This form will be kept securely in a locked cabinet or as a digital copy for seven years after the end of the project, accessible by the University finance and administrative staff in the event of a financial audit.

Possible benefits and disadvantages to taking part

On completion of this survey, you will be given the chance to enter the prize draw. In terms of disadvantages, there is a very small risk that some questions may cause you distress. If this is the case, please find support on the NHS Moodzone webpage (here [hyperlink: https://www.nhs.uk/conditions/stress-anxiety-depression/]).

Questions about the Research and Contacting the Research Team
If you have questions regarding this study, you may contact Vibhuti Patel on vpatel5@sheffield.ac.uk. If you have questions you do not feel comfortable asking the lead

researcher or would like to make a complaint, you may contact the researcher's supervisors, Dr. Nicola Buckland (n.buckland@sheffield.ac.uk) or Professor Helen Kennedy (h.kennedy@sheffield.ac.uk). If the supervisors are unable to resolve your complaint, please contact Professor Glenn Waller at g.waller@sheffield.ac.uk.

Consent:

I understand the nature and purpose of the procedures involved in this study. These have been communicated to me on the information provided above.

I understand that I am free to withdraw from this study at any time by closing my browser.

I understand that once I start the survey I will be unable to withdraw my partially completed or completed response.

I understand and acknowledge that the investigation is designed to promote scientific knowledge and that the University of Sheffield will use the data I provide for no purpose other than research.

I confirm that I have read and understood the above information, and I know who to contact if I have any questions or concerns. Yes/No

- **Study Four (Chapter Six) Information and Consent Form:**

Participant Information Sheet

Reference Number: 21/04B
Date: 05/05/2021

DIETARY CHOICES AT UNIVERSITY FOOD OUTLETS
INFORMATION SHEET FOR PARTICIPANTS

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate we thank you. If you decide not to take part there will be no disadvantage to you and we thank you for considering our request.

What is the Aim of the Project?
This survey forms part of a collaborative project between the University of Sheffield, UK, and the University of Otago. It aims to explore factors that may influence food choice at university food outlets. Before you decide to take part, please take time to read the following information. Contact us if there is anything that is not clear or if you would like more information.

What Types of Participants are being sought?
We are looking for people over the age of 18 who have made a purchase at St David Café (86 Saint David Street, North Dunedin, Dunedin 9016) on 5 May, 2021. No further selection criteria apply. Upon completion of the survey you will have the opportunity to enter into a prize draw to win a $50 supermarket voucher. Participation in this research study is entirely voluntary. You have the right to withdraw at any time or refuse to participate without negative consequences, up until the time of submission of the survey.

What will Participants be asked to do?
Should you agree to take part in this project, you will be asked to answer a series of questions about you (e.g. age, sex), your experience at St David café today, and your diet. This survey should take no longer than 5 minutes.

There is a small risk that some of the questions in the survey may cause distress. If this is the case, please visit https://www.health.govt.nz/your-health/conditions-and-treatments/mental-health for support.

Please be aware that you may decide not to take part in the project without any disadvantage to yourself.

What Data or Information will be collected and what use will be made of it?
All data obtained from participants will be kept confidential and will only be reported in an

aggregate format (by reporting only combined results and never reporting individual ones). The data collected will be stored in a password-protected file on the University of Otago and the University of Sheffield servers for five years as required by the University's research policy. After five years the raw data will be destroyed, however the data derived from the research will, in most cases, be kept for much longer or possibly indefinitely.

All questionnaires will be anonymised. No material that could personally identify you will be used in any reports on this study. No one other than the researcher and the researcher's supervisors/advisors listed below will have access to them. Your anonymous responses to the survey may be shared with other researchers or used for future unplanned analysis. This will also apply if the study results are published in an academic journal.

Email addresses for the purposes of the prize draw will be destroyed immediately after the prize is drawn. However, if you win the prize draw for this study, you will be asked to electronically sign a form confirming that you have received this prize when you collect it. This form will be kept securely in a locked cabinet or as a digital copy for at 7 years after the end of the project, accessible by University of Sheffield finance and administrative staff for reference in the event of a financial audit. According to data protection legislation, we are required to inform you that the legal basis we are applying in order to process your personal data is that 'processing is necessary for the performance of a task carried out in the public interest' (Article 6(1)(e)). Further information can be found in the University's Privacy Notice https://www.sheffield.ac.uk/govern/data-protection/privacy/general.

The data for this project will be used for a PhD thesis, and will be written up as part of a manuscript for publication in an academic journal.

Can Participants change their mind and withdraw from the project?

Participants may withdraw from this project at any point up until survey submission with no disadvantage. It is impossible to withdraw once the survey has been submitted, as there will be no way to identify individual submissions.

What if Participants have any Questions?

If you have questions regarding this study, you may contact the researcher Vibhuti Patel on vpatel5@sheffield.ac.uk. If you have questions you do not feel comfortable asking the lead researcher or would like to make a complaint, you may contact the researcher's supervisor, Dr. Nicola Buckland (n.buckland@sheffield.ac.uk), or advisor Assoc. Prof. Miranda Mirosa (miranda.mirosa@otago.ac.nz).

This study has been approved by the Department stated above. However, if you have any concerns about the ethical conduct of the research you may contact the University of Otago Human Ethics Committee through the Human Ethics Committee Administrator (ph +643 479 8256 or email gary.witte@otago.ac.nz). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

Consent:

DIETARY CHOICES AT UNIVERSITY FOOD OUTLETS
CONSENT FORM FOR PARTICIPANTS

I have read the Information Sheet concerning this project and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.
I know that:

1. My participation in the project is entirely voluntary;

2. I am free to withdraw from the project before the submission of the survey without adverse consequences;

3. Personal identifying information (i.e. email addresses for prize draw) will be destroyed at the conclusion of the project but any raw data on which the results of the project depend will be retained in secure storage for at least five years;

4. The data from this project will be publicly archived so that it may be used by other researchers. I understand my personal details (i.e. email address) will not be revealed to people outside the project;

5. There is a small chance that I will experience distress during this survey, and I have been given guidance on how to deal with this;

6. I will have the opportunity to enter a prize draw at the end of the survey which will require me to input my email address. If I were to win the survey, I will need to sign a confirmation of receipt form, which will be stored with the finance department at the University of Sheffield for seven years.

After reading the information sheet and consent form I understand that my consent to take part in this project will be acknowledged by selecting "yes" to start the survey.

_____ Yes
_____ No

....
(Signature of participant) (Date)

.....
(Printed name)

- **Study Five (Chapter Seven) Information and Consent Form:**

Participant Information Sheet

This study is being run by the Department of Psychology at the University of Sheffield. Before you decide to take part, please take time to read the following information. Contact us if there is anything that is not clear or if you would like more information.

What does this survey involve?

This survey aims to explore factors that may influence food choice. If you agree to participate, you will be asked a series of questions about you (e.g. age, sex), your diet, and your recent experience(s) at four food outlets at the Sheffield SU. This survey should take no longer than 3 minutes. Upon completion of the survey you will have the opportunity to be entered into a prize draw to win a £50 One4All voucher. Participation in this study is entirely voluntary. You have the right to withdraw at any time (by closing your browser) or refuse to participate without negative consequences, up until the time of submission.

Ethics and Confidentiality

This survey has received ethical approval from the University of Sheffield Psychology Department ethics committee #032636, date approved: 14/02/2020. All data obtained from participants will be kept confidential and will only be reported in an aggregate format (by reporting only combined results and never reporting individual ones). Your anonymous responses to the survey may be shared with other researchers or used for future unplanned analysis. This will also apply if the study results are published in an academic journal.

The data collected will be stored in a password-protected file on the University of Sheffield servers. All questionnaires will be anonymised, and no one other than the researcher and the researcher's supervisors listed below will have access to them. Email addresses for the purposes of the prize draw will be destroyed immediately after the prize is drawn. However, if you win the prize draw for this study, you will be asked to electronically sign a form confirming that you have received this prize when you collect it. This form will be kept securely in a locked cabinet or as a digital copy for at 7 years after the end of the project, accessible by University finance and administrative staff for reference in the event of a financial audit.

According to data protection legislation, we are required to inform you that the legal basis we are applying in order to process your personal data is that 'processing is necessary for the performance of a task carried out in the public interest' (Article 6(1)(e)). Further information can be found in the University's Privacy Notice https://www.sheffield.ac.uk/govern/data-protection/privacy/general.

Questions and Contact Details

If you have questions regarding this study, you may contact Vibhuti Patel (vpatel5@sheffield.ac.uk). If you have questions you do not feel comfortable asking the lead researcher or would like to make a complaint, you may contact the supervisors, Dr. Nicola Buckland (n.buckland@sheffield.ac.uk) or Prof. Helen Kennedy (h.kennedy@sheffield.ac.uk). If the supervisors are unable to resolve your complaint, please contact Prof. Elizabeth Milne at psy-hod@sheffield.ac.uk.

If you wish to make a report of a concern or incident relating to potential exploitation, abuse or harm resulting from your involvement in this project, please in the first instance contact one of the project's Designated Safeguarding Contacts, that is, the primary researcher Vibhuti Patel (vpatel5@sheffield.ac.uk) or the primary project supervisor, Dr Nicola Buckland (n.buckland@sheffield.ac.uk). If the concern or incident relates to the Designated Safeguarding Contact, or if you feel a report you have made to this Contact has not been handled in a satisfactory way, please contact the Head of the Department of Psychology, Professor Elizabeth Milne (psy-hod@sheffield.ac.uk) and/or the University's Research Ethics & Integrity Manager (Lindsay Unwin; l.v.unwin@sheffield.ac.uk).

Consent:
I have read and understood the project information sheet and have been given the opportunity to ask questions about the project.

I understand my taking part in this survey is voluntary and I can withdraw at any time before the survey has been submitted without adverse consequences.

I give permission for the survey responses that I provide to be deposited in in an online research data repository so it can be used for future research and learning.

I understand my personal details (i.e. email address) will not be revealed to people outside the project.

I agree to assign the copyright I hold in any materials generated as part of this project to The University of Sheffield.

I understand and agree that other authorised researchers may use my data in publications, reports, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.

- ○ **I agree to the above terms and would like to take part in this survey.**
- ○ **I do not agree to the above terms.**

Appendix 2. Study Materials and Surveys

- **Summary of measures and covariates used (studies two and three).**

Measure	Items	Assessment
Awareness of sustainability and diet (5 items, adapted from de Boer, et al., 2013; Eating Better Survey, 2017)	Climate change and the degradation of the environment are very real threats to our future. *The seriousness of climate change has been exaggerated* Producing and consuming meat/livestock products has a significant negative impact on the environment (e.g. deforestation, water pollution). Producing and consuming meat/livestock products is a major cause of climate change Reducing meat consumption (i.e. choosing one or more meat-free meals every week) can make a big difference to nature and climate protection	7- point scale (1=strongly disagree, 7=strongly agree); scores averaged to create a 'composite environmental awareness' score per participant.
Participant dietary habits	Which of the following most closely describes your dietary habits? a. Vegetarian (does not eat meat or fish, but may eat cheese, butter, milk, and/or eggs) b. Vegan (does not eat meat, fish, cheese, butter, milk, eggs, or any other products derived from an animal) c. Pescetarian (does not eat meat, but eats fish) d. Meat consumer (does not fit into one of the above; eats meat, either frequently or infrequently)	Multichoice
Meat reduction status[a]	Are you currently reducing your consumption of red meat (e.g. beef, veal, pork, lamb, bacon, venison, ham)? Are you currently reducing your consumption of white meat (e.g. chicken, turkey, duck, rabbit)? Are you currently reducing your consumption of fish?	Yes/No
Age	What is your age?	*Open-ended textbox*
Sex	What is your sex?	*Male, Female, Other, Prefer not to say*
Ethnicity	What is your ethnic group?	*White, Mixed/Multiple ethnic groups, Asian or Asian British, Black or Black British, Prefer not to say, Other (please specify)*
Nationality	What is your nationality?	*Dropdown box with 225 options; Prefer not to say*

Education (The Office for National Statistics Census, 2011)	What is your highest level of education?	*No formal qualifications, 1-4 GCSEs or equivalent qualifications, 5 GCSEs or -equivalent qualifications, Apprenticeships, 2 or more A-levels or equivalent qualifications, Bachelors degree or equivalent, Doctoral or higher education, Other qualifications including foreign qualifications*
Political inclination (from The British Election Study; Fieldhouse et al., 2018)	Generally speaking, do you think of yourself as Labour, Conservative, Liberal Democrat, or other?	*Conservative, Labour, Liberal Democrat, Scottish National Party (SNP), Plaid Cymru, United Kingdom Independence Party (UKIP), Green Party, Sinn Fein, British National Party (BNP), No – none, Don't know, Prefer not to say, Other party (please specify)*
Subjective Socioeconomic Status (The MacArthur Scale of Subjective Social Status; Adler & Stewart, 2007)	Participants were given the following instruction: *Think of this ladder as representing where people stand in society.* *At the top of the ladder are the people who are best off—those who have the most money, most education and the best jobs.* *At the bottom are the people who are worst off—who have the least money, least education and the worst jobs or no job.* *The higher up you are on this ladder, the closer you are to people at the very top and the lower you are, the closer you are to the bottom.* *Please click on the rung where you think you would stand at this point in your life, relative to other people in the United Kingdom.*	An image of a ladder was presented with clickable rungs (1-10).
Income[b]	What the total annual income of your household (before tax and deductions)?	*Below £10,000, £10,001-£20,000, £20,001-£30,000. £30,001-£40,000, Above £40,000, Prefer not to say*
Employment Status	What is your current employment status?	*Full time (40 or more hours per week), Part time (up to 39 hours per week), Unemployed, Student, Retired, Homemaker, Unable to work, Other (please specify), Prefer not to say*

Index of Multiple Deprivation (Ministry of Housing, Communities & Local Government, 2015)	Which postcode do you live in? (Please use capital letters and add a space between the outward code and inward code, e.g. write S3 7EQ rather than S37EQ or s37eq)	*UK postal code content textbox* postcodes were used to identify participants' socioeconomic status using the Index of Multiple Deprivation

[a] appeared only to participants that had indicated they were a meat consumer in the previous question about dietary habits. [b] appeared to all participants in study two, but only to participants in the staff cohort of study three.

- **Examples of synonyms grouped together in each category construct (study two, n=366).**

Category	Common words
healthy	healthy, health, healthier, wellbeing, reduce diseases
eco-friendly	green, environmental, environmentally friendly, eco, sustainable
animal lovers	Animal lovers, care about animals, animal rights, animal welfare, animal friendly
unhealthy	Unhealthy, pale, cholesterol, protein deficient, bowel cancer
normal	Normal, average, traditional, mainstream, majority
fit	Fit, muscle, gym, active, athletes
conscious	Aware, conscious, mindful, forward thinking, informed
happy	Happy, satisfied, pleased, content, cheerful
ethical	Ethical, virtuous, principled
caring	Caring, considerate, empathic, altruistic

- **Survey used during social norms intervention, printed copies delivered to participants by the researcher (study four, n=66)**

Dietary Choices at St David Café: Survey

1. **What is your age?** _____ or prefer not to say ☐
2. **What is your sex?** (please circle) a. Male b. Female c. Other d. Prefer not to say
3. **What is your nationality?** _____ or prefer not to say ☐
4. **What is your ethnicity?** (please circle)
   a. New Zealand European
   b. Maori
   c. Samoan
   d. Cook Island Maori
   e. Tongan
   f. Niuean
   g. Chinese
   h. Indian
   i. Other (please specify): _____
   j. Prefer not to say
5. **Are you:** a. University staff b. Undergraduate student c. Postgraduate student d. Other
6. **Did you make a purchase at St David Café today?**
   ☐ No
   ☐ Yes (please specify what you purchased): _____
   _____
   _____
7. **Which factors influenced your purchase today?** *Examples could include convenience, taste, price, habit, health/nutrition etc:* _____
   _____
   _____
8. **Which of the following best describes your dietary habits?**
   ☐ Meat consumer
   ☐ Vegetarian (does not eat meat or fish, but may eat cheese, eggs, or milk)
   ☐ Vegan (does not eat meat, fish, dairy, eggs, or milk)
   ☐ Pescetarian (does not eat meat, but eats fish/seafood)
   ☐ Other (please specify): _____
9. **Please indicate which of the following apply:**
   ☐ I am currently reducing the amount of sugar that I eat.
   ☐ I am currently reducing the amount of meat that I eat.
   ☐ I am currently increasing the amount of fruit and vegetables that I eat.
   ☐ I am not currently making any changes to my diet.

10. Which of the following marketing materials did you notice BEFORE your purchase at St David Café today? ***If you did not notice any of the posters, please leave this question blank.***

(a)

(b)

(c)

(d)

(e)

11. How often do you visit St David Café?

- ☐ Daily
- ☐ Several times a week
- ☐ Once a week
- ☐ Several times a month
- ☐ Once a month
- ☐ Several times a year
- ☐ Rarely
- ☐ Never
- ☐ Other (please specify): _____

_____

Thank you for your participation!

This study involves collecting demographic and dietary information about customers at Otago food outlets. As this is an ongoing study, we are unable to disclose precise details. If you would like more information about the study and a report of the results, please contact the researcher at vpatel5@sheffield.ac.uk.

If any part of this study has caused distress, please visit https://www.health.govt.nz/your-health/conditions-and-treatments/mental-health for support.

If you would like to enter a prize draw to win a $50 supermarket voucher, please enter your email address on the sign-up sheet. **Please note that your email address will only be used for the purpose of the prize draw.**

- **Export of post-trial survey, hosted online on Qualtrics and accessed via QR code (study five, n=13)**

Demographics

1) What is your age?

2) What gender are you?

- ○ Male
- ○ Female
- ○ Other
- ○ Prefer not to say

3) What is your ethnicity?

- ○ White
- ○ Mixed or multiple ethnic groups
- ○ Asian or Asian British
- ○ Black, African, Caribbean, or Black British
- ○ Other (please specify):
- ○ Prefer not to say

4) What is your nationality?

5) Are you:

- ○ University staff
- ○ Undergraduate student
- ○ Postgraduate student
- ○ None of the above

Outlet

Which of these four SU food outlets have you visited over the past two weeks?

- ☐ New Leaf
- ☐ Our Express Food
- ☐ Bar One
- ☐ Coffee Revolution
- ☐ None of the above

Our Express Food

1) Generally, how often do you visit Our Express Food?

- ○ Daily
- ○ Several times a week
- ○ Once a week
- ○ Several times a month
- ○ Once a month
- ○ Several times a year
- ○ Rarely
- ○ Never
- ○ Other (please specify):

2) Which of the following items have you purchased from Our Express Food purchase over the past two weeks?

(Please select all that apply).

- ☐ Burger - Veggie
- ☐ Burger - Meat
- ☐ Toastie - Veggie
- ☐ Toastie - Meat
- ☐ Panini - Meat
- ☐ Panini - Veggie
- ☐ Noodle Pot - Veggie
- ☐ Noodle Pot - Meat
- ☐ Chicken Nuggets
- ☐ Vegan Nuggets
- ☐ Soup of the Day
- ☐ Baked Potato - Meat Toppings
- ☐ Baked Potato - Veggie Toppings
- ☐ Wedges
- ☐ No food purchased.

Bar One

1) Generally, how often do you visit Bar One?

- ○ Daily
- ○ Several times a week
- ○ Once a week
- ○ Several times a month
- ○ Once a month
- ○ Several times a year
- ○ Rarely
- ○ Never
- ○ Other (please specify): _____

2) The menu for Bar One is shown below. What foods have you purchased at Bar One over the past two weeks? Please click on the menu to indicate your response.

(Please select all that apply. If you have not purchased food, please leave this question blank).

If you have made any other food purchases at Bar One over the past two weeks, please detail them below:

Coffee Revolution

1) Generally, how often do you visit Coffee Revolution?

- ○ Daily
- ○ Several times a week
- ○ Once a week
- ○ Several times a month
- ○ Once a month
- ○ Several times a year
- ○ Rarely
- ○ Never
- ○ Other (please specify): _____

2) The menu for Coffee Revolution is shown below. What foods have you purchased at Coffee Revolution over the past two weeks? Please click on the menu to indicate your response.

(Please select all that apply. If you have not purchased food, please leave this question blank).

If you have made any other food purchases at Coffee Revolution over the past two weeks, please detail them below:

_____

Dietary patterns

1) Which of the following best describes your dietary habits?

- ○ Vegetarian (does not eat meat or fish, but eats cheese, butter, milk, and eggs).
- ○ Vegan (does not eat meat, fish, cheese, butter, milk, eggs, or any other products derived from an animal).
- ○ Pescetarian (does not eat meat, but eats fish, eggs, milk, cheese, and butter).
- ○ Meat consumer (eats meat, fish, eggs, milk, cheese, and butter).
- ○ Prefer not to say.

2) Please indicate which of the following apply:

- ☐ I am currently increasing the amount of fruit and vegetables that I eat.
- ☐ I am currently limiting the amount of meat that I eat.
- ☐ I am currently limiting the amount of sugar that I eat.
- ☐ I am not currently making any changes to my diet.

For how long have you been limiting your meat intake?

- ○ 6 months or less
- ○ Over 6 months, up to 1 year
- ○ Over 1 year, up to 3 years
- ○ Over 3 years

SN_Message

Do you recall seeing this message over the past two weeks?

- ○ Yes
- ○ No

Where did you see this message?

(Please select all that apply)

- ☐ Bar One
- ☐ New Leaf
- ☐ Coffee Revolution
- ☐ Instagram post
- ☐ Our Express Food
- ☐ Twitter post

Debrief

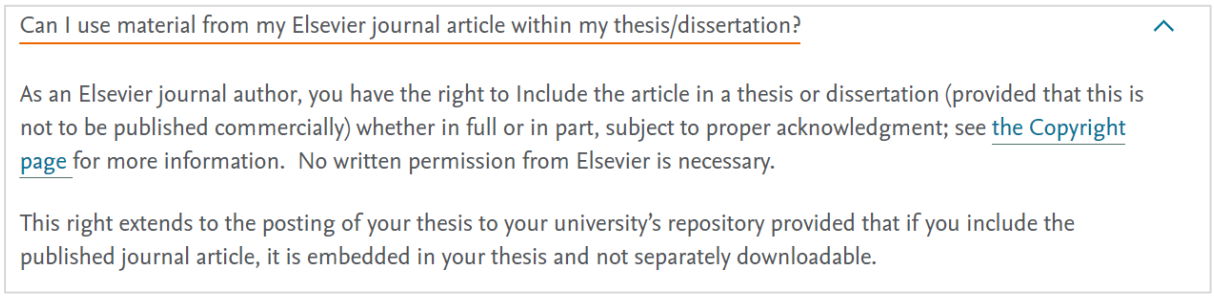
Thank you for your participation!

This study involves collecting demographic and dietary information about customers who dine in the Student Union food outlets. As this is an ongoing study, we are currently unable to disclose precise details. If you would like more information about the study and a report of the results, please contact the researcher at vpatel5@sheffield.ac.uk. If any part of this study has caused distress, please visit https://www.nhs.uk/conditions/stress-anxiety-depression/.

Please proceed to the next page if you'd like to enter the prize draw for a £50 One4All voucher!

Appendix 3. Permission for Published Materials

Studies two and three (Chapter Five): **Patel, V.** & Buckland, N. (2021). Perceptions about meat reducers: Results from two UK studies exploring personality impressions and perceived group membership. *Food Quality and Preference, 93*, 104289.


Can I use material from my Elsevier journal article within my thesis/dissertation?

As an Elsevier journal author, you have the right to Include the article in a thesis or dissertation (provided that this is not to be published commercially) whether in full or in part, subject to proper acknowledgment; see the Copyright page for more information. No written permission from Elsevier is necessary.

This right extends to the posting of your thesis to your university's repository provided that if you include the published journal article, it is embedded in your thesis and not separately downloadable.

Image from the Elsevier webpage; https://www.elsevier.com/about/policies/copyright/permissions, accessed 01 November, 2022.