

Applying an extended version of the theory of planned behaviour to understand exercise behaviour after leaving university

G. M. Jones

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Applying an extended version of the theory of planned behaviour to understand exercise behaviour after leaving university

By:

Gareth Michael Jones

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Table of Contents

List of Figures vi

List of Tables vi

Access to Thesis Form viii

Acknowledgements x

Thesis Abstract 1

Chapter 1. The Theory of Planned Behaviour, Exercise, and Exercise Interventions: Literature Review 3

Overview 3

Background 4

Life Transitions 7

Models of Health Behaviour 9

Justification for the Theoretical Framework Employed in the Thesis 15

Theory of Planned Behaviour 16

Intention 17

Attitude 18

Subjective Norm 20

Perceived Behavioural Control 23

The TPB and Exercise 26

Additional Predictors 29

Past Behaviour and Habit 30

Self-Identity 32

Action Planning 35

Anticipated Regret 38

Moral Norms 38

Interventions 39

Developing a TPB Intervention 39

TPB Interventions 40

Mode of Delivery 41

Self-Identity 43

Habit 43

Planning 45

Behaviour Change Techniques 48

Conclusion 51

Chapter 2. University Students Beliefs About Exercise After Leaving University (Study 1a) 53

Abstract 53

Prelude 54

Introduction 55

Exercise Beliefs 55

The Present Study 57

Elicitation Study 58

Method 58

Procedure and Participants 58

Results 59

Elicitation Study Discussion 60

The Main Study 63

Method 63

Design 63

Procedure and Participants 63

Measures 64

Results 66

Attrition Analysis 66

Composite Belief Measures 66

Individual Belief Measures 67

Correlations with Intention 74

Regression Analysis Predicting Intention 75

Correlations with Time Three Behaviour 75

Regression Analysis Predicting Time Three Behaviour 75

Discussion 77

Chapter 3. Predicting Exercise Across the Post-University Transition: An Application of an Extended Theory of Planned Behaviour (Study 1b) 87

Abstract 87

Prelude 88

Introduction 89

The Theory of Planned Behaviour 89

The Present Study 92

Method 93

Design 93

Procedure and Participants 93

Measures 94

Sample Size Calculations 97

Results 97

Descriptive Statistics 97

Correlations with Intention 98

Regression Analysis Predicting Intention 99

Correlations with Behaviour 100

Regression Analysis Predicting Behaviour 100

Time Two Correlations with Intention at Six-Month Follow-Up 111

Time Two Regression Analysis Predicting Intention at Six-Month Follow-Up 111

Correlations Between Time Two Cognitions and Time Three Behaviour 112

Regression Analysis to Predict Time Three Behaviour from Time Two Cognitions 112

Discussion 116

Chapter 4. A Qualitative Study of Recent Graduates’ Experiences of Exercise in the Post-University Transition (Study 2) 125

Abstract 125

Prelude 126

Introduction 127

The Present Study 129

Method 129

Design 129

Procedure and Participants 130

Interview Schedule 131

Analysis 132

Results 132

Descriptive Statistics 132

1. The Transition 134

2. Influencing Factors 137

3. Social Factors 146

4. Supportive Strategies 150

Discussion 152

Limitations 167

Conclusion 169

Chapter 5. A Theory-Based Intervention to Encourage Exercise Behaviour Across the Post-University Transition (Study 3) 170

Abstract 170

Prelude 171

Introduction 173

The Present Study 178

Method 178

Design 178

Procedure and Participants 178

Intervention 180

Measures 181

Results 184

Descriptive Statistics 184

Randomisation Checks 185

Intervention Effects at Time One 186

Intervention Effects at Time Two 187

Discussion 191

Chapter 6. General Discussion 196

Prelude 196

Thesis Structure 196

Overall Aim of Thesis 197

Summary of Main Findings 197

Chapter 2. Exercise Belief Elicitation Study 197

Chapter 2. Prospective Exercise Belief Study 199

Chapter 3. Extended TPB Study 201

Chapter 4. Qualitative Study on Exercise Beliefs 205

Chapter 5. Exercise Intervention Study 210

Overall Implications 212

Strengths 215

Limitations 216

Conclusion 217

References 220

Appendix A 232

Belief Elicitation Questionnaire 232

Appendix B 234

An Extended TPB and Belief Questionnaire 234

Appendix C 241

Semi Structured Telephone Interview Schedule 241

Appendix D 243

Example Transcript 243

Appendix E 254

Intervention Questionnaire 254

Appendix F 265

Intervention Video Script Outline 265

# List of Figures

|  |  |
| --- | --- |
| Figure 1. | Graph of Fitness Levels in Both Men and Women in Varying Age Groups (HSE, 2008). |
| Figure 2. | The Social Cognitive Theory (Bandura, 2000) |
| Figure 3. | The Health Action Process Approach (Schwarzer, 1992) |
| Figure 4. | The Health Belief Model (Hochbaum, 1958) |
| Figure 5. | The Theory of Planned Behaviour (Ajzen, 1991). |
| Figure 6. | The Behaviour Change Wheel (BCW) (Michie et al. 2011). |
| Figure 7. | Self-Efficacy (SE) Scores by Time and Condition (Means and error bars, 95% confidence intervals). |
| Figure 8. | Self-Identity (SI) Scores by Time and Condition (Means and error bars 95% confidence intervals) |

# List of Tables

|  |  |
| --- | --- |
| Table 1. | Beliefs About Engaging in Exercise After Graduating From University (N = 11) |
| Table 2. | Descriptive Statistics for the Belief-Based TPB Measures and Correlations with Intention and Follow-Up Behaviour |
| Table 3. | Descriptive Statistics for Individual Beliefs and Correlations with Intention (N = 136), Time Two Behaviour (N = 84), and Time Three Behaviour (N = 78) |
| Table 4. | Summary of Hierarchical Regression Analysis of Beliefs Predicting Intention (N = 136) |
| Table 5. | Summary of Hierarchical Regression Analysis of Beliefs Predicting Behaviour at Six-Month Follow-Up (N = 84) |
| Table 6. | Summary of Hierarchical Regression Analysis of Beliefs Predicting Behaviour at 18-Month Follow-Up (N = 78) |
| Table 7 | Means and Standard Deviations for Individual Beliefs at Baseline and Six-Month Follow-Up (*N* = 84). |
| Table 8. | Descriptive Statistics for Time Two Individual Beliefs and Correlations with Intention (N = 84) and Time Three Behaviour (N = 78) |
| Table 9. | Summary of Hierarchical Regression Analysis of Beliefs Predicting Intention (N = 84) |
| Table 10. | Summary of Hierarchical Regression Analysis of Beliefs Predicting Time Three (18-month Follow-Up) Behaviour (N = 78) |
| Table 11. | Descriptive Statistics for Main Study Variables (N = 136) |
| Table 12. | Correlations Between Main Study Variables (N = 136) |
| Table 13. | Summary of Hierarchical Regression Analysis for Variables Predicting Intention (N = 136) |
| Table 14. | Summary of Hierarchical Regression Analysis for Variables Predicting Behaviour at Time Two (n = 84) |
| Table 15. | Summary of Hierarchical Regression Analysis for Variables Predicting Behaviour at Time Three (n = 78) |
| Table 16. | Means and Standard Deviations of the Extended TPB Variables at Baseline and Six-Month Follow-Up and Paired Samples T-Tests. |
| Table 17. | Correlations Between Time Two Main Study Variables (N = 84) |
| Table 18. | Summary of Hierarchical Regression Analysis for Time Two Variables Predicting Intention at Time Two (N = 84) |
| Table 19. | Summary of Hierarchical Regression Analysis for Time Two Variables Predicting Behaviour at Time Three (n = 78) |
| Table 20. | Participant Information |
| Table 21. | Themes From the Qualitative Analysis |
| Table 22. | Descriptive Statistics for Main Study Variables at Time One for the Full Sample (N = 125) |
| Table 23. | Statistics for Main Study Variables Immediately Post-Intervention (Time One) by Condition (N = 125) |
| Table 24. | Means and SD’s for Main Study Variables at Time One and Time Two by Condition |

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# Thesis Abstract

Regular exercise is an important component of a healthy lifestyle; however, the majority of the UK population does not adhere to recommended weekly exercise. Exercise peaks in the 16-24 age group and declines with age. Life transitions have been found to negatively impact health behaviours such as exercise. The theory of planned behaviour (TPB) was employed to examine the effects of a life transition (graduating university) on exercise intentions and behaviour. The TPB states that the most proximal determinant of behaviour is intention. Intention, in turn, is determined by attitude, subjective norms and perceived behavioural control.

Study 1a investigated graduating university students’ beliefs about exercise post-university. First, final year students (N = 11) completed an online belief elicitation questionnaire to identify modal salient beliefs about exercise after leaving university. Fifteen modal salient beliefs were identified (focusing on advantages, disadvantages, significant referents, facilitators, and inhibitors). The strength of these beliefs were then assessed in an online survey of final year students (*N* = 136) and related to exercise intentions and behaviour six and 18 months after leaving university. Study 1b used the same sample (*N* = 136) to apply an extended version of the TPB to explain exercise intentions and behaviour post-university. Attitude, intention, planning, and self-identity were all important predictors of exercise intention and behaviour. Study 2 comprised semi-structured telephone interviews with 10 participants, six months after they had left university. The interviews were thematically analysed to provide an in-depth exploration of how and why the transition impacted on exercise beliefs and behaviour post-university. Self-identity, social motivation, routine, and planning were identified as important factors for maintaining exercise behaviour. Study 3 (*N* = 125) evaluated a brief video-based online intervention, based on the results of Studies 1 and 2, to promote exercise post-university. Final year students were randomly allocated to either a control or intervention condition and followed-up six months later. The effect of the intervention on behaviour was non-significant; however, it had a positive effect on subjective norms at six-month follow-up.

The present thesis provides some support for an extended version of the TPB for predicting exercise intentions and behaviour across the transition of graduating university; however, the thesis does not support its utility in the design of a brief online intervention. Further investigation into interventions targeting exercise beliefs, intention, and behaviour across significant life transitions is needed to prevent negative impacts on exercise behaviour.

# Chapter 1. The Theory of Planned Behaviour, Exercise, and Exercise Interventions: Literature Review

## Overview

This chapter provides a review of the relevant literatures that provide the background to the research reported in the thesis. First, the importance of regular exercise as part of a healthy lifestyle is highlighted. Data indicate that exercise levels decline with age, with a marked decrease in late adolescence/early adulthood. Second, the impact of significant life transitions on health behaviour, including exercise, is considered. Many significant life transitions occur in late adolescence/early adulthood, which might help to account for the observed decline in exercise. Third, current models of health behaviour that can be used to explain changes in exercise behaviour are outlined. The theory of planned behaviour (TPB; Ajzen, 1991) was chosen to provide the theoretical framework for the research reported in the thesis. Applications of the TPB to exercise behaviour are reviewed. Fourth, possible interventions to help maintain exercise behaviour across life transitions (e.g., graduating from university) are considered.

## Background

A healthy lifestyle is made up of many important components, one of which is regular exercise (Pate, Dowda, Ward, & Neill, 2007). Exercise has been defined by Caspersen, Powell, and Christenson (1985) as movement produced by the skeletal muscles, which induce energy expenditure which is measured in Kilocalories. Exercise occurs in everyday life, in varying intensities. Higher intensity exercise, such as running, playing basketball, football, hockey, and swimming is typically planned, structured and often repetitive, and results in positive health benefits (Caspersen et al., 1985). The World Health Organisation (WHO) have highlighted lack of exercise as the fourth most important risk factor for chronic (non-communicable) diseases (WHO, 2009), accounting for 9% of all premature deaths worldwide (Lee et al., 2012). ‘Moderate to vigorous exercise’ which typically refers to activities such running, jogging, swimming and playing sports (Hu et al., 1999), has been highlighted to be important for the health benefits of exercise to occur. Haskell et al. (2007) recommend that young adults adhere to exercise bouts three days per week and for a minimum time of 20 minutes to reach desired health benefits.

Exercise has been highlighted as important for a healthy lifestyle (Pate et al., 2007), with benefits including protection against medical conditions such as type 2 diabetes, coronary heart disease and cancer, as well as the prevention of weight gain which leads to obesity (Byers et al., 2002; Erikssen, 2001; HSE, 2008; Kromhout, Bloemberg, Seidell, Nissinen, & Menotti, 2001). The Health Survey for England (HSE 2008, 2012) highlighted the cost implications of a lack of exercise for the NHS, estimating a direct cost to the NHS of £1.1 billion and an indirect cost of £8.2 billion a year. Exercise reflects only energy expenditure rather than energy intake; however, exercise levels, and more recently, a focus on the reduction in sedentary behaviour, are vitally important components in reducing the risk of, and protection against, coronary heart disease, type 2 diabetes, cancer, and weight gain, as part of a healthy lifestyle (Pate et al., 2007). Exercise helps to achieve these benefits by balancing out the equation of energy expenditure versus energy intake.

**Figure 1**. Graph of Fitness Levels in Both Men and Women in Varying Age Groups (HSE, 2008).

Recent research, however, indicates that many people do not participate in regular exercise, with 60% of women and 32% of men aged 16-34 finding walking up a 5% gradient at 3mph either a severe exertion or not possible (De Bruijn, 2011; HSE 2008).

In addition, evidence demonstrates that people are most active during childhood and early adulthood (HSE, 2012) and that as age increases, there is a decrease in fitness levels, which are closely related to exercise levels, as shown in Figure 1 (HSE, 2008). Adult fitness levels peak in both men and women at the age of 16-24 (40.9ml O2/min/kg & 35.4ml O2/min/kg, respectively), and then continually decreases with age until the lowest recorded level in both men and women aged 65-74 (29.9ml O2/min/kg and 27.3ml O2/min/kg, respectively). Research has indicated that this relationship is not a linear one, and that there is a marked decrease in exercise and fitness levels towards late adolescence/early adulthood (HSE, 2008; Kwan Bray, & Ginis, 2009). Furthermore, the HSE (2008) report that baseline levels of fitness (using VO2 max tests), which are closely related to exercise levels, within the 16-24 age category (the peak fitness level for both men and women) dropped from 1990-2008. In 1990, men and women aged 16-24 scored 55.5ml O2/min/kg and 40.3ml O2/min/kg respectively, which dropped to 40.9 ml O2/min/kg and 35.4ml O2/min/kg respectively in 2008. The issue is therefore twofold. First, there is a marked decrease in exercise/fitness levels in late adolescent/early adulthood that further decreases with increasing age, and second, there has been a decrease in the exercise/fitness levels of 16-24 year olds from 1990-2008. Some research has suggested that reasons for low exercise participation include lack of time, work, parenthood and low motivation towards exercise (Dishman, 1980; Gotham, 1997; Kwan, 2012).

While there is some research that has explored this time period of late adolescence/early adulthood within the exercise literature, very little in known about exactly why exercise levels decrease from late adolescents/early adulthood (16-24). The current thesis hypothesised that this could be due to the many significant life transitions that are present in this time period (e.g., puberty, graduating high school, leaving home, parenthood, full time employment, entering and graduating from university), as it has been found that significant life transitions can have a negative effect on health behaviours. However, little is unknown about what effect these significant life transitions have on exercise levels in early adulthood and why these occur (Kwan et al, 2009, 2012; Wheaton, 1990).

## Life Transitions

Significant life transitions have been defined as major life changes in which a role change occurs which generates a demand for an individual to adjust their lives (Wheaton, 1990). In late adolescence/early adulthood, such life transitions include moving away from home, going to university, graduating from university, and starting full-time employment (Gotham et al., 1997; Kwan et al., 2009). Some research has examined the effects these transitions have on behaviour change, including alcohol consumption and exercise behaviour (Gotham et al., 1997; Kuntsche, Rehm, & Gmel, 2004; Kwan, Cairney, Faulkner, & Pullenayegum, 2012; Kwan et al., 2009).

Kwan et al. (2012) investigated how health behaviours such as exercise, binge drinking and smoking were affected by the transition into early adulthood. Their study used 640 Canadian participants aged 12-15 at baseline, with interviews taking place in 1994-1995 and 2006-2007. Regarding exercise, there was a significant 24% decrease in exercise (equivalent to 1 MET/day) across the 12 year time period, with a significant interaction effect (time X gender X educational trajectory interaction). This interaction effect revealed that participants most at risk for a decline in exercise were males who entered university. The results suggest that the transition of entering university has a negative effect on exercise, particularly for males. It was suggested that reasons for this negative affect were due to new social environments and newly acquired responsibilities associated with becoming an adult.

Kwan et al. (2009) investigated the transition of leaving home and moving to university and the effect this had on exercise levels. Their study recruited first year university students (*N* = 212), and defined exercise in line with Health Canada standards of being physically active with participation of moderate to vigorous exercise at least four times per week. Participants completed measures of past behaviour regarding exercise at the start of the fall semester (time one), and then again at eight-week follow-up. Participants at time one indicated that over the previous eight months they had exercised for at least 30 minutes or more, for an average of 3.4 days per week. Using the Health Canada standards, 147 participants (69%) were classed as not physically active and 65 participants (31%) were classed as physically active at time 1. During the eight weeks between time 1 and time 2, participants’ exercise levels dropped to 2.9 days per week; a significant decrease of 0.5 days per week in exercise behaviour. This reduction in exercise was hypothesised to be due to a volatile period of adjustment and unanticipated demands to be socially active and engage in academic activities when starting university (Kwan et al., 2009). Kwan et al. (2009) have argued that significant life transitions (e.g., moving to university or graduating university) may cause dramatic life changes, including changes in location, social groups, routines, facilities, opportunities and responsibilities. Given the abruptness and wide-ranging implications of these changes, the significant life transitions that cause these changes may be described as being volatile in nature. A limitation of the study was that it only measured exercise behaviour during the first semester of university, although this is likely to be the most volatile time period within the first year. It was reported that the transition of moving to university was seen by the participants as an opportunity to increase exercise participation; however, in reality, exercise participation decreased across the transition, despite their positive exercise intentions.

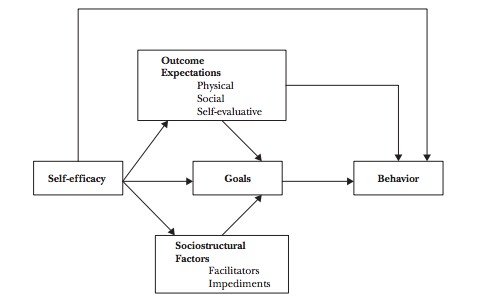
Considering changes in health behaviour after leaving university, Gotham et al. (1997) investigated changes in alcohol consumption post-university. Their study measured alcohol consumption in full-time students (*N* = 288) in their final year of university and at three-year follow-up. A significant decrease was found in alcohol consumption between the two time periods. Gotham et al. (1997) suggested that the decrease in alcohol consumption was due to the students entering full-time employment, marriage and parenthood, and were thus maturing out of behaviours such as binge drinking, in line with other literature (Chen & Kandel, 1995; Kwan et al., 2012). The maturing out effect is described as a period of time in which a normative decline of a behaviour occurs as age increases (Littlefield, Sher, & Wood, 2009). It is often associated with individuals assuming adult responsibilities or roles (in early adulthood), and adhering to a more conventional lifestyle (Littlefield et al., 2009).

The above literature has highlighted the negative influence of transitionary periods of life, and the detrimental effects this can have on health behaviours such as exercise (Gotham et al., 1997; Kuntsche et al., 2004; Kwan et al., 2009). The general populations’ exercise levels have also been found to reduce with age, particularly from the age of 16-24 onwards, and to continually decline over time from 1990-2008 (HSE, 2008). These issues provide the rationale for the current study – i.e., to study exercise in young adults across a key life transition (e.g., leaving university).

## Models of Health Behaviour

Baum and Posluszny (1999) state that there are three ways in which one’s behaviour impacts health, (1) having a direct impact on biological changes, (2) causing or protecting against health risks, (3) or by leading to the early detection of a disease or treatment against it. Thus, there is keen interest in understanding the determinants of health behaviour. A number of models have been developed that attempt to understand and predict health behaviour, such as exercise. Among these models are social cognition models that focus on individuals’ beliefs about health behaviour. Some of the most widely applied social cognition models include Social Cognitive Theory (SCT: Bandura, 1986), the Health Action Process Approach (HAPA: Schwarzer, 1992, 2001), the Health Belief Model (Sas-Nowosielski, Grabara, & Hadzik, 2013), and the Theory of Planned Behaviour (TPB: Ajzen, 1991).

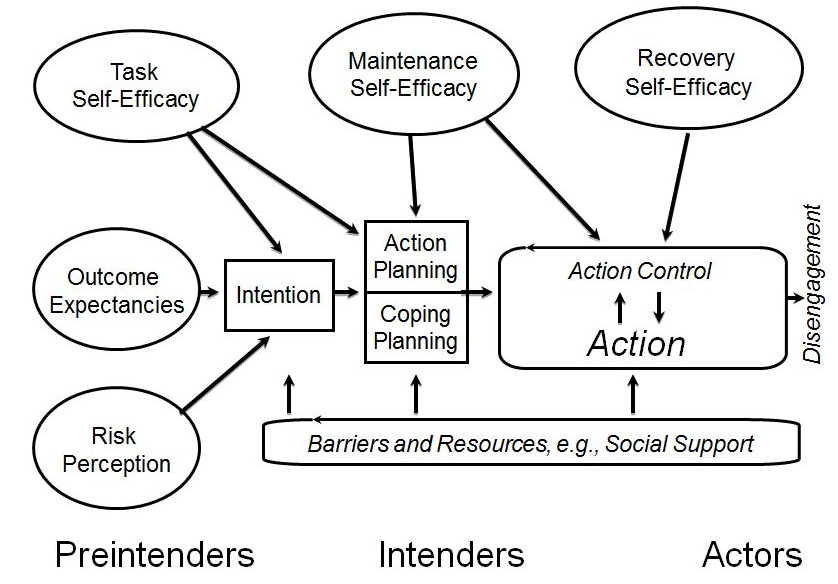
Social Cognitive Theory (SCT) (see Figure 2) outlines three constructs that determine behavioural goals and, in turn, behaviour. First, and at the heart of Bandura’s (1986) model is self-efficacy. Self-efficacy refers to one’s confidence of being able to perform a specific behaviour. Second, are outcome expectations about the likelihood of physical, social, and self-evaluative outcomes of the behaviour. These refer to beliefs about the possible consequences of the behaviour. Third, are perceived facilitators or impediments to behaviour that include socio-cultural factors that may support or hinder performance of the behaviour. These three constructs determine goals (which are akin to intention), which the model states as the proximal determinant of behaviour, although self-efficacy and outcome expectations are also hypothesized to have direct effects on behaviour.



**Figure 2.** The Social Cognitive Theory (Bandura, 2000).

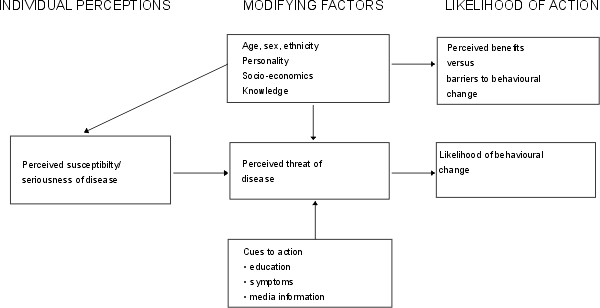
Applications of SCT in relation to exercise have produced mixed results (Luszczynska & Schwarzer, 2015). However, some recent studies have provided strong evidence to support the SCT in relation to the prediction of health behaviour, including exercise adherence (Hatchet, Hallam, & Ford, 2013; Mailey, Phillips, Dlugonski, & Conroy, 2015). Various studies investigating exercise among different age ranges have suggested that self-efficacy plays a consistent role. For example, Strauss et al. (2001) study with 10-16 year old adolescents, found that self-efficacy was directly related to high levels of exercise. Additionally, Dewer et al. (2013) study investigating the use of the SCT in predicting exercise levels using an adolescent population (M age = 13.2, SD = 0.4) again found that self-efficacy was directly related to exercise behaviour at 12-month follow-up. Similarly, Maddison et al. (2014) investigated exercise participation as part of a cardiac rehabilitation process through targeting self-efficacy as an intervention. They also found that self-efficacy positively influenced exercise adherence at follow-up (24 weeks). Hatchet et al. (2013) investigated the use of an email intervention based on the SCT model to influence exercise adherence in breast cancer survivors. Their study supported the utility of self-efficacy, finding that the intervention significantly improved self-reported exercise levels at both six and 12 week follow-up. The previous success of the SCT and the importance of self-efficacy, has led to self-efficacy being incorporated into other models, such as the HAPA.

The HAPA (see Figure 3) was largely influenced by SCT (Bandura, 1986), through the inclusion of self-efficacy as a key predictor, and Volitional Theory (Heckhausen, 1991), through the distinction between motivational and volitional phases of health behaviour (Schwarzer et al., 2008). The HAPA model therefore makes a distinction between pre-intentional (motivational) factors that determine one’s intention to perform a behaviour, and post-intentional (volitional) factors that help translate intention into health behaviour. Considering constructs in the motivational phase, risk perceptions (susceptibility and severity), outcome expectancies and action self-efficacy determine intention. In the volitional phase, intention determines behaviour through action and coping planning. Coping self-efficacy and recovery self-efficacy are additional determinants of behaviour. A key feature of the HAPA model is the key role that is afforded to self-efficacy at different phases of health behaviour. Thus, action self-efficacy, which refers to one imagining successful scenarios, anticipating potential outcomes of diverse strategies, is an important determinant of motivation to perform a behaviour (Schwarzer & Renner, 2000). In contrast, coping self-efficacy, which refers to beliefs about one’s ability to overcome and deal with potential barriers that could arise during the initiation and maintenance period (Schwarzer & Renner, 2000), and recovery self-efficacy, which refers to one’s confidence to deal with lapses (Rodgers et al., 2009), are important in ensuring that action is initiated and maintained. HAPA has been applied to the prediction of various health behaviours (Luszczynska & Schwarzer, 2003; Schwarzer et al., 2008; & Sniehotta, Scholz, & Schwarzer, 2005) including exercise. A recent meta-anaysis of the HAPA and exercise by Gholami (2014) revealed significant average weighted correlations for action self-efficacy-intention (*r* = .50, *p* < .001), outcome expectancies-intention (*r* = .40, *p* < .001), action self-efficacy-planning (*r* = .36, *p* < .001), coping self-efficacy-planning (*r* = .49, *p* < .001), intention-planning (*r* = .42, *p* <.001), planning-exercise (*r* = .34, *p* < .001) and finally, coping self-efficacy-exercise (*r* = .32, *p* < .001). The risk perception-intention average correlation was non-significant (*r* = .10, *p* > .05). The meta-analysis revealed self-efficacy to again, have a strong relationship with both intention and planning, with planning playing a mediating role between intention and behaviour. However, the meta-analysis only included 11 studies and not all studies made a distinction between action planning and coping planning, thus they used the overarching term, planning. As a result, there is currently a lack of evidence to employing the HAPA in the present context to examine exerise across the post-university transition. Moreover, while the HAPA model could be used to identify specific outcome expectancy beliefs that could be targeted in an intervntion, it does not focus on beliefs about specific barriers to, or enablers of, a behaviour, instead focusing on different kinds of self-efficacy.



**Figure 3.** The Health Action Process Approach (Luszczynska & Schwarzer, 2003).

The Health Belief Model (see Figure 4) (HBM; Hochbaum, 1958; Rosenstock, 1966) was originally designed to increase the uptake of health education programmes but is now more commonly used to explain health behaviours (Abraham & Sheeran, 2005). The HBM is centred around two main appraisal processes; threat appraisals and coping appraisals. The former includes perceived susceptibility to an illness/health problem and perceived severity of the illness/health problem (Abraham & Sheeran, 2005). The latter refers to the beliefs about perceived benefits and the perceived barriers to performing a health behaviour in response to the illness/health problem. In later versions of the HBM, a health motivation construct was included, which reflects one’s readiness to be concerned about health matters. Lastly, cues to action is also included in the HBM and covers social influences, individual perceptions of symptoms, and health education campaigns that might initiate the threat and coping appraisal processes (Abraham & Sheeran, 2005).



**Figure 4.** The Health Belief Model

The HBM model is thus more concerned with beliefs about how to avoid negative health outcomes. In contrast, the focus of the current research is on promoting a positive health behaviour, i.e., the maintenance of exercise participation over the transition of graduating university. In addition, the HBM fails to measure constructs such as social pressures (both descriptive and subjective) and additional predictors such as action planning and self-identity.

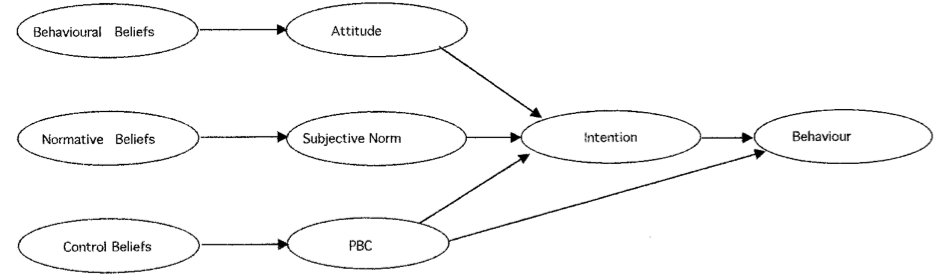
## Justification for the Theoretical Framework Employed in the Thesis

The TPB (Ajzen, 1991) was chosen to provide the theoretical framework for the research presented in this thesis, rather than other social cognition models that have been developed to explain health behaviour. The TPB (Ajzen, 1991) has a strong evidence-based and has been a widely applied to understand and predict health behaviour, including exercise. The TPB also includes many constructs included in other models, including outcome expectancies, perceived benefits and barriers, and self-efficacy. The TPB also allows for consideration of additional predictors such as self-identity, planning, moral norms, past behaviour, and anticipated regret. In the current thesis, past behaviour, habit strength, self-identity, and planning were included as additional predictors given the evidence and theoretical base for their inclusion. In contrast, moral norms were not included as the target behaviour does not have any obvious moral or ethical implications and the target sample comprise young adults.

Other social cognition models such as the HBM, were not chosen as the theoretical framework for the current research as, although the HBM model has had some success in creating interventions for health behaviour change (Cao, Chen, & Wang, 2014; Montanaro & Bryan, 2014), the model does not include some important determinants such as perceived social pressures and intention. The HAPA, model was not chosen due to its lack of supporting evidence in relation to exercise. In addition, it has not been used to identify and target specific beliefs about the barriers to a behaviour.

## Theory of Planned Behaviour

The TPB (Ajzen, 1985; Ajzen, 1991) is one of the most widely applied theories of human behaviour and is supported by numerous meta-analyses (Armitage & Conner, 2001; Godin & Kok, 1996; Godin, Valois, & Lepage, 1993; Hagger, Chatzisarantis, & Biddle, 2002a; McEachan, Conner, Taylor, & Lawton, 2011), and many studies focusing on exercise behaviour. The TPB emphasises intention as a key predictor of behaviour, as it is the most proximal antecedent of behaviour. The TPB has three main components that determine intention; namely, attitude, subjective norm, and perceived behavioural control (PBC). The three TPB components are underpinned by behavioural, normative, and control beliefs respectively. Figure 5 outlines the TPB.



**Figure 5.** The Theory of Planned Behaviour (Ajzen, 1991).

### Intention

Intention is the central component of the TPB, being the most proximal antecedent of behaviour (Ajzen, 1991; Sheeran & Abraham, 2003). Intention has been defined as a person’s cognitive decision to act on a behaviour, and assumes that exerted effort will be a direct reflection of intention strength towards achieving a goal or behaviour. Ajzen (1991) states that the intention component of the TPB captures the motivational factors that influence behaviour and represents how hard someone is willing to try to perform a behaviour, and their planned exertion effort in order for behaviour performance. Thus, intention is positively related to the likelihood of the performance of a behaviour, with intention seen to be one of the key components in health behaviour change (Abraham & Sheeran, 2003; Ajzen, 1991; Rise, Sheeran, & Hukkelberg, 2010). The three components of the TPB (attitude, subjective norm, and PBC) all influence intention which, in turn, influences behaviour (Sheeran & Abraham, 2003). This, however, only occurs when the behaviour is perceived to be under one’s volitional control, otherwise, behaviour is likely to be dictated solely by PBC.

Intention, however, does not explain all of the variance in behaviour and thus there is a significant gap between people’s intention and subsequent behaviour (Sheeran & Abraham, 2003). McEachan et al. (2011) meta-analysis has provided intention-behaviour correlations of *r* = .48 for all exercise studies, *r* = .46 for adolescent exercise studies, and *r* = .54 for student exercise studies. Other volitional factors, such as action and coping planning as outlined in the HAPA, may be required to bridge this intention-behaviour gap.

A possible explanation for this intention-behaviour gap is that intentions are thought to differ in valence (positive/negative) as well as in strength (high/low) (Austin & Vancouver, 1996). Valence refers to whether one takes a positive approach towards a behaviour, or has a more negative standpoint, thus avoids the behaviour. Valence is often linked to task difficulty and thus, perceived self-efficacy in success or failure of said behaviour. It is often used in conjunction with goals, thus a post-intentional factor, bridging the intention-behaviour relationship. Intentional strength refers to ones motivation to comply, or not comply, with a behaviour. The stronger the intention, the more likely one is to comply (or not) with the behaviour in question (Ajzen, 1991), thus increasing the strength on the relationship between intention and behaviour.

### Attitude

Ajzen (1991) defines attitude as the degree to which someone has a favourable or unfavourable evaluation of an attitude object (e.g., a behaviour). Attitude has been found to be a strong predictor of intention and behaviour for many health behaviours, including exercise, as supported by the McEachan et al. (2011) meta-analysis which found that for exercise, attitude was significantly correlated with intention (*r* = .60). Moreover, the correlation was stronger than the correlations for subjective norm (*r* = .38) and PBC (*r* = .55), indicating that attitude has the strongest impact on exercise intentions. This is in line with previous meta-analyses (Armitage & Conner, 2001; Hagger et al., 2002a).

A recent distinction has been made between instrumental and affective attitudes (Kraft, Rise, Sutton, & Roysamb, 2005). Instrumental attitudes refer to one’s perception of a behaviour being wise/foolish or beneficial/harmful, whereas affective attitudes refers to whether one perceives a behaviour to be pleasant/unpleasant or interesting/boring (Ajzen, 1991). Affective attitudes have been found to be more closely related to intention than instrumental attitudes (Lowe, Eves, & Carroll, 2002). This may reflect the fact that many of the affective consequences of exercise (e.g., enjoyment) are more immediate and therefore likely to have a stronger influence on intentions than instrumental consequences (e.g., decreases risk of type 2 diabetes) that are more distal (Hall & Fong, 2007).

Salient attitudes are reasonably stable (Ajzen & Fishbein, 2005; Hagger et al., 2002a; Rutter & Quine, 2002); however, if one is challenged about a behaviour or is new to a behaviour, Sheeran and Abraham (2003) suggest that subjective norm, PBC, or past behaviour can influence intention and behaviour. Sheeran and Abraham (2003) refer to this as temporal stability (the prediction of attitude strength), thus if one has high temporal stability then an attitude is likely to be stable and therefore influence intention. Krosnick and Petty (1995) state that there are two defining features that help mould a strong attitude: (a) the durability and (b) the impact they have. The durability of an attitude is twofold; first it refers to the persistence of an attitude over time, and secondly it refers to resistance to challenges. Attitude impact represents the predictive utility in influencing judgments, information processing, and behaviour (Krosnick & Petty, 1995).

Attitudes are based on an individual’s salient behavioural beliefs (Ajzen, 1991; Downs & Hausenblas, 2005). One may possess many beliefs about a particular behaviour; however, only some beliefs are salient, and determine attitude. Behavioural beliefs are the perceived consequences of engaging in a behaviour, weighted by an evaluation of the consequences. For example, exercise can be perceived to lead to various health benefits (outcome expectancy), which are evaluated positively (valence). Alternatively, exercise could also be perceived as costly and time consuming, which are evaluated negatively. Thus, an attitude depends on the perceived likelihood of different outcomes and an evaluation of the outcomes. McEachan et al.’s (2011) meta analysis on health behaviours and the TPB included studies measuring beliefs, reporting that behavioural beliefs had a positive relationship with both attitude and intention (*r* = .43 & *r* = .42 respectively).

### Subjective Norm

The second TPB component that determines intention is subjective norm. Subjective norm is defined as one’s perception of the social pressures to perform, or not perform, a particular behaviour (Ajzen, 1991; Rhodes & Courneya, 2003). Within the literature, the views on the importance of subjective norm are mixed (Godin & Kok, 1996), which has led some authors to leave the subjective norm component out of their analysis (Sparks, Shepherd, Wieringa, & Zimmermanns, 1995). Within the health behaviour literature, subjective norm is generally seen to be a weak predictor of intention and behaviour, when compared to attitude and PBC. Studies specifically within exercise literature however, have found the subjective norm component to be a significant predictor of intention (Armitage & Conner, 2001; Hagger et al., 2002a; Kwan et al., 2009), even though its contribution to the prediction of intention is still generally weaker (*r* = .38).

Conner and Sparks (2005) suggested that the weaker correlations for subjective norm may be due to the use of single-item measures with reduced reliability, although more recently studies have employed multi-item measures (Hagger et al., 2002a). Another possible explanation for subjective norm being a weaker predictor of intention is that the reinforcement of a normative belief is external (from another person) and thus may not lead to self-determined intentions (Deci & Ryan, 1985). In addition, one’s knowledge of the views of a significant other may be unclear or different referents may have conflicting views. Finally, Kwan et al. (2009) suggested that the subjective norm component may have greater importance in younger populations, such as students and adolescents, due to the increased time spent with peers and the importance or peer networks. Another interesting finding within the exercise literature is that the subjective norm component of the TPB has generally been criticized within the literature (Sparks et al., 1995), however meta-analysis results indicate that within the health behaviour and exercise literature, subjective norm has a small but significant correlation and contribution to both intention (*r* = .38, R*²=*.32, *β* = .12, p < .01) and behaviour (*r* = .21, *R²=*.17, *β* = .05, p < .01) (Hagger et al., 2002a). Thus, subjective norms utility within the model is vital in attempting to explain the maximum variance in both intention and behaviour when considering exercise.

Again, a distinction has been made between two types of norms: (a) injunctive norms, and (b) descriptive norms (Ajzen, 1985). Injunctive norms refer to one’s perception of the views of significant others whereas descriptive norms refer to one’s perception of significant others’ actual behaviour. Okun, Karoly, and Lutz (2002) compared four normative categories; family injunctive norms, friend injunctive norms, family descriptive norms, and friend descriptive norms. They found all four of the injunctive and descriptive components to correlate with intention, with friend descriptive norms to have the strongest correlation (*r* = .28). The hierarchical regression analysis predicting intention revealed friend descriptive norm as the only normative significant predictor, along with PBC and attitude. More interestingly, however, a regression analysis predicting behaviour revealed friend descriptive norm as the second strongest predictor of exercise behaviour, with PBC and intention being the only other predictors of behaviour. Their study therefore supports the use of the descriptive norm component within an exercise setting, and suggests that descriptive norms are potentially more influential than injunctive norms in this setting. Rivis and Sheeran (2003) conducted a meta-analysis on the normative component of the TPB. Their results indicate that descriptive norms explained additional variance in intention, over and above the variance explained by the TPB variables (Rivis & Sheeran, 2003). Again, this supports the use of the descriptive norm component.

The subjective norm component is determined by normative beliefs about the perceived views of specific referents (i.e., whether they would approve/disapprove of the individual performing/not performing the behaviour) and the individual’s motivation to comply with the views of the referent (Ajzen, 1991; Hagger et al., 2002a). For example, one might believe that one’s parents would approve of one exercising, and one might be motivated to comply with their wishes. Normative beliefs may utilize the perception of both injunctive norms (belief on whether to comply with a certain behaviour or not from social perceptions) and descriptive norms (observing significant others actual behaviour) (Ajzen, 1985). Both may increase in valence if a significant other is involved (Downs & Hausenblas, 2005). McEachan et al. (2011) found that across health behaviours, normative beliefs had a strong correlation with subjective norm (*r* = .53) and a moderate correlation with intention (*r* = .37).

### Perceived Behavioural Control

The PBC construct is the final determinant of intention in the TPB and is also hypothesised to have a direct effect on behaviour in addition to intention. PBC has been defined as the extent to which an individual perceives they have control (opportunity and recourses) over a behaviour, and their confidence or ability to perform the behaviour (Ajzen, 1991). Ajzen (1991) added that the opportunities and resources available to someone would inevitably dictate the likelihood of being able to achieve a target behaviour. For example in an exercise context, exercise behaviour may be directly affected by barriers and obstacles such as time pressures, weather, and cost, that prevent people acting on their intentions (Norman, Conner, & Bell, 2000). PBC differs from locus of control as it is a *perceived* control over behaviour that can vary across situations. Locus of control is more of a generalized expectancy and is thought to be more stable across varying situations. The confidence in one’s ability element of the PBC component derives from Bandura (1978) concept of perceived self-efficacy, which refers to individuals’ confidence in their ability to successfully perform a specific behaviour. Self-efficacy can influence one’s motivation, effort exerted, thought patterns, choice of activity, activity preparation, and emotional reactions (Bandura, 1991). Thus, there are two distinct components they make up PBC. First, perceived control describes one’s perception of control over having the resources and opportunities available to perform a behaviour. Second, self-efficacy describes one’s confidence in their ability to successfully perform a behaviour (Ajzen, 1991).

The PBC construct is therefore typically measured through its two components, (a) perceived control and (b) self-efficacy (Ajzen, 1991; Conner & Armitage, 1998; Luszczynska, Schwarzer, Lippke, & Mazurkiewicz, 2011). Perceived control refers to one’s perception of the volitional control one holds over performing or not performing a behaviour. This is measured through questions such as *“How much control do you have over whether or not you engage in… (no control-complete control)”*. In contrast, self-efficacy refers to one’s confidence in having the skill or ability to be able to complete the task or behaviour successfully and is measured through questions such as *“Engaging in regular exercise would be… (difficult-easy)”.*

Self-efficacy towards a behaviour can be gained through several sources, such as verbal persuasion, physiological arousal, vicarious experiences, and overt mastery experiences (Bandura, 1986). For example, in relation to vicarious experiences, an observer can increase their self-efficacy to perform a behaviour through observing successful performance of the behaviour by another person. In addition, a behaviour can be broken down into smaller steps so that each is mastered in turn thereby increasing self-efficacy. Within exercise research, self-efficacy has been further separated into three separate types, task, coping, and scheduling self-efficacy (Rodgers, Hall, Blanchard, McAuley, & Munroe, 2002; Rodgers, Murray, Courneya, Bell, & Harber, 2009). Task self-efficacy is concerned with one’s confidence to perform specific elements of a behaviour, which has been related to the initiation of exercise; coping self-efficacy is associated with one’s confidence to overcome barriers to exercise, and is linked with the maintenance of exercise; and scheduling self-efficacy is one’s confidence to manage one’s time for regular exercise (Rogers et al., 2002, 2009). Rodgers et al. (2002) and (2009) also propose that the three different types of self-efficacy will have different influences over behaviour at different phases of exercise adoption. For example, Rodgers et al. (2009) suggest that task self-efficacy will be more important in the early acquisition of learning a new behaviour or skill, whereas scheduling self-efficacy is consistently appropriate, regardless of the stage of adoption, and finally, coping self-efficacy is most appropriate once a behaviour has been initiated, and is trying to be maintained.

PBC is a unique concept within the TPB as it can directly influence behaviour without being mediated by intention (Ajzen & Fishbein, 2005). This occurs when there is no volitional control over a behaviour, and therefore regardless of intention or motivation to perform a behaviour, the behaviour will not be performed. In contrast, PBC has the capacity to become obsolete in studies where participants have complete volitional control (Ajzen, 1991; Armitage & Conner, 2001; Hagger, Chatzisarantis, & Biddle, 2002b). If this occurs, other components of the TPB become increasingly important in influencing intention (Ajzen & Fishbein, 2005). Within exercise studies specifically, PBC is often found to be a significant predictor of both intentions and behaviour (Armitage & Conner, 2001; McEachan et al., 2011). Thus, McEachan et al. (2011) reported strong average correlations between PBC and both exercise intentions (*r* = .55) and exercise behaviour (*r* = .34). Meta-analyses results (Hagger et al., 2002a) in an exercise context have indicated that the PBC component significantly correlated with both intention (*r* = .57) and behaviour (*r* = .39). PBC was also found to make a significant explanation of variance in both intention (*β* = .33, p < .01) and behaviour (*β* = .15, p < .01), explaining an additional 3.06% of variance in exercise behaviour (Hagger et al., 2002a). A more recent meta-analysis result by McEachan et al. (2011) support this evidence for exercise, with PBC predicting intention (*r* = .47) and behaviour (*r* = .31), highlighting the strength of the model with consistent results over time.

PBC is determined by control beliefs about factors that might inhibit or facilitate performance of the behaviour weighted by the perceived likelihood of their occurrence. Control beliefs are thought to be based on various forms of previous experiences with a behaviour or similar behaviour, or perception of difficulty of the behaviour (Conner & Sparks, 2005). Thus, one might believe that cheap facilities would facilitate exercise, but also have the belief that cheap exercise facilities are unlikely to occur (Ajzen, 1991). Meta-analysis results from McEachan et al. (2011) indicated a strong correlations between control beliefs and PBC (*r* = .41) and between control beliefs and intention (*r* = .44).

### The TPB and Exercise

The TPB has been found to be a successful model for explaining health behaviours, including exercise (Armitage & Conner, 2001; Hagger et al., 2002a; McEachan et al., 2011). Research using the TPB has highlighted significant links between the TPB constructs, which may help towards the development of appropriate interventions to promote health behaviours.

Hagger et al. (2002a) meta-analysis of TPB exercise studies found that intention was the strongest predictor of behaviour (*r* = .51), followed by PBC (*r* =.39). It also found that attitude (*r* = .60) and PBC (*r* = .57) were stronger predictors of intention than subjective norm (*r* = .32), which was supported by McEachan et al.’s (2011) more recent meta-analysis of health behaviours. Intention is the strongest prediction of behaviour (Hagger et al., 2002a; McEachan et al., 2011), with attitude (*r* = .57), PBC (r = .54), and subjective norm (*r* = .40) all significantly predictive of intention, with subjective norm being the weakest predictor of the three components. Both Hagger et al. (2002a) and McEachan et al. (2011) meta-analyses found intention, the proximal antecedent of behaviour, to be mainly determined by both attitude and PBC. Using the TPB, the total explained variance in exercise intention was 46.3%, and 23.9% of behaviour (McEachan et al., 2011). Interestingly, McEachan et al. (2011) also assessed TPB-exercise relations for different age groups including adults, students, and adolescents. However, the pattern of correlations between TPB components and exercise intentions and behaviour was similar for all age groups with intention being the strongest predictor of exercise behaviour and attitude being the strongest predictor of intention, followed by PBC and subjective norm.

Lowe et al. (2002) investigated the effect of attitude on exercise intention and behaviour, looking at both affective and instrumental attitudes. Their study used the TPB (*N* = 365) and found that affective attitudes had a greater significant effect on intention (*r* = .56, *p* < .001 vs. *r* = .34, *p* < .001) and behaviour (*r* = .30, p < .05 vs. *r* = .16, p > .05) than did instrumental attitudes. Therefore, whether one believes exercise is pleasant/unpleasant or enjoyable /not enjoyable was more important than one’s perceptions of how beneficial it is to their health.

To date, only one TPB study has investigated exercise behaviour across a significant life transition such as entering or leaving university (Kwan et al., 2009). Kwan et al. (2009) examined students entering university and how their relationship with exercise was affected. Their results indicated that the significant life transition of entering university had a significant negative effect on participants’ exercise levels. Considering the TPB, attitude (*r* = .54), subjective norm (*r* = .32), and PBC (*r* = .49) all had moderate-strong associations with intention, and past behaviour (*r* = .39), intentions (*r* = .18), and PBC (*r* = .20) were moderately correlated with behaviour. Similar to other research (Godin & Kok, 1996; Hagger et al., 2002a; McEachan et al. 2011), attitude, subjective norm, and PBC significantly predicted exercise intentions, explaining 37.1% of the variance in exercise intentions. The inclusion of past behaviour significantly increased the amount of variance explained in intentions to 38.6%, although this was a relatively small contribution when compared to the previous literature (Conner & Armitage, 1998; Hagger et al., 2002a). When predicting exercise behaviour, past behaviour was the sole significant predictor explaining 16% of the variance. This was interpreted to be due to participants encountering many new experiences and barriers, and therefore being overwhelmed and thus reverting back to habitual exercise patterns.. Kwan et al. (2009) proposed that past behaviour is an important additional predictor when considering a significant life transition due to the high demands of a changing environment and the seemingly automated response of reverting to habitual exercise behaviour.

According to the TPB, individuals’ behavioural, normative, and control beliefs inform attitude, subjective norm, and PBC, respectively (Downs & Hausenblas, 2005; McEachan et al., 2011). Therefore, the core beliefs held by a population are important in determining their motivation to perform a particular behaviour. For example, Norman and Smith (1995) reported significant correlations between behavioural beliefs and attitude, normative beliefs and subjective norm, and control beliefs and PBC, which in turn were correlated with exercise intentions. Downs and Hausenblas (2005) conducted a systematic review of TPB studies that had measured beliefs about exercise. They firstly examined studies that had conducted elicitation interviews or surveys to identify modal salient behavioural, normative, and control beliefs about exercise. A total of 47 exercise TPB elicitation studies were identified spanning a 22-year period (1975-2002). The average number of behavioural beliefs elicited was seven, normative beliefs four, and control beliefs six. Elicitation studies are important as they capture the core underlying beliefs a population has about a behaviour, acting as a foundation to build interventions designed on salient beliefs, and understanding what beliefs are important to a behaviour. These beliefs derive from people’s personal experiences, family environment, and interactions with others. Their results indicated that the most salient behavioural beliefs were that exercise improves one’s physical and psychological health, controls weight, improves daily functioning, increases energy, and relieves stress and promotes relaxation. The most salient normative beliefs were one’s family, followed by friends, and then healthcare professionals. The most salient control beliefs were health issues, inconvenience, lack of motivation and energy, time, lack of social support for perceived barriers, and pleasure, and social support for perceived facilitators. Behavioural beliefs explained 54.2% of the variance in attitude, normative beliefs explained 55.8% of the variance in subjective norm, and control beliefs explained 33.7% of the variance in PBC. Ajzen (2015) states that elicitation studies are important within the literature, as specific elicited beliefs allow researchers to develop interventions that target the modal salient beliefs found regarding a specific target population. Downs and Hausenblas (2005) study comprised of various demographic groups, including community adults, undergraduate students, worksite employees, patients, older adults, and other. Therefore, their results are generalised across varying populations, and thus the salient beliefs are from various demographic groups. As a result, it is recommended to carry out an elicitation study within a target demographic in order to identify the specific beliefs held (Downs & Hausenblas, 2005). This is important as, to date, no studies have specifically examined beliefs about exercise after leaving university. Moreover, Downs and Hausenblas’ (2005) review highlighted considerable variation between the beliefs elicited for different populations.

## Additional Predictors

Although the TPB has been successfully applied to the prediction of health behaviours (Armitage & Conner, 2001; Hagger et al., 2002a; McEachan et al., 2011), researchers have emphasised the utility of additional constructs to the TPB, such as past behaviour, habit, self-identity, action planning, anticipated regret, and moral norms (Abraham & Sheeran, 2003; Carraro & Gaudreau, 2013; Conner, & Norman, (2015); Conner, Sandberg, & Norman, 2010; Norman et al., 2000; Rivis et al., 2009; Scholz, Schuez, Ziegelmann, Lippke, & Schwarzer, 2008; Sheeran & Abraham, 2003). These additional constructs have been successful in explaining additional variance in both intention and behaviour (Carraro & Gaudreau, 2013; Charng et al., 1988; Norman et al., 2000; Scholz et al., 2008; Sheeran & Abraham, 2003). Ajzen (1991) states that the TPB is open to inclusion of additional variables providing (a) there is evidence that they explain additional variance, and (b) a strong theoretical case can be made for their inclusion. A number of potential additional predictors have been highlighted including past behaviour/habit, self-identity, action planning, anticipated regret and moral norms (Conner & Sparks, 2015).

### Past Behaviour and Habit

Past behaviour incorporates previous experiences that can influence future behaviour through the assembly of favourable or unfavourable evaluations of the behaviour and perceptions of control over the behaviour (Sheeran & Abraham, 2003; Verplanken & Orbell, 2003). As a result, the influence of past behaviour on future behaviour should be mediated by the TPB (Ajzen, 1991). However, past behaviour, has often been found to have a direct effect on future behaviour (Godin et al., 1993; Hagger et al., 2002a; Norman & Smith, 1995). Conner and Armitage’s (1998) meta-analysis reported that, on average, past behaviour accounted for an additional 13% of the variance in future behaviour over and above the influence of the TPB variables. For example, Norman et al. (2000) found that past behaviour had a direct effect on future exercise behaviour, over and above the influence of the TPB influence. Similarly, Norman and Smith (1995) found prior behaviour to be the sole significant predictor of exercise behaviour over and above the influence of TPB variables. Hagger et al.’s (2002a) meta-analysis of TPB-exercise studies found past behaviour to be a significant predictor of behaviour, intention, attitude, subjective norm, PBC, and self-efficacy. There was an indication that past behaviour attenuated the relationships between the TPB constructs and exercise, although it did not completely remove the effects of attitudes on intention, intention on behaviour, or of PBC on behaviour (Hagger et al., 2002a).

Past behaviour has also been found to moderate the intention-behaviour link; as behaviour becomes frequent this results in a weaker intention-behaviour relationship (Norman et al., 2000). This suggests that the influence of the TPB’s social cognitive constructs become weaker as the behaviour becomes more habitual. If a past behaviour occurs regularly and in a stable context it has the potential to become habitual (Verplanken & Orbell, 2003). In this way, the direct effect of past behaviour may reflect the operation of habitual processes (Godin et al., 1993); the act of automatically performing a behaviour (Maddux, 1997). Habitual behaviour has the characteristics of satisfactory repetition, automaticity and spontaneously triggered behaviour to specific environmental cues (Verplanken & Aarts, 1999; Verplanken & Orbell, 2003). A review of additional predictors to the TPB by Conner and Armitage (1998) confirmed that habit was a useful additional predictor for future behaviour, as if a behaviour is habitual, then that behaviour is automatically triggered by certain environmental cues, needing little to no cognitive thought. Additionally, habit has been suggested to moderate the relationship between intention and behaviour as when a past behaviour is performed frequently in a stable context, intention is not needed to initiate a behaviour; instead, habitual processes control behaviour. More recent studies (De Bruijn et al., 2007) have investigated habit strength with the TPB in relation to fruit consumption. Results indicated that habit strength moderated the intention-behaviour relationship, as with low-medium habit strength individuals, intention significantly predicted fruit consumption, whereas when habit strength was high, intention became a non-significant predictor of behaviour. Similarly, De Bruijn (2011) investigated the relationship between habit strength and exercise within a student population. Their results indicated that habit strength helped the prediction of behaviour, as at time two, 94.9% of those who were exercising regularly had strong exercise habits, whilst 88.48% of participants whose exercise behaviour did not meet sufficient levels reported weak exercise habits. However, De Bruijn (2011) found that 40% of strong habitual exercise intenders did not perform their intentions, which has been hypothesised to be due to the volatile (i.e., unstable) environment a student population is within (Kwan et al., 2009).

Past behaviour and habit are therefore vital additions to the TPB, especially within the exercise domain (Hagger et al., 2002a), as they have the ability to explain additional variance, over and above the TPB components, in both intention and behaviour (Conner & Armitage, 1998; Hagger et al., 2002a; Norman & Smith, 1995). In addition, persistent past behaviour has been linked to the creation of that behaviour becoming part of one’s self-identity (Charng et al., 1988), which has also been proposed as an additional construct to the TPB.

### Self-Identity

Self-identity is described as the strength with which one believes that a behaviour is a part of one’s self-concept (Sparks & Shepherd, 1992). According to Rise et al. (2010), self-identity refers to salient and enduring aspects of one’s self-perception (e.g., someone who enjoys jogging regularly may see the term ‘an exerciser’ as a way of describing themselves). Additionally, one may apply a socially meaningful category to oneself as a description when answering the question “Who am I?” (Rise et al., 2010), in order to express an accurate representation of oneself. With the nature of exercise and the positive impact this can have on a person’s health (Byers et al., 2002; Erikssen, 2001), self-identity is an important construct to help predict exercise intentions and behaviour. Early studies suggest that one’s self-identity can arise from repeatedly performing a behaviour, influencing one’s self-concept, which can create an overriding influence on behaviour over one’s attitude (positive or negative) (Charng et al., 1988). Self-identity is believed to influence people’s motivation to perform a behaviour, thus it should indirectly influence behaviour (De Bruijn, Verkooijen, De Vries, & Van Den Putte, 2012; Rise et al., 2010; Terry, Hogg, & White, 1999). It has been suggested that self-identity is important to behaviour change as people will change their behaviour so that it conforms with their self-identity (Rise et al., 2010). Self-identity effects are hypothesized to strengthen with repeated performance of a behaviour as it increases the likelihood that the behaviour will be important to one’s self-identity and enhances motivation to validate the behaviour to one’s self-identity (Terry et al., 1999).

Research has supported the use of self-identity as an additional predictor within TPB exercise studies. Early studies on exercise identity such as Theodorakis (1994) found the addition of self-identity to the TPB aided the explanation of behaviour. The study assessed exercise intention to continue with exercise classes at a gym. Participants’ exercise behaviour was then measured at one month and two months. Interestingly, self-identity did not significantly predict exercise intention, in contrast to more recent research supporting the prediction of intention through self-identity (Booth, Norman, Harris, & Goyder, 2013). It was however, a significant predictor of behaviour. At one month follow up, self-identity explained an additional 1% of the variance in behaviour, and at two-month follow up, explained an additional 3% of the variance. This result indicates that over time, the importance of one’s exercise identity increases in relation to behaviour. De Bruijn et al. (2012) used self-identity as an additional measure to the TPB to investigate exercise levels among undergraduate students, splitting participants into two groups (strong exercise self-identity and weak exercise self-identity). Results indicated that participants in the strong exercise identity group had stronger intentions to exercise than participants with a weak exercise identity, and that of these exercise intenders, the majority of the successful intenders were also in the high exercise identity group. The study also found that participants with strong exercise identities had significantly higher PBC and affective attitude scores, supporting previous studies (Armitage & Conner, 2001; Hagger et al., 2002a).

A meta-analysis of TPB studies conducted by Rise et al. (2010) found a significant correlation between self-identity and intention that was of a medium magnitude (*r* = .47) (Cohen, 1992) across various health-related and other behaviours. Self-identity was found to significantly improve the prediction of intentions, explaining an additional 6% of the variance over and above the TPB components (Rise et al., 2010). Interestingly, when past behaviour, and self-identity were considered together as additional predictors, past behaviour accounted for an additional 5% of the variance in intention, and self-identity an additional 9%, supporting the proposal that self-identity is a strong determinant of behavioural intentions independent of the influence of past behaviour (Rise et al., 2010). Finally, 36% of the variance in behaviour was explained by intention, PBC, and self-identity, with self-identity making a significant contribution to the prediction of exercise behaviour, explaining an additional 2% of the variance (Rise et al., 2010).

Self-identity has been found to explain additional variance in both behavioural intention and in behaviour (Charng et al., 1988; De Bruijn et al., 2012; GranBerg & Holmberg, 1990; Kraft et al., 2005; Ries, Hein, Pihu, & Armenta, 2012; Rise et al., 2010; Terry et al., 1999). The direct link between self-identity and behaviour however, needs further research, as it is not clear if this link is accurate, or an artefact of a large sample size resulting from a meta-analysis (Rise et al., 2010). Rise et al. (2010) concluded that self-identity does have a significant influence on behaviour, although it is more likely to have an indirect influence through intention, rather than a direct influence, as outlined/hypothesized by self-identity theory (Rise et al., 2010). A more recent study by Ries et al. (2012) did find a direct link between both self-identity and intention and self-identity and behaviour. Their research investigated the role of self-identity in conjunction with the TPB and exercise behaviour. In total their study explained 67% of the variance in intention and 45% in exercise behaviour, with 4% of the variance in behaviour being explained by self-identity. This provided further support for self-identity as an important determinant of intention and behaviour.

### Action Planning

The TPB provide a strong prediction of intention (Hagger et al., 2002a; McEachan et al., 2011); however, there is a widely recognised disparity between people’s intentions to perform a behaviour and people’s actual behaviour (Sniehotta, Scholz, & Schwarzer, 2005); this is known as the intention-behaviour gap (Sniehotta et al., 2005). The Health Action Process Approach (HAPA) (Lippke, Ziegelmann, & Schwarzer, 2004; Luszczynska & Schwarzer, 2003; Schwarzer, Luszczynska, Ziegelmann, Scholz, & Lippke, 2008; Sniehotta et al., 2005) outlines two distinct phases in health behaviour. First, in the motivational phase, pre-intentional factors lead to the formation of a behavioural intention. Second, in the volitional phase, post-intentional processes aid behaviour adoption (Schwarzer et al., 2008). The post-intentional processes are particularly important for bridging the intention-behaviour gap and include action planning (Schwarzer et al., 2008). Schwarzer et al. (2008) state that for intentions to improve in their likelihood of performance, development of success scenarios and incorporating strategies is essential. Action planning has been described by Gollwitzer (1999) as the action of specifying the when, where and how the implementation of a particular behaviour will occur, thus creating a detailed plan of how a goal will and can be attained. Sniehotta et al. (2005) stated that action planning is one of the key components within the literature designed to bridge the intention-behaviour gap (Gollwitzer, 1999; Scholz et al., 2008). Gollwitzer (1999) argued that for action planning to work, plans need to be positively formed, whilst being challenging and specific. Similar ideas have been proposed in the sport literature (Wanlin, Hrycaiko, Martin, & Mahon, 1997), stating that action plans need to be challenging yet realistic, resulting in increased likelihood of goal attainment as the goal helps to translate one’s intentions into actions (Gollwitzer, 1999; Wanlin et al., 1997). An action plan needs to not merely state the outcome, but have a plan of action for how goal attainment is to be achieved (when, where, and how a goal is going to be accomplished and a set time period) (Gollwitzer, 1999; Locke & Latham, 1990; Wanlin et al., 1997). Action planning is designed to both mediate and moderate the intention-behaviour relationship (Conner, Sandberg, & Norman, 2010; Scholz et al., 2008). Action planning can both (i) mediate the intention-behaviour gap, as strong intentions may lead to action planning which then results in increased likelihood of behaviour performance (Scholz et al., 2008) and (ii) moderate the intention-behaviour relationship as when action plans are used, the intention-behaviour relationship is stronger (Scholz et al., 2008).

A recent meta-analysis conducted by Carraro and Gaudreau (2013) on action planning investigated the effects of both action planning and coping planning on exercise behaviour. The main variables considered were action planning, coping planning, and exercise intention. Their results reported that intention had a direct significantly effect on exercise behaviour. More importantly, however, were the indirect effects of intention through action planning and coping planning, both of which were significant, indicating that action planning and coping planning mediation pathways were predictive of exercise behaviour. Both action planning and coping planning were positively related. Carraro and Gaudreau (2013) state that the mediation of the relationship between intention and exercise behaviour was most significant with a prospective sequence from intention to action planning to control planning to exercise behaviour. Thus, both action planning and coping planning emerged as mediators for exercise behaviour which is in keeping with the current literature findings on action planning and within HAPA research (Conner et al., 2010; Luszczynska et al., 2011; Schwarzer et al., 2008).

Recent research into action planning, such as Conner et al. (2010) supports the utility of action planning as an additional measure in applications of the TPB to exercise. In Conner et al.’s (2010) study, young adults (*N* = 777) completed a questionnaire based on the TPB variables, past behaviour, and planning, in relation to exercise. Exercise behaviour was assessed at two-week follow-up. Planning was found to partially mediate the intention-exercise behaviour relationship, although intention maintained a significant direct effect. Furthermore, a moderated mediation effect was found such that as participants’ intentions increased, the influence of planning on behaviour also increased. Thus, when intentions to exercise were strong, a stronger intention-planning-behaviour relationship was evident. It needs to be noted, however, it was only at high intention levels, where intention had a significant effect on behaviour via action planning (Conner et al., 2010).

### Anticipated Regret

Anticipated regret is an expected negative emotional outcome of performing or not performing a particular behaviour that affects decision making (Conner & Sparks, 2015). It impacts on intention and subsequent behaviour through motivating one to perform, or not perform, a behaviour in order to avoid future feelings of regret. In a review of anticipated regret and health behaviours by Sandberg and Conner (2008), anticipated regret was found to have a significant correlation with intention (*r+* = .47), whilst also significantly adding to the prediction of intention (*R*2change = .07, *p* < .001), over and above the TPB variables. Additionally, anticipated regret was found to have a medium sized correlation with behaviour (*r+* = .47) and also explained additional variance in behaviour (*R*2change = .01, *p* < .001) over and above the TPB variables. A recent study by Conner et al. (2014) also found a significant relationship between anticipated regret and behaviour (*r+* = .23). A criticism of anticipated regret is that research has not yet addressed the issue of separating anticipated regret and instrumental/affective attitudes (Sandberg & Conner, 2008), thus demonstrating anticipated regret to have an independent effect on intention. Addressing this issue, Conner et al. (2015) reported that affective attitude and anticipated regret were only moderately inter-correlated, and that anticipated regret had an independent impact on intention. They state, however, further research is required to test independent effects for behaviour change.

### Moral Norms

Moral norms are an individual’s beliefs of the moral correctness or incorrectness of either performing or not performing a behaviour (Conner & Sparks, 2015) and influences one’s intention and behaviour in order to comply with one’s own moral beliefs of what is believed to be right or wrong. Moral norms may be a useful addition to the TPB model when the behaviour has a moral or ethical element (Beck & Ajzen, 1991). Moral norms are proposed to add to the prediction of intention alongside attitudes, subjective norm and PBC (Ajzen, 1991). Rivis, Sheeran, and Armitage (2009) conducted a meta-analysis on the influence of moral norms and revealed a medium correlation between moral norms and intention (*r+* = .46) when measuring behaviours with a moral dimension. In addition, moral norms significantly increased the amount of explained variance within intention by 3%, after controlling for other TPB variables. Rivis et al. (2009) added that their analysis found evidence that as age increases, so does the influence of moral norms. Moral norms therefore, are a useful additional component to the TPB when a moral dimension is important and/or among older populations. To date, there have been no TPB studies investigating whether moral norms influence one’s exercise intention or behaviour. In the current thesis, such moral obligations are not apparent, and thus it was not incorporated in the research.

## Interventions

### Developing a TPB Intervention

The TPB has been widely applied to help understand and predict health behaviour (Conner & Sparks, 2015). Although not its intended purpose, the TPB been also been adopted a basis for developing behaviour change interventions (Ajzen, 2015). This is due to the TPB strong predictive utility and clear identification of the proximal modifiable determinants of behaviour. The TPB can be used to aid the development of interventions to increase people’s motivation to perform a behaviour through targeting attitudes, subjective norms, and PBC. However, strong intentions are not always translated into changes in behaviour. As a result, other interventions may be needed to bridge the intention-behaviour gap. For example, planning could be used to translate intentions into behaviour or interventions may need to ensure that one has the means, skills, and resources needed to perform the behaviour (Ajzen, 2015).

Ajzen and Fishbein (2005) have suggested three ways in which behaviour change can be encouraged through TPB-based interventions. These are to (i) create new salient attitudinal/normative/control beliefs, (ii) make existing non-salient beliefs salient, (iii) and change existing salient beliefs. Changing one’s beliefs about a behaviour however is difficult, as a salient belief is typically deeply interweaved with the behaviour (Ajzen & Fishbein, 2005). Epton, et al. (2015) proposed and conducted a three-phase programme of formative based on the TPB to develop an intervention. In particular, they (*i*) identified modal salient behavioural, normative and control beliefs about the health behaviour, (*ii*) tested which of the beliefs most strongly predicted intentions and behaviour, and (*iii*) and identified reasons underlying each of the beliefs that could be targeted in health messages. Their study was successful in evidencing how a three-phased approach could be used to develop health messages with strong theoretical and empirical base for health behaviour change interventions, in line with the guidelines proposed by Ajzen and Fishbein (2005).

### TPB Interventions

The TPB has a strong evidence base for understanding health behaviours (McEachan et al., 2011; Sheeran et al., 2014). However, the TPB has received less attention as a model for intervention design and evaluation. Hardeman et al. (2002) conducted a systematic review of TPB intervention and reported that the TPB was often used to evaluate the impact of an intervention rather than in the development phase of an intervention. Hardeman et al. identified only 12 studies that had used the TPB for intervention design, with only one of those interventions designed to improve exercise behaviour. Approximately half of the 12 studies reported a significant effect on behaviour; however, they also stated that the results were not conclusive due to small effect sizes. Hardeman et al. suggested the TPB has a strong potential for intervention behaviour change design, although further research was needed to develop and test interventions that were more clearly based on the TPB.

To date, Darker et al. (2010) is one of the only studies to have used the TPB for intervention design in an exercise context (i.e., to increase walking behaviour). The intervention specifically focused on the PBC component of the TPB as this was found in prior research to be the most important predictor of walking behaviour. Their results support the use of the TPB for intervention design, finding that participants on average increased their daily walking levels from 20 minutes to 32 minutes. The current thesis will therefore add to the present literature through the investigation of the TPB’s utility for intervention design.

### Mode of Delivery

Video-based interventions are a well-accepted intervention methodology used for behaviour change (Clark & Lester, 2000; LeBlanc, 2010; O'Donnell, Doval, Duran, & O'Donnell, 1995). Video-based interventions can be effective methods through reinforcing positive beliefs about a behaviour, whilst also being able to counteract any negative beliefs about that behaviour as well. Clark and Lester (2000) study on caregivers for the elderly and how they take care of themselves used a video-based intervention to improve attitudes and positive behaviours for the caregivers. The study used a longitudinal design (baseline, immediate post-intervention and 6-8 week follow-up) and included 97 female caregivers (M age = 61) who were allocated to one of three conditions: a self-care intervention, a self-care intervention plus a structured discussion group, and a control condition. The video-based intervention had a positive effect immediately post-intervention, with both intervention groups reporting a more positive score for ‘*talking when frustrated*’ and ‘*scheduling in special time for ones-self*’. At 6-8 week follow-up, the intervention condition (self-care intervention condition only) still reported a significantly higher score for ‘*scheduling in special time for ones-self*’. The results support the utility of the video-based intervention for influencing female caregivers’ beliefs about making sure that they give themselves sufficient time in a day to look after themselves, thereby improving the service they are capable of offering to their patients.

Video-based interventions have also been found to be useful within sexual health behaviour research. O’Donnell et al. (1995) investigated the effectiveness of a video-based intervention on condom acquisition in at risk men and women in New York, USA. O’Donnell et al. (1995) also had three conditions: a video-based intervention targeting key beliefs, a video intervention targeting key beliefs coupled with an interactive group discussion, and a control condition. The study consisted of 3348 African American and Hispanic men and women. Participants received a coupon for free condoms that could be redeemed once they had completed the initial stage of the process (i.e., control or intervention conditions). Objective data were obtained of how many from each condition redeemed their coupon for free condoms. Results showed that both intervention conditions redeemed their coupon significantly more often that the control condition. In the control condition, 21.2% of the participants redeemed their free coupon, compared with 27.6% in the video intervention only condition and 36.9% in the video plus group discussion intervention condition.

### Self-Identity

Self-identity has been found to be a crucial component within health behaviour research given that it is a strong predictor of both intention and behaviour (Booth et al., 2013; Rise, Sheeran, & Hukkelberg, 2010). Self-identity may be particularly important in maintenance of a health behaviour given its association with past behaviour. Targeting self-identity within an intervention could be an important step in achieving behaviour change/maintenance across a significant life transition.

To date, however, there are very few studies investigating the use of a self-identity interventions for behaviour change/maintenance for exercise . However, considering other health behaviours, such as chlamydia screening, there are some positive results for interventions based around self-identity. Pavlin et al.’s (2006) systematic review noted that the positive promotion of chlamydia testing, through terms such as ‘responsible behaviour’, were successful in increasing the uptake of chlamydia testing in women. O’Keefe (2002) suggest that in order to create an identity, an intervention must attempt to activate an individuals self-attribute as being an ‘exerciser’ or ‘physically active’ in order to reinforce the link between being an ‘exerciser’ and performing regular exercise behaviour. In addition, research in more clinical settings (e.g., eating disorders or dementia) have also reported some success through the utilisation of interventions designed around self-identity (Caddell & Clare, 2011; Stein, Wing, Corte, Chen, & Nuliyala, 2013). However, there are still few interventions designed to target self-identity despite the strong predictive utility of the construct.

### Habit

The formation of habits can have a powerful impact of ones maintenance of a health behaviour (De Bruijn, 2011; Hagger et al., 2002b). For example, when a behaviour becomes a habit, thought processes and cognition to initiate the behaviour decline, and instead, activation of a behaviour is instigated by environmental cues or patterns (Verplanken & Orbell, 2003). Rothman et al. (2009) suggest two ways in which habit formation or change can occur; (i) deliberate self-control strategies could be used to overcome negative/unwanted habits such as smoking; and (ii) environmental cues that trigger positive habitual behaviours.

Interventions designed around habit formation have seen positive results within the current literature (Carels et al., 2014; Gardner, Thune-Boyle, Iliffe, Fox, Jefferis, Hamer, Tyler, & Wardle, 2014; Kliemann, Vickerstaff, Croker, Johnson, & Beeken, 2016; Lally et al., 2008; Mullan, Allom, & Johnston, 2014). Interventions based on habit, often revolve around positive habit formation which involve asking participants to repeat a positive behavioural action to an environmental cue in order create a positive habit formation. Interventions are thus quite detailed. For example, Mullan, Allom, and Johnston (2014) study investigated the use of a habit formation intervention on food-safety behaviour. There were three groups, a control condition, and two intervention conditions (low and high intervention exposure). The intervention included a poster designed to act as a cue to action for the behaviour ‘disinfect a sponge/dishcloth using disinfectant or a microwave for 1 minute’, and an email containing a Self-Report Habit Index (SRHI) questionnaire that needed to be complete the same day they were sent the email (3x a week for the low exposure group and 5x a week for the high exposure group). Results support the positive impact of the intervention, with both intervention conditions reporting significantly increased food-safety behaviour. Obvious limitations to their study were that the intervention was time consuming for the participants, thus may not be applicable to the current context when participants are going through a significant life transition, and the study’s sample size was small, however results were comparable to previous literature. The sample size may have partly been a result of the extensive intervention, resulting in either low recruitment and/or high drop out.

Additionally, recent habitual interventions revolving around weight loss (Carels et al., 2014; Lally et al., 2008) have successfully achieved positive behaviour change. Carels et al. (2014) study investigated the impact of promoting healthy habits, whilst also disrupting unhealthy habits in regard to dietary behaviours and exercise. Their study used habit formation as an intervention for a 12-week weight loss program. The intervention included implementation intentions, developing sustainable routines, anticipating potential barriers, not reinforcing unhealthy behaviours, and removing negative environmental cues. Results support that the habit based intervention produced significant weight loss for the participants by the end of the 12-week intervention, which participants were able to maintain at six-month follow-up.

### Planning

Planning is a widely used technique within behaviour change research (Luszczynska et al., 2011; Skår, Sniehotta, Molloy, Prestwich, & Araújo-Soares, 2011) and is relevant across varying health behaviours, including exercise behaviour (Luszczynska & Schwarzer, 2003; Luszczynska et al., 2011; Skår et al., 2011).

Luszczynska et al. (2011) examined the effect of action planning and coping planning on participants’ behaviour, as well as the moderating role of self-efficacy. Action planning involves making specific plans in order to perform a particular behaviour (where, when, and how to accomplish their goal), whereas coping planning refers to the anticipation of particular barriers and creating strategies to overcome those barriers. Study 1 investigated the effect of action planning on action self-efficacy among participants with diabetes. The results indicated that action planning had a significant effect on exercise levels. Within the intervention group, where participants took part in a session that promoted goal setting and how this is best achieved, participants with strong baseline exercise self-efficacy had a greater benefit from the intervention than those with weak exercise self-efficacy beliefs. Study 2 investigated coping planning among runners who were asked to maintain their personal vigorous exercise levels over a two-year period. Results show that a coping planning intervention was unsuccessful in maintaining participant exercise levels over the two-year period. Interestingly, however, participants with a high exercise self-efficacy were much more successful at maintaining their exercise levels than participants with low exercise self-efficacy. Luszczynska et al. (2011) concluded that action planning is a positive method for supporting exercise behaviour, although it is less effective for those with a low self-efficacy for exercise. Skar et al. (2011) also investigated the use of action planning and coping planning, in order to investigate if planning was an effective intervention in promoting exercise behaviour in university students. Action planning involved making specific plans in order to perform a particular behaviour (where, when, and how to accomplish their goal). Coping planning referred to the anticipation of particular barriers and creating strategies to overcome those barriers. Their results did not support the utility of either planning method as an effective intervention for promoting exercise adherence in university students. This could be because the planning intervention being was too brief.

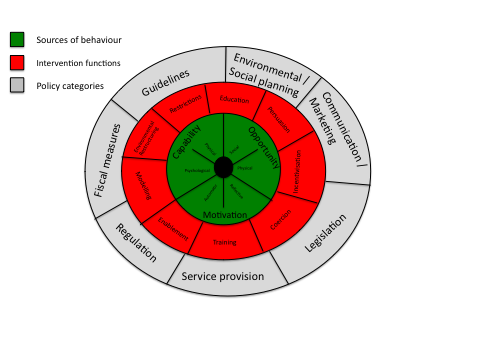
Closely related to the concept of action planning are implementation intentions (Gollwitzer & Sheeran, 2006b). Forming an implementation intention requires an individual to link a certain situation with an appropriate behavioural response (Gollwitzer, 1993), through asking participants to write down specifics such as when, where, and how through an *‘if-then’* plan. For example *if* (barrier to goal) I don’t feel motivated to exercise, *then* (response)I will remind myself that I want to exercise to lose weight and be healthier. Implementation intentions are thought to work simply through cue-behaviour associations so that critical situations or cues are easily recognised and appropriate behavioural responses are performed efficiently.

A meta-analysis conducted by Gollwitzer and Sheeran (2006) found a medium effect size of *d* = 0.65 when implementation intention interventions were used across 94 studies. Implementation intentions encourage people to make detailed plans whilst predicting potential future barriers, thus when and if these barriers occur, an appropriate plan is already in place to overcome the barrier. Murray, Rodgers and Fraser (2009) study investigated how the use of implementation intentions could encourage participants to maintain an exercise regime across an 11-week period. The results supported the utility of implementation intentions for exercise, as participants in the implementation intention condition adhered to the exercise programme significantly better (i.e., maintained higher levels of exercise at follow-up) than those in the control condition.

Implementation intentions has since been developed within the health behaviour literature by Armitage and Arden (2010) to create volitional help sheets. Volitional help sheets use the same format as implementation intentions (i.e., asking someone to link a particular barrier to a desired behaviour with a specific response to counteract that barrier): however, the participant does this through the use of a volitional help sheet. The volitional help sheet is a list with two columns, one column details common barriers and the second column lists potential appropriate responses to those barriers. Participants are then asked to draw a line between the barrier and the desired response (Armitage & Arden, 2010). The results of Armitage and Arden’s (2010) study provided evidence that the volitional help sheet intervention had a significant positive affect on increasing exercise behaviour in people with low socioeconomic status. The experimental condition increased their Metabolic Equivalent (MET) exercise scores from 733.12 at baseline to 1080.62 at one-month follow-up, whereas the control condition MET scores at baseline were 896.89, and 869.33 at follow-up.

### Behaviour Change Techniques

An alternative approach to the development of health behaviour change interventions is to identify specific Behaviour Change Techniques (BCTs) that can be included in an intervention following a “behavioural diagnosis” based on the COM-B model and the Behaviour Change Wheel (BCW) (Michie et al., 2014; Michie, van Stralen, & West, 2011, Michie & Wood, 2015). The COM-B model outlines Capability (C), Opportunity (O) and Motivation (M) as key determinants of behaviour (B). One of the reported benefits of COM-B is that capability (psychological and physical aspects), opportunity (physical and social aspects) and motivation (reflective and automatic processes) are described as a mutually influencing system, rather than a set of factors focusing on reflective motivations as outlined in other SCMs (Michie & Wood, 2015). The COM-B model is often used for a “behavioural diagnosis” whereby it provides a method of analysing behaviour to determine what factors need to be changed to produce change in behaviour (Michie & Wood, 2015). The COM-B model has since been incorporated by Michie et al. (2014) into the BCW (Figure 6). At the centre of the BCW is the COM-B model, which is surrounded by nine intervention functions and seven policy categories. The BCW is a tool for intervention design, where identification and behavioural diagnosis occurs, which subsequently allows for appropriate intervention identification and policies to be chosen. Stone et al.’s (2012) ‘Clean Your Hands Campaign’ was an intervention designed to improve hand hygiene in NHS health workers. The COM-B and BCW model was used to inform how this campaign could be improved. For example, using COM-B to analyse the intervention, it revealed that the intervention did in fact target both opportunity and motivation; however, it did not target capability. The analysis identified a number of BCTs to address this issue and improve the intervention, including goal setting, one-to-one feedback, and action planning. The improved intervention resulted in NHS staff being 13-18% more likely to clean their hands (Fuller et al., 2012).



**Figure 6.** The Behaviour Change Wheel (BCW) (Michie et al., 2014).

The BCT taxonomy is a hierarchical list of various intervention techniques that can be used for behaviour change. The BCT taxonomy has been outlined as being useful in various behavioural domains including, exercise, smoking cessation, healthy eating, alcohol consumption control, and increasing condom use (Michie & Wood, 2015). For example, a systematic review and meta-analysis of which BCTs are most influential to increase obese individuals’ self-efficacy and their exercise behaviour by Olander et al. (2013) revealed that overall, interventions had a small effect size on self-efficacy and a medium effect size for exercise behaviour. In addition, a non-significant relationship was found between change in self-efficacy and change in exercise behaviour. However, the review did find that ‘prompt self-monitoring of behavioural outcomes’ and ‘plan social support/social change’ were significantly associated with both a positive change in self-efficacy and exercise behaviour. Orlander et al.’s (2013) analysis supports the utility of the BCT taxonomy as a model for behaviour change. However, it is evident that further research into which BCTs are most appropriate for which population and for which behaviour is needed.

A recent review by Ogden (2016a) on the BCT taxonomy and the BCW highlighted a number of strengths and limitations of this approach to intervention design. Ogden highlighted that the BCT taxonomy is useful for, (i) coding intervention protocols in order for to increase transparency in reporting and to aid study replicability and (ii) to help identify which behaviour change techniques are most relevant for the behaviour in question. However, Ogden also highlighted that many intervention protocols are poorly reported and therefore the evidence base for the identifying active BCTs is weak. Ogden also questioned whether the COM-B model can be falsified describing it as a “theory of everything” (Ogden, 2016b, p.274).

Given the strong evidence-base for the TPB as a model for explaining health behaviour, and given limitations of other potential models and approaches, it was decided to use the TPB as the overarching theoretical framework to (i) understand the proximal modifiable determinants of exercise behaviour across the post-university transition and (ii) for the development of an intervention to promote exercise behaviour across this transition. The TPB has the advantage of helping to specify the behavioural, normative and control beliefs that can be targeted in an intervention as well as being open to the inclusion of additional predictors. Thus, the research reported in this thesis first identified the modal salient beliefs associated with exercise behaviour across this transition as well as additional predictors included in an extended TPB. On the basis of these findings, a theory-based intervention was developed and tested to support exercise across the post-university transition. By understanding which constructs are the most important determinants of intention and behaviour, interventions can be designed to target those constructs and either bolster positive beliefs about the behaviour or create counter arguments for negative beliefs about the target behaviour for pre-intentional interventions, or use post-intentional interventions to bridge the intention-behaviour gap, such as action planning.

## Conclusion

This chapter has highlighted the physical benefits of exercise, with the most important being protection against health threats such as type 2 diabetes, coronary heart disease and cancer, as well as the prevention of weight gain. Research by the HSE (2008; 2012) demonstrates that many people in the UK do not adhere to appropriate levels of exercise, and that levels of exercise behaviour deteriorate over time and with increasing age. Life transitions have been found to have a negative impact on exercise levels due to the volatile nature of a changing environment, adding many barriers towards exercise. The current thesis employs a widely used and supported theoretical underpinning, the Theory of Planned Behaviour, to understand changes in exercise beliefs and behaviour during a significant life transition (e.g., leaving university). In addition to the TPB, a range of additional predictors of exercise behaviour were assessed, including action planning, past behaviour/habit, and self-identity. The aim of the current thesis is to gather information regarding the exercise beliefs, intentions and behaviour of final year students during the transition from university to post-university life, then implement an intervention designed to reduce any negative transition effects, helping graduating students either maintain or increase their exercise behaviour.

# Chapter 2. University Students Beliefs About Exercise After Leaving University (Study 1a)

## Abstract

**Background.** This study sought to explore final year university student’s beliefs about exercise and the transition of graduating university. The Theory of Planned Behaviour (TPB) was used as the underpinning theoretical framework for the study.

**Method.** A belief elicitation study was conducted with final year university students (*N* = 11). Participants completed an online questionnaire designed to elicit behavioural beliefs (advantages and disadvantages), normative beliefs (people who they would consider when making decisions), and control beliefs (facilitate or inhibit) regarding exercise after leaving university. In the main study, final year university students (*N* = 136) completed an online questionnaire measuring behavioural, normative and control beliefs as well as direct measures of the TPB and intention. Participants were followed up six-months (*N* = 84) and 18-months (*N* = 78) later when their exercise behaviour was assessed.

**Results.** The elicitation study elicited 29 beliefs. Using scree plots, 15 beliefs were identified as being modal salient beliefs. These beliefs were categorised into six different categories, advantages, disadvantages, approvers, disapprovers, and facilitators and inhibitors. In the main study, composite measures of the behavioural, normative and control belief were all significantly correlated with intention. Regression analyses indicated that behavioural beliefs, normative beliefs and control beliefs explained significant proportions of variance in intention to exercise (42%, 13%, and 17%, respectively). The only belief to significantly correlate with behaviour at six-month follow-up was less time (negative control belief). No beliefs correlated significantly with behaviour at 18-month follow-up.

**Conclusion.** The present study highlighted which beliefs were most important in final year university students regarding exercise after graduating from university. The modal salient beliefs explained significant proportions of the variance in exercise intention, but not in subsequent behaviour. This may be due to the volatile nature of transition of graduating from university. Nonetheless, the beliefs identified in the study may provide appropriate targets for interventions to encourage strong intentions to exercise across this life transition.

## Prelude

Chapter 2 sought to (i) identify students’ modal salient beliefs about exercise behaviour after leaving university, (ii) examine associations between these beliefs intention and behaviour, and (iii) examine changes in these beliefs across this transition. There has been little previous research on how significant life transitions, such as graduating from university, impact on health behaviour and, in particular, the beliefs that are associated with changes in behaviour across the transition. Significant life transitions are often associated with behaviour change. For example, exercise behaviour has been found to decline when students enter university and health surveys indicate that exercise levels continue to decline with increasing age. Study 1a used the theory of planned behaviour (TPB) as a theoretical framework for examining the behavioural, normative and control beliefs that are related to students’ intentions and exercise behaviour across the transition of graduating from university. As outlined by Ajzen (2006), identifying the beliefs most strongly associated with intention and behaviour is the first stage in developing a TPB-based intervention to change behaviour.

## Introduction

### Exercise Beliefs

The Theory of Planned Behaviour (TPB; Ajzen, 1991) has received extensive support as a predictive model of health behaviour (McEachan et al., 2011), and can be used to identify key motivational determinants of behaviour. According to the TPB, behavioural, normative and control beliefs underpin the three TPB constructs of attitude, subjective norm, and perceived behavioural control. Thus, beliefs indirectly influence intentions which, in turn, determine subsequent behaviour.

Elicitation studies exploring the beliefs of a particular population and behaviour are important to identify the underlying modal salient beliefs that can be targeted in behaviour change interventions (Bellows-Riecken, Mark, & Rhodes, 2013; Downs & Hausenblas, 2005; Pastor et al., 2015). Downs and Hausenblas (2005) conducted a systematic review of such belief studies in the exercise domain. Their review included 47 TPB studies that used an elicitation study to identify key behavioural, normative, and control beliefs. They reported that the most salient behavioural beliefs were that exercise: (a) improves physical and psychological health, (b) manages weight, (c) improves daily functioning, (d) increases energy, and (e) relieves stress and promotes relaxation (Downs & Hausenblas, 2005). The most common disadvantage to exercise was health issues (e.g., pain). Thus, the positive behavioural beliefs focused on improving one’s physical and psychological health. They reported one salient negative behavioural belief, ‘health issues’, that might prevent people from exercising. The most salient normative beliefs were: (a) family members, (b) friends, and (c) healthcare professionals. These normative beliefs focus on the significant others who participants are most likely to be in frequent contact with, and with professionals who can offer knowledge and information. The most salient control beliefs about barriers to exercise were: (a) health issues (e.g., injury, pain, psychological problems), (b) inconvenience, (c) low motivation and energy, (d) time, and (e) lacking social support. The most common control beliefs about facilitators of exercise were (a) convenience, (b) pleasure, and (c) social support. These control beliefs describe both physical and psychological facilitators/barriers. Downs and Hausenblas (2005) also reported that behavioural beliefs explained 54.2% of the variance in attitude, normative beliefs explained 55.8% of the variance in subjective norm, and control beliefs explained 33.7% of the variance in PBC.

Identifying the key beliefs of a target population is vital when attempting to change behaviour. As noted by Downs and Hausenblas (2005), even when investigating a common behaviour such as exercise, there is likely to be variation in beliefs about exercise. For example, Downs and Hausenblas (2005) found that for people in good health one of the most salient beliefs was the improved physical and psychological health benefits exercise brings about. In contrast, for people with cardiovascular disease or chronic pain, the most salient belief was experiencing health problems such as pain, soreness and illness. Gaining knowledge of a specific population’s modal salient beliefs about a behaviour is an important first step in being able to design an intervention to target salient behavioural, normative and control beliefs to encourage behaviour change. Epton et al. (2014a, 2014b) investigated whether an online intervention, targeting health behaviours (including exercise) could have a positive impact on these health behaviours across the transition of entering university. Their study used three behaviour change techniques, e.g., self-affirmations, theory-based persuasive messages, and implementation intentions, in order to positively influence exercise behaviour (as well as fruit and vegetable intake, alcohol consumption, and smoking) across this transition. The messages targeted TPB beliefs and either confirmed positive beliefs about the health behaviours (e.g., binge drinking has a negative effect on your studies), or provided counter arguments about negative beliefs (e.g., binge drinking is not the best way to make friends… instead use student clubs or societies). The mode of delivery used a mixture of text, short videos, and links to other relevant material. Regarding exercise, the intervention did not have a significant impact on behaviour at either one month or six-month follow-up. However, when considering smoking cessation, the intervention was found to have a positive significant impact at six-month follow-up. This study is relatively unique in design, and there is little other research on salient behavioural, normative, and control beliefs for exercise in the transition literature, with no research investigating exercise beliefs across the transition out of university.

### The Present Study

The present study employed the Theory of Planned Behaviour (TPB; Ajzen, 1991) as the theoretical underpinning to investigate final year students’ beliefs about exercise post-university. An elicitation study was conducted to identify students’ modal salient behaviour, normative and control beliefs about exercise after leaving university. Associations between these beliefs and post-university exercise intentions and behaviour were then assessed in the main study. To date, there have been no studies that have examined the underlying beliefs about exercise after leaving university. Gaining knowledge about the underlying beliefs is important for the development of interventions to promote post-university exercise.

## Elicitation Study

### Method

### Procedure and Participants

Following ethical approval and informed consent, 11 final year university students (5 male, 6 female, mean age = 21.27, SD = 1.11) were recruited via an email that was sent to the University of Sheffield volunteers list with a link to the qualitative online questionnaire. Currently there are no guidelines on the number of participants needed to identify the modal salient beliefs of a population or the criteria for deciding what constitutes a modal salient belief (Ajzen, 2006). In the current study, data saturation was reached with 11 participants and, as a result, further participants were not recruited. Willing participants completed the online elicitation questionnaire (Appendix A) regarding their beliefs about exercise participation after leaving university.

The elicitation questionnaire asked participants about their behavioural beliefs (advantages and disadvantages), normative beliefs (people who they would consider when making decisions), and control beliefs (facilitators or inhibitors) towards exercise after leaving university. For example, for behavioural beliefs participants were asked about the advantages about exercise (i.e., “What do you think would be the advantages of (or positive things about) engaging in regular exercise after you have left university?”), and the disadvantages about exercise (i.e., “What do you think would be the disadvantages of (or negative things about) engaging in regular exercise after you have left university?”); for normative beliefs, participants were asked who would approve exercise behaviour (i.e., “Are there other people whose views would be important to you in relation to engaging in regular exercise after you have left university?” “Who would approve of you engaging in regular exercise after you have left university?”), or disapprove (i.e., “Are there other people whose views would be important to you in relation to engaging in regular exercise after you have left university?” “Who would disapprove of you engaging in regular exercise after you have left university?”) of their exercise; and finally, for control beliefs, participants were asked about facilitators (i.e., “What do you think are the things that would make it easier to engage in regular exercise after you have left university?”), and inhibitors (i.e., “What do you think are the things that would make it more difficult to engage in regular exercise after you have left university?”) for exercise. The beliefs were coded using a similar process to that of framework analysis’ five stages (Richie & Spencer, 1994) (data familiarisation, identifying a thematic framework, indexing participant quotes onto those themes, charting of the framework, and mapping and interpretation of the data). However, as the TPB was being used as the theoretical underpinning of the study, themes from the data, and participant quotes, were mapped onto pre-agreed categories (i.e. the TPB components). Two independent raters reviewed the data, with 95.73% agreement. Any disagreements were resolved through discussion.

### Results

Twenty-nine beliefs about engaging in exercise after university were elicited. These were categorised into positive behavioural beliefs (e.g., advantages), negative behavioural beliefs (e.g., disadvantages), positive normative beliefs (e.g., approvers), negative normative beliefs (e.g., disapprovers), positive control beliefs (e.g., facilitators), and negative control beliefs (e.g., inhibitors). Scree plots were used to identify the modal salient beliefs about engaging in exercise after university for each category (see Table 1). For example, for positive behavioural beliefs (e.g., advantages), nine beliefs were elicited. Examination of the number of participants citing each belief reveals a marked drop-off in frequency after the fourth belief. Thus, four modal salient positive behavioural beliefs were identified (e.g., fit/healthy, social, mental health, and positive body image). Using the same procedure, three negative behavioural beliefs (e.g., time, cost, and tiring), three normative beliefs (e.g., friends, family/partner, and colleagues), three positive control beliefs (e.g., more income, motivated friends, and set routine), and two negative control beliefs (e.g., have less time, money issues) were identified as modal salient beliefs. These beliefs were used in the main study to assess correlations with intention and behaviour.

Table 1. Beliefs About Engaging in Exercise After Graduating From University (N = 11)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Advantages *n* Disadvantages *n***

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**\_\_ be fit and healthy 10 \_\_ not enough time 6**

**\_\_ good mental health 9 \_\_ it costs a lot 5**

**\_\_ be sociable 7 \_\_ it is tiring 3**

**\_\_ positive body image 5** \_\_ no opportunities 1

\_\_ have the time 1 \_\_ potential injury 1

\_\_ fat loss 1

\_\_ good stress outlet 1

\_\_ sleep well 1

\_\_ good hobby 1

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Approvers *n* Disapprovers *n***

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**\_\_ my friends 6** **\_\_**colleagues 1

**\_\_ my family 4** **\_\_**friends 1

**\_\_ my colleagues 2** **\_\_**family/partner 1

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Facilitators *n* Inhibitors *n***

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**\_\_ will have more income 5 \_\_ have less time 8**

**\_\_ have more motivated friends 4 \_\_ money issues 4**

**\_\_ have a set routine 4** **\_\_** will be relocated 2

**\_\_** other 1 **\_\_** no opportunities 2

**\_\_** other 1

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Note.* Modal salient beliefs are highlighted in bold.

### Elicitation Study Discussion

The present study elicited 29 beliefs (14 behavioural beliefs, nine normative beliefs, and six control beliefs) in total, with 15 of those being modal salient beliefs. Downs and Hausenblas’ (2005) systematic review on elicitation studies within the exercise literature found the average of number beliefs elicited was 17 (seven behavioural beliefs, four normative beliefs, and six control beliefs). Their study comprised of a mixture of various populations, with the largest groups being community adults and undergraduate students. The present study therefore, found an above average total number of elicited beliefs, which could have been a factor of going through a significant life transition, and thus there are many more variables to consider (e.g., location, financial, and general behaviour change); however, the 15 modal salient beliefs are largely in line with Downs and Hausenblas’ (2005) study. For example, Downs and Hausenblas (2005) reported physical and psychological health, weight control, improved daily functioning, increased energy, and relieved stress and promotes relaxation, as modal salient positive behavioural beliefs. The current study found physical and mental health (e.g., improved mood, relaxation), being sociable, and positive body image to be modal salient beliefs, thus the highest reported beliefs were the same. The current study added to previous knowledge by finding that within a graduating population, social and positive body image factors are also important, as well as negative behavioural beliefs about exercise being too expensive and too tiring, which may be related to the anticipated transition. Additionally, normative beliefs were broadly similar when comparing the present research and Downs and Hausenblas (2005); however, Downs and Hausenblas (2005) report family to be the most significant normative group, whereas the present study found friends the most important group. This is likely to be due to the nature of the transition and that participants were mainly socialising with friends at this point in time; thus, this group was particularly important at this stage. Furthermore, it has been reported that in younger age groups (e.g., adolescents/young adults), social influence is more prevalent (Kwan et al., 2009) than in other age groups.

Finally, considering control beliefs, the findings of the present study and the Downs and Hausenblas (2005) review, are broadly consistent, although there are some differences. For example, less time for exercise was the highest reported control belief in the present study, whereas Downs and Hausenblas (2005) report less time as the fourth most salient control belief, with inconvenience and health issues (e.g., injury, pain) to be the most salient control beliefs. Thus, among participants graduating university, time for exercise appeared to be a key concern, in terms of associations with both intention to exercise and behaviour (Time 2). This may reflect the that fact that participants were potentially entering full-time employment for the first time, and were aware that a lack of time might impact on their exercise behaviour. In terms of the COM-B model, a lack of time would relate to a lack of opportunity for exercise, due to competing priorities (e.g., work, social commitments).

The present study therefore largely supports previous literature regarding modal salient beliefs about exercise, indicating that within a significant life transition, similar beliefs about exercise are important; however, there were some differences, which may reflect the volatile nature of the significant life transition. However, it should be noted that some of the current findings could be a product of a relatively small sample size and highly motivated sample (i.e., strong exercise intenders).

## The Main Study

## Method

### Design

The main study employed a prospective design assessing exercise beliefs and intentions among final year university students, with a six and 18-month follow-up on self-reported behaviour. The University of Sheffield, Department of Psychology Ethics Committee granted ethical approval for the study (application approval no #641).

## Procedure and Participants

An email was sent to the University of Sheffield volunteers list with a link to an online questionnaire. The questionnaire (Appendix B) was completed by 136 final year university students (*N* = 136, undergraduate *n* = 98, postgraduate *n* = 38, *M* age = 23.29, *SD* = 4.05, male *n* = 55, female *n* = 81). A follow-up questionnaire was sent six months (*N* = 84) where behaviour and beliefs were assessed, and at 18-months (*N* = 78) when just behaviour was assessed.

A definition of regular exercise was provided at the beginning of the study. Consistent with previous research (Norman & Smith, 1995; Sheeran & Abraham, 2003), exercise was defined as “a minimum of 30 minutes of vigorous-intensity exercise, at least three days a week”. This is in line with the current literature highlighting the need for vigorous exercise such as running, jogging, playing football, basketball, swimming, cross country skiing etc. to confer significant health benefits (Hu et al., 1999).

### Measures

The modal salient behavioural, normative, and control beliefs identified in the elicitation study were assessed along with intention. All items were scored on 7-point response scales.

Positive behavioural beliefs (e.g., advantages) were assessed with four items, e.g., ‘*Engaging in regular exercise after university would lead to feeling fit and healthy’,* ‘*Engaging in regular exercise after university would lead to feeling good about my body image’, ‘Engaging in regular exercise after university would have social benefits’* and *‘Engaging in regular exercise after university would lead to better mental health’* (*likely/unlikely*). Cronbach’s alpha was .78.

Negative behavioural beliefs (e.g., disadvantages) were assessed with three items, e.g., ‘*Engaging in regular exercise after university would be difficult due to time’*, ‘*Engaging in regular exercise after university would be expensive’*, and *‘Engaging in regular exercise after university would make me too tired’* (*likely/unlikely*). Cronbach’s alpha was .67.

Normative beliefs were assessed with three items, e.g., ‘*My friends think that I should/should not engage in regular exercise after university’*, ‘*My family/partner think that I should/should not engage in regular exercise after university’*, and *‘My work colleagues would think that I should/should not engage in regular exercise after university’* (*think I should/think I should not*). Cronbach’s alpha was .90.

Positive control beliefs (e.g., about facilitating factors) were assessed with three items, e.g., ‘*After leaving university, I expect that I will have more money for regular exercise’*, *‘After leaving university, I expect that I will have a set routine that will help with regular exercise’*, and *‘After leaving university, I expect that I will have motivated friends to help with regular exercise’* (*agree/disagree*). Cronbach’s alpha was .61.

Negative control beliefs (e.g., about inhibiting factors) were assessed using two items, e.g., ‘*After leaving university, I expect that I will have less time for regular exercise’*, and *‘After leaving university, I expect that I will have less money for regular exercise’* (*likely/unlikely*). Cronbach’s alpha was .37.

Intention was measured with two items, e.g., ‘*How likely is it that you will engage in regular exercise after you leave university… likely/unlikely’*. Cronbach’s alpha was .82 for the measure of intention.

A measure of exercise behaviour was measured using the Godin-Sheppard Leisure-Time Exercise Questionnaire (GLTEQ; (Godin, 2011)). The questionnaire comprises three items to gain the number of times mild (yoga, archery, fishing, golf etc), moderate (fast walking, tennis, volleyball, badminton, easy swimming etc), and strenuous (running, football, squash, basketball, vigorous swimming etc) exercises are performed during a typical 7-day period. The GLTEQ is a valid measure of exercise, correlating with percentile VO2max (*r* = .24, *p* < .001) and percentile body fat (*r* = .13, *p* < .01). For the purpose of the present study, only the number of times participants engaged in strenuous exercise was used in the analysis, as this corresponded most closely with the definition of regular exercise used in the TPB items and additional predictors.

## Results

### Attrition Analysis

An attrition analysis was conducted to investigate whether there were any significant differences between those participants who completed the follow-up questionnaires versus those who only completed the first questionnaire. Participants were compared on baseline measures of baseline exercise behaviour, exercise beliefs, as well as demographics (gender, age, nationality, ethnicity, and study level). All comparisons were non-significant.

Table 2.Descriptive Statistics for the Belief-Based TPB Measures and Correlations with Intention (*N* = 136) and Follow-Up Behaviour at Six (*N* = 84) and 18 Months (*N* = 78).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Mean** | **SD** | ***Intention* r** | ***Behaviour r***  ***(six months)*** | ***Behaviour r (18 months)*** |
| Positive Behavioural Beliefs | 6.18 | 0.91 | .53\*\*\* | .13 | .13 |
| Negative Behavioural Beliefs | 4.00 | 1.31 | -.25\*\* | -.01 | .03 |
| Normative Beliefs | 5.44 | 1.29 | .37\*\*\* | .08 | .02 |
| Positive Control Beliefs | 4.50 | 1.30 | .32\*\*\* | .12 | .09 |
| Negative Control Beliefs | 3.60 | 1.41 | -.19\* | .07 | .02 |

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

### Composite Belief Measures

Composite TPB belief-based measures were constructed by averaging responses to the belief items. Table 2 reports the mean scores of the TPB belief-based measures and correlations with intention and behaviour. Cronbach’s alphas for all measures were excellent, with the exception of two belief measures that were acceptable (negative behavioural beliefs = .67 and positive control beliefs = .61), and the negative control belief measure that was poor (Cronbach’s alpha = .37).

The mean scores for the belief measures were all close to the mid-point with the exception of positive behavioural beliefs, which was rated highly (mean = 6.18). All of the TPB belief measures correlated significantly with intention, with positive behavioural beliefs having the strongest correlation. None of the belief measures significantly correlated with time 2 or 3 behaviour.

In addition, positive behavioural beliefs correlated significantly with affective attitude, *r*(133) = .58, *p* < .001, and instrumental attitude, *r*(133) = .67, *p* < .001. Negative behavioural beliefs did not significantly correlate with affective attitude, *r*(136) = -.15, *p* = .06, or instrumental attitude, *r*(136) = -.10, *p* = .21. Normative beliefs correlated significantly with subjective-norm, *r*(133) = .56, *p* < .001, and descriptive norm, *r*(133) = .19, *p* = .01. Positive control beliefs significantly correlated with both perceived control, *r*(133) = .19, *p* = .01, and self-efficacy, *r*(133) = .27, *p <* .001. Negative control beliefs also significantly correlated with perceived control, *r*(133) = -.23, *p* < .001, and self-efficacy, *r*(133) = -.23, *p* < .001.

### Individual Belief Measures

Table 3 reports the mean scores of the individual belief items and correlations with intention and follow-up behaviour. The means scores for the positive behavioural belief items were all high, whereas negative behavioural belief scores were all near the mid-point. The means scores for the normative belief items were all high. The means scores for the positive and negative control belief items were all near the mid-point.

All of the positive behavioural beliefs and negative behavioural beliefs, with the exception of one negative belief (lack of time), had significant correlations with intention. Of the behavioural beliefs, being fit and healthy had the strongest correlation with intention. All of the normative beliefs correlated significantly with intention, with friends having the strongest correlation with intention. Only one of the positive control beliefs (set regular routine) and one of the negative control beliefs (less money) correlated significantly with intention. Of the control beliefs, a set regular routine had the strongest correlation with intention. None of the behavioural beliefs or normative beliefs significantly correlated with behaviour. One of control beliefs (less time) significantly correlated with behaviour at six-month follow-up, but not at 18-month follow-up.

Table 3. Descriptive Statistics for Individual Beliefs at Time One and Correlations with Intention (N = 136), Follow-Up Behaviour at Six (N = 84), and 18 Months (N = 78)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **Belief Item** | **Mean** | **SD** | **Intention *r*** | **Behaviour *r* (6 months)** | **Behaviour *r* (18 months)** |
| Positive Behavioural Beliefs | Fit and healthy | 6.58 | 0.78 | .53\*\*\* | .17 | .19 |
| Social benefits | 5.67 | 1.53 | .34\*\*\* | .10 | .06 |
| Better mental health | 6.25 | 1.03 | .49\*\*\* | .01 | .13 |
| Positive body image | 6.33 | 1.05 | .51\*\*\* | .15 | .16 |
| Negative Behavioural Beliefs | Lack of time | 4.63 | 1.63 | -.15 | .04 | -.06 |
| Too expensive | 4.19 | 1.77 | -.21\*\* | .06 | .20 |
| Too tiring | 3.19 | 1.63 | -.21\*\* | -.12 | -.08 |
| Normative Beliefs | Friends | 5.39 | 1.45 | .36\*\*\* | .09 | .01 |
| Family/partner | 5.64 | 1.47 | .30\*\*\* | -.02 | .01 |
| Work colleagues | 5.15 | 1.45 | .25\*\* | .14 | .04 |
| Positive Control Beliefs | More money | 4.59 | 1.97 | .14 | .13 | .01 |
| Motivated friends | 3.90 | 1.59 | .16 | -.02 | .01 |
| Set regular routine | 5.06 | 1.66 | .40\*\*\* | .14 | .18 |
| Negative Control Beliefs | Less time | 4.10 | 1.82 | -.10 | .27\* | .07 |
| Less money | 3.11 | 1.76 | -.19\* | -.17 | -.03 |

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

Three separate regression analysis were conducted to examine associations between the individual behavioural, normative and control beliefs and intention (see Table 4). Behavioural beliefs explained 42% of the variance in intention, *R*2 = .42, *F*(7,139) = 14.52, *p* < .001. Feeling fit and healthy, better mental health, positive body image, and lack of time, emerged as significant predictors. The normative beliefs explained 13% of the variance in intention, *R*2 = .13, *F*(3,143) = 7.04, *p* < .001, with friends emerging as the only significant predictor. The control beliefs explained 17% of the variance in intention, *R*2 = .17, *F*(5,140) = 5.70, *p* < .001. The only significant control belief was set routine.

Table 4. Summary of Hierarchical Regression Analysis of Time One Beliefs Predicting Intention (N = 136)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **Belief Item** | **B** | **SE** | ***ß*** |
| Behavioural Beliefs | Fit and healthy | .39 | .15 | .24\*\* |
|  | Social benefits | .05 | .07 | .05 |
|  | Better mental health | .25 | .12 | .19\* |
|  | Positive body image | .30 | .11 | .25\*\* |
|  | Lack of time | -.13 | .06 | -.17\* |
|  | Too expensive | -.09 | .05 | -.12 |
|  | Too tiring | .03 | .06 | .04 |
|  | *R*2 |  |  | .42\*\*\* |
| Normative Beliefs | Friends | .34 | .13 | .40\*\* |
|  | Family/partner | .01 | .11 | .01 |
|  | Work Colleagues | -.06 | .11 | -.07 |
|  | *R*2 |  |  | .13\*\*\* |
| Control Beliefs | More money | -.00 | .06 | -.00 |
|  | Motivated friends | .04 | .07 | .05 |
|  | Set regular routine | .27 | .06 | .36\*\*\* |
|  | Less time | -.02 | .06 | -.02 |
|  | Less money | -.05 | .07 | -.07 |
|  | *R*2 |  |  | .17\*\*\* |

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

Table 5. Summary of Hierarchical Regression Analysis of Time One Beliefs Predicting Time Two Behaviour at Six-Month Follow-Up (N = 84)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Belief Item** | **Variable** | **B** | **SE** | ***ß*** |
| Behavioural Beliefs | Fit and healthy | .45 | .38 | .19 |
|  | Social benefits | .12 | .16 | .09 |
|  | Better mental health | -.50 | .32 | -.24 |
|  | Positive body image | .21 | .30 | .11 |
|  | Lack of time | .09 | .15 | .07 |
|  | Too expensive | .06 | .14 | .06 |
|  | Too tiring | -.12 | .15 | -.11 |
|  | *R*2 |  |  | .08 |
| Normative Beliefs | Friends | .13 | .26 | .09 |
|  | Family/partner | -.33 | .22 | -.25 |
|  | Work Colleagues | .31 | .23 | .24 |
|  | *R*2 |  |  | .05 |
| Control Beliefs | More money | -.03 | .14 | -.03 |
|  | Motivated friends | .01 | .15 | .01 |
|  | Set regular routine | .08 | .13 | .08 |
|  | Less time | .32 | .12 | .30\*\* |
|  | Less money | -.22 | .15 | -.20 |
|  | *R2* |  |  | .12 |

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

Table 6. Summary of Hierarchical Regression Analysis of Time One Beliefs Predicting Time Three Behaviour at 18-Month Follow-Up (N = 78)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Belief Item** | **Variable** | **B** | **SE** | ***ß*** |
| Behavioural Beliefs | Fit and healthy | .41 | .33 | .20 |
|  | Social benefits | .12 | .17 | -.10 |
|  | Better mental health | -.14 | .29 | .08 |
|  | Positive body image | .07 | .25 | .04 |
|  | Lack of time | -.21 | .15 | -.19 |
|  | Too expensive | .26 | .12 | .26\* |
|  | Too tiring | .02 | .14 | .02 |
|  | *R*2 |  |  | .11 |
| Normative Beliefs | Friends | -.07 | .26 | -.06 |
|  | Family/partner | .02 | .22 | .02 |
|  | Work Colleagues | .08 | .21 | .07 |
|  | *R*2 |  |  | .00 |
| Control Beliefs | More money | -.05 | .14 | -.06 |
|  | Motivated friends | -.03 | .15 | -.02 |
|  | Set regular routine | .20 | .12 | .20 |
|  | Less time | .08 | .11 | .08 |
|  | Less money | -.05 | .16 | -.05 |
|  | *R*2 |  |  | .04 |

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

Three separate regression analysis were then conducted to examine associations between the individual behavioural, normative and control beliefs with exercise behaviour at six- and 18-month follow-up (e.g., at time 2 and time 3) (see Table 5 and 6 respectively). Intention was not included in the regression analysis as the focus was on which specific beliefs were associated with exercise behaviour at follow-up. Considering exercise behaviour at six-month follow-up, behavioural beliefs explained a non-significant 8% of the variance in behaviour, *R*2 = .08, *F*(7,74) = .91, *p* = .50. None of the behavioural beliefs emerged as significant predictors. The normative beliefs explained a non-significant 5% of the variance in behaviour, *R*2 = .05, *F*(3,79) = 1.34, *p* = .27. Again, none of the normative beliefs emerged as significant predictors. Control beliefs explained a non-significant 12% of the variance in behaviour, *R*2 = .12, *F*(5,76) = 2.09, *p* = .08. The only significant control belief was less time for regular exercise.

Considering exercise behaviour at 18-month follow-up, behavioural beliefs explained a non-significant 11% of the variance in behaviour, *R*2 = .11, *F*(7,76) = 1.26, *p* = .28. The only significant behavioural belief was engaging in exercise post-university would be expensive. The normative beliefs explained a non-significant .2% of the variance in behaviour, *R*2 = .002, *F*(3,76) = .06, *p* = .98. None of the normative beliefs emerged as significant predictors. Control beliefs explained a non-significant 4% of the variance in behaviour, *R*2 = .04, *F*(5,75) = .66, *p* = .65. Again, none of the control beliefs emerged as significant predictors.

Changes in beliefs were assessed across the transition from university to six-month follow-up to determine whether the transition of graduating university impacted on participants’ beliefs. A series of paired samples t-tests were conducted in order to address this question (see Table 7). Significant changes were found in the behavioural beliefs that post-university exercise would be too expensive, too tiring, would have motivated friends post-university, and the control beliefs of having a set exercise routine, having less time for exercise, and having less money for exercise post-university. Thus, the transition negatively impacted participant’s beliefs about exercise, the perceived support from friends, and their perceptions of barriers. However, at six-month follow-up, the behavioural beliefs that exercise would lead to feeling fit and healthy, exercise having social benefits, exercise leading to better mental health, exercise leading to feeling good about ones body image, and exercise being difficult due to time, had not significantly changed. Similarly, the normative beliefs of significant others believing that they should not engage in exercise (friends, family/partner and work colleagues), and the control belief that participants will have more money for exercise post-university also had not significantly changed.

Table 7. Means and Standard Deviations for Individual Beliefs at Time One (Baseline) and Time Two at Six-Month Follow-Up (*N* = 84).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variable | Belief | Baseline | | Six-month follow-up | | *t* |
| Mean | SD | Mean | SD |
| Positive Behavioural Beliefs | Fit and healthy | 6.54 | 0.83 | 6.38 | 1.10 | 1.23 |
| Social benefits | 5.54 | 1.56 | 5.58 | 1.49 | -.0.25 |
| Better mental health | 6.22 | 1.06 | 6.11 | 1.07 | 0.69 |
| Positive body image | 6.30 | 0.98 | 6.16 | 1.19 | 1.08 |
| Negative Behavioural Beliefs | Lack of time | 4.59 | 1.53 | 4.99 | 1.95 | -1.53 |
| Too expensive | 4.01 | 1.62 | 4.55 | 1.84 | -2.49\*\* |
| Too tiring | 3.01 | 1.58 | 3.83 | 1.75 | -4.47\*\*\* |
| Normative Beliefs | Friends | 5.35 | 1.39 | 5.43 | 1.30 | -0.46 |
| Family/partner | 5.65 | 1.40 | 5.55 | 1.39 | 0.62 |
| Work colleagues | 5.09 | 1.45 | 5.05 | 1.47 | 0.20 |
| Positive Control Beliefs | More money | 4.63 | 2.05 | 4.22 | 2.12 | 1.93 |
| Motivated friends | 3.78 | 1.61 | 2.82 | 1.59 | 4.10\*\*\* |
| Set regular routine | 5.04 | 1.71 | 3.65 | 2.12 | 4.93\*\*\* |
| Negative Control Beliefs | Less time | 3.89 | 1.81 | 4.51 | 2.05 | -2.44\*\* |
| Less money | 3.00 | 1.74 | 3.62 | 1.98 | -2.73\*\* |

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

Table 8. Descriptive Statistics for Time Two Individual Beliefs and Correlations with Intention (N = 84) and Time Three Behaviour (N = 78)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Belief Item** | **Mean** | **SD** | **Intention *r*** | **Behaviour *r* (18-months)** |
| Positive Behavioural Beliefs | Fit and healthy | 6.38 | 1.10 | .43\*\*\* | .23\* |
| Social benefits | 5.58 | 1.49 | .48\*\*\* | .05 |
| Better mental health | 6.11 | 1.07 | .44\*\*\* | .20 |
| Positive body image | 6.16 | 1.19 | .43\*\*\* | .29\* |
| Negative Behavioural Beliefs | Lack of time | 4.99 | 1.95 | -.18 | .13 |
| Too expensive | 4.55 | 1.86 | -.29 | -.05 |
| Too tiring | 3.83 | 1.75 | -.29\*\* | .05 |
| Normative Beliefs | Friends | 5.43 | 1.30 | .18 | .00 |
| Family/partner | 5.55 | 1.39 | .33\*\* | -.10 |
| Work colleagues | 5.05 | 1.47 | .27\* | -.07 |
| Positive Control Beliefs | More money | 4.22 | 2.12 | .27\* | -.02 |
| Motivated friends | 2.82 | 1.59 | .28\* | -.06 |
| Set regular routine | 3.65 | 2.12 | .53\*\*\* | -.02 |
| Negative Control Beliefs | Less time | 4.51 | 2.05 | -.26\* | .12 |
| Less money | 3.00 | 1.74 | -.24\* | -.04 |

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

### Correlations with Intention

All time 2 beliefs, with the exception of lack of time, too expensive, and the significant referent of friends, correlated significantly with exercise intention (see Table 8). Set regular routine had the strongest correlation, closely followed by social benefits, better mental health, fit and healthy and positive body image.

### Regression Analysis Predicting Intention

To assess the ability of the beliefs assessed at time 2 to predict post-university exercise intentions, a hierarchical regression analysis was conducted in which three separate regression analysis (individual behavioural, normative and control beliefs) were conducted (see Table 9). Behavioural beliefs explained 40% of the variance in intention, *R*2 = .40, *F*(7,71) = 6.79, *p* < .001. Exercise after university having social benefits was the sole significant predictor. The normative beliefs explained 14% of the variance in intention, *R*2 = .14, *F*(3,74) = 4.14, *p* < .01, with family/partner emerging as the sole significant predictor. Control beliefs explained 33% of the variance in intention, *R*2 = .33, *F*(5,72) = 6.93, *p* < .001. The only significant control belief was set routine.

### Correlations with Time Three Behaviour

Correlations between the time 2 beliefs and time 3 exercise behaviour are presented in Table 8. The only significant correlates with time 3 behaviour were the positive behavioural beliefs, fit and healthy and positive body image.

### Regression Analysis Predicting Time Three Behaviour

To assess the ability of the beliefs assessed at time 2 to predict post-university exercise behaviour at time 3, three separate regression analysis were conducted (individual behavioural, normative and control beliefs) (see Table 10). Behavioural beliefs explained 13% of the variance in behaviour, *R*2 = .13, *F*(7,65) = 1.40, *p =* .22. None of the behavioural beliefs were significant predictors. The normative beliefs explained 2% of the variance in behaviour, *R*2 = .02, *F*(3,68) = 0.51, *p* = .68. None of the normative beliefs were significant predictors. Finally, control beliefs explained 3% of the variance in behaviour, *R*2 = .03, *F*(5,66) = 0.40, *p* = .85. Again, none of the beliefs were significant predictors.

Table 9. Summary of Hierarchical Regression Analysis of Time One Beliefs Predicting Intention (N = 84)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **Belief Item** | **B** | **SE** | ***ß*** |
| Behavioural Beliefs | Fit and healthy | .22 | .19 | .16 |
|  | Social benefits | .36 | .09 | .38\*\*\* |
|  | Better mental health | .18 | .17 | .14 |
|  | Positive body image | .08 | .17 | .06 |
|  | Lack of time | -.14 | .09 | -.19 |
|  | Too expensive | -.11 | .08 | -.14 |
|  | Too tiring | .01 | .11 | .00 |
|  | *R*2 |  |  | .40\*\*\* |
| Normative Beliefs | Friends | -.43 | .23 | -.40 |
|  | Family/partner | .54 | .21 | .53\*\* |
|  | Work Colleagues | .17 | .16 | .17 |
|  | *R*2 |  |  | .14\*\* |
| Control Beliefs | More money | .02 | .11 | .03 |
|  | Motivated friends | .06 | .09 | .07 |
|  | Set regular routine | .25 | .06 | .40\*\*\* |
|  | Less time | -.11 | .06 | -.17 |
|  | Less money | -.11 | .12 | -.17 |
|  | *R*2 |  |  | .33\*\*\* |

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

Table 10. Summary of Hierarchical Regression Analysis of Time One Beliefs Predicting Time Three (18-month Follow-Up) Behaviour (N = 78)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Belief Item** | **Variable** | **B** | **SE** | ***ß*** |
| Behavioural Beliefs | Fit and healthy | .08 | .27 | .06 |
|  | Social benefits | -.06 | .14 | -.06 |
|  | Better mental health | .04 | .24 | .03 |
|  | Positive body image | .37 | .23 | .28 |
|  | Lack of time | .11 | .13 | .13 |
|  | Too expensive | -.06 | .11 | -.07 |
|  | Too tiring | .05 | .15 | .05 |
|  | *R*2 |  |  | .13 |
| Normative Beliefs | Friends | .29 | .28 | .24 |
|  | Family/partner | -.29 | .25 | -.26 |
|  | Work Colleagues | -.03 | .20 | -.03 |
|  | *R*2 |  |  | .02 |
| Control Beliefs | More money | -.17 | .19 | -.24 |
|  | Motivated friends | .03 | .13 | -.07 |
|  | Set regular routine | .03 | .10 | .04 |
|  | Less time | .09 | .10 | .11 |
|  | Less money | -.21 | .21 | -.26 |
|  | *R*2 |  |  | .03 |

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

## Discussion

The present study sought to use the TPB as a theoretical framework to investigate students’ beliefs about exercise across the transition from final year of university to post-university life. The study elicited the model salient beliefs about exercise post-university, and identified which beliefs had the strongest associations with intention and subsequent behaviour.

Considering the relationship between composite belief measures and TPB direct measures, the present study largely supports previous findings. For example, the current study found that positive behavioural composite measures significantly correlated with the direct TPB measure, attitude, meaning that positive salient beliefs held by participants about exercise had a strong relationship with their overall attitude towards exercise. However, the negative behavioural composite measure did not significantly correlate with attitude, indicating that attitudes towards exercise were predominantly based on beliefs about the positive consequences of exercise. The normative composite measure significantly correlated with subjective norm, and both (positive and negative) control composite belief measures significantly correlated with PBC. The current findings are broadly in line with Downs and Hausenblas (2005) who found large effect sizes for the correlations between composite belief measures and TPB constructs. Such findings suggest that interventions can target key beliefs within the target population, with the knowledge that these beliefs have strong relationships with attitudes, subjective normative influences, and PBC and, in turn, intention and behaviour. Interpreting the results in terms of the COM-B model suggests two main avenues for behaviour change; namely, targeting motivation and opportunity. Considering motivation, many of the beliefs elicited focused on important motivations to exercise (e.g., be fit and healthy, psychological benefits). Considering opportunity, the remaining beliefs focused on reduced opportunities to exercise post-university and how it may be more difficult (e.g., less time for exercise).

More recent literature on beliefs about exercise supports the findings of the Downs and Hausenblas (2005) review. For example, Pastor et al. (2015) investigated views about exercise (walking) in people who suffered with Fibromyalgia in order to identify modal salient beliefs about walking for people, to explore belief relationships with behaviour, and to inform an intervention designed to increase exercise (walking). Their results were broadly in line with previous literature and the present study, in that both physical and psychological outcomes were highlighted as important for engaging in exercise (behavioural beliefs), family and friends were important significant referents (normative beliefs), and, facilitating and inhibiting factors such as pain, fatigue and emotional state were identified (control beliefs). In addition, a study by Bellows-Riecken, Mark and Rhodes (2013) explored the importance of affective beliefs on exercise behaviour with undergraduate students using the TPB as their theoretical underpinning. Their results were again in line with previous literature, finding that key positive beliefs revolved around exercise improving psychological and physical health and being a positive social event, whilst negative beliefs included having a lack of time for exercise/time conflict, physical discomfort, and low motivation (exercise being an obligation).

Analysis of the relationships between the individual beliefs and intention and behaviour revealed some interesting findings. For example, with regard to intention, all of the behavioural beliefs with the exception of lack of time (negative behavioural belief) correlated significantly with intention, with fit and healthy, positive body image, and improved mental health correlating most strongly. The belief of exercise being too expensive and tiring was significantly related to intention to regularly exercise post-university, although it was not predictive of behaviour. Some previous literature (Pastor et al., 2015; Riddle, 1980) however have found that beliefs that exercise takes too much time or creates fatigue are not strongly held beliefs among exercisers. In contrast, Bellows-Riecken, Mark and Rhodes (2013) found that time was a significant factor regarding exercise behaviour, as it was the most frequently cited negative behavioural belief about exercise, in line with the current study. Participants in the current study were frequent exercisers and their over-riding evaluation of exercise was positive. They believed that spending time exercising is a productive use of time, and that fatigue, although it negatively affected intention, did not affect behaviour. All normative beliefs significantly correlated with intention, with friends having the strongest correlation. Friends were found to have the strongest relationship with intentions which may be due to the social bonds that are created at university, as for many students, university is likely to be the first time living away from home. As a result, peer networks increase in importance. Finally, only two of the five control beliefs significantly correlated with intention, set regular routine (positive control belief) and less money (negative control belief). This suggests that participants believe that a set regular routine will increase their intention to exercise post-university, and that they do not believe money will be a significantly influencing factor. This is likely to be because of the prospect of a job post-university, and therefore, the potential to have an increased and stable income when compared to being at university. The strong belief-intention correlations supports the use and accuracy of the elicitation study used to identify modal salient beliefs in the target population. The only belief to significantly correlate with behaviour was the negative control belief, less time. Participants therefore believed, that post-university there was a relationship between a reduction in their exercise levels and their perceived reduction in spare time for exercise post-university. Those who thought that having less time to exercise after leaving university were found to exercise less at follow-up.

Behavioural beliefs explained 42% of the variance in intention, normative beliefs explained 13% of intentional variance, and control beliefs explained 17% of the variance in intention. The significant predictors indicated that for students about to graduate from university, being fit and healthy, improved mental health, a positive body image, having a perceived lack of time for exercise (behavioural beliefs), the influence of friends (normative beliefs), and having a set routine to facilitate exercise (control beliefs) are all important factors that contribute to having a positive intention to exercise post-university. Thus, considering behavioural beliefs, the physical and psychological health benefits were very important with regard to motivation to exercise post-university; however, participants were also concerned about the amount of free time for exercise post-university. Their friends were the most important social group when considering whether to exercise or not post-university. As students’ timetables are relatively unstable, the finding that the perception of having a set regular routine post-university was the sole significant control belief predictor of intention, suggests that participants believed that a positive outcome of post-university life was having a stable, set routine around which they could incorporate exercise. It is worth noting that the internal reliability of the overall measures negative control beliefs was low (Cronbach’s alpha = .37). Low internal reliability is likely to reduce the strength of correlations. However, the overall measure may be better considered as an index of control factors, rather than a scale, as there is no reason why a strong belief about one barrier should be similar to a belief about another factor. Nonetheless, it is interesting that the other belief measured had good levels of internal consistency (e.g., beliefs were correlated with each other).

The amount of variance explained in behaviour by the behavioural beliefs was 8% (time 2) and 11% (time 3). This was non-significant, with none of the beliefs making a significant contribution at time 2, although at time 3 the belief that exercise was too expensive was significant, although it should be noted that the bivariate correlation was non-significant. The normative beliefs explained 5% of the variance in behaviour at time 2 and 0.2% at time 3; both amounts of variance explained were non-significant and none of the beliefs were significant predictors of behaviour. The control beliefs explained 12% (non-significant) of the behavioural variance at time 2. Less time was the sole significant predictor of behaviour, suggesting that participants who thought that they would have less time for exercise post-university, were subsequently less likely to exercise post-university. The control beliefs explained a non-significant 4% of the variance in time 3 behaviour.

The transition of graduating university had a negative impact on participants’ exercise beliefs. For six of the 15 beliefs, scores became significantly more negative across the transition. These included exercise being too expensive post-university, too tiring, having less motivated friends than anticipated, creating a set regular exercise routine was an issue, and less time and money for exercise than anticipated post-university. The most marked change was for the control belief, set regular routine. Before graduating university participants were quite confident they would be able to have a set regular routine that would help them to exercise, scoring well above the mid-point (*M* = 5.04), whereas at six-month follow-up the score had dropped to around the mid-point (*M* = 3.65). Additionally, having less motivated friends for exercise was also a marked difference, such that post-university participants felt they had much less motivated friends for exercise than they had anticipated before graduating university. The volatile nature of a significant life transition, including changes in location, friendship groups, and facilities/opportunities, may make it difficult to create a set routine and establish strong social groups to exercise with. These issues warrant further attention. For example, future research could investigate the impact of pre and post-transition facility opportunities, costs, distance, location, variance in facilities on individuals’ ability to follow an exercise routine at, and after leaving, university.

At time 2, the correlations between individual beliefs and intention broadly mirrored those obtained at time one, although there were some differences. For example, exercise being too expensive post-university did not have a significant correlation with intention at time 2, whereas having a lack of time (control belief) for exercise did, as did beliefs about having more money and support from friends. In addition, beliefs about being fit and healthy and having a positive body image were significant correlates of behaviour at time 3. These findings indicate that six months post-university (time two) participants no longer viewed the costs associated with exercise as being a significant barrier that influenced their motivation to exercise. In contrast, the belief that they would have less time for exercise had a significant correlation with intention six months post-university, highlighting the importance of time concerns for recent graduates. Beliefs about time and how to fit exercise into a busy schedule may be important to target for maintaining exercise behaviour after leaving university.

Regression analyses revealed that beliefs about the social benefits of exercise, support from family/partner, and having a set regular routine were all predictive of post-university exercise intentions. The significant result for perceived support from family/partner is interesting as the importance of the normative component of the TPB has often been downplayed (Sparks et al., 1995). Interestingly, McEachan et al.’s (2011) meta-analysis found that subjective norms were more predictive of behaviour in adolescent/student populations than in adult populations. The current findings are therefore consistent with previous research with adolescent/student populations, but extend them within the context of a significant life transition. The current findings suggest that norms may be important even across a transition when social contexts are likely to change. Regarding prediction of behaviour, none of the beliefs were significant at 18-month follow-up. Thus, this finding is not supportive of the TPB as a framework for the prediction of behaviour when using a long-term follow-up when considering individual beliefs.

The main aim of the study was to elicit modal salient behavioural, normative, and control beliefs about exercise post-university, and to establish the extent to which these beliefs were associated with exercise intentions and behaviour post-university. Downs and Hausenblas (2005) systematic review reported modal salient beliefs in relation to exercise with predominant beliefs being that exercise is good for both physical and mental health (behavioural beliefs), family and friends are important significant others (normative beliefs), enjoyment and social support (facilitating control beliefs), and a lack of time, social support, motivation, and health issues (inhibiting control beliefs). The present research is consistent with many of Downs and Hausenblas’ (2005) findings with regard to the main beliefs elicited. Some of the modal salient beliefs however, differ slightly. For example, the present research found that friends had the strongest normative influence, whereas Downs and Hausenblas (2005) reported that family has the strongest influence. The present research adds to the existing literature by identifying the modal salient beliefs of young people across a significant life transition (e.g., graduating from university). The current study was also successful in highlighting the significant underlying beliefs about exercise intentions and behaviour across the transition of graduating university and entering post-university life.

There are a few methodological limitations within the present study, which should be considered when interpreting the current findings. First, the study used the University of Sheffield volunteer list to recruit participants. Given the subject nature of the study (exercise), this may have led to a bias in who completed the questionnaire. It is possible that those who participated in the study were highly interested in exercise and may have differed from the rest of the student population. As a result, the present sample may not be representative of the broad student population (e.g., those who are not regular exercisers), which will limit the generalisability of the findings. Future studies should seek to recruit participants with a broader range of views/experiences with exercise (i.e., those who do and do not exercise at university). Second, the elicitation study included 11 participants. While low, this is similar to numbers used in other TPB belief elicitation studies and was deemed sufficient to identify the main modal salient beliefs held by this population. Third, as discussed earlier, the composite measure of negative control beliefs had low internal reliability. However, composite belief measures are better considered as indices of beliefs and, as a result, individual items are not necessarily expected to correlate with each other. Fourth, the main study had a modest sample size, especially at follow-up, which may have reduced the statistical power of some of the analysis, although a sample size of 84 is sufficient to detect a medium sized correlation (Cohen, 1992), as typically reported in TPB studies (McEachan et al., 2011). However, the relative small sample size for the main study precluded the use of more sophisticated data analyses, such as Structural Equation Modelling (SEM) (Hoyle, 2012). Notwithstanding these limitations, the present results are broadly in line with previous research (Bellows-Riecken, Mark, & Rhodes, 2013; Downs & Hausenblas, 2005).

The current study highlights specific beliefs about exercise for participants about to graduate university. The implication of this means that future research designed to reduce any negative transition affects on exercise intention and behaviour, can base an intervention on specific beliefs that have been elicited about the transition. Interventions should focus on the following beliefs: positive behavioural beliefs such as physical and mental health, having a positive body image; negative behavioural beliefs about a lack of time and exercise cost; friends’ and family/partners views and support (normative belief); and having a set regular exercise routine (control belief) to facilitate exercise behaviour post-university. Basing an intervention on these beliefs is likely to aid in the development of an effective behaviour change intervention for students about to go through the significant life transition of graduating university. However, these conclusions need to be treated with caution due to the study limitations. Nonetheless, this study highlighted modal salient beliefs that could be targeted in an intervention that are broadly congruent with previous literature (Bellows-Riecken, Mark, & Rhodes, 2013; Downs & Hausenblas, 2005), but specific to the current population.

In conclusion, the present study sought to investigate final year students’ beliefs about exercise over the transition of graduating from university. Behavioural beliefs, normative beliefs, and control beliefs were all found to correlate with post-university exercise intentions. Regression analyses, indicated that being fit and healthy, better mental health, a positive body image, lack of time (behavioural beliefs), friends (normative beliefs), and having a set regular routine (control beliefs), were the most important determinants of participants’ intention to exercise post-university. However, only one control belief (i.e., less time for exercise) was correlated with exercise behaviour at follow-up. Interventions should therefore target these beliefs in order to encourage exercise across the significant life transition of leaving university.

# Chapter 3. Predicting Exercise Across the Post-University Transition: An Application of an Extended Theory of Planned Behaviour (Study 1b)

## Abstract

**Background**. Regular exercise has an array of positive health benefits, but declines with age. The most dramatic decline occurs in late adolescence and early adulthood, when young people encounter many significant life transitions including starting, and leaving, university. The present study applied an extended version of the theory of planned behaviour (TPB) to predict exercise intentions and behaviour across the post-university transition.

**Method**. This study reports data from the same sample that completed Study 1a. This chapter will report the results of associations between direct measures of TPB with intention and behaviour, as well as association with a range of additional predictors that have been hypothesised to increase the predictive utility of the TPB. Students (N = 136) completed an online questionnaire at the end of their final semester at university assessing direct measures of TPB variables (i.e., attitude, subjective norms, perceived behavioural control, intention) as well as past behaviour, habit strength, self-identity, planning, and behaviour. Participants were followed-up six months (N = 84) and 18 months (N = 78) later when exercise behaviour was assessed again.

**Results.** All of the TPB and additional variables correlated significantly with intention to exercise after university apart from descriptive norm. Affective attitude, intention, habit, self-identity, and past behaviour all significantly correlated with behaviour at six-month follow-up. Hierarchical regression analyses indicated that the extended TPB explained 72% of the variance in exercise intentions, with affective attitude, instrumental attitude, perceived control, and self-identity making significant independent contributions. The extended TPB explained 43% of the variance in exercise behaviour at six-month follow-up with intention and self-identity emerging as significant independent predictors. Planning had the sole significant relationship with exercise behaviour at 18-month follow-up.

**Conclusions**. The results support the importance of attitude, perceived control, and self-identity for exercise intentions, and intention and self-identity for exercise behaviour when considering exercise behaviour across the transition of graduating university. Interventions should therefore target these key variables in future studies. Additionally, planning may be important when considering long-term exercise behaviour, although further studies investigating this relationship would be beneficial.

## Prelude

Regular exercise has a range of physical benefits including prevention of coronary heart disease, type 2 diabetes, and weight gain, as well as various psychological benefits including improved wellbeing, happiness, reduced anxiety and reduced stress. Previous research has shown that significant life transitions often have an impact on health behaviours and, in the case of exercise, this is a negative impact. To date, the impact of the transition of graduating university on exercise has not been investigated; Chapter 3 addresses this gap in the literature. Chapter 3 also sought to use the TPB to predict intention and behaviour across the significant life transition of graduating university. Identifying the key predictors of exercise behaviour across this transition is important for identifying potential variables to target in interventions to support exercise behaviour across this transition.

## Introduction

### The Theory of Planned Behaviour

The current study employed the Theory of Planned Behaviour (TPB (Ajzen, 1991)) as the theoretical framework to investigate exercise post-university. The TPB has received strong empirical support as a predictive model of exercise intentions and behaviour (McEachan et al., 2011). Kwan et al. (2009) is the only study to date that has employed the TPB to explain exercise behaviour across a significant life transition in young people. They focused on the transition into university, finding that the TPB explained 37% of the variance in exercise intentions, with all three TPB variables (i.e. attitude, subjective norm, and PBC) having significant contributions, assessed at the start of university. Kwan et al. (2009) also measured the additional predictor, past behaviour, which was also a significant predictor of exercise intentions. Past behaviour however only explained a small additional amount of variance (1.5%), bringing the total explained intentional variance to just under 39%. Moreover, the TPB predictors remained significant. However, the TPB was unable to explain future exercise behaviour, which was assessed eight weeks later. Instead, past behaviour was the only significant predictor of future exercise behaviour. Kwan et al. (2009) explained this finding by suggesting that although the students had strong intentions and perceptions of control to exercise at university, barriers such as social demands, time, and university work load, made it difficult to initiate their intentions, and instead, participants may have reverted back to previous patterns of (in)activity. However, this account is somewhat at odds with habitual accounts of the effect of past behaviour on future behaviour that emphasise the stability of the context in which the behaviour is performed (Ouellette & Wood, 1998) and the automaticity of behaviour in response to environmental cues (Gardner, 2015). In a changing context, such as the transition to university, one might expect the effect of previous habitual patterns of behaviour to weaken (Wood, Tam, & Witt, 2005).

In line with this argument, both past behaviour and habit have been found to explain additional variance in both intention and behaviour in exercise (Hagger et al., 2002a). Past behaviour is often found to be the strongest predictor of future behaviour, explaining variance over and above the TPB variables (Conner & Armitage, 1998; Hagger et al., 2002a). Hagger et al.’s (2002a) meta-analysis found past exercise to be a significant predictor of behaviour, intention, attitude, subjective norm, PBC, and self-efficacy. Past behaviour may incorporate previous experiences that can influence future behaviour through the assembly of favourable or unfavourable evaluations of the behaviour (Sheeran & Abraham, 2003; Verplanken & Orbell, 2003). However, it has also been argued that when past behaviour is related to future behaviour, it may reflect the influence of habitual processes (Verplanken & Orbell, 2003) due to the repeated performance. There is not a precise measure of how many times a behaviour needs to be performed to become habitual; rather habitual behaviour has the characteristics of satisfactory repetition, automaticity and spontaneously, that is triggered in response to specific environmental cues (Verplanken & Aarts, 1999; Verplanken & Orbell, 2003). Gardner’s (2015) meta-analysis on the relationship between habit strength and nutrition and exercise behaviours, revealed that habit strength had a medium to large correlation. Additionally, they found that habit strength moderated the intention-behaviour relationship, such that as habit strength increased, the impact of intention on behaviour reduced. Automaticity is said to be a key feature of habit strength, as habits are automatically set in motion from environmental cues, rather than through the process of conscious intentions (De Bruijn, 2011), thus needing little cognitive input. Both past behaviour and habit strength have been found to moderate the intention-behaviour link (De Bruijn et al., 2007). For example, Norman et al. (2000) found that as behaviour frequency increased, the intention-behaviour relationship became weaker, in line with Gardner’s (2015) recent meta-analysis.

Another route through which past behaviour may impact on future behaviour is through strengthening an individual’s self-identity (e.g., as an exerciser). Self-identity has been defined as the strength of one’s belief that a behaviour is a part of one’s self-concept (Sparks & Shepherd, 1992). Self-identity is thought to be closely linked to habit, as when behaviour frequency increases, self-identity effects strengthen, increasing the likelihood of a behaviour becoming part of one’s self-identity (Terry et al., 1999). A recent meta-analysis by Rise et al. (2010) supported self-identity as a significant additional predictor. They reported that self-identity explained an additional 6% of the variance in intention, and an additional 9% of the variance in behaviour, over and above the influence of TPB variables. De Bruijn et al. (2012) investigated self-identity and exercise with undergraduate students, finding that participants with a strong exercise identity also had positive intentions to exercise. Similarly, Strachan et al. (2011) found that stronger exercise identities were associated with higher self-regulatory efficacy (SRE), meaning that participants were more confident in their pursuit of exercise behaviour. The effect of self-identity has been found to be moderated by past behaviour with Fekadu and Kraft (2001) reporting that the self-identity-intention relationship became stronger with increasing levels of past behaviour.

Research has consistently found that the TPB explains more of the variance in intention than behaviour (Sniehotta, Scholz, & Schwarzer, 2005; McEachan et al., 2011). This is reflected in the intention-behaviour gap, such that positive intentions do not always translate into behaviour (McEachan et al., 2011). Thus, post-intentional variables, such as action planning, are needed to better predict behaviour (Conner et al., 2010). Action planning is the action of specifying the when, where and how the a particular behaviour will be enacted (Gollwitzer, 1999). Action planning is a post-intentional factor, and therefore is believed to mediate and moderate the intention-behaviour relationship (Conner et al., 2010; Scholz et al., 2008). Thus, intentions may have their impact on behaviour through action planning (i.e., mediation) and/or the intention-behaviour relationship may be stronger among those who engage in action planning (i.e., moderation). Action planning revolves around goal attainment, and is therefore associated with one’s motivation (Wanlin et al., 1997). Gollwitzer (1999) states that an action plan needs to be detailed in order to bridge the intention-behaviour gap. Merely stating an end goal is not enough; instead, a detailed plan of when, where, and how a goal is to be achieved needs to be formulated. Conner et al. (2010) supported the utility of action planning as an additional predictor within the TPB. Planning explained additional variance in exercise behaviour, mediating the effect of intention. In addition, planning moderated the intention-planning relationship, which was only significant under moderate and high levels of planning. Similarly, Scholz et al. (2008) also found that planning significantly increased the amount of variance explained in behaviour over and above the TPB variables. More recently, Carraro and Gaudreau’s (2013) meta-analysis supported the use of action planning, reporting that planning explained additional variance in behaviour, over and above the influence of intention.

### The Present Study

The present chapter reports data on an extended TPB from the same participants used in Study 1a. The present chapter focuses on associations between direct measures of the TPB variables (and additional variables) and exercise intentions and behaviour across the transition of graduating from university. To date, no study has examined exercise behaviour across the transition from university to post-university life. The study also sought to assess the extent to which the TPB was able to explain exercise intentions and behaviour across this transition, as well as the extent to which a number of additional predictors (i.e., past behaviour, habit strength, self-identity, and action planning) explained additional variance in exercise intentions and behaviour.

## Method

### Design

The study employed a prospective design assessing direct measures of the TPB, as well as a number of additional predictors and exercise behaviour among final year university students, with six and 18-month follow-ups post-university. The University of Sheffield Department of Psychology Ethics Committee granted the study ethical approval (application approval no #641).

### Procedure and Participants

An email was sent to the University of Sheffield volunteers list with a link to an online questionnaire. The questionnaire (Appendix B) was completed by 136 final year university students (*N* = 136, undergraduate *n* = 98, postgraduate *n* = 38, *M* age = 23.29, *SD* = 4.05, male *n* = 55, female *n* = 81).

A second questionnaire was sent to all participants who had given a valid email address at the end of the time 1 questionnaire (*n* = 134) at six-month follow-up. The second questionnaire was completed by 84 of the participants. An attrition analysis was conducted to investigate whether there were any significant differences between those participants who completed both questionnaires versus those who only completed the first questionnaire. Participants were compared on baseline measures of the extended TPB variables, as well as exercise behaviour and demographics (gender, age, nationality, ethnicity, and study level). All comparisons were non-significant. A third questionnaire was sent out 18 months later to all participants who had completed the time two questionnaire. This was completed by 78 participants. Again, an attrition analysis was conducted to investigate whether there were any significant differences between those participants who completed both questionnaires versus those who only completed the first questionnaire. Participants were compared on baseline measures of the extended TPB variables, exercise behaviour and demographics (gender, age, nationality, ethnicity, and study level). All comparisons were non-significant.

A definition of regular exercise was provided at the beginning of the study. Consistent with previous research (Norman & Smith, 1995; Sheeran & Abraham, 2003), exercise was defined as “a minimum of 30 minutes of vigorous-intensity physical activity, at least three days a week”. This is in line with the current literature highlighting the need for vigorous exercise such as running, jogging, playing football, basketball, swimming, cross country skiing etc, to accrue significant health benefits (Hu et al., 1999). Participants completed direct measures of TPB variables, measures of additional predictors (i.e., habit, self-identity and planning), and a measure of their past exercise behaviour (Godin-Sheppard Leisure-Time Exercise Questionnaire, GLTEQ; (Godin, 2011)).

### Measures

The TPB questionnaire assessed participants’ attitudes, subjective norm, descriptive norm, PBC, and intention towards exercise after university. In addition, past behaviour, habit strength (Gardner, Abraham, Lally, & De Bruijn, 2012), self-identity (Sparks & Shepherd, 1992), and action planning (Conner et al., 2010) were also measured. Unless otherwise indicated, all items were rated on 7-point response scales and coded so that high scores reflected high values on the variable of interest (e.g., positive attitudes). Item scores were averaged to provide a measure of each variable.

Attitudes towards regular exercise after university were assessed with measures of instrumental and affective attitude. Instrumental attitudes were measured using three items, e.g., ‘*Engaging in regular exercise after I leave university would be… wise/foolish’*. Affective attitudes were measured using two items, e.g., ‘*Engaging in regular exercise after I leave university would be… enjoyable/unenjoyable’*. Cronbach’s alpha was .88 for affective attitude and .74 for instrumental attitude.

Subjective norms were assessed using measures of injunctive and descriptive norms. The injunctive norm component was assessed with two items, e.g., *‘People who are important to me would approve/disapprove of me engaging in regular exercise after I leave university… approve/disapprove’.* Descriptive norms were measured with two items, e.g., *‘Most people who I know at university will engage in regular exercise after leaving university… none/all’.* Cronbach’s alpha was .71 for injunctive norm and .84 for descriptive norm.

PBC was assessed using measures of perceived control (2 items, e.g., *‘I feel in complete control over whether or not I engage in regular exercise after I leave university… strongly disagree/strongly agree’*) and self-efficacy (2 items, e.g., ‘*If I wanted to, engaging in regular exercise after I leave university would be… easy/difficult’*). Cronbach’s alpha was .75 for perceived control and .79 for self-efficacy.

Intention was measured with two items, e.g., ‘*How likely is it that you will engage in regular exercise after you leave university… likely/unlikely’*. Cronbach’s alpha was .82 for the measure of intention.

Past exercise behaviour was measured using the Godin-Sheppard Leisure-Time Exercise Questionnaire (GLTEQ; (Godin, 2011)). The questionnaire comprises three items to gain the number of times mild (yoga, archery, fishing, golf etc.), moderate (fast walking, tennis, volleyball, badminton, easy swimming etc.), and strenuous (running, football, squash, basketball, vigorous swimming etc.) exercises are performed during a typical 7-day period. The GLTEQ is a valid measure of exercise behaviour, correlating with percentile VO2max (r = .24, p < .001) and percentile body fat (r = .13, p < .01). For the purpose of the present study, only the number of times participants engaged in strenuous exercise was used in the analysis, as this corresponded most closely with the definition of regular exercise used in the TPB items and additional predictors.

Habit strength was measured using a shortened version of the Self-Report Habit Index (SRHI) (Verplanken & Orbell, 2003); the Self-Report Behavioural Automaticity Index (SRBAI), developed by Gardner et al. (2012). The SRBAI focuses on the central component of habit, i.e., automaticity. The SRBAI includes four items, e.g., *‘Regular exercise is something I do automatically …agree/disagree’.* Cronbach’s alpha was .93.

Three items derived from De Bruijn et al. (2012) were used to measure self-identity. Those three items were as follows; *‘To engage in regular exercise is an important part of who I am’, ‘I am the type of person who is orientated to engage in regular exercise’,* and *‘I would feel at a loss if I was forced to give up regular exercise’*. Cronbach’s alpha was .93.

Action planning was assessed using four items derived from Conner et al. (2010), e.g., ‘*I have made a detailed plan regarding when to exercise after I leave university… not at all true/exactly true’*. Cronbach’s alpha was .92.

### Sample Size Calculations

A sensitivity power analysis was conducted to determine the minimum effect size that could be detected given the participant numbers and IVs with 80% power and alpha set at .05 (Cohen, 1992). For intention, where there were 136 participants and six IVs (attitude, subjective norm, PBC, habit strength, self-identity, and past behaviour), the study was adequately powered to detect a minimum effect size of *f2* = 0.105, which equates to *R2* = .095. For behaviour, where there were 84 participants (Time 2) and 78 participants (Time 3), and eight IVs (attitude, subjective norm, PBC, intention, planning, habit strength, self-identity, and past behaviour), the study was adequately powered to detect a minimum effect size of *f2* = 0.198, which equates to *R2* = .165 (Time 2) and *f2* = 0.215, which equates to *R2* = .177 (Time 3). Given that the TPB (including past behaviour) typically explains 54% and 34% of variance in intention and behaviour respectively (McEachan et al., 2011), the sensitivity power analysis indicates that this study was adequately powered.

## Results

### Descriptive Statistics

One hundred and thirty-six respondents (*M* age = 23.29, *SD* = 4.05) completed the online TPB questionnaire regarding exercise after university. Participants were final year students (*N* = 136, male *n* = 55, female *n* = 81) from the University of Sheffield, with the majority being from the UK (84.6%) and undergraduates (72.1%). Cronbach’s alphas for all measures were acceptable (see Table 11). Mean scores on all of the TPB measures were high (i.e., above the mid-point), with the exception of descriptive norm, which was close to the mid-point. The mean scores for the additional measures (i.e., habit strength, self-identity, and planning) were all near the mid-point. Participants reported engaging in approximately two bouts of strenuous exercise in a typical week (*M* = 1.95, *SD* = 1.88) at time one, which decreased at time two (*M* = 1.76, *SD* = 1.86). This decrease was non-significant, *t*(83) = 1.40, *p* = .16. A third behavioural measure was used to assess participants (*n* = 78) exercise levels 18 months after time one. Participant exercise levels also decreased between baseline time three (*M* = 1.58, *SD* = 1.61), although the decrease was non-significant, *t*(77) = 1.78, *p* = .07.

Table 11. Descriptive Statistics for Main Study Variables (N = 136)

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Alpha** | **Mean** | **SD** |
| Affective Attitude | .88 | 5.85 | 1.33 |
| Instrumental Attitude | .74 | 6.51 | 0.80 |
| Subjective Norm | .71 | 5.62 | 1.48 |
| Descriptive Norm | .84 | 3.99 | 1.16 |
| Perceived Control | .75 | 5.20 | 1.13 |
| Self-Efficacy | .79 | 5.16 | 1.32 |
| Habit strength | .93 | 3.46 | 1.79 |
| Self-Identity | .93 | 4.40 | 1.94 |
| Planning | .92 | 3.10 | 1.77 |
| Intention | .82 | 5.85 | 1.26 |
| Strenuous Exercise (Time 1) |  | 1.95 | 1.88 |
| Strenuous Exercise (Time 2) **a** |  | 1.76 | 1.86 |
| Strenuous Exercise (Time 3) **b** |  | 1.58 | 1.61 |

Note. a, *N* = 84, b, *N* = 78. Scores on the extended TPB variables could range between 1 (low levels) and 7 (high levels).

### Correlations with Intention

The first stage of the analysis was to correlate the TPB variables and additional predictors (habit strength, self-identity, past behaviour) with exercise intention (see Table 12). All TPB variables, as well as the additional variables, were significantly correlated with intention to exercise after university apart from descriptive norm. Affective and instrumental attitude had the strongest correlations with intention, followed by perceived control, self-efficacy, and subjective norm. Past behaviour also significantly correlated with intention, as did self-identity and habit strength.

T-tests were performed to examine associations between the socio-demographic variables and intention. The associations for nationality (British vs. Other), *t*(134) = 1.61, *p* = .11, gender, *t*(134) = 1.11, *p* = .27, and study level (postgraduate vs. undergraduate), *t*(134) = 0.06, *p* = .96, were all non-significant. In addition, the correlation between age and intention was also non-significant, *r*(134) = .13, *p* = .12.

### Regression Analysis Predicting Intention

To assess the ability of the TPB and the additional predictors to explain post-university exercise intentions, a hierarchical regression analysis was conducted in which the independent variables were entered in three steps: (i) the TPB variables, (ii) habit strength and self-identity, and (iii) past behaviour (see Table 13). In this way it was possible to assess the amount of variance explained in intention by the TPB, the amount of additional variance explained by habit strength and self-identity, and finally whether any significant associations remain after the addition of past behaviour.

At the first step, the TPB variables explained 67% of the variance in intention, *R2*= .67, *F*(6,141) = 47.88, *p* < .001, with affective attitude, instrumental attitude, and perceived control emerging as significant independent predictors. The addition of habit strength and self-identity at step two increased the amount of variance explained by 5%, ∆*R2* = .05, *F*change(8,139) = 13.31, *p* < .001. Self-identity emerged as a significant predictor along with affective attitude, instrumental attitude, and perceived control. At step three, the addition of past behaviour failed to increase the amount of variance explained, ∆*R*2 = .00, *F*change(9,138) = .27, *p* = .60. The variables in the final regression equation explained 72% of the variance in intention, *R*2 = .72, *F*(9,138) = 40.28, *p* < .001, with affective attitude, instrumental attitude, perceived control, and self-identity making significant independent contributions to the regression equation.

Moderated regression analyses were conducted to examine whether past behaviour and habit strength moderated the relationship between self-identity and intention. The independent variable (i.e., self-identity) and the moderator (i.e., past behaviour or habit strength) were mean centred before interaction terms were constructed. Two moderated regression analyses were conducted in which the mean centred independent and moderator variable were entered into a regression analysis with their interaction term. A significant interaction effect would provide evidence for moderation. However, both the interactions between self-identity and past behaviour (*ß* = -.02, *p* = .80) and self-identity and habit strength (*ß* = .12, *p* = .11) were non-significant.

### Correlations with Behaviour

Participants (*N* = 84) completed a six-month follow-up questionnaire to record exercise behaviour since leaving university. Correlations between the TPB variables and additional predictors (habit strength, self-identity, past behaviour, and planning) with exercise behaviour were conducted (see Table 12). Intention and affective attitude were the only TPB variables to correlate significantly with exercise behaviour after university. Habit strength, self-identity, and past behaviour all significantly correlated with exercise behaviour. Planning did not correlate with exercise behaviour. Planning was the only baseline variable to have a significant correlation with exercise behaviour at 18-month follow-up.

### Regression Analysis Predicting Behaviour

A hierarchical regression analysis was conducted to assess the ability of the TPB and the additional predictors to predict exercise behaviour after university. The independent variables were entered in five steps: (i) intention, perceived control, and self-efficacy, (ii) planning, (iii) affective attitude, instrumental attitude, subjective norm, and descriptive norm, (iv) habit strength and self-identity, and finally (v) past behaviour (see Table 14). In this way it was possible to assess (i) the amount of variance explained in exercise behaviour by the proximal TPB variables of intention, perceived control and self-efficacy, (ii) the remaining TPB variables, (iii) planning, and (iv) if habit strength and self-identity explained additional variance in exercise behaviour, and finally (v) whether any significant associations remain after the addition of past behaviour.

At the first step, intention, perceived control and self-efficacy explained 12% of the variance in exercise behaviour, *R*2 = .12, *F*(3,80) = 3.73, *p* = .01, with intention emerging as the sole significant independent predictor. At step two, the addition of planning did not significantly increase the amount of variance explained in exercise behaviour, ∆*R*2 = .00, *F*change (4, 79) = 2.82, *p* = .67. The addition of the TPB variables at step three increased the amount of explained variance by 7%, however, this increase was also non-significant, ∆*R*2 = .07, *F*change (8, 75) = 2.32, *p* = .15. Both intention and affective attitude made significant contributions at this step. The addition of habit strength and self-identity at step four increased the amount of variance explained by a further 22%, ∆*R*2 = .22, *F*change (10, 73) = 5.33, *p* < .001. Self-identity emerged as the sole significant predictor. At step five, the addition of past behaviour failed to significantly increase the amount of variance explained, ∆*R*2 = .01, *F*change (11, 72) = 4.89, *p* = .40. The variables in the final regression equation explained 43% of the variance in exercise behaviour, *R*2 = .42, *F*(11, 72) = 4.89, *p* < .001, with self-identity emerging as the sole significant independent predictor.

Moderated regression analyses were conducted to examine whether past behaviour and habit strength moderated the relationship between self-identity and behaviour, and if the intention-behaviour relationship was moderated by planning, past behaviour, or habit strength. The independent (i.e., self-identity) and the moderator (i.e., planning, past behaviour or habit strength) variables were mean centred before interaction terms were constructed. Five moderated regression analyses were conducted in which the mean centred independent and moderator variables were entered into a regression analysis with their interaction term. A significant interaction effect would provide evidence for moderation. However, all of the interactions, between self-identity and past behaviour (*ß* = .08, *p* = .45), self-identity and habit strength (*ß* = .09, *p* = .35), intention and planning (*ß* = .09, *p* = .52), intention and past behaviour (*ß* = .18, *p* = .09), and intention and habit strength (*ß* = .11, *p* = .28), were non-significant.

A second hierarchical regression analysis (Table 15) was conducted using the same procedure as above, but with time three behaviour (at 18-month follow-up) as the dependent variable. At the first step, the intention, perceived control and self-efficacy explained 4% of the variance in exercise behaviour, *R*2 = .04, *F*(3,74) = 1.13, *p* = .34. None of the variables emerged significant. At step two, the addition of planning increased the explained variance by 4%; this was not a significant increase in the amount of variance explained in exercise behaviour, ∆*R*2 = .04, *F*change (1, 73) = 1.71, *p* = .07, although it did approach significance. The addition of the TPB variables at step three increased the amount of explained variance by only half a percent which was also non-significant, ∆*R*2 = .005, *F*change (4, 69) = .85, *p* = .98. The addition of habit strength and self-identity at step four increased the amount of variance explained by a further 1.8%, ∆*R*2 = .018, *F*change (2, 67) = .81, *p* = .51. At step five, the addition of past behaviour failed to significantly increase the amount of variance explained, ∆*R*2 = .01, *F*change (1, 66) = .80, *p* = .40. The variables in the final regression equation explained 12% of the variance in exercise time three behaviour, *R*2 = .12, *F*(11, 66) = .80, *p* = .64, with no significant predictors, although planning approached significance, *ß* = .26, *p* = .052. Moderated regression analyses were conducted to examine whether past behaviour and habit strength moderated the relationship between self-identity and behaviour, and if the intention-behaviour relationship was moderated by planning, past behaviour, or habit strength. The independent (i.e., intention) and the moderator (i.e., planning, past behaviour or habit strength) variables were mean centred before interaction terms were constructed. Five moderated regression analyses were conducted in which the mean centred independent and moderator variables were entered into a regression analysis with their interaction term. A significant interaction effect would provide evidence for moderation. All interactions between intention and planning (*ß* = .12, *p* = .40), intention and past behaviour (*ß* = .14, *p* = .25), intention and habit strength (*ß* = -.04, *p* = .72), self-identity and past behaviour (*ß* = -.13, *p* = .33), and self-identity and habit strength (*ß* = -.05, *p* = .69), were non-significant.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | INST ATT | SN | DN | PC | SE | HS | SI | T1 Exer | Plan | INT | Strenuous Exercise T2 | Strenuous Exercise T3 |
| Affective Attitude (AFF INT) | .67\*\*\* | .43\*\*\* | -.07 | .18\* | .41\*\*\* | .37\*\*\* | .63\*\*\* | .31\*\*\* | .33\*\* | .67\*\*\* | .25\* | .10 |
| Instrumental Attitude (INST ATT) |  | .46\*\*\* | .02 | .25\*\*\* | .30\*\*\* | .14 | .36\*\*\* | .19\* | .23\* | .67\*\*\* | .10 | .13 |
| Subjective Norm (SN) |  |  | .16 | .28\*\*\* | .20\* | .05 | .21\* | .03 | .21 | .39\*\*\* | -.06 | .10 |
| Descriptive Norm (DN) |  |  |  | .21\* | .20\* | -.05 | -.11 | -.06 | .07 | .04 | -.07 | .04 |
| Perceived Control (PC) |  |  |  |  | .68\*\*\* | .11 | .16 | .08 | .35\*\* | .51\*\*\* | -.02 | .12 |
| Self-Efficacy (SE) |  |  |  |  |  | .15 | .25\*\*\* | .12 | .31\*\* | .49\*\*\* | -.01 | .04 |
| Habit Strength (HS) |  |  |  |  |  |  | .68\*\*\* | .34\*\*\* | .25\* | .29\*\*\* | .51\*\* | .01 |
| Self-Identity (SI) |  |  |  |  |  |  |  | .61\*\*\* | .22\* | .59\*\*\* | .57\*\* | .13 |
| Strenuous Exercise (T1 Exer) |  |  |  |  |  |  |  |  | .14 | .40\*\*\* | .47\*\* | .16 |
| Planning (Plan) |  |  |  |  |  |  |  |  |  | .39\*\* | .11 | .26\* |
| Intention (Int) |  |  |  |  |  |  |  |  |  |  | .27\* | .18 |
| Strenuous Exercise T2 |  |  |  |  |  |  |  |  |  |  |  | .06 |

Table 12. Correlations Between Main Study Variables (N = 136)

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

Table 13. Summary of Hierarchical Regression Analysis for Variables Predicting Intention (N = 136)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Step** | **Variable** | **B** | **SE** | ***ß*** |
| 1 | Affective Attitude | .41 | .08 | .43\*\*\* |
|  | Instrumental Attitude | .49 | .11 | .30\*\*\* |
|  | Subjective Norm | -.00 | .05 | -.01 |
|  | Descriptive Norm | -.01 | .06 | -.01 |
|  | Perceived Control | .35 | .06 | .40\*\*\* |
|  | Self-Efficacy | -.06 | .08 | -.06 |
| 2 | Affective Attitude | .21 | .08 | .22\* |
|  | Instrumental Attitude | .53 | .11 | .33\*\*\* |
|  | Subjective Norm | .00 | .05 | .00 |
|  | Descriptive Norm | .01 | .05 | .01 |
|  | Perceived Control | .30 | .06 | .34\*\*\* |
|  | Self-Efficacy | -.03 | .07 | -.03 |
|  | Habit Strength | -.08 | .04 | -.11 |
|  | Self-Identity | .24 | .05 | .36\*\*\* |
| 3 | Affective Attitude | .22 | .08 | .22\* |
|  | Instrumental Attitude | .52 | .11 | .32\*\*\* |
|  | Subjective Norm | .00 | .05 | .00 |
|  | Descriptive Norm | .01 | .05 | .01 |
|  | Perceived Control | .31 | .06 | .34\*\*\* |
|  | Self-Efficacy | -.03 | .07 | -.03 |
|  | Habit Strength | -.07 | .04 | -.11 |
|  | Self-Identity | .22 | .06 | .34\*\*\* |
|  | Strenuous Exercise (T1) | .02 | .04 | .03 |

*Note*. \* *p* < .05. \*\*\* *p* < .001.

Table 14. Summary of Hierarchical Regression Analysis for Variables Predicting Behaviour at Time Two (n = 84)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Step** | **Variable** | **B** | **SE** | ***ß*** |
| 1 | Intention | .64 | .19 | .44\*\* |
|  | Perceived Control | -.30 | .21 | -.22 |
|  | Self-Efficacy | -.13 | .21 | -.09 |
| 2 | Intention | .62 | .20 | .43\*\* |
|  | Perceived Control | -.31 | .21 | -.23 |
|  | Self-Efficacy | -.13 | .21 | -.09 |
|  | Planning | .05 | .12 | .05 |
| 3 | Intention | .60 | .27 | .41\* |
|  | Perceived Control | -.13 | .24 | -.10 |
|  | Self-efficacy | -.35 | .25 | -.24 |
|  | Planning | .02 | .12 | .02 |
|  | Affective Attitude | .52 | .26 | .38\* |
|  | Instrumental Attitude | -.45 | .38 | -.19 |
|  | Subjective Norm | -.31 | .17 | -.24 |
|  | Descriptive Norm | .15 | .20 | .08 |
| 4 | Intention | .19 | .25 | .13 |
|  | Perceived Control | -.14 | .21 | -.10 |
|  | Self-efficacy | -.32 | .22 | -.23 |
|  | Planning | .02 | .10 | .02 |
|  | Affective Attitude | .02 | .25 | .02 |
|  | Instrumental Attitude | .02 | .34 | .01 |
|  | Subjective Norm | -.16 | .15 | -.12 |
|  | Descriptive Norm | .21 | .18 | .12 |
|  | Habit Strength | .22 | .14 | .22 |
|  | Self-Identity | .44 | .15 | .47\*\* |
| 5 | Intention | .17 | .25 | .12 |
|  | Perceived Control | -.13 | .21 | -.09 |
|  | Self-Efficacy | -.32 | .22 | -.22 |
|  | Planning | .02 | .10 | .02 |
|  | Affective Attitude | .04 | .25 | .03 |
|  | Instrumental Attitude | -.01 | .34 | -.00 |
|  | Subjective Norm | -.14 | .15 | -.11 |
|  | Descriptive Norm | .22 | .17 | .12 |
|  | Habit Strength | .23 | .14 | .22 |
|  | Self-Identity | .36 | .17 | .39\* |
|  | Strenuous Exercise (T1) | .11 | .13 | .11 |

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

Table 15. Summary of Hierarchical Regression Analysis for Variables Predicting Behaviour at Time Three (n = 78)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Step** | **Variable** | **B** | **SE** | ***ß*** |
| 1 | Intention T1 | .41 | .18 | .21 |
|  | Perceived Control | .25 | .19 | .08 |
|  | Self-Efficacy | .09 | .20 | -.13 |
| 2 | Intention | .16 | .18 | .13 |
|  | Perceived Control | .06 | .19 | .05 |
|  | Self-Efficacy | -.17 | .19 | -.13 |
|  | Planning | .20 | .11 | .23 |
| 3 | Intention | .17 | .25 | .14 |
|  | Perceived Control | .04 | .22 | .04 |
|  | Self-efficacy | -.18 | .25 | -.15 |
|  | Planning | .20 | .11 | .23 |
|  | Affective Attitude | -.02 | .26 | -.02 |
|  | Instrumental Attitude | -.02 | .37 | -.01 |
|  | Subjective Norm | .05 | .17 | .04 |
|  | Descriptive Norm | .09 | .19 | .06 |
| 4 | Intention | .07 | .28 | .05 |
|  | Perceived Control | .04 | .22 | .04 |
|  | Self-efficacy | -.17 | .25 | -.14 |
|  | Planning | .23 | .11 | .26 |
|  | Affective Attitude | -.06 | .28 | -.05 |
|  | Instrumental Attitude | .04 | .39 | .02 |
|  | Subjective Norm | .03 | .17 | .03 |
|  | Descriptive Norm | .11 | .19 | .07 |
|  | Habit Strength | -.15 | .14 | -.17 |
|  | Self-Identity | .17 | .16 | .21 |
| 5 | Intention | .05 | .28 | .04 |
|  | Perceived Control | .05 | .23 | .05 |
|  | Self-Efficacy | -.18 | .25 | -.14 |
|  | Planning | .23 | .11 | .26 |
|  | Affective Attitude | -.04 | .29 | -.03 |
|  | Instrumental Attitude | -.00 | .40 | .00 |
|  | Subjective Norm | .05 | .18 | .05 |
|  | Descriptive Norm | .13 | .20 | .09 |
|  | Habit Strength | -.14 | .15 | -.16 |
|  | Self-Identity | .10 | .19 | .11 |
|  | Strenuous Exercise (T1) | .13 | .15 | .14 |

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

Changes in the extended TPB variables from university to six-month follow-up were tested to assess whether the transition had an impact on exercise cognitions. A series of paired samples t-tests were conducted in order to address this question. Affective attitude, instrumental attitude, descriptive norm, perceived control, self-efficacy, and habit strength all had significant changed over time. In each case the mean scores were lower at follow-up indicating that the transition had a negative impact on exercise cognitions. However, subjective norm, self-identity, planning, and intention scores had not changed significantly at follow-up (see Table 16).

Table 16. Means and Standard Deviations of the Extended TPB Variables at Baseline and Six-Month Follow-Up and Paired Samples T-Tests.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | Baseline | | Six-month follow-up | | *t* |
| Mean | SD | Mean | SD |
| Affective attitude | 5.75 | 1.38 | 5.37 | 1.49 | 2.63\*\* |
| Instrumental attitude | 6.54 | 0.68 | 6.33 | 0.83 | 2.59\*\* |
| Subjective norm | 5.67 | 1.46 | 5.40 | 1.30 | 1.70 |
| Descriptive norm | 4.21 | 1.04 | 3.77 | 1.10 | 2.95\*\* |
| Perceived control | 5.40 | 1.36 | 4.71 | 1.65 | 3.34\*\*\* |
| Self-efficacy | 5.30 | 1.29 | 4.55 | 1.86 | 3.37\*\*\* |
| Habit strength | 3.40 | 1.81 | 2.39 | 1.76 | 2.54\*\* |
| Self-identity | 4.39 | 1.99 | 4.22 | 1.88 | 1.28 |
| Planning | 3.12 | 1.87 | 3.24 | 1.91 | 0.52 |
| Intention | 5.89 | 1.29 | 5.67 | 1.39 | 1.52 |

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | INST ATT (T2) | SN  (T2) | DN (T2) | PC (T2) | SE (T2) | HS (T2) | SI (T2) | Plan (T2) | INT (T2) | Strenuous Exercise T3 |
| Affective Attitude (AFF INT) (T2) | .53\*\*\* | .19 | .01 | .28\*\* | .32\*\* | .39\*\*\* | .68\*\*\* | .29\*\* | .66\*\*\* | .12 |
| Instrumental Attitude (INST ATT) (T2) |  | .54\*\*\* | -.05 | .41\*\*\* | .44\*\*\* | .11 | .39\*\*\* | .25\* | .64\*\*\* | .25\* |
| Subjective-norm (SN) (T2) |  |  | .02 | .24\* | .08 | .00 | .09 | .15 | .24\* | .04 |
| Descriptive Norm (DN) (T2) |  |  |  | .14 | .17 | .06 | -.04 | .04 | .05 | -.04 |
| Perceived Control (PC) (T2) |  |  |  |  | .79\*\*\* | .12 | .13 | .16 | .33\*\* | -.12 |
| Self-Efficacy (SE) (T2) |  |  |  |  |  | .27\* | .24\* | .13 | .44\*\*\* | -.03 |
| Habit Strength (HS) (T2) |  |  |  |  |  |  | .62\*\*\* | .10 | .32\*\* | -.05 |
| Self-Identity (SI) (T2) |  |  |  |  |  |  |  | .35\*\* | .67\*\*\* | .09 |
| Planning (Plan) (T2) |  |  |  |  |  |  |  |  | .47\*\*\* | .14 |
| Intention (Int) (T2) |  |  |  |  |  |  |  |  |  | .08 |
| Strenuous Exercise T2 |  |  |  |  |  |  |  |  |  | .06 |

Table 17. Correlations Between Time Two Main Study Variables (N = 84)

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

### Time Two Correlations with Intention at Six-Month Follow-Up

All cognitions, assessed at six-month follow-up, with the exception of descriptive norm, correlated significantly with exercise intention (see Table 17). Affective and instrumental attitude and self-identity had the strongest correlations with intention, followed by past behaviour, self-efficacy, perceived control, habit strength, and subjective-norm.

### Time Two Regression Analysis Predicting Intention at Six-Month Follow-Up

To assess the ability of the TPB and the additional predictors to explain post-university exercise intentions at six-month follow-up, a hierarchical regression analysis was conducted in which the time two independent variables were entered in three steps: (i) the TPB variables, (ii) habit strength and self-identity, and (iii) past behaviour (see Table 18). In this way it was possible to assess the predictive utility of the TPB, whether the extended variables (habit strength and self-identity) explained additional variance in intention, and whether the relationships remained when taking into consideration past behaviour.

At the first step, the TPB variables explained 60% of the variance in intention, *R*2 = .60, *F*(6,69) = 17.21, *p* < .001, with affective attitude and instrumental attitude emerging as significant independent predictors. The addition of habit strength and self-identity at step two increased the amount of variance explained by 10%, ∆*R*2 = .10, *F*change(2,67) = 19.83, *p* < .001. Self-identity emerged as a significant predictor along with affective attitude and instrumental attitude. At step three, the addition of past behaviour failed to increase the amount of variance explained, ∆*R*2 = .00, *Fchange*(1,66) = 17.41, *p* = .72. The variables in the final regression equation explained 70% of the variance in intention, *R*2 = .70, *F*(9,66) = 17.41, *p* < .001, with affective attitude, instrumental attitude, and self-identity making significant independent contributions to the regression equation.

### Correlations Between Time Two Cognitions and Time Three Behaviour

Correlations between the extended TPB variables assessed at six-month follow-up (T2) and exercise behaviour at 18-month follow-up (T3) were conducted (see Table 17). Only instrumental attitude was significantly correlated with T3 behaviour.

### Regression Analysis to Predict Time Three Behaviour from Time Two Cognitions

A hierarchical regression analysis was conducted to assess the ability of the T2 TPB and the additional predictors to predict T3 exercise behaviour. The independent variables were entered in five steps: (i) intention, perceived control, and self-efficacy, (ii) planning, (iii) affective attitude, instrumental attitude, subjective norm, and descriptive norm, (iv) habit strength and self-identity, and finally (v) past behaviour (see Table 19). In this way it was possible to assess the predictive utility of the proximal TPB variables (intention, perceived control, and self-efficacy), whether planning, a post-intentional variable, explained additional variance, whether the remaining TPB and extended variables also explained additional variance, and whether any significant relationships remained when controlling for past behaviour.

At the first step, intention, perceived control and self-efficacy explained 2% of the variance in exercise behaviour, *R*2 = .02, *F*(3,66) = 0.60, *p* = .61. None of the variables were significant. At step two, the addition of planning did not significantly increase the amount of variance explained in T3 exercise behaviour, *∆R*2 = .00, *F*change (1, 65) = 0.58, *p* = .45. The addition of the TPB variables at step three increased the amount of explained variance by 13%, although this increase was non-significant, ∆*R*2 = .13, *F*change (4,61) = 1.53, *p* = .057. Nonetheless, instrumental attitude emerged as a sole significant predictor. The addition of habit strength and self-identity at step four increased the amount of variance explained by 1%, ∆*R*2 = .01, *F*change (2,59) = 1.28, *p* = .66. At step five, the addition of past behaviour failed to significantly increase the amount of variance explained, ∆*R*2 = .00, Fchange (1, 58) = 1.16, *p* = .74. The variables in the final regression equation explained 18% of the variance in exercise behaviour, *R*2 = .18, *F*(11, 72) = 1.16, *p* = .33, with instrumental attitude emerging as the sole significant independent predictor.

Table 18. Summary of Hierarchical Regression Analysis for Time Two Variables Predicting Intention at Time Two (N = 84)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Step** | **Variable** | **B** | **SE** | ***ß*** |
| 1 | Affective Attitude T2 | .44 | .08 | .52\*\*\* |
|  | Instrumental Attitude T2 | .51 | .21 | .28\* |
|  | Subjective Norm T2 | .04 | .09 | .04 |
|  | Descriptive Norm T2 | -.03 | .09 | -.02 |
|  | Perceived Control T2 | -.15 | .09 | -.20 |
|  | Self-Efficacy T2 | .17 | .09 | .25 |
| 2 | Affective Attitude T2 | .21 | .08 | .24\* |
|  | Instrumental Attitude T2 | .43 | .19 | .24\* |
|  | Subjective Norm T2 | .07 | .08 | .07 |
|  | Descriptive Norm T2 | -.00 | .08 | -.00 |
|  | Perceived Control T2 | -.11 | .09 | -.13 |
|  | Self-Efficacy T2 | .16 | .08 | .22 |
|  | Habit Strength T2 | -.10 | .06 | -.14 |
|  | Self-Identity T2 | .34 | .07 | .51\*\*\* |
| 3 | Affective Attitude T2 | .21 | .09 | .24\* |
|  | Instrumental Attitude T2 | .43 | .19 | .23\* |
|  | Subjective Norm T2 | .08 | .08 | .07 |
|  | Descriptive Norm T2 | -.00 | .08 | -.00 |
|  | Perceived Control T2 | -.10 | .09 | -.13 |
|  | Self-Efficacy T2 | .16 | .08 | .22 |
|  | Habit Strength T2 | -.11 | .06 | -.15 |
|  | Self-Identity T2 | .36 | .09 | .53\*\*\* |
|  | Strenuous Exercise (T2) | -.02 | .07 | -.03 |

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

Table 19. Summary of Hierarchical Regression Analysis for Time Two Variables Predicting Behaviour at Time Three (n = 78)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Step** | **Variable** | **B** | **SE** | ***ß*** |
| 1 | Intention T2 | .16 | .17 | .12 |
|  | Perceived Control T2 | -.15 | .20 | -.15 |
|  | Self-Efficacy T2 | .03 | .19 | .03 |
| 2 | Intention T2 | .08 | .20 | .06 |
|  | Perceived Control T2 | -.17 | .20 | -.17 |
|  | Self-Efficacy T2 | .05 | .19 | .05 |
|  | Planning T2 | .09 | .12 | .10 |
| 3 | Intention T2 | -.33 | .23 | -.25 |
|  | Perceived Control T2 | -.22 | .20 | -.22 |
|  | Self-efficacy T2 | -.05 | .19 | -.05 |
|  | Planning T2 | .11 | .12 | .13 |
|  | Affective Attitude T2 | .10 | .20 | .09 |
|  | Instrumental Attitude T2 | 1.22 | .43 | .52\*\* |
|  | Subjective Norm T2 | -.18 | .19 | -.14 |
|  | Descriptive Norm T2 | .06 | .18 | .04 |
| 4 | Intention T2 | -.44 | .31 | -.33 |
|  | Perceived Control T2 | -.21 | .21 | -.21 |
|  | Self-efficacy T2 | -.03 | .21 | -.04 |
|  | Planning T2 | .10 | .12 | .11 |
|  | Affective Attitude T2 | .04 | .23 | .04 |
|  | Instrumental Attitude T2 | 1.22 | .44 | .52\*\* |
|  | Subjective Norm T2 | -.16 | .19 | -.12 |
|  | Descriptive Norm T2 | .06 | .18 | .04 |
|  | Habit Strength T2 | -.06 | .15 | -.17 |
|  | Self-Identity T2 | .17 | .18 | .20 |
| 5 | Intention T2 | -.46 | .32 | -.35 |
|  | Perceived Control T2 | -.19 | .21 | -.19 |
|  | Self-Efficacy T2 | -.05 | .22 | -.06 |
|  | Planning T2 | .09 | .12 | .11 |
|  | Affective Attitude T2 | .05 | .23 | .05 |
|  | Instrumental Attitude T2 | 1.23 | .45 | .52\*\* |
|  | Subjective Norm T2 | -.14 | .20 | -.11 |
|  | Descriptive Norm T2 | .04 | .19 | .03 |
|  | Habit Strength T2 | -.06 | .15 | -.07 |
|  | Self-Identity T2 | .14 | .21 | .16 |
|  | Strenuous Exercise (T2) | .05 | .16 | .06 |

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

## Discussion

The present study sought to use the TPB as a theoretical framework to investigate students’ exercise intentions and behaviour across the transition from final year of university to post-university life. The study also examined the influence of a range of additional predictors, i.e., past behaviour, habit, self-identity, and action planning.

In line with predictions, all TPB variables significantly correlated with intention at baseline with the exception of descriptive norm. The non-significant correlation for descriptive norm may reflect the volatile nature (due to the many life changes occurring in a short period of time) of this transitionary period and the unknown social parameters and surroundings in which participants will find themselves after leaving university. Thus, leaving university will produce an inherent change in students’ social environments. Previous research has highlighted the importance of descriptive norm and its influence on intention. Sheeran and Orbell (1999) reported that descriptive norm correlated strongly with intention (*r* = .52, across their 4 studies). Similarly, Rivis and Sheeran’s (2003) meta-analyses indicated the importance of descriptive norm, finding it to correlate significantly with intention (*r*+ = .44). However, previous tests on descriptive norm have not taken place in the context of a significant life transition; instead they have been conducted in stable contexts.

In the present study, the TPB explained 67% of the variance in intentions to engage in regular exercise post-university, with affective and instrumental attitude, and perceived control emerging as significant predictors of intention. Thus, those with strong intentions to perform regular exercise were more likely to believe that engaging in regular exercise post-university would have instrumental (e.g., healthy/beneficial) and affective (e.g., enjoyable) outcomes, and that it would be under their control. The lack of a significant effect for subjective norm in the current regression analysis may be due to the focus on a significant life transition (graduating from university). During such transitions, established peer networks and influences are likely to be broken which may negate the role of normative pressures on exercise behaviour. Hagger et al. (2002a) meta-analysis reported that the TPB explained 44.5% of the variance in exercise intention, with attitude and PBC emerging as significant predictors of intention, similar to the present study. More recently, McEachan et al.’s (2011) meta-analysis reported that attitude emerged as the strongest predictor, followed by PBC, and subjective norm. Subjective norm was a weaker, but still significant, predictor. The TPB explained a larger proportion of variance in exercise intentions in the present study than reported in a previous meta-analysis (Hagger et al., 2002a). This could be due to the student population, as previous research has found that the TPB explains more of the variance in intention in student versus other populations (McEachan et al., 2011). Kwan et al. (2009) used the TPB to investigate exercise behaviour across the transition of entering university, finding that attitude, PBC, and subjective norm, not only correlated with intention, but also explained significant variance in the prediction of exercise intention, even after accounting for past exercise behaviour.

The additional predictors, i.e., past behaviour, habit, and self-identity, all correlated significantly with intention. This suggests that participants future exercise intentions are based on their current exercise levels. The present study found the addition of habit strength and self-identity explained an additional 5% of the variance in post-university exercise intentions, although only self-identity emerged as a significant predictor. The current finding could be a result of a sample bias, as those who had a high exercise identity may have been more inclined to complete the present study. However, the correlation between self-identity and attitude is in line with previous research (De Bruijn et al., 2012), suggesting that one’s self-identity as an exerciser, is strengthened by positive attitudes towards exercise post-university. Moreover, Rise et al.’s (2010) meta-analysis also found that self-identity significantly added to the prediction of intention, over and above the TPB variables. Self-identity may be linked to habit and past behaviour, as an increase in behaviour frequency resulted in stronger self-identity effects (Terry et al., 1999). The current study supports this idea as significant correlations were found between self-identity and habit strength as well as with past behaviour. Rise et al. (2010) state that one’s behaviour is a reflection of an attempt to conform to one’s self-identity; thus, self-identity influences one’s motivation to perform a behaviour. Previous research has suggested a possible moderation effect between past behaviour and self-identity, as when a behaviour is performed more regularly, the strength of the relationship between self-identity and behaviour increases. However, in the present study, the effect of self-identity on intention was not found to be moderated by either past behaviour or habit strength.

Past behaviour and habit have previously been found to have a significant positive influence over both intention and behaviour (De Bruijn, 2011; Hagger et al., 2002b). Although past strenuous exercise was highly correlated with intention in the present study, it did not make a significant contribution to the prediction of intention over and above the TPB. This may be due to the volatile time period of a significant life transition and its effect on participants’ exercise intentions and behaviours.

Intention, affective attitude, habit strength, self-identity, and past behaviour, all significantly correlated with time T2 follow-up behaviour (Table 12). The TPB variables were able to explain 20% of the variance in behaviour, in line with the meta analysis results from McEachan et al. (2011), who found that the TPB explained 22% of the variance in the exercise behaviour of adolescents.

In the current study, regression analysis indicated that of the TPB variables, intention and affective attitude were the only significant predictors of behaviour at six-month follow-up. Self-identity and habit significantly increased the explained variance in behaviour by 22%. These results support that of recent meta-analysis (Rise et al., 2010), with self-identity and habit explaining an additional 22% of behavioural variance, although, in the present study it was only self-identity that emerged as a significant predictor of behaviour, over and above the TPB. Habit strength may have been non-significant because of the volatile and unknown nature of this transition period (i.e., graduating from university), as it failed to even correlate with either intention or behaviour, supporting some previous literature stating that in a changing context, one might expect behavioural habitual processes to weaken (Wood et al., 2005). Also, this result supports Rise et al. (2010) previous meta-analysis, who found that the inclusion of past behaviour did not significantly further predict behaviour. This however, is in contrast to much of the previous literature (Conner & Armitage, 1998; Hagger et al., 2002a; McEachan et al., 2011), which has found past behaviour to have a strong effect on future behaviour. For example, Kwan et al.’s (2009) study of the transition effects on exercise behaviour also found past behaviour to significantly predict future behaviour. However, Kwan et al.’s study also found an intention-behaviour gap, as although participants had positive exercise intentions, similar to the current study, these intentions were not translated into behaviour. Kwan et al. (2009) suggested that this could be because of barriers such as social demands, time, and university work load, making it difficult to initiate their intentions, and instead, participants may have reverted back to previous patterns of (in)activity. Additionally, McEachan et al. (2011), found past behaviour significantly increased the explained amount of variance in exercise behaviour overall across various ages of demographic; however, past behaviour had no additional effect on exercise among adolescents. This might be due to the unstable contexts in adolescence, such as significant life transitions (Kwan et al., 2009).

Correlations with time three behaviour (at 18-months follow-up, Table 12) were all non-significant apart from planning. As planning did not correlate with time two exercise behaviour, this suggest that planning might increase in importance over longer time periods. Shortly after graduation, students’ social and physical environments might still be in a state of flux, and it might be difficult to enact previous plans. However, after 18 months from graduation, the transition of graduating university may be more complete, and planning may help with their exercise regimes. This could be because they are now in a more stable environment again.

The time three regression analysis revealed that none of the extended TPB variable were predictive of behaviour 18 months after graduating university, although planning approached significance. The non-significant result might be due to lower statistical power for this regression analysis. Thus planning may have some importance for longer-term exercise behaviour. This result adds to the literature as planning has not previously been investigated with regards to exercise over a transition.

Considering changes in cognitions across the transition of graduating university (i.e., from baseline to six months post-university), it was found that the transition of graduating university had a significant negative impact on affective attitude, instrumental attitude, descriptive norm, perceived control, self-efficacy, and habit strength. Thus, participants’ cognitions about post-university exercise became more negative after leaving university. The reduction in descriptive norm was expected given the likely changes in participants’ social groups who would be likely to exercise less than participants’ social groups at university. The finding that both attitude scores decreased over the transition is interesting. Participants therefore viewed exercise as less enjoyable (affective attitude) and less beneficial (instrumental attitude). These changes may be due to competing priorities that are evident during a significant life transition (i.e., finding a job). However, it is noteworthy that participants’ exercise intentions did not significantly decrease over the transition. This may be due to self-identity scores also being maintained over the transition, as self-identity was a strong predictor of exercise intention at both time one and two.

Six-months post-university, all of the extended time two TPB measures correlated significantly with intention with the exception of descriptive norm. When considering the predictive value of the time two cognitions, it was found that affective attitude, instrumental attitude, and self-identity were all significant predictors of intention to exercise six-months post university. Thus, those who perceived exercise to be fun and enjoyable, to be of benefit (either physical or psychological), and perceived exercise to be important their self-concept, were more likely to have a positive intention to exercise six months post-university. The results therefore support previous literature (De Bruijn et al., 2012; McEachan et al., 2011; Rise et al., 2010) outlining the importance of these components, albeit in a new context (i.e., graduating university). However, when considering the relationship between time two cognitions and time three behaviour, the only significant correlate was instrumental attitude. Similarly, the regression analysis revealed that instrumental attitude was a sole significant predictor of time three exercise behaviour, further supporting much of the previous literature that has highlighted attitude as a key predictor of behaviour (Ajzen, 1991; McEachan et al., 2011). Thus, perceiving exercise to be beneficial was associated with higher exercise levels 18-months post-university. Additionally, there was little evidence that the TPB is able to predict exercise behaviour at 18-month follow-up, supporting that of previous literature (McEachan et al. 2011), who found the predictive power of the model reduced with increased follow-up periods. Over extended time periods there may be other variables/influences that affect exercise behaviour that are not captured by the (extended) TPB, as argued by Sniehotta, Presseau and Araujo-Soares (2014). Nonetheless, further research with long-term follow-ups is needed to ascertain why the model decreases in predictive value with time.

There are a number of methodological limitations, which should be taken into consideration when interpreting the current findings. First, the study used the University of Sheffield’s volunteer list to recruit participants. Due to the nature of the study, this may have led to a bias in who completed the questionnaire. It is possible that the participants of the current study were already highly interested in exercise as reported exercise levels were above population norms (HSE, 2008), thus may have differed from the rest of the student population. Second, the sample size was modest, especially at follow-up. This may have reduced the statistical power of some of the analysis, although the results were broadly in line with previous applications of the TPB to exercise behaviour and the power analysis provided evidence of adequate power. Finally, the current study used a self-report measure of exercise behaviour. Armitage and Conner (2001) meta-analysis of the TPB found stronger correlations for self-report measures rather than objective measures of behaviour. Future research could therefore seek to replicate the current findings using both self-report measures and objective measures of exercise behaviour (such as accelerometers).

The current results suggest that interventions should firstly target both affective and instrumental attitude, perceived control, and self-identity to increase intention to exercise, as intention was related to time two exercise behaviour (with T1 affective attitude being the sole TPB variable to predict exercise behaviour at six-month follow-up and T2 instrumental attitude being the sole TPB variable to correlate and predict exercise behaviour at 18-month follow-up). An intervention to change the TPB variables could be achieved through basing the intervention on the underlying beliefs (i.e., *to be fit and healthy*, *to have a positive body image*) as identified in Study 1a. Secondly, self-identity should also be targeted in interventions. Self-identity can be bolstered through encouraging participants to think of themselves as an exerciser (Booth et al., 2013), which may help improve exercise levels over this transition. Additionally, for long-term exercise behaviour, encouraging students to make exercise plans is potentially an important technique that may support longer-term changes in behaviour, as has been found in previous studies (Gollwitzer, 1999; Scholz et al., 2008; Sniehotta et al., 2005).

In conclusion, the present study sought to investigate final year university students’ intentions and exercise behaviour across the transition from the final year of university to post-university life. The findings highlighted that attitude (both affective and instrumental), perceived control, and self-identity are important factors to consider in relation to students’ post-university exercise intentions. Furthermore, the findings indicate that attitude and intention, and to a greater extent, self-identity are key variables to consider in maintaining exercise levels post-university. Interventions need to therefore target participants’ attitudes and perceived control regarding intentions to exercise, but more importantly, to focus on participants exercise self-identity to maintain exercise levels across this transition. Finally, planning may be important for long-term exercise adherence, although further investigation into this is needed.

# Chapter 4. A Qualitative Study of Recent Graduates’ Experiences of Exercise in the Post-University Transition (Study 2)

## Abstract

**Background.** The current study investigated graduating participants’ experiences of exercise post-university using semi-structured interviews. There have been no previous qualitative studies examining exercise in young people across a significant life transition. The present study therefore applied a qualitative research paradigm in order to gain a better understanding of participants’ experiences with exercise across the transition of graduating university.

**Method.** Participants (*N* = 10) were recruited via email from participants who completed the six-month follow-up questionnaire in Study 1. Telephone interviews were conducted. The interview schedule was based on the Theory of Planned Behaviour (TPB). Interviews were transcribed verbatim, coded and analysed using thematic analysis to identify salient themes.

**Results.** Four main themes emerged from the data. These were 1) the transition, 2) influencing factors, 3) social factors, and 4) action planning. First, graduating from university was not found to have a negative impact on participants’ exercise levels or motivations. Second, participants reported an increase in exercise barriers (e.g., lack of time, cost) across the transition (i.e., when compared to during university); however, there were many benefits such as better mental and physical health, improved social network and a stable routine, which all facilitated the continuation of exercise. Third, social factors were found to be a key theme for influencing exercise behaviour post-university. Fourth, planning also emerged as a significant factor in regard to being able to continue exercising across this significant life transition.

**Conclusions.** Participants overall exercise frequency was not affected by the transition; however, their behaviour (i.e., types of exercise) was affected due to having to adapt to post-university life. Participants who were able to continue exercising expressed having positive attitudes towards exercise, approval and encouragement from others, feeling in control of their exercise behaviour, having a strong exercise-identity, and using planning. The knowledge gained from this study is important for the design of interventions to maintain exercise after leaving university.

## Prelude

Study 2 aimed to extend the Study 1 findings, through the use of semi-structured interviews with recent graduates to gain an in-depth knowledge about exercise after university. Study 1 highlighted the specific beliefs and components that are important for predicting across the transition of graduating university. In contrast, this chapter investigates what, why, and how behaviour changed (or was maintained) and recent graduates’ personal experiences of the transition of graduating and how it impacted on their levels of exercise.

A qualitative paradigm was utilised to facilitate the exploration of a participants’ experiences and to provide an in-depth insight into beliefs and behavioural patterns relating to behaviour change and/or maintenance. To date, there has been little research on how significant life transitions impact on health behaviours such as exercise. As a result, utilising a qualitative methodology is appropriate for exploring this issue in greater detail.

## Introduction

Study 1a elicited 15 modal salient behavioural, normative and control beliefs. The most important beliefs, in terms of their relationships with exercise intentions and behaviour, were being fit and healthy, improved mental health, positive body image, a lack of time, the influence of friends, and the importance of a set regular routine. Study 1b, revealed that attitudes, perceived control, and self-identity were predictive of exercise intentions, and intention and self-identity were predictive of exercise behaviour at six-month follow-up. In addition, planning was correlated with exercise behaviour at 18-month follow-up. The present study (i.e., Study 2) sought to explore these issues in greater depth, given the lack of previous research investigating the transition of graduating university and exercise beliefs. The present study therefore builds on findings from Studies 1a and 1b, using a qualitative methodology to investigate recent graduates’ experiences of exercise post-university. A qualitative methodology facilitates the exploration of a particular subject and provides an in-depth insight into perceptions, behavioural patterns, and beliefs (Duda & Allison, 1990). Qualitative methods can also be used to triangulate the findings of quantitative studies. Denzin and Lincoln (2000) list five main features and advantages of qualitative research. These include (i) concentrating on the richness of descriptions; (ii) capturing an individual’s perspective and their individuality and experiences; (iii) rejecting positivism and the use of post-modern perspectives, so that the researcher does not seek to generalise the participants’ experiences; (iv) using postmodern sensibility, meaning that researchers are able to get much closer to participants’ real life experiences as there is often a sense of personal responsibility between the researcher and participant; and (v) examining of the constraints of everyday life that quantitative methods often overlook (e.g., participants’ individual circumstances and everyday social implications). These features ensure that qualitative research provides rich data and a deeper understanding of why a specific factor may, or may not, impact on behaviour. For example, a quantitative study may reveal that attitudes about the health benefits of exercise are important for strong exercise intention, whereas a qualitative study will explore why, and in what ways, the perceived benefits of exercise are important to the individual.

Telephone interviews were conducted with 10 participants who had recently graduated from university. The telephone interview schedule was based on the Theory of Planned Behaviour (TPB) (Ajzen, 1991) and additional predictors (e.g. self-identity) that were found to be significant predictors in Studies 1a and 1b. It also allowed participants the opportunity to raise any additional beliefs and experiences about the transition and its impact on exercise behaviour.

There has been no previous qualitative research with young adults on the effect of transitions on exercise behaviour and little in general on the exercise beliefs and behaviour of young adults. For example, Ashton et al. (2015) investigated young adult males’ motivators and perceived barriers towards being active and eating healthily, using focus groups with 61 males aged 18-25 in New South Wales, Australia. With regard to physical activity, the main themes for motivators were physical appearance (e.g., sexual attractiveness), social inclusion (e.g., making friends), physical and mental health (e.g., relieve stress), and improve sports performance. The main themes for key barriers were busy lifestyle (e.g., lack of time), logistics (e.g., cost), cognitive-emotional (e.g., feeling inferiority), and social factors (e.g., family upbringing). Study 1a in this thesis revealed similar motivators and barriers to exercise, highlighting improved physical and mental health, social benefits, and a positive body image as key exercise motivators, and a lack of time, too expensive, and social factors as key barriers to exercise post-university. These results therefore suggest that motivators and barriers may be common across different contexts. Kwan et al. (2009) found that going through a significant life transition has a negative effect on the frequency of exercise behaviour. Thus, even though beliefs about motivators and barriers to exercise may be common, the experience of a life transition may have a greater impact on behaviour. For example, going through a transition might lead to a heightened sense of exercise barriers and a reduced perception of exercise motivators, due to the impact of other co-occurring significant life events and factors (e.g., moving house/location, social network change, beginning a new job, and extra responsibilities: Gotham, Sher, & Wood, (1997)).

### The Present Study

The aim of the present study was to gain an in-depth understanding of recent graduates’ experiences and beliefs about exercise post-university. To date, there has been little qualitative research into how health behaviours such as exercise are affected by significant life transitions in this age group. The study therefore sought to address a number of key questions. What were students’ experiences of the transition in relation to their exercise levels? How have they adapted to including exercise in their next stage in life? Have they used any specific plans or strategies to help them? Have there been any factors that have made exercising across the transition either more difficult or easier?

## Method

### Design

Semi-structured telephone interviews were conducted with 10 participants, lasting an average of 33.22 minutes (range: 24 - 45.41 minutes). Telephone interviews were used because it was convenient and allowed better data collection from transient alumni. One of the major drawbacks however with this method is that it misses non-verbal cues (Opdenakker, 2006). The interviews took place six months after the participants had graduated from university at a time that was convenient. Each interview was recorded using a Dictaphone so that they could later be transcribed verbatim. The interviewer also made notes on each interview to ensure that all potential data were collected. Participants were briefed on the subject matter before the interviews began and were given brief information sheets explaining the next steps for participation. Informed consent was gained before commencing the interview. The University of Sheffield Department of Psychology Ethics Committee granted the study ethical approval (application approval no #612).

### Procedure and Participants

Participants were recruited via a question at the end of the six-month follow-up questionnaire in Study 1. The question asked them to express an interest to take part in the telephone interviews concerning their experiences with exercise since graduating university. Participants who expressed their interest in the study were contacted via email and provided with further information regarding the study. Initially there were 14 participants who expressed an interest in taking part, with 10 participants subsequently completing the interview process (*N* = 10, male = 4, female = 6, mean age = 25.4 years old, British = 8). Participant 7 was much older than other participants (age = 40), thus their results need to be considered carefully, as their age could mean that they experienced different experiences and motivations for exercise across the transition of graduating university. Interviews took place approximately six months after (December 2013) participants graduated from university, thus capturing the transition period.

Finding an appropriate method to capture the data was key. As participants were likely to have left the Sheffield area post-university, the practicality of focus groups and face-to-face interviews was low. Telephone interviews, however, are more cost-effective, have the ability to reach geographically dispersed respondents, and enhance interviewer safety (Novick, 2008). In addition, there is little research to suggest that they are an inferior data collection method than face-to-face interviews; in fact, the findings are quite mixed (Novick, 2008).

To assist participants in answering the questions about ‘regular exercise’, a standard definition was provided at the beginning of each interview, consistent with previous research (Norman & Smith, 1995; Sheeran & Abraham, 2003): “vigorous physical activity, which is strenuous activities which usually make you sweat, breathe harder, and feel your heart beat. Examples of vigorous physical activities are jogging/running, working out in the gym, playing sports like football, badminton, and squash. The term ‘regular’ exercise is defined as at least three times per week for at least 30 minutes each time”. This definition was provided as research suggests that this amount and level of exercise leads to significant health benefits (Hu et al., 1999)*.*

### Interview Schedule

The semi-structured interview schedule (Appendix C) was developed to reflect the extended TPB variables tested in Study 1. The questions were open-ended, which meant that, because of the semi-structured design, the interviewer could further explore participants’ responses as appropriate. At the start of the interview, the interviewer outlined the aims of the research again, reminding participants that the research was specifically interested in exercise post-university (i.e., the past six months). The interviews then opened with general questions in order to help the participant relax into the interview. For example, participants were asked ‘What are you doing now, post-university?’ and ‘What kinds of exercise did you engage in at university?” The interview then focused on (i) participants’ beliefs about the advantages and disadvantages of exercising after leaving university, (ii) things that have made it easier or more difficult for them to engage in regular exercise since leaving university, (iii) the views of other people, (iv) their main motivations for exercising, including their view of themselves, (v) whether and why their exercise levels have changed since leaving university and (vi) any strategies that they had used to help them to keep exercising.

### Analysis

Data was analysed using thematic analysis (Braun & Clarke, 2006). Thematic analysis takes into account what is said during data collection, not how it is said, and is used to extract broad themes from the data (Howitt, 2010). In line with recommendations, six phases of thematic analysis were conducted; namely; 1. Familiarising yourself with the data, 2. Generating initial codes, 3. Searching for themes, 4. Reviewing themes, 5. Defining and naming themes, and 6. Producing the report. Once the data had been collected and transcribed by the lead researcher, an independent reviewer checked the transcripts for accuracy. Initial coding was completed in the course of getting to know the data as the researcher collected, transcribed (see Appendix D for example), and then read through the interviews multiple times. Using Microsoft Word, key quotes relevant to the research aims were continuously extracted from the transcripts. From these Word document coding sheets, the development of themes began, and were revised and consolidated accordingly. At this point, two raters independently analysed the data and initial themes; any disagreements were resolved through discussion. The themes were then developed further, generating defined themes. The findings were compared and discussed, and a final set of themes was produced.

## Results

### Descriptive Statistics

Ten participants (Table 20, male n = 4, female n = 6) completed the interviews. Participants were recent graduates from the University of Sheffield. The interviews were audio recorded and transcribed verbatim by the lead author. From the transcribed interviews, coding sheets were created. Four themes emerged from the data (see Table 21).

Table 20. Participant Information

|  |  |  |  |
| --- | --- | --- | --- |
| Participant ID | Age | Gender | Nationality |
| P1 | 25 | M | British |
| P2 | 22 | F | British |
| P3 | 26 | F | British |
| P4 | 26 | M | Italian |
| P5 | 21 | M | British |
| P6 | 21 | F | British |
| P7 | 40 | M | British |
| P8 | 21 | F | British |
| P9 | 24 | F | German |
| P10 | 22 | F | British |

Table 21. Themes from the Qualitative Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Themes** | | **Sub-themes** | |
| 1 | The Transition | 1.1 | Stable or increased exercise |
|  |  | 1.2 | Reduced exercise |
|  |  | 1.3 | Changes in types of exercise |
| 2 | Influencing Factors | 2.1 | Facilitators (psychological, physical, routine/habit, social benefits, exercise identity, material factors) |
|  |  | 2.2 | Barriers (psychological and physical/material) |
| 3 | Social Factors | 3.1 | Encouraging groups (family members/partner, friends, work colleagues) |
|  |  | 3.2 | Discouraging groups (family members/partner, friends, work colleagues) |
| 4 | Supportive Strategies | 4.1 | Positive intentions |
|  |  | 4.2 | Making plans |

### 1. The Transition

Participants reported that the post-university transition had a significant impact on exercise behaviour, although this was not always negative. The majority of the participants (n = 7) reported having exercised regularly during university, participating in a wide variety of sporting activities including going to the gym, football, badminton, korfball, swimming, running/jogging, cycling, Zumba dancing, martial arts, walking, and ballet.

*“I did quite a lot, erm, I mean I was a part of the badminton society for quite a few years* (ok) *erm and I was like the vice president in my final year so, yea I did quite a lot of sport during university, I also played quite a bit of football as well”* (P5)*.*

The remaining three participants reported being more sporadic with their exercise levels, or only participating in low level exercise intensities, such as walking. This was reported to be for various reasons including both physical and psychological exercise barriers.

**1.1. Stable or increased exercise**

Most participants (n = 8) reported that their general exercise levels had either remained the same or increased, and that many of the types of exercise were similar.

“*Yea I still play kind of regular sport like probably three or four times a week, I usually play like, badminton, badminton, squash, table tennis, erm sometimes, sometimes football and a bit of running as well”* (P5).

One participant stated that their exercise increased a lot over the summer due to the work they were doing; however, they had since gone back to previous levels of exercise. Participants who reported that the transition did not really affect their exercise regimes stated that was due to planning for exercise in the future.

*“But then when I started planning where to live this year I was looking at where a gym was. That was kind of part of my decision, so I suppose I was kind of thinking about it, you know in advance”* (P2).

This helped them maintain their exercise levels; their exercise habits have helped to maintain their motivation to exercise.

**1.2 Reduced exercise**

Not all participants (n = 2), however, reported either a stable or increase in exercise levels post-university, stating that their exercise levels had decreased as a result of the transition and the new routines and regimes that are associated with post-university life.

*“So while my exercise is usually quite personal err, just jogging around the block, going cycling occasionally. It is vastly different and not as vigorous as before”*(P1).

One of these participants reported that their exercise levels were a method of maintaining a healthy weight, and because of additional stresses and constraints post-university (i.e., limited time) they chose to diet to control their weight instead of exercising. These participants were surprised that the transition had an impact on their exercise behaviour (i.e., how much adjustment was needed to continue exercising post-university), reporting that they had taken their exercise levels for granted whilst at university, as once they had graduated, their exercise behaviour changed quite a lot.

*“I don’t think that I thought about it at all that much, I just took my exercising for granted. I wasn’t really feeling the erm, I wasn’t seeing the big picture because I had that sort of comfort of going in the sauna going to the swimming pool two times a week and jogging up to Ringinglow and back every now and then. That was fairly erm, that was fairly organised, I think I took that very much for granted, after that I realised how much I took it for granted when I left, I left university”*(P1)*.*

Participants reported that they no longer had gaps in their timetables.

*“It’s affected all of my regimes very significantly. I don’t have the err, I don’t have those gaps in my timetable I can fill in with exercise”* (P1).

Other reasons the transition had impacted exercise behaviour included weaker social support, moving to a new location, reduced time, and having different reasons for exercise. All of these factors were reported as being barriers to exercise post-university.

**1.3. Changes in types of exercise**

Interestingly, although the frequency of exercise remained the same, the way in which participants were exercising had changed. Experiences varied, with some participants finding that the transition of leaving university greatly affected their previous exercise routines.

“*I was going running occasionally and a couple of big bike trips but that was a different routine to the one that I had at uni when I was next to the gym*”(P2)*.*

It also affected how participantsexercised, which they had not expected. This was reported to be positive for some participants.

*“I’m doing a little bit of palates, which I was doing before, but that’s just like watching Youtube video’s and doing it in the living room, erm I’ve been running along the canal occasionally, and I’ve taken up ballet once a week which is good. So I’m sure there’s been a step in a new routine and trying to be more active, which is nice”*(P3)*.*

Other participants, however, did not expect a behaviour change post-university and because of their dedication and strong exercise identity they were able to maintain their exercise levels across the transition

*”Because it’s my decision to do exercise, strongly driven by my passion, so it’s not like changing my lifestyle will change it because its not like, it’s not relative to the lifestyle I’m having. So no major change in how I’m feeling, there’s a change in what I do, but not in what I feel”*(P4).

### 2. Influencing Factors

Participants described the different influencing factors that affected their exercise motivation, behaviour, and levels (i.e., frequency). Factors that influenced exercise behaviour post-university were sub-categorised into *benefits* of, and *barriers* to, exercise post-university. Both of these sub-themes incorporated both psychological and physical factors. In addition, participants also reported a range of other factors that impacted on the exercise behaviour post-university.

**2.1 Benefits (physical and psychological)**

All ten participants reported they either currently exercised or had exercised in the past because of the positive benefits exercise brings about, both physical (i.e., weight management) and psychological. The psychological benefits influencing exercise behaviour included improved mental wellbeing, social implications, motivational factors, exercise-identity, anticipated regret, and habit. The physical benefits were health, routine, convenience and facilities.

One of the most salient influencing factors to exercise post-university for ‘why’ participants exercised, regarded how exercise helped participants’ overall mental wellbeing and mood (*n* = 10) through reduced stress levels, increased happiness, increased competitiveness, a change of scenery, and relaxation.

“*I think just generally I feel a lot happier when I’ve done exercise and it’s a good way to sort of de-stress after, after work and so I think it probably erm, it just generally keeps me a bit happier”*(P8).

Three participants also reported that exercise had a positive effect on their general motivation levels.

*“I think exercise has been beneficial for just making me, making me realise I can’t stay in this err this rut forever. Exercise is key in motivation I think, so exercise helps me get motivated to do many things”*(P1).

In addition to the positive psychological advantages to exercise reported, were the physical benefits of exercise. These also helped participants feel more positive about themselves, improving their mental wellbeing. Physical benefits were reported by nine participants, and were associated being more physically fit,

*“Yea it’s the feeling of building up muscle, building up stamina, losing the weight I’ve put on since I’ve been looking for a job”*(P1),

as well as an increase in energy levels.

*“I think when I do exercise I know that I do feel like I’ve got more energy”*(P6).

Five participants reported having a set regular routine as an influencing factor on their exercise behaviour.

*“And to introduce a routine, which is like the one I had at uni, because that’s kind of helped me transfer to a new place”* (P2)*.*

A routine helped participants continue to exercise after leaving university because it allowed them to plan their exercise behaviour. An exercise routine was also reported to be beneficial to positively influence exercise behaviour as it encouraged participants to socialise with new and existing friends.

*“It’s just nice to do something regular scheduled to get out of the house that is with people that I don’t really know that well”*(P3).

In addition, two participants also reported that having a more stable routine in other aspects of their lives, also helped them to exercise post-university

*“Since I left university, I think that knowing every day schedule I can schedule my exercise time table better”* (P4).

Related to routine, six participants reported habit was another factor that influenced their exercise post-university (e.g. P7 *“Yea I’d say it is a habit.”*). Participants reported that exercise was automatically integrated into their routines, such that not much cognitive thought was needed to initiate exercise.

*“It’s just something that I will automatically schedule into my week, it’s one of the things that I kind of base my week around, kind of plan my meals, I’ll go shopping, go do my weekly shop and at the same time I’ll plan Monday to Sunday exercise timetable”*(P2).

Five participants reported that the social benefits of exercise positively influenced their behaviour. This was because of either being a part of a team

*“I think also because of being in a team, it helps me relate to people and do some new friendships and these kind of things”* (P4)*,*

or using exercise as a good way to meet people.

*“It’s just a different way of meeting people because erm as you, I went from knowing a lot of people at uni to not really knowing anyone in Sheffield”* (P8).

Another major influencing factor for exercise behaviour was having a strong exercise identity (n = 5). The reasons for defining themselves as an exerciser were quite broad. For example, participants reported regularity and frequency to be important to warrant exercise making up a part of their self-identity.

*“I can’t really think of myself not playing”* (P4)*.*

Other factors related to their self-identity as an exerciser were happiness and mood

*“Yea I mean it brings me enjoyment”*(P7),

physical benefits, and the clothing and brands they like to wear and buy to highlight their exercise-identity. In addition, anticipated regret was one of the features participants reported as being important to being able to label themselves as an exerciser. Out of the ten participants, eight reported that they would feel some form of guilt or regret if they did not participate in exercise regularly

*“I think it’s mainly guilt. I do feel really bad that I don’t do it. Especially when you hear about other people doing it, that’s when I feel like the worst… I feel like I really should do something”* (P6).

A range of material factors also influenced exercise post-university. Seven participants reported that some aspects of exercise were easier to achieve post-university than at university. Reasons included having increased free time, more opportunities, location, and an increased income.

Three participants reported that having more free time helped them to exercise post-university as they were able to include exercise into their day, which in general was more predictable.

*“I’ve just got so much free time and I’m not shackled to my laptop, writing for 17 hours a day so, it’s a big change. Yea it’s the time mostly”*(P3),

One participant reported a reduction in travel time post-university facilitated them exercising. This additional free time allowed participants to devote more time towards exercise, whilst also being able to be productive in other areas of their life, i.e., social life. This increase in free time was closely linked to an increase in opportunities to exercise post-university (*n* = 2).

*“Yea it’s easier in that there’s more opportunities”* (P3).

Another participant reported increased opportunity for exercise because of their job and location facilitated exercise as they worked at Center Parcs, and thus has lots of facilities around them.

Participants’ new location also impacted on their exercise behaviour. Participants reported that they were either closer to the facilities,

*“I live quite rural, it’s usually about 10 miles to the gyms, so because it’s nearer I go a lot more often and that’s a big advantage to it”*(P7)

or their new location is more exercise friendly.

*“I guess like where I live would be better for like getting out doors because it’s not in like the middle of a city anymore”*(P6).

By being closer to the facilities, less time is needed to exercise, again linking to the theme of time.

Finally, increased income was also highlighted as an important factor that facilitated exercise post-university.

*“Having more money, erm because I pay for a gym subscription, that’s made it easier because I have more disposable income”* (P2).

This was not a common theme; however, it is worth noting that not all participants were in a stable or full time job at the time of the interviews. By having an increased income, participants were able to afford to pay for facilities where they can exercise.

**2.2 Barriers**

Participants also reported many barriers to exercise post-university. The psychological barriers influencing exercise behaviour included a lack of motivation and a lack of enjoyment. The physical barriers to exercise influencing exercise behaviour were a lack of time (i.e., actively looking for a job which took preference, routine changes, and work and family commitments), unknown location in the future and decreased access to facilities, lack of disposable income and cost, the weather and danger, fatigue and injury, and social constraints.

Considering the psychological barriers to exercise, two participants reported lacking motivation to engage in exercise post-university due to being tired from work or because their reasons for exercise had changed.

“*Cause if you’re on a late shift, you might not want to do it before work. Or if you’re on a certain shift you might not be able to like be bothered after work”* (P5)*,*

“*I’m not sure really, I think a lot of it is just total lack of any form of motivation to do it. You know I’ve found a way of, and the fact that the reasons why I would do it have changed”* (P6)*.*

In contrast, whilst at university there were fewer barriers than reported post-university.

In addition, three participants reported that they no longer enjoy exercising.

*“Erm well I would look at it because I wouldn’t find certain types of exercise very fun, so I wouldn’t be looking forward to it, so then if I have to go and do it in my free time I would see that as a bad thing taking out of my free time”* (P10).

This reported lack of enjoyment had further implications. One participant reported therefore feeling that exercise was detracting from their free time, rather than something productive to do with their free time. Enjoyment is therefore a key factor when considering exercise across a transition, as those who enjoy exercise are more likely to continue participation. This reduction in enjoyment was because there were fewer opportunities (i.e., facilities) for exercise post-university.

Participants reported more physical barriers to exercise, which included competing priorities, such as social constraints and time, and perceived physical barriers such as location, the weather and financial issues. Five of the participants stated lack of time was an important barrier post-university,

*“I think maybe exercising the last couple of months has become a little impractical maybe, that’s one of the disadvantages. Because I’ve got more important things to be doing”* (P1),

and included social constraints,

“*I guess the amount of exercise I do means that erm I don’t have as much time for socialising, which when you’re trying to create a new circle of friends erm you know, I could spend more time doing other things*” (P2),

routine changes,

*“Yea I mean time constraints erm, do, I have to go to sort of evening classes rather than the early morning ones because I need to be working at my desk”* (P2),

and having other commitments such as family or looking for a job.

*“Because there’s a serious lack of time so I’m not in the house anywhere near as much erm and then when I am, I feel like I’ve got other things to do that come before that”* (P6).

Some participants found that restrictiveness of their new schedule when compared to university made it more difficult to exercise

*“Time table again, whereas before I had like some of the games of the season were 5 o’clock or 4, I had some friends that played at 2, I can’t now because I have a commitment and I have to respect that so, in a way I will have to like choose different times, so it’s a bit restrictive after university”* (P4).

Participants also reported that their current or future location was a barrier to exercise post-university.

*“I used to live next to the gym and now my new gym is like 20 minutes away, so it does take up like 40 minutes just getting there and back, which is more than at uni”* (P2).

This was because it was more difficult to exercise in their new location, due to facility access and distance.

*“I’d say the only thing that’s made it harder is access to the swimming pool. Where I live it’s quite far away, whereas when I was at Sheffield I could just walk to it”* (P10).

As a result, it was much more time consuming to exercise and easy access to similar facilities were an issue.

Cost was reported as a barrier to exercise post-university,

*“Yea it’s easier in that there’s more opportunities but harder in that I don’t have any disposable income at the moment. Which wasn’t the case back in uni, I had some income, I could spend some money here or there on gym, going here or there”* (P3).

Participants stated that the cost of exercising post-university was too high, especially considering that they were now financially self-sufficient.

*“But money wise, despite the fact that I’m kind of earning a full time income, because I’ve moved into my own place and I’m supporting myself completely, erm I don’t really feel like I have any more money than I did… well I just can’t afford so that’s the thing”* (P7).

The weather was reported by three participants as being a barrier to exercise post-university, and was often linked to other barriers such as low energy or low enjoyment.

*“If it’s raining or the weather’s bad then it’s just, it’s no fun”* (P9).

It is likely that in isolation these barriers would be not be significant in influencing exercise behaviour; however, participants often linked them together

*“It’s finding the motivation to do that, when you come in and your tired, and especially because of the winter as well seems to really make it worse”* (P9).

The weather was reported to be a negative influencing factor because exercise can often be outside, and thus participants did not want to exercise when it was dark, wet or cold. This was linked to participants reporting danger (*n* = 2) as another barrier. Due to the reduction in facilities, their location to the facilities, or the affordability of those exercise facilities, some participants felt that they had to exercise outside where they were exposed to harsh weather and danger.

*“I don’t really go running down the canal, which is a really nice path down by the canal, sort of takes you out of the city, just sort of more open areas, but it just gets dark so early, and when it rains it puddles, I got a bit muddy last time I went, and the bridges as well, when you go under the bridges the passage is really narrow and it’s long, so it’s a bit dangerous as well.”* (P3).

Another influencing factor for exercise behaviour post-university was the thought of physical injury (n = 4)

*“And the other is of course injuries. If someone tackles too hard and you get a bit of an injury, then it might be not nice to go to work with a plasters or something like that”* (P4)

and discomfort.

*“Yea I have to walk my way to work with a lot of pain in my legs. Because I played a bit too much this week… I’ve started running training, which is, which is quite hard to start with, erm like it is quite tiring”* (P4).

### 3. Social Factors

Participants reported that their post-university exercise was influenced by various social factors. Significant others were reported as having the ability to have a positive, negative or no influence. Friends, family/partner, and colleagues were the three salient groups reported to have either a positive or a negative influence on exercise intentions and behaviour, depending on participants’ personal experiences and circumstances. It is worth noting that for participants who experienced a negative influence, this was not towards exercise itself, but towards the significant other’s view that the participant should be mindful of other important factors within this significant life transition, i.e. finding a job.

*“My parents are less likely to approve now then they would have done before university when I had a, when I had a erm, maintenance grant and a loan coming in… I think maybe when I get a job, and full time pay, I think they would approve more”* (P1).

**3.1 Encouraging groups**

Overall, participants experienced a positive, supportive influence from significant others to exercise post-university, including family members

*“Yea, my mother especially, both of my parents used to go to the gym… So erm, I think that was erm, definitely a significant factor for me, as I saw what I could achieve, what I could do if I exercised regularly”* (P1),

and partners.

*“My boyfriend’s really sporty and active, so erm because he’s quite active because he plays on a couple of teams erm I think I always feel sort of, not unequal, but I would notice if I’m not doing any sport we would both notice and he would encourage me if I wasn’t really doing it, to get back into sport”* (P2).

Family and partners were therefore reported to have a strong influence over participants’ exercise behaviour due to familiarity and time spent with the participant. In both of these examples, the participant mentions someone who they live with, and thus could objectively view this significant other exercising, as well as their positive attitude towards exercise, which in turn positively influenced participants’ own exercise intentions and behaviour.

Friends were another social group that were reported to strongly influence participants’ exercise intentions and behaviour.

“*Well quite a lot of my friends are, go to the gym quite a lot or some of them are still at uni and play on like sports teams, so that’s made me think maybe I should probably be doing some more exercise myself”* (P10).

Friends are also a social group that the participants spend a lot of time with and thus can regularly be influenced by their attitudes and behaviour objectively. Participants reported feeling encouraged and motivated to exercise either because their friends were exercising and this motivated them to conform,

*“I think if I didn’t have anyone around me to, if I didn’t have people around me who were interested in sport and exercise I think it would, probably would de-motivate me a bit, and probably obviously give me less opportunities”* (P5),

or by feeling a sense of responsibility to exercise because their friends were actively encouraging them.

*“I’ve got like a friend who lives down the road and you know she was always trying to get me to go swimming and stuff”* (P6).

Friends were also reported to influence participants to exercise out of guilt or not wanting to feel that they were being left out.

*“There was definitely a thing of well I want to be part of this group thing and I definitely don’t want to be anyone who is not doing it”* (P10).

Work colleagues were another social group that participants reported as having a positive influence on their exercise participation post-university. Colleagues, however, did not seem be have the same level of influence when comparing to a family member or friend, as they were not reported as often or by as many participants. Nonetheless, colleagues were still reported by some as having a positive influence on exercise intention and behaviour.

*“I think they have made it easier actually because my colleagues at the moment who I do see about once a week they all do exercise and some of them play squash together and things, so we can talk about sports together”* (P2).

The significant life transition often includes participants having to set up new social groups, with one of those new groups being work colleagues. The influence of colleagues may have been under-reported as some participants were in between jobs at the time of the interview, and did not have any work colleagues.

**3.2 Discouraging groups**

Not all participants reported positive social influences on their exercise post-university. The same three social groups were reported as having the potential for negatively affecting exercise behaviour post-university (i.e., family/partner, friends, work colleagues).

Some parents of the participants were reported to not approve of exercise behaviour post-university, mainly because they thought that their siblings should be concentrating more of their time of other important factors (e.g., finding a job) and for financial reasons.

*“My parents are less likely to approve now then they would have done before university when I had a, when I had a erm, maintenance grant and a loan coming in. So yea I think the approval is a bit less. At least at the moment, I think maybe when I get a job, and full time pay, I think they would approve more”* (P1).

One participant reported that their parents thought that they exercised too much at times and were slightly worried about their health.

*“My mum tells me not to exercise too much”* (P2).

In both cases, it was reported that the parents’ negative views did not influence exercise intentions or behaviour. This was because the participants either had strong exercise identities or viewed exercise as being very important to them.

*“But I think I would know because obviously I’d be too tired kind of thing, as seen as my time management is ok, then yea I just sort of ignore her* (P2)*.*

Two participants reported that friends influenced their exercise intention and behaviour negatively as well, not because they had a negative view on it, but because their new social groups post-university were not exercisers

*“I think I would do a lot more if my friends were into it because they’d probably invite me along to whatever it was that they were doing and I’d go and see if I liked it”* (P3),

or they did not exercise as part of a group post-university, thus the lack of social support was demotivating.

*“I think since I left university it’s become less of a social activity because I don’t know that many… I know many people in Shrewsbury but err it’s not like going to the gym as a part of a block, as part of a, as part of a group any more”* (P1).

### 4. Supportive Strategies

The majority of participants reported that they used action planning in some form to help with their exercise post-university and it was apparent that these plans were preceded by positive intentions.

**4.1 Positive intentions**

In order to make plans to exercise, one first needs to hold a positive intention to exercise.

*“Exercise is something that I want to do more often, so I’m going to try and do it more”* (P10).

All participants reported currently having positive intentions for continued exercise post-university.

“*It means an awful lot to me, I wouldn’t say I live to exercise but I certainly exercise to make myself feel better*” (P1).

Having a positive intention for exercise is generally reflective of holding a positive attitude towards exercise, for the reasons outlined in Theme 2.1.

**4.2 Making plans**

Participants reported using planning to help them convert their positive intentions into behaviour. Planning was used to help participants create time for exercise,

*“I think because it’s my decision, it’s just at the start of the week I erm plan all my meals, plan erm sort out my days cause I work from home, make a timetable for myself and book myself in for the exercise sessions”* (P2),

find out where to exercise,

*“Yea it’s worked because especially moving to a new area, I wouldn’t have just popped out of my front door and just known where is a good place to run and where is safe and what would be a descent length route as well”* (P3),

potential teams they could join, and how and what forms of exercise they enjoy participating in that they could do.

*“But erm I do still enjoy it so I plan to do it”* (P8).

Thus, planning exercise activities were successful for these participants.

In contrast, some participants reported that they did not use any form of planning. However, one participant stated that they relied on their exercise habits, therefore reverting to habitual exercise routines once they had graduated. As a result, they felt that they did not need to plan their exercise.

*“It just kind of happened, I didn’t plan for it or have a strategy, just, I kind of go back to doing what I like doing at the time”* (P7).

Another participant stated that because they had no routine they could not plan their exercise behaviour and did it sporadically instead.

*“No absolutely nothing, it happens completely unprompted… Yea it’s because I don’t have the routine”* (P1).

Interestingly, participants whose exercise levels decreased over the transition of graduating university reported that they did not use planning to aid their exercise behaviour.

## Discussion

The aim of the current study was to gain an in-depth knowledge and understanding of recent graduates’ beliefs about, and experiences of, exercise after leaving university. Four main themes were derived from the data. In the first theme, *the transition*, participants described how the transition affected exercise intentions and behaviour; in the second theme, *influencing factors*, participants outlined the various facilitators and barriers that impacted on exercise post-university; in the third theme, *social factors*, various groups were identified who encouraged or discouraged exercise post-university; and in the fourth theme, supporting strategies*,* participants outlined the importance of intention and how planning was utilised to maintain exercise post-university. The present study adds to the literature, as there is very little research into exercise behaviour across life transitions, and no qualitative research on young peoples’ experiences of exercise and how it is affected by a significant life transition

Considering theme one, *the transition*, this included reports on exercise levels and behaviour and how they have changed from during university, to six months post-university. Pre-transition, participants generally thought that the transition of graduating university was going to impact on their exercise behaviour in some way, with the majority predicting a negative relationship, due to being unsure of where they were going to be living post-university, and how much free time they would have to exercise. It is therefore evident that participants were anxious about various unknown parameters and perceived control over exercise behaviour post-university, which could affect their exercise behaviour. Additionally, many of the participants’ exercise in the current study, utilised either a team or a facility, thus they were unsure of where, when and how to access these facilities post-graduating. This was also related to being anxious over a control aspect of their exercise participation post-university. In general, participants’ predictions were accurate as it was reported that the transition of leaving university had affected exercise regimes or types of exercise in some shape or form. Some participants however reported that they did not think that the transition of graduating university would affect their exercise frequency because their exercise behaviour was strongly motivated by their passion and lifestyle, linking to the concept of self-identity theory (Rise et al., 2010) and self-regulatory efficacy (SRE) (Strachan et al., 2011).

Self-identity refers to one’s self-concept and evaluation of what is important to oneself as a person. As a result, people should be motivated to comply with their self-identity. A recent study by Ries, Hein, Pihu, and Armenta (2012) found that self-identity was a significant predictor of both exercise intention and behaviour. Supporting how self-identity might influence one’s intention and behaviour, SRE is defined as the confidence in one’s ability to self-regulate a specific, or multiple behaviours (Strachan et al., 2011; Jung & Brawley, 2013; Strachan et al., 2015). In Strachan et al.’s (2015) study, they investigated whether SRE played a mediating role between self-identity and exercise behaviour. Results supported the idea that SRE does play a mediating role between self-identity and exercise behaviour; thus having a strong identity as an exerciser is related to one’s ability to self-regulate exercise which, in turn, is related to exercise behaviour. This link between a strong exercise identity and high (exercise) self-regulatory ability may be particularly important across a life transition such as graduating university. During the transition of graduating university there are many significant life changes that occur in a relatively short period of time (e.g., location, social groups, routine) that could have a negative impact on exercise. A strong exercise identity may be associated with strong self-regulatory efficacy, which is likely to be essential for maintaining one’s exercise behaviour across the transition.

Post-university (six months after graduating), most participants reported that their exercise levels had remained roughly the same or increased. One significant reason was that they had more free time for exercise post-university due to no longer having assignment deadlines. Having an increase in free time meant that participants could commit more time to exercising and feel less guilty about doing so as they could still maintain other aspects of their lives (e.g., socialising). This is in contrast to Kwan et al. (2009) who found that the significant life transition of entering university had a negative impact on exercise levels. The finding in the current study may to be due to participants having a deep-set belief and interest in exercise and thus being highly motivated to exercise post-university. The results may therefore not reflect a wider population of university graduates; instead, they might highlight important factors to consider to help people to continue exercising across the significant life transition of graduating university (e.g., strong exercise identity, and positive exercise attitudes and intentions).

There is limited literature on the effects of transitions on health behaviour, with the majority of the transition literature focussing on alcohol behaviours (Chen & Kandel, 1995; Gotham et al., 1997; Ham & Hope, 2003; Kuntshe et al., 2004; Schulenberg et al., 2001). Kwan et al. (2009) however, investigated how the transition of entering university affected exercise behaviour. They found that the transition had a significant negative effect on participants’ exercise levels despite positive intentions, because participants were prioritising other factors over exercise, such as socialising and workload. In contrast, Study 1b found that although participants’ exercise levels did decrease after leaving university, this decrease was non-significant. In the current study, most participants reported that their exercise levels had not changed, although the type of exercise they engaged in had changed.

Barnett et al.’s (2011) systematic review of how the transition of retiring impacted exercise behaviour revealed some interesting findings. Their analysis indicated that changes in exercise levels were dependent on socioeconomic status (SES), such that exercise levels decreased for participants from low SES groups whereas exercise levels increased for participants from high SES groups. Although this review is not directly related to the current context (i.e., retiring versus graduating university), the SES findings are interesting as this theme could relate to the theme of financial opportunity. In addition, Perales, Pozo-Cruz and Pozo-Cruz (2015) investigated the transition of exercise and entering parenthood. Their results support the notion that in both men and women, exercise levels drop across the transition, but that this decline in more marked in women. Their research also suggests that both men and women do not recover from this transition, i.e., they do not ever return to previous (higher) exercise levels. This finding is in contrast to the current study’s findings as most of the participants were able to sustain their exercise levels across the transition. However, it should be noted that the participants in the Perales et al. (2015) study were older (*M* age = 45.64 for males, 45.73 for females) than in the current study.

The current study sought to gain in-depth knowledge about the impact of graduating university and exercise beliefs, motivations, and behaviour. The study revealed that participants with a strong positive evaluation of exercise (in general) were able to continue exercising across the transition of graduating university, and highlighted key factors that enabled them to continue exercising. The current findings could therefore be used to help create a framework of key components to help people going through a significant life transition (i.e., graduating university) to pre-empt potential barriers to maintaining exercise. Although the results suggest that the transition did not have a negative impact of exercise levels, participants did report that their exercise behaviour had changed. For example, the time, place, nature and type of exercise they participated in had changed across the transition, as did motivation to exercise. This is not surprising given the participants’ routines had changed drastically, and they had gone from being relatively flexible during university (having gaps in their timetable), to having strict and structured days, less access to facilities and thus perceived reduction in opportunities.

Considering the second theme, influencing factors, participants highlighted both benefits and barriers to exercise post-university, similar to those found by Ashton et al. (2015). In general, participants felt that it was more difficult to exercise after leaving university due to an increase in the number of barriers.

The psychological benefits reported in the current study included improved mood, to either reduce or maintain low stress levels, increased feeling of happiness, for enjoyment, improved wellbeing, feeling energised, increased general motivation, feeling relaxed and reflective, and being competitive. It is well documented that exercise improves mood (Downs & Hausenblas, 2005); however, the current study helps link the why and how exercise improves mood. For example, exercise was reported as being a specific time where participants could mentally switch off from work and other stresses in life, interact with others in a social context, enjoy the fresh air and experience that comes with exercise, and the positive physical feelings that are associated with exercise such as the release endorphins such as serotonin and dopamine (Hadjicharalambous, Kilduff, & Pitsiladis, 2008; Van Praag, 2009). These psychological benefits of exercise were key motivators for participants to continue exercising after leaving university. Exercise for some participants was also a way of being competitive, which they reported as being very motivating for them, as noted in other literature (Ashton et al., 2015).

Physical benefits to exercise included, being physically healthy, fitness levels, weight management, management of their physique, and increase muscle mass. This finding supports much of the previous literature on beliefs about exercise in general (Ashton et al., 2015; Downs & Hausenblas, 2005; McEachan et al., 2011). These physical benefits motivated participants because their general health was important to them. Additionally, the transition altered some participants’ motivation for exercise. For example, pre-transition motivation revolved around fitness; however, post-university, the psychological benefits became more salient. The perceived physical benefits of exercise may also mediate the psychological benefits of exercise to some extent, as it was reported that to feel fitter or stronger helped them feel more confident and better about their self mentally (i.e. happier).

Opportunities for exercise post-university were also reported to increase. With so many parameters changing across this significant life transition (living arrangements, location, entering full time employment, social parameters), perception of control over exercise may have been affected. It was expected that participants may report a decrease in exercise opportunities; however, the results suggest that this was not necessarily the case. For example, increased opportunity was linked to increased income (i.e., affordable facilities), more free time, a structured routine allowing planning, friendship support, and their new location. This increase in opportunity may have led to positive perceptions of control over exercise, which is very important in carrying out health behaviours (McEachan et al., 2011).

Ashton et al. (2015) qualitative study on exercise and healthy eating used focus groups to discuss key motivators and perceived barriers. The study comprised of 61 male (age: 18-25) participants. Key motivators to exercise included physical appearance (e.g., sexual attractiveness), social inclusion (e.g., making friends), physical and mental health (e.g., relieve stress), and improved sport performance (e.g., improve fitness). Many of the motivators were similar to the present study, with the exception of sexual attractiveness. This result could be due to participants in Ashton et al.’s (2015) study having a stable lifestyle at that time and thus they had time to focus on more superficial aspects of exercise (e.g.. sexual attractiveness) rather than the more fundamental perceived outcomes of exercise at this time (i.e., mental and physical health).

In the present study it was found that many participants reverted back to previous exercise behaviours across the transition, resulting in maintained exercise levels. This is likely to have contributed to the positive intentions and exercise behaviour post-university found in the current study as participants sought to plan exercise into their weekly routine. For example, exercise was a first response for travel (i.e., commuting to work by foot or a bike instead of driving or catching the bus as their preferred mode of transport). Previous research has shown that past behaviour is able to significantly predict future intentions and behaviour (Norman & Smith, 1995), which is in line with the current findings. As exercise is repeated it is likely to lead to the creation of a habit, so that it is performed with little conscious thought (De Bruijn & Rhodes, 2011). Habitual exercise behaviour is also likely to support a strong exercise-identity, which was found to be a key component in the maintenance of exercise across the transition in the current study.

Self-identity is defined by the extent to which a particular behaviour is perceived to be part of one’s self-concept (Sparks & Shepherd, 1992) and has previously been found to explain significant amounts of variance in both exercise intention and behaviour, even after controlling for TPB variables (Rise et al., 2010). Participants in the current study attributed their strong exercise-identity to the extent to which they committed a large portion of their time to exercise, they talked about exercise frequently with significant others, they really enjoyed exercise and the mental benefits it brings about (e.g. happiness and wellbeing), they enjoyed the physical benefits exercise brings about (e.g. fitness and physique), their passion for exercise and sport (e.g. football), and finally, the feeling of loss when they could not exercise. Rise, Sheeran and Hukkelberg (2010) found self-identity to significantly improve the intention-behaviour relationship, explaining that one is intrinsically motivated to continue a behaviour that is congruent with one’s self-identity. The current findings are in line with this finding as the majority of participants had strong exercise intentions and self-identity, and were able to continue exercising across the transition.

Self-Determination Theory (SDT; Deci & Ryan, 1987, 2000) can help explain how participants were able to continue exercising across the transition of graduating university. SDT is a continuum-based model that helps explain how individuals move from amotivation (i.e., not motivated to perform a behaviour) to high intrinsic motivation. The theory is comprised of three main components; autonomy describes an intrinsic motivation to perform a behaviour from within; competence describes one’s perceived or expected success/failure at a task or behaviour; and relatedness describes social parameters of why one would perform a behaviour. Both extrinsic and intrinsic motivation are outlined in the theory, moving from extrinsically motivated at the amotivation end of the continuum, to intrinsically motivated at the other end of the continuum.

Recent studies have utilised the SDT, both as a model for understanding exercise behaviour and for intervention design (Fenton, Duda, & Barrett, 2016;Hsu, Buckworth, Focht, & O’Connell, 2013). Fenton et al. (2016) investigated how the SDT could be used to understand how sports coaches’ behaviour (i.e., coach-created social environment and related player motivation) impacts on young people’s (*M* age = 11.66, *SD* = 1.62) motivation towards football. Results supported the importance of autonomous support for intrinsic motivation towards football. Additionally, Hsu et al. (2013) investigated if a SDT based exercise intervention could encourage sedentary overweight women to be more active. Their results supported the use of a SDT based intervention for adherence to exercise goals at four week follow-up, although larger effect sizes were found for changes in key motivational variables such as self-determination, autonomy, goal-setting, planning, and scheduling self-efficacy (Hsu et al., 2013). Nonetheless, there were some notable limitations to the study. Firstly, the sample size was small (*N* = 25), meaning that the generalisability of the study results needs to be considered. Secondly, the participants were only women, thus gender differences (if any) cannot be identified, again reducing the generalisability of the study. Lastly, there was no control group; instead, there were two intervention groups that were compared. Relating the SDT to the current study, participants were likely to be highly intrinsically motivated already as they mentioned that they were motivated by their strong exercise-identity (autonomy), positive past experiences and enjoyment (high competence level), and the social benefits of exercise post-university (relatedness). Therefore, future research should look to bolster these components and themes from the current study, in line with SDT.

Many participants with a strong exercise identity reported that they anticipate a feeling of loss if they did not exercise. This relates to the notion of anticipated regret (AR). AR is the expectation that one will experience a negative emotional response about performance or non-performance of a certain behaviour, that has been found to predict future behaviour (Abraham & Sheeran, 2004). Most participants reported that they would feel a sense of guilt or regret from not being able to exercise post-university because of the thought of gaining weight, missing psychological benefits (i.e., improve mood), missing the social aspect of exercise, missing the competition of exercise, general health worries, guilt from knowing others are exercising and therefore they should be exercising too, and a feeling of letting others down (e.g., team mates). This AR feeling intrinsically motivated participants to exercise so to avoid any feeling of guilt. The current findings supports Abraham and Sheeran’s (2004) findings on AR, and highlight its importance in relation to participants’ exercise behaviour across a significant life transition. Abraham and Sheeran (2004) reported two studies, the first measured intention to exercise using the TPB as the theoretical framework, alongside additional predictors of past behaviour and AR. The second study however included a control and an intervention group. The control completed the same measures in the same order as used in study one, whereas the intervention group completed AR questions before completing intention questions. Results supported the role of AR in the first study as AR significantly predicted stronger intentions to exercise. In the second study, participants who complete the AR measures before the intention measures had stronger intentions to exercise.

The current findings revealed that participants found exercise post-university more difficult to achieve than whilst at university, as there was an increase in barriers to exercise across the transition. Physical barriers to exercise included time constraints due to other commitments (e.g., finding a job, family, and social commitments), a lack of disposable income and cost of facilities, unknown living and facility location, bad weather, potential danger, and finally, physical fatigue and injury. In regards to one of the more salient barriers, time, this was a result of a rigid timetable (i.e., working 9-5). This was exacerbated as participants routines had changed, specifically because they were now working throughout the day without gaps in their timetable for exercise, as well as trying to keep up with other daily chores and regimes, such as eating their dinner and commuting to and from work, adding to these time constraints. These results largely corroborate previous literature (McEachan et al., 2011); however, the present study adds to the literature as it highlights that ‘danger’ as well as physical fatigue and injury were important factors when considering whether to exercise or not. In particular, participants did not enjoy the feeling of physical discomfort high intensity exercise brought about, or the risk of injury as that had larger implications to their day-to-day living.

The current findings suggest that participants had very varied experiences with influences over exercise behaviour; for example, income was reported as both being a benefit and a barrier. Some participants reported that an increased income post-university facilitated exercise behaviour, whereas other participants reported that despite earning a full time wage, income remained a barrier post-university. This may be due to participants earning varying incomes, as well as some participants having more expensive exercise expectations (i.e., gym membership). In addition, not all participants were in full time employment six-months after graduating university and were either between jobs, unemployed or still deciding where to live. This may have been an additional contributing factor for income being reported as both being a benefit and a barrier.

Only two participants reported that the transition of graduating university had an adverse effect on exercise behaviour, due to experiencing an increased number of barriers post-university, in line with previous transition literature (Kwan et al., 2009). Future research could focus in more detail on the beliefs and experiences those whose exercise declines over the transition of graduating university. For example, both participants struggled to report many benefits of exercise when compared to the other participants; in contrast, both participants mentioned numerous barriers. Additionally, these participants did not report using coping techniques or strategies as other participants had done (i.e., planning). This may have been a result of a weak exercise-identity, which previous research has identified as a key intrinsic motivator (Rise et al., 2010).

Facilities were cited as a common barrier in the current study, and referred to either a lack of facilities in general or a lack of access to facilitates, by either location or cost. Ashton et al.’s (2015) paper reported similar barriers to exercise to those identified in the current study, including time constraints, logistic factors, cognitive emotional factors, and social factors. When at university, exercise facilities were close by and affordable. In contrast, post-university, the price of the facilities are likely to have increased and to be further afield. These barriers are likely to be quite common when students graduate from university. As a result, university graduates could be made aware of this when planning for the future and where they are going to live in relation to exercise facilities. This is likely to be particularly important during the winter months, as exercise was reported to be less appealing at this time due to the weather, as well as being more dangerous (i.e., running outside in the dark).

The third theme focused on social influences on exercise behaviour; these were reported to have both a positive and a negative influence, as well as highlighting major social groups (i.e., family and partner, friends, and work colleagues). Significant others were found to motivate participants to engage in exercise post-university. Social support was achieved through encouragement, physical support, engaging in group exercise, and motivation to comply with perceived social influence. It may be that the importance of significant others views are more salient during a significant life transition as participants seek advice or try to foster some routine and structure from those they are closest to. Additionally, forming new social groups harnesses the motivation to comply with positive health behaviours (Deci & Ryan, 2000) in order to gain acceptance; this, coupled with an existing positive intention towards exercising, helped participants maintain their exercise levels across the transition. It is possible that the influence of significant others (e.g., new friendship groups or colleagues) increases in valence over a significant life transition in younger populations, as participants are creating new relationships and are eager to engage in the activities of that group (Kwan et al., 2009; McEachan et al., 2011).

Previous literature is mixed on the importance of the behavioural effects of significant others across varying behaviours, including exercise (McEachan et al., 2011; Sparks et al., 1995); however, in the current study, as well as in Study 1a and 1b, social influences were found to have strong relationship with, and positively influence, exercise intentions and behaviour. It is possible that the current participants, given their strong exercise identify, also had friends who engaged in, and were supportive of, exercise. Further investigation into the normative influence over intention and behaviour across a significant life transition is needed.

Social influence appears to be more important for exercise behaviour than other health behaviours such as smoking or drinking cessation (Armitage & Conner, 2001). Additionally, Kwan et al. (2009) suggested that significant others may have an increased importance in younger populations, such as students. More recently, Ashton et al.’s (2015) study supported this hypothesis, finding a strong social influence on participants’ exercise behaviour. A key theme for exercise behaviour included social factors, more specifically, social inclusion, for example, feeling part of a group or a team. Additionally to the Ashton et al.’s (2015) study, the present study found participants were motivated to exercise in a social context because they enjoyed it, not just to prove themselves as a superior athlete amongst their peers.

The social barriers to exercise were in line with previous research findings (Ashton et al., 2015). Ashton et al. (2015) reported that peers, social groups and family upbringing were barriers to exercise. Peers were reported to have the potential for being a barrier as they stated that if one’s friends do not work out or go to the gym, it is unlikely that an individual would want to go either. In a similar vein, family upbringing was a barrier, as if one was brought up with a sedentary lifestyle, it is again likely that this behaviour will continue through life. These results are in line with the current study as friends and family were also found to be potential exercise barriers; however, the current study included highly motivated individuals, and so the social barriers revolved family members’ concerns about prioritisation (e.g., seeking work) and health (e.g., doing too much exercise). These social influences, however, were reported to not alter participants’ intentions to exercise, as other salient beliefs to continue exercising were stronger, such as the positive psychological and physical benefits of exercise. This finding supports the importance of having positive attitudes, intentions, and a strong exercise-identity in order to fend off barriers (i.e., being resilient to exercise barriers such as bad weather, time constraints, and social influences).

The fourth theme that emerged from the data was *supportive strategies*, which incorporated two sub-themes; namely, positive intentions and making plans. Intention is crucial for behaviour as it is the proximal antecedent for either choosing to, or not to, participate in a particular behaviour (Ajzen, 1991). However, good intentions are not always translated into behaviour (Gollwitzer, 1993).

All participants reported having strong, positive intentions to continue to exercise post-university, which was likely a result of the reported perceived benefits that come about with exercise behaviour, i.e., improved mood and happiness, enjoyment of participation, reduced stress levels, improved social factors, physical health, etc. Most, but not all, participants were able to maintain their exercise levels after leaving university, thereby demonstrating a close correspondence between their exercise intentions and behaviour. Planning was reported to be a significant contributor to achieving this and has been found to help bridge the intention-behaviour gap for a range of health behaviours (Gollwitzer & Sheeran, 2006) including exercise (Sniehotta et al., 2005). Arguably, planning is more important for those who are going through a significant life transition than for those who remain in a stable context, in order to overcome the unstable nature and changes that inevitably occur as the result of a life transition. Interestingly, the two participants whose exercise behaviour decreased across the transition of graduating university did not report using planning.

Previous research has found planning to be useful for health behaviours such as exercise (Carraro & Gaudreau, 2013) although it has not been investigated in relation to a significant life transition. Study 1b did not support the use of planning at six-months post-university, although it did have a significant relationship with behaviour at 18-month post-university. It is possible that due to the volatile nature of graduating university, participants were not initially using planning; however, once a more stable routine was adopted (i.e., 18 months later), planning became more useful and appropriate. In the current study however, planning seemed to be one of the key factors in being able to successfully transfer exercise behaviour across the transition of graduating university.

### Limitations

The current study had some limitations. First, there could have been some selection bias as participants were recruited via Study 1 and consequently had already completed two questionnaires before volunteering to take part in the interviews. As a result, findings need to be considered carefully, as they have the potential to simply repeat the findings from Study 1a and 1b given that participants were a subset of those who completed Study 1a and 1b. This also means that participants may have been especially interested in exercise. Accordingly, the majority of participants had a strong relationship with exercise at some point in their life. Therefore, the current results may not be generalisable to the wider student population who do not have such a strong relationship with exercise or of the views of all participants recruited in Study 1. Future studies should seek to investigate those who exercise at university, but have weaker exercise identities. This would provide greater information on those whose exercise behaviour is negatively impacted by the transition. The results are likely skewed towards a favourable opinion of exercise, thus perhaps missing some barriers, beliefs or experiences that are experienced by those with a less favourable opinion about exercise. Second, having a relatively small sample is another potential limitation to the study. Similar to the first limitation, increasing the number of participants may have produced a greater variety of views and experiences of the impact of the transition of graduating university on exercise behaviour. Third, the interviews took place six months post-university, and therefore provided only a snapshot of participants’ experiences. In addition, not all participants had completed the transition phase of graduating university (i.e., they were still looking for work). As a result, some factors that are important for longer-term adaptation to post-university life, in terms of exercise behaviour, may have been over-looked or under-estimated. Therefore, future investigations could conduct follow-up interviews at 18-months post-university, as in Study 1. Fourth, although participants were made explicitly aware the interview was interested in their experience with exercise across the transition, participants’ accounts may have also reflected their more general attitudes towards exercise. As a result, some of the beliefs identified in the current study may not be specific to the transition. Finally, the use of telephone interviews meant that the interviewer had less control over the nature of the environment in which the interviews were conducted. This may have impacted on the quality of the data from the interviews (Opdenakker, 2006). However, telephone interviews were the most practical option, as participants had moved away from Sheffield after leaving university.

### Conclusion

In conclusion, the present study found that a significant life transition, graduating university, did not negatively affect exercise participation. Although participant exercise frequency remained stable, the type of exercise participants were involved in post-university was altered by the transition. The stability of exercise frequency over this transition is likely to be a product of several variables acting to help participants maintain exercise levels. These variables were: a favourable attitude towards exercise, positive support from significant others, strong exercise intention, planning, and a strong exercise-identity. These factors represent potential targets for an intervention to promote exercise after graduating university. In the current study, the majority of the participants were either or had been keen exercisers in the past, although this was not the case for all participants (*n* = 2). Future qualitative research should seek to focus on participants who are not as highly motivated, who have weaker exercise identities, or who are less frequent exercisers. This may lead to greater insight into the barriers and experiences of those students for whom exercise is not such a strong central component of their lifestyles.

# Chapter 5. A Theory-Based Intervention to Encourage Exercise Behaviour Across the Post-University Transition (Study 3)

## Abstract

**Background.** The current study sought to test a brief intervention to encourage exercise across the transition of graduating from university. The intervention was based on the Theory of Planned Behaviour (TPB) and targeted the key behaviour, normative, and control beliefs identified in Study 1a as well as additional predictors (i.e., self-identity, planning) identified in Study 1b.

**Method.**  Final year university students (*N* = 125) were randomly allocated to condition: intervention or control. Participants in the intervention condition watched a short video targeting key beliefs about exercise post-university, and then completed a TPB questionnaire, containing multi-item measures of the TPB (i.e., attitude, subjective norms, perceived behavioural control, intention) as well as measures of habit strength, self-identity and planning. Participants in the control condition only completed the questionnaire. Six months later (i.e., after leaving university), participants (*N* = 70) completed a follow-up questionnaire that assessed the extended TPB variables as well as their current exercise levels.

**Results.** Condition was found to have a significant effect on subjective norm and self-efficacy immediately after the video, with the intervention condition having higher scores. All other effects of condition on TPB variables were non-significant. At six-month follow-up, exercise levels in both conditions had significantly decreased. The condition x time interaction was non-significant. Time had a significant main effect with the transition negatively affecting affective attitude, descriptive norm, perceived control, self-efficacy, and self-identity. Condition had a significant main effect on subjective norm, with the intervention condition scoring higher across both time points. Finally, there was a significant time x condition interaction effect on self-efficacy and self-identity. Immediate post-intervention differences had disappeared at six-month follow-up.

**Conclusion.** The results indicate that the intervention was unsuccessful in maintaining exercise behaviour across the post-university transition. The intervention had some positive effects on participants’ exercise beliefs (i.e., subjective norm and self-efficacy), but failed to have a lasting effect on the extended TPB variables, although the effect on subjective norm remained at six-moth follow-up. The study provides only partial support for the efficacy of a theory-based intervention to promote exercise beliefs and behaviour across a significant life transition. Future studies could increase the frequency with which participants are exposed to the intervention and extend the follow-up period.

## Prelude

The final empirical study of this thesis aimed to deliver a brief online intervention based on the findings of Studies 1a, 1b and 2 presented in Chapters 2, 3, and 4 to promote regular exercise across the transition of graduating university.

Study 1a identified the key beliefs about exercise post-university that were predictive of intention (fit and healthy, better mental health, positive body image, lack of time, friends approval, set regular routine) and behaviour (less time and too expensive), Study 1b highlighted the importance of attitude, perceived behavioural control, intention, self-identity and, to a lesser extent, planning. The qualitative study (Study 2) reported in Chapter 4 reinforced the importance of having a favourable attitude towards exercise, positive support from significant others, a strong exercise intention, planning, and a strong positive exercise-identity for maintaining exercise across the significant life transition of graduating university.

This chapter evaluates an intervention designed around the TPB and the results from Studies 1a, 1b and 2, in order to inform an intervention to maintain exercise across the transition of graduating university. The intervention was in the form of a brief online video targeting key beliefs about exercise and other extended TPB constructs.

## Introduction

The final study tested a theory and evidence-based intervention to encourage exercise across the post-university transition. Thus, the intervention was based of an extended version of the Theory of Planned Behaviour as well as the findings of Studies 1 and 2. In particular, the intervention targeted the significant modal salient beliefs about exercise from Study 1a. These included positive body image and social benefits (positive behavioural belief); too expensive and tiring (negative behavioural beliefs); friends and family (normative beliefs); increased income, social support and set regular exercise routine (positive control beliefs); and less money for exercise (negative control beliefs). In addition, Studies 2 and 3 highlighted that self-identity and planning were important constructs to target as well.

Interventions based on theory are vital in order to change behaviour. Previous research has found that interventions based on theory in design and evaluation have a larger impact on behaviour when compared to interventions not based on theory (Michie & Prestwich, 2010). Michie and Prestwich (2010) outlined various criteria for assessing the extent to which an intervention is based on theory. They produced a 19 item coding scheme, that considered the use of theory in intervention implementation, the theoretical constructs targeted, and if theory was used to evaluate the intervention. They state that interventions that are based on theory have a clear direction (i.e., structure that is easy to follow), are relevant and valid to the behaviour in question, and are able to target key constructs and components that have been identified in previous research. The current study employed an extended version of the theory of planned behaviour (TPB (Ajzen, 1991)) as the theoretical framework to design and test the effect of an intervention on exercise post-university. The TPB states that intention is the proximal antecedent of behaviour, and is the central component of the TPB (Abraham & Sheeran, 2003; Ajzen, 1991). The McEachan et al. (2011) meta-analysis estimated intention-behaviour correlations of r = .54 for student exercise. Intention, in turn, is determined by attitude (r = .63), subjective norm (r = .38), and perceived behavioural control (PBC (r = .61)). PBC is also hypothesized to have a direct influence on behaviour, to the extent to which it reflects actual behaviour. The TPB therefore provides a strong prediction of exercise intentions and behaviour and should therefore also provide a strong theoretical basis for interventions to encourage exercise.

A systematic review of TPB-based interventions conducted by Hardeman et al. (2002) found that the TPB was used for a wide variety of behaviour change applications, including exercise, smoking cessation, drink driving, and sugar intake. However, they noted that only half of the studies included in the review used the TPB for intervention design (12 studies). The remainder used the TPB to evaluate interventions (i.e., as outcome measures). The interventions mainly used informative or persuasive techniques for behaviour change; other less frequently used techniques include goal setting, modelling, planning/implementation intentions, and social inclusion/support. How the interventions were administered varied, with videotapes, audiovisual, audiotapes and printed materials all being used to deliver the interventions. The interventions targeted specific beliefs about the target behaviour, with the aim of behaviour change. Hardeman et al. (2002) reported that about half of the interventions that were based on the TPB reported a significant positive change in intention, and about two-thirds of the interventions based on the TPB reported a significant positive change in behaviour. Thus, there is reasonable evidence for use of the TPB for intervention design. However, given the small number of intervention studies included in the review, there is a need for further research to test the utility of TPB-based interventions.

Studies 2 and 3 found that planning was an important factor for maintaining exercising across the transition of graduating from university. Previous exercise interventions have used implementation intentions (Gollwitzer & Brandstatter, 1997; Gollwitzer & Sheeran, 2006) to support behaviour change. Implementation intentions are defined as a precise action plan that promotes goal attainment by helping people initiate behaviour change (Sniehotta et al., 2005). This occurs by stating where, when and how a positive behaviour can occur and adopting an ‘*if-then*’ format (i.e., if I am feeling bored, then I will go for a jog). Gollwitzer and Sheeran (2006) meta-analysis of implementation intentions found a positive effect size of *d* = .65 when implementation intentions were used across 94 studies of varying behaviours. Implementation intentions represent detailed plans that can be used to supplement goal intentions, as previous research has found goal setting on its own to have mixed results. Gollwitzer and Sheeran (2006) state that merely having a goal does not guarantee goal attainment as people may not have thought about potential problems and barriers that can occur along the way. Forming an implementation intention entails considering the potential barriers to goal attainment and then creating appropriate solutions. Sniehotta et al. (2005) found that the use of implementation intentions to promote exercise behaviour was a successful method in bridging the intention-behaviour gap with cardiac rehabilitation participants. In Study 1b, planning was significantly correlated with behaviour at 18-month follow-up. In addition, in Study 2, participants supported the utility and positive impact planning had on their success of maintaining their exercise levels across the transition of graduating university.

In order for plans to be effective, it is necessary to have a strong goal intention, as this will increase the likelihood of plans being made and carried out. Having a strong behaviour-related self-identity is also likely to be important (De Bruijn et al., 2012; Rise et al., 2010). Self-identity is frequently used in conjunction with the TPB (Rise et al., 2010), especially in regard to exercise (Ries et al., 2012). Self-identity defines the salient and enduring characteristic of one’s self-perception (Sparks, 2000). Literature suggests that one can create a strong self-identity through repeatedly performing a behaviour, influencing one’s self-concept, which can create an overriding influence on behaviour over one’s attitude (positive or negative) (Charng et al., 1988). Self-identity is understood to have a bearing on one’s motivation to perform or not perform a behaviour; thus it indirectly effects behaviour (De Bruijn et al., 2012; Rise et al., 2010; Terry et al., 1999). Self-identity was found to be an important construct in Study 1b, explaining additional variance in both intention and behaviour in Study 1b. Moreover, participants in Study 2 frequently reported having a strong exercise identity as being important for being able to continue exercise across the transition of graduating university.

Considering the mode of delivery of interventions, video-based interventions have been found to be an alternative method for the promotion of positive behaviour change (Clark & Lester, 2000; LeBlanc, 2010; O'Donnell et al., 1995). Clark and Lester (2000) investigated the effects of a video-based intervention on improving attitudes and positive behaviours for self-care in caregivers for the elderly community. Female caregivers were allocated to one of three conditions: an intervention condition that included the self-care video-based intervention, another intervention condition which included a self-care video-based intervention plus a structured discussion group, and a control condition. The use of a video-based intervention was found to have a positive influence on behaviour. At immediate post-intervention, both intervention conditions reported more positive scores for ‘*talking when frustrated’* and ‘*scheduling in special time for ones-self’*. At 6-8 week follow-up, the sole video intervention condition reported continued significantly higher scores with ‘*scheduling in special time for ones-self’*. The study therefore supports the utility of a video-based intervention to be used for behaviour change.

O’Donnell et al. (1995) investigated whether a video-based intervention could positively influence condom acquisition in at risk men and women in New York, America. O’Donnell et al. (1995) also had three conditions: a sole video-based intervention, a video-based intervention plus an interactive group discussion, and a control condition. Results show that both intervention conditions redeemed significantly more condom coupons than the control condition. The first intervention condition (video only) redeemed significantly more condoms than the control condition (27.6% vs. 21.2%), and the second intervention condition (video plus interactive session) redeemed significantly more condoms than the first intervention condition (36.9% vs. 27.6%). Due to the focus of the current study on exercise across the transition of graduating university, it was not possible to incorporate a discussion group into the design of the study. In addition, there is good evidence that online interventions based on the TPB can produce significant changes in health behaviour. For example, Webb et al. (2010) reported that online interventions based on the TPB had a larger sized effect on health behaviour (*d*= .36), than the average effect size found for all online health behaviour interventions included in their review (*d*= .16). Thus, there is good evidence in the literature that TPB-based intervention are able to change health behaviour, and that they can be delivered through the use of videos and online technologies. The systematic review of TPB-based interventions conducted by Hardeman et al. (2002) found that when video-based interventions (*N* = 4) were used, two of them were found to have a significant positive impact on intention, and one was able to positively impact behaviour. Hardeman et al. (2002) recommended further investigation of the use of video-based interventions. A short video-based intervention was therefore chosen as the most appropriate method for delivering the intervention that targeted key modal salient beliefs about exercise post-university.

### The Present Study

To date, no studies have tested an intervention to promote exercise across the transition from university to post-university life. The present study’s main aim therefore, was to test an intervention based on an extended version of the TPB and the results of Studies 1 and 2 to promote exercise beliefs and behaviour across this transition. In particular, the present study used a video-based intervention to target key behavioural, normative, and control beliefs.

## Method

### Design

The study employed an experimental design to assess the impact of a video-based intervention on exercise beliefs and behaviour among final year university students, with a six-month follow-up post-university. The study used a 2x2 mixed-measures design, with condition (intervention vs. control) as the between-participants factor and time (before leaving university and six months after graduating university) as the within-participants factor. The University of Sheffield Department of Psychology Research Ethics Committee granted the study ethical approval (application approval no #905).

### Procedure and Participants

Participants were invited to take part in the study via email, using the University of Sheffield volunteers list with a link to the study. Within the email, a description of the study was given, as well as the overall aim of the study. Participants were informed that they could withdraw from the study at any point without having to supply a reason. Participation was voluntary but a monetary incentive (a chance to win a £50 voucher) was provided to help incentivise participation. The study targeted final year students from the University of Sheffield, who were about to undergo the transition of graduating from university to complete the online questionnaire (Appendix E). In total, 125 final year university students (undergraduate *n* = 83, postgraduate *n* = 42, M age = 23.11, SD = 4.25, male *n* = 44, female *n* = 81) were recruited into the study. After completing measures of demographics and current exercise behaviour, participants were randomly allocated into one of two conditions: a) an intervention condition (*n* = 63) in which participants watched a short video about exercise after university and then completed a TPB questionnaire, b) a control condition (*n* = 62) in which participants only completed the TPB questionnaire. Participants were randomly allocated to condition by the survey software (Qualtrics). CONSORT (Consolidated Standards of Reporting Trials) (Consort, 2010) is a checklist designed to help improve the standard or Randomised Control Trials (RCT). The CONSORT checklist was followed to ensure the reporting of all the relevant information relating to the design and analysis of the intervention (e.g., how participants were randomised, who received the intervention, drop out, etc.).

An email was sent to all participants who had given a valid email address at the end of the time one questionnaire (*n* = 92), inviting them to complete a second questionnaire at six-month follow-up. The second questionnaire was completed by 70 of the participants. An attrition analysis was conducted to investigate whether there were any significant differences between those participants who completed both questionnaires versus those who only completed the first questionnaire. Participants were compared on baseline measures of the extended TPB variables, baseline exercise behaviour, and demographics (gender, age, nationality, ethnicity, and study level). All comparisons were non-significant.

A definition of regular exercise was provided to participants at the beginning of the study. Consistent with previous research (Norman & Smith, 1995; Sheeran & Abraham, 2003), exercise was defined as “a minimum of 30 minutes of vigorous-intensity physical activity, at least three days a week”. This is in line with literature highlighting the need for vigorous exercise such as running, jogging, playing football, basketball, swimming, cross country skiing etc, to accrue significant health benefits (Hu et al., 1999). Participants completed direct measures of TPB variables, measures of additional predictors (i.e., self-identity and planning), and a measure of their past exercise behaviour (Godin-Sheppard Leisure-Time Exercise Questionnaire, GLTEQ; (Godin, 2011)).

### Intervention

In order to aid the design of interventions, Bartholomew, Parcel, and Kok (1998) have outlined an intervention mapping process. This process outlines specific procedures to ensure correct development of an intervention to help maximise its potential to achieve theory-based health behaviour change. They outline five stages of intervention mapping 1) Generate a matrix of proximal program objectives, 2) Select theory-based intervention methods and practical strategies, 3) Designing and organising a program, 4) Specifying adoption and implementation plans, and 5) Generate program evaluation plans (Bartholomew, et al., 1998). This procedure has since been updated by Bartholomew, Markham**,** Ruiter**,** Fernández**,** Kok**,** and Parcel (2016) to provide six stages of intervention mapping; 1) Logic model of the problem, 2) Program outcomes and objectives, 3) Program design, 4) Program production, 5) Implementation plan, and 6) Evaluation plan. The mapping process allows for interventions to have both a strong theory and evidence-base. Applying this procedure to the development of the current intervention, at step one, the intervention was based on modal salient beliefs about exercise and the transition gained from Studies 1 and 2. Step two, outcomes and objectives were outlined to maintain exercise intentions and behaviour across the transition of graduating university. Step 3, the intervention was designed around the extended TPB to target components found to be predictive in Study 1. Step 4, the intervention video script was created, to bolster positive beliefs about exercise post-university and to counteract negative beliefs (e.g., disadvantages to exercise post-university), that was then created in a video format. Step five, the brief online intervention was distributed to all participants who had expressed their interest in the study and were randomly allocated to intervention versus control conditions. Finally, at step six, data was analysed, to test whether the intervention had an impact on exercise behaviour across the transition as well as on the targeted, extended TPB, constructs and beliefs.

The intervention comprised of a short 2-minute video (Appendix F) with actors talking to the camera, expressing various beliefs about exercise post-university. The intervention was designed and created by the researchers, and the script was based on the results from Studies 1 and 2 and targeted key components from the extended TPB. Thus, a script for the actors to repeat in front of the camera was created based on the key modal salient beliefs (e.g., the belief ‘Better mental health’ – *‘It improves my mood and makes me feel confident’*). At the end of the video, the key messages were then summarised in text form (see Appendix F for video script).

### Measures

The TPB questionnaire assessed participants’ instrumental and affective attitudes, subjective norm, descriptive norm, perceived control, self-efficacy, and intention towards exercise after university. In addition, self-identity (Sparks & Shepherd, 1992), action planning (Conner et al., 2010), and past behaviour (Godin, 2011) were also measured. Unless otherwise indicated, all items were rated on 7-point response scales and coded so that high scores reflected high values on the variable of interest (e.g., positive attitudes). Item scores were averaged to provide a measure of each variable.

*Instrumental attitudes* towards exercise post-university were measured using three items, e.g., “Engaging in regular exercise after I leave university would be… wise/foolish”. *Affective attitudes* were measured using two items, e.g., “Engaging in regular exercise after I leave university would be… enjoyable/unenjoyable”. Cronbach’s alpha was .66 for instrumental attitude and .89 for affective attitude.

*Subjective norms* were assessed with two items, e.g., “People who are important to me would approve/disapprove of me engaging in regular exercise after I leave university… approve/disapprove”. *Descriptive norms* were measured with two items, e.g., “Most people who I know at university will engage in regular exercise after leaving university… none/all”. Cronbach’s alpha was .78 for subjective norms and .88 for descriptive norms.

Two items assessed *perceived control*, e.g., “I feel in complete control over whether or not I engage in regular exercise after I leave university” and two items assessed *self-efficacy*, e.g., “If I wanted to, engaging in regular exercise after I leave university would be… easy/difficult”. Cronbach’s alpha was .78 for perceived control and .86 for self-efficacy.

*Intention* was measured with two items, e.g., “How likely is it that you will engage in regular exercise after you leave university… likely/unlikely’”. Cronbach’s alpha was .82 for the measure of intention.

Three items derived from De Bruijn et al. (2012) were used to measure *self-identity*, i.e., “To engage in regular exercise is an important part of who I am”, “I am the type of person who is orientated to engage in regular exercise”, and “I would feel at a loss if I was forced to give up regular exercise”. Cronbach’s alpha was .93.

Action planning was assessed using four items derived from Conner et al. (2010), e.g., “I have made a detailed plan regarding when to exercise after I leave university… not at all true/exactly true”. Cronbach’s alpha was .96.

Past exercise behaviour was measured using the *Godin-Sheppard Leisure-Time Exercise Questionnaire* (GLTEQ; (Godin, 2011)). The questionnaire comprises three items to gain the number of times mild (yoga, archery, fishing, golf etc.), moderate (fast walking, tennis, volleyball, badminton, easy swimming etc.), and strenuous (running, football, squash, basketball, vigorous swimming etc.) exercises are performed during a typical 7-day period. The GLTEQ is a valid measure of exercise, correlating with percentile VO2max (r = .24, *p* < .001) and percentile body fat (r = .13, *p* < .01). For the purpose of the present study, only the number of times participants engaged in strenuous exercise was used in the analysis, as this corresponded most closely with the definition of regular exercise used in the TPB items and additional predictors.

## Results

### Descriptive Statistics

One hundred and twenty-five respondents (*M* age = 23.11, *SD* = 4.25) were recruited into the study. Participants were final year students (male *n* = 44, 35.2%, female *n* = 81, 63.1%, 1.6% other) from the University of Sheffield, with the majority being from the UK (75.2%), white (80%), and undergraduates (66.4%), followed by final year master’s degree students (25.6%) and PhD students (7.2%). Cronbach’s alphas for all measures were acceptable(see Table 22). Mean scores on all of the TPB measures were high (i.e., above the mid-point). The additional measure of self-identity also had a high mean score; however, planning was close to the mid-point. Of the original 125 participants, only 92 people provided their email address to be contacted at follow-up. At time two, seventy participants (*n =* 70) responded to the follow-up questionnaire. In total, participants reported engaging in just over two bouts of strenuous exercise in a typical week *(M =* 2.36*, SD =* 1.78)at time one, which significantly decreased at time two to just under two bouts of strenuous exercise(*M =* 1.87*, SD =* 1.73, *t*(65) = 2.90, *p* = .005).

An a priori power analysis was conducted in order to assess the sample size needed for this study. Webb et al. (2010) reported that online interventions based on the TPB had an average effect size of *d* = .36. To obtain a similar sized effect in the current study with alpha set at .05, and with 80% power, would require 123 participants per condition (Cohen, 1992). A sensitivity power analysis was also conducted which revealed that with 63 participants in the intervention condition and 62 participants in the control condition the study was sufficient powered (i.e., 80% power) to detect an effect size of *d* = .50, with alpha set at .05. This equates to a medium-sized effect (Cohen, 1992).

### Randomisation Checks

Randomisation checks were completed using chi-squared and t-tests on baseline (pre-intervention) measures of gender, nationality, ethnicity, age, study level, and strenuous activity. All comparisons between the control and the intervention conditions were non-significant.

Table 22. Descriptive Statistics for Main Study Variables at Time One for the Full Sample (N = 125)

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Alpha** | **Mean** | **SD** |
| Affective Attitude | .89 | 6.15 | 1.00 |
| Instrumental Attitude | .66 | 6.66 | .56 |
| Subjective norm | .78 | 5.98 | 1.20 |
| Descriptive Norm | .88 | 4.10 | 1.14 |
| Perceived Control | .78 | 5.28 | 1.28 |
| Self-Efficacy | .86 | 5.30 | 1.22 |
| Self-Identity | .93 | 4.96 | 1.60 |
| Planning | .96 | 3.13 | 1.74 |
| Intention | .82 | 5.81 | 1.20 |
| Strenuous Exercise (Time 1) | - | 2.36 | 1.78 |
| Strenuous Exercise (Time 2) **a** | - | 1.85 | 1.72 |

*Note. a n = 70.*

Table 23. Statistics for Main Study Variables Immediately Post-Intervention (Time One) by Condition (N = 125)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Control group**  (*n* = 62) | | **Intervention group**  (*n* = 63) | |  | | |
| **Variable** | **Mean** | **SD** | **Mean** | **SD** | ***F*** | ***p*** |
| Affective Attitude | 6.03 | 1.15 | 6.23 | 0.78 | 1.98 | .16 |
| Instrumental Attitude | 6.70 | 0.56 | 6.63 | 0.56 | 0.36 | .54 |
| Subjective norm | 5.75 | 1.40 | 6.25 | 0.85 | 4.96 | .03 |
| Descriptive Norm | 3.92 | 1.04 | 4.28 | 1.22 | 1.70 | .19 |
| Perceived Control | 5.10 | 1.37 | 5.51 | 1.14 | 2.95 | .09 |
| Self-Efficacy | 5.03 | 1.33 | 5.60 | 1.00 | 6.56 | .01 |
| Self-Identity | 4.92 | 1.58 | 5.01 | 1.62 | 0.28 | .59 |
| Planning | 2.98 | 1.80 | 3.30 | 1.68 | 1.06 | .31 |
| Intention | 5.65 | 1.26 | 5.58 | 1.08 | 2.22 | .14 |

### Intervention Effects at Time One

The first stage of the analysis was to examine the effect of condition (intervention vs. control) on the extended TPB measures assessed immediately post-intervention. Condition was found to have significant effects on subjective norm, *F*(1, 102) = 4.96, *p* = .03, and self-efficacy, *F*(1, 102) = 6.56, *p* = .01. In both cases, the intervention condition reported higher scores than the control condition, such that participants in the intervention condition were more likely to believe that significant others would want them to exercise after university and had stronger feelings of self-efficacy than participants in the control condition. The effects of condition on the other extended TPB variables were non-significant, although the effect on perceived control approached significance (*p* < .10) and was in the expected direction. The means and standard deviations for the extended TPB variables at time 1 by condition are presented in Table 23. Participants in the intervention condition were asked if they either a) watched the intervention video in full, b) watched some of it, and c) did not watch it. The majority of participants watched all or some of the video (60.8%, 33.3%, and 5.9% respectively). Additional analyses were run to check whether watching all, some, or none of the intervention video influenced the results. However, given the low number of participants who reported watching none of the video (*n* = 3), the analyses only compared those who watched the video in full (*n* = 31) versus those who watched some of it (*n* = 15). Only one significant difference was observed. Unexpectedly, those who watched all of the video had lower planning scores (*M* = 2.81, *SD* = 1.58) than those who watched part of the video (*M* = 3.86, *SD* = 1.44), *t*(44) = 2.16, *p* = .03.

### Intervention Effects at Time Two

At six-month follow-up, the effect of the intervention on exercise behaviour was measured using a 2 (condition) x 2 (time) ANOVA. Participants’ exercise levels significantly decreased, *F*(1, 56) = 5.37, *p* = .02, from baseline (*M* = 2.36, *SD* = 1.78) to follow-up (*M* = 1.85, *SD* = 1.72). The effects of condition, *F*(1, 56) = .21, *p* = .65, and the condition x time interaction, *F*(1, 56) = .13, *p* = .72, were non-significant.

A series of 2 (time: time 1 vs. time 2) x 2 (condition: intervention vs. control) mixed-measures ANOVAs were then conducted to test the effect of the intervention on the extended TPB variables. Time was found to have significant effects on affective attitude, descriptive norm, perceived control, self-efficacy, and self-identity. The effect of time on subjective norm also approached significance (*p* < .10). In each case, scores decreased over time. Condition was found to have a significant effect on subjective norm, *F*(1,60) = 4.72, *p* = .03, with the intervention condition scoring higher than the control condition. Significant time x condition interactions were found for self-efficacy, *F*(1,60) = 8.71, *p* = .005, and self-identity, *F*(1,60) = 4.20, *p* = .04 (see Figures 7 and 8). All other interactions were non-significant, although interaction effect on intention was close to significance (*p* < .10). Post-hoc tests were completed on both of the significant interactions. Considering self-efficacy, the conditions (intervention vs. control) differed significantly at time 1, *t*(64) = 2.44, *p* < .05, with the intervention condition (*M* = 5.65, *SD* = 1.10) scoring higher than the control condition (*M* = 4.91, *SD* = 1.40); however, they did not significantly differ at time 2 (Intervention *M* = 4.76, *SD* = 1.58, Control *M* = 4.90, *SD* = 1.68), *t*(65) = -0.35, *p* > .05. Considering self-identity, the conditions did not significantly differ at either time 1 (Intervention *M* = 5.02, *SD* = 1.62, Control *M* = 4.60, *SD* = 1.51), *t*(65) = 1.08, *p* > .05, or time 2 (Intervention *M* = 4.52, *SD* = 1.68, Control *M* = 4.59, *SD* = 1.60), *t*(66) = -0.17, *p* > .05. Self-identity did, however, differ significantly over time in the intervention condition, *t*(33) = 2.41, *p* =.02 (T1 *M* = 5.02 , *SD* = 1.58, T2 *M* = 4.52, *SD* = 1.68), but not in the control condition, *t*(32) = 0.08, *p* = .93 (T1 *M* = 4.60, *SD* = 1.51, T2 *M* = 4.59, *SD* = 1.60). These results indicate that the intervention had an immediate effect on self-efficacy and self-identity; however, this did not last over time. *F* values for the main effects and interactions are displayed in Table 24, along with means and standard deviations by condition over time.

Table 24. Means and SD’s for Main Study Variables at Time One and Time Two by Condition

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Time 1** | | | | **Time 2** | | | | ***F*-values** | | |
|  | **Intervention** | | **Control** | | **Intervention** | | **Control** | |
| **Variable** | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **SD** | **Time** | **Condition** | **Time\*Condition** |
| Intention | 6.00 | 1.12 | 5.63 | 1.41 | 5.93 | 1.26 | 6.13 | 1.04 | 1.68 | 0.11 | 2.77 |
| Affective Attitude | 6.30 | 0.74 | 5.83 | 1.24 | 5.78 | 1.04 | 5.66 | 0.90 | 7.34\*\* | 1.73 | 1.92 |
| Instrumental Attitude | 6.67 | 0.52 | 6.78 | 0.45 | 6.68 | 0.59 | 6.63 | 0.73 | 0.41 | 0.07 | 0.62 |
| Subjective norm | 6.37 | 0.72 | 5.76 | 1.46 | 6.06 | 1.01 | 5.58 | 1.17 | 3.48 | 4.72\* | 0.24 |
| Descriptive norm | 4.30 | 1.30 | 4.01 | 0.97 | 3.75 | 1.03 | 3.83 | 0.90 | 5.41\* | 0.10 | 0.75 |
| Perceived control | 5.64 | 0.98 | 5.10 | 1.32 | 4.78 | 1.31 | 4.56 | 1.49 | 17.07\*\*\* | 1.81 | 0.94 |
| Self-Efficacy | 5.65 | 1.10 | 4.91 | 1.40 | 4.76 | 1.58 | 4.90 | 1.68 | 7.03\*\* | 1.11 | 8.71\*\* |
| Self-Identity | 5.02 | 1.62 | 4.60 | 1.51 | 4.52 | 1.68 | 4.59 | 1.60 | 5.24\* | 0.81 | 4.20\* |
| Planning | 3.39 | 1.55 | 3.03 | 1.93 | 3.23 | 1.62 | 3.30 | 1.56 | 0.05 | 0.18 | 0.77 |
| Strenuous Exercise | 2.42 | 1.94 | 2.31 | 1.61 | 1.86 | 1.84 | 1.83 | 1.58 | 5.37\* | 0.21 | 0.13 |

*Note. N = 70. \*p* < .05. \*\**p* <.01. \*\*\* *p* <.001.

**Figure 7**.Self-Efficacy (SE) Scores by Time and Condition (Means and Error Bars 95% Confidence Intervals).

**Figure 8**.Self-Identity (SI) Scores by Time and Condition (Means and Error Bars 95% Confidence Intervals).

## Discussion

The present study sought to use the TPB as a theoretical framework to develop an online intervention to target students’ exercise intentions and behaviour across the transition from final year of university to post-university life. The intervention was found to have a significant effect on subjective norm and self-efficacy when assessed immediately post-intervention, such that participants in the intervention condition were more likely to believe that significant others would be supportive of their exercising post-university and had a higher self-efficacy for exercise post-university than participants in the control condition. However, the effects of the intervention on other extended TPB variables were non-significant, but in the predicted direction. It is also worth noting that the participants did not complete measures assessing the extended TPB prior to being allocated to the intervention versus control conditions. As a result, it cannot be concluded with certainty that the intervention changed subjective norm and self-efficacy, although given that participants were randomly allocated to condition and the randomisation checks on the baseline measures (that included past exercise behaviour) were all non-significant, other explanations for these significant differences are likely to be tenuous.

Despite the current study finding an immediate overall non-significant difference between conditions immediately post-intervention, the directions of all the TPB components mean scores were in the predicted direction (i.e., the intervention condition scored higher than the control condition) apart from instrumental attitude. Univariate analysis did, however, reveal that the subjective norm and self-efficacy components differed significantly between conditions (Table 23), with the intervention condition scoring higher than the control condition. Perceived control was also close to being significant, as was intention. Thus, the intervention had a positive effect, on participants’ perceptions of significant others views about exercise post-university, participant’s confidence to be able to exercise post-university, and to a lesser extent on their control perceptions and intentions to exercise post-university.

The non-significant results are in contrast with previous studies that have tested video-based interventions and found significant differences between conditions (intervention vs. control) even when measured with longer follow-up times (O'Donnell, San Doval, Duran, & O'Donnell, 1995). The O’Donnell et al. (1995) study was, however, on condom use and may be more influential due to the perceived higher consequences and ease of use. In addition, the non-significant results may have been due to the limited number of participants in each condition, which would have affected the statistical power of the tests. A sensitivity power analysis indicated that the study was sufficiently powered to detect a medium effect size (*d* = .50), which is larger that than the effect size typically found for online TPB interventions (*d* = .36) (Webb et al., 2010). As a result, the current findings need to be interpreted with caution as the small sample size may have produced some Type 2 errors. Nonetheless, the current study provides only partial support for the utility of an online intervention based on theory targeting key TPB beliefs at immediate post-intervention, and little support for the intervention at long-term follow-up (i.e., six-months). As there was no interim follow-up data between baseline and six-months, it is not known at which point intervention effects started to weaken. Thus, the positive effects of the intervention may only last a few hours, days or weeks. Further investigations to determine the length of intervention impact would therefore be beneficial.

At six-month follow-up, exercise levels had significantly decreased over time. This is in line with previous literature (Gotham et al., 1997; Kwan et al., 2009), supporting the idea that a significant life transition (i.e., graduating from university) can have a significant effect on behaviour. The transition of graduating university can often bring significant life changes such as moving to a new location, social groups changing, accessibility of facilities changing and time available to exercise. In Study 2 participants reported that these reasons caused them to struggle with motivation to exercise, and represented important barriers to exercise that needed to be overcome.

There was a general negative effect of time, with scores on the majority of extended TPB variables decreasing with time in both the control and the intervention conditions. This indicates that not only did the intervention wear off, the transition of leaving university had an overall negative affect on one’s beliefs about exercise. Thus, after leaving university, participants had a less positive attitude towards exercise as they perceived it as less fun and enjoyable, decreased perceived and objective normative influence, decreased perceived control over exercise, decreased confidence to be able to perform exercise, and a weaker exercise identity. Within this transition period, participants may have temporarily decreased their exercise levels in order to focus on other goals, such as getting a job. The lower levels of exercise may have then led to participants feeling a reduced level of exercise benefits, feelings of a lack of control, and the reduced importance of exercise-identity. Linking these findings back to the HSE (2008), they support the idea that exercise levels drop with age, and that this may be due to the negative impact of significant life transitions such as leaving university. Finding an effective method to reduce the negative effects of the transition on exercise beliefs will be a key step in the maintenance of exercise levels, as this will facilitate the maintenance of strong intentions to exercise, thus increasing the likelihood of maintaining behaviour.

Participants in the intervention condition had higher subjective norm scores than those in the control condition at immediate post intervention, which was maintained at six-month follow-up. This suggests that the intervention had a lasting effect on participants’ perceptions of significant others views of their exercise behaviour. The intervention may have had a lasting significant effect on subjective norm due to the nature of the life transition, as participants’ social groups were likely to have changed. The intervention video comprised of recent graduates talking about exercise post-university, which seemingly had a strong influence on participant’s beliefs about the impact of (supportive) normative beliefs. This would support the current literature as it suggests that behaviour can be shaped by one’s motivation to comply with significant others’ views (Ajzen, 1991).

Two significant time x condition interactions were found that indicated that the intervention had an immediate effect on both self-efficacy and self-identity, that wore off over time. The intervention had a positive impact on self-efficacy scores such that participants in the intervention condition were more confident in their own ability to continue exercising post-university after watching the intervention video. However, this effect wore off over time. A similar pattern of scores was also found for self-identity, which, in part, might reflect reduced exercise levels post-university.

The current study had a few limitations that should be noted when interpreting the results. First, due to the nature of the study being exercise, this may have led to a bias in who completed the questionnaire. Reported exercise levels were above that of population norms (HSE, 2008). It is possible that the current participants were already highly interested in exercise and may have differed from the rest of the student population. Second, the impact of the intervention wore off over time. This might, in part, be due to the brief nature of the intervention and the fact that participants only saw the video once. Therefore, it would be useful to investigate whether exposing participants to the intervention on numerous occasions (i.e., ‘booster’ sessions) would strengthen the immediate and lasting effects of the intervention. Third, the sample size was small, especially at follow-up. This also meant that the study was underpowered, increasing the risk of Type 2 errors. Conclusions based on the present results should take this possibility into consideration. Using a sensitivity power analysis, the present study was sufficiently powered to detect a medium effect size, thus a small effect size would not be detected. Interestingly most of the non-significant effects were still in the predicted direction. Fourth, the follow-up period could be extended beyond six-month as many participants may have still been in the transition (i.e., still seeking full time employment), as found in Study 2. Finally, Clark and Lester (2000) found that the addition of the discussion group was a positive addition to a video-based intervention. The current intervention could therefore be extended to include a similar discussion group. In summary, future research could administer a more intense intervention coupled with “booster” sessions to a larger and more representative sample of participants. Including both an online video-based intervention (with “booster sessions”) and a discussion group might increase engagement with, and systematic processing of, the intervention material.

In conclusion, the present study tested whether an online intervention, based on an extended TPB, could positively influence graduating students’ exercise beliefs, intentions, and behaviours across the significant life transition of graduating from university. The intervention was unsuccessful in maintaining exercise behaviour as exercise levels declined across this transition in both the intervention and control conditions. However, the intervention had some significant effects on participants’ exercise beliefs immediately after the intervention, although most effects wore off over time, with the exception of the effect on subjective norms. The study therefore provided only partial support for the efficacy of a theory-based intervention to promote exercise beliefs and behaviour across a significant life transition. The study has, however, helped to highlight some key issues for future research to address. In particular, the frequency with which participants are exposed to the intervention could be increased and supplemented with a discussion group to reinforce the key messages included in the intervention.

# Chapter 6. General Discussion

## Prelude

Chapter 6 provides and overview and summary of the findings reported in Chapters 2-5, highlighting key findings, study limitations, lessons learned from the research, future research directions and practical implications. In particular, this chapter considers the application of the TPB as a predictive model for exercise intention and behaviour across a significant life transition, as well as a theoretical framework for developing an intervention. In addition, recommendations are made for future research directions. For example, other models could be used to supplement the TPB to increase its predictive utility and/or the TPB could draw on recent research that has produced a taxonomy of behaviour change techniques that could be used to increase to effectiveness of the intervention.

## Thesis Structure

The thesis comprised six chapters. Chapter 1 provided an overview of the literatures on exercise, life transitions, and the TPB. Chapter 2 investigated graduating university students’ modal salient beliefs about exercise post-university, and included a belief elicitation study as well as a prospective study relating these beliefs to exercise intention and behaviour post-university. Chapter 3 reported an application of an extended version of the TPB study on exercise intentions and behaviour post-university. Chapter 4 comprised a qualitative investigation to provide an in-depth analysis of how and why the transition impacted on exercise beliefs and behaviour post-university. Chapter 5 reported the evaluation of a brief online intervention, based on the results reported in Chapters 2-4, which was designed to promote exercise post-university. Chapter 6 provides an overall discussion of the findings reported in the thesis.

## Overall Aim of Thesis

The overall aim of the thesis was to investigate the impact of a significant life transition (graduating from university) on exercise beliefs, intentions, and behaviour. Previous research has provided evidence that significant life transitions can negatively affect positive health behaviours such as exercise (Kwan et al., 2009). Additionally, the HSE (2012 & 2008) have also provided evidence that from early adulthood (16-24) population VO2 max fitness levels, which are linked to exercise frequency and intensity, continually decline with age in the UK. Within early adulthood, there are several significant life transitions (i.e., puberty, graduating high school, moving away from home, going to university, graduating university, starting a career, and starting a family), that all have the potential to negatively affect exercise behaviour. This thesis focused on the life transition of graduating from university within this age bracket. The thesis concentrated on investigating what the modal salient beliefs were about exercise in this population; used the theory of planned behaviour (TPB) as the theoretical framework; explored how the transition of graduating from university affects exercise beliefs, intentions, and behaviour; utilised both quantitative and qualitative methods; and developed and tested an intervention to promote exercise intentions and behaviour across the transition.

## Summary of Main Findings

### Chapter 2. Exercise Belief Elicitation Study

A belief elicitation study was conducted with final year undergraduate students from the University of Sheffield (*n* = 11). In total, 29 beliefs were elicited, which were categorized into advantages, disadvantages, facilitators, inhibitors, approvers and disapprovers. Using scree plots, the modal salient beliefs participants held about exercise post-university were identified. These were being fit/healthy, social, mental health, and positive body image (positive behavioural beliefs); time, cost, and too tiring (negative behavioural beliefs); more income, motivated friends, and set routine (positive control beliefs); time and money (negative control beliefs); and friends, family/partner, and colleagues (normative beliefs). All three normative beliefs were reported as having the potential to be a positive or negative influence on exercise.

The results from the elicitation study were broadly consistent with previous studies (Downs & Hausenblas, 2005) with both psychological and physical benefits to exercise being reported as an advantage to exercise, time, money, and fatigue being reported as the key disadvantages or inhibitors for exercise post-university, income and set routine reported to help with exercise adherence, and finally, family, friends, and colleagues reported as significant others who had the potential to influence exercise behaviour.

The modal salient beliefs identified about exercise across the post-university transition were similar to those identified for exercise more generally (Downs & Hausenblas, 2005). However, one of the main differences was that pre-transition, participants in the present study saw income as a key facilitator for exercise post-university. Whilst being at university, participants may have had limited disposable income for activities such as exercise as well as being offered cheaper access to facilities; however, for many their income would be likely to increase after leaving university, thus providing them more disposable income to spend on exercising, even after controlling for likely increases in price to facilities due to no longer being a student. Therefore, participants saw income as a facilitator for exercise post-university, opening up further opportunities for exercise post-university and/or increasing participant confidence that they could continue pre-transition exercise habits. This is a novel finding, as previous research has not investigated the impact of a transition on exercise beliefs. It is also likely that this may be unique to transitions that involve an increase in income. To date, there has been little research investigating exercise behaviour across significant life transitions; however, in studies examining exercise behaviour more generally, income does not seem to be an important control belief. Further investigation into this belief would be helpful (e.g., investigating another significant life transition). Other research has suggested that a lack of affordable activities or facilities is often reported as a barrier to exercise among parents with young children (Peterson, Bell, & Hasin, 2009).

### Chapter 2. Prospective Exercise Belief Study

Associations between the modal salient beliefs identified in the elicitation study and post-university exercise intentions and behaviour were assessed in a subsequent prospective study. Nearly all of the individual beliefs correlated significantly with intention at baseline; however, the only belief to correlate significantly with behaviour at six-month follow-up was the negative control belief, less time. There were no significant correlations at 18-month follow-up. The belief correlations at baseline indicate that students who believe that exercise post-university can lead them to be fit and healthy, have social benefits, improve mental health, have a positive body image, and for exercise to not seen be too expensive or tiring, are more likely to have a strong intention to exercise post-university. The results also indicate that approval from all normative groups is important for a strong intention to exercise post-university, as is having a set regular routine and having more disposable income. However, these beliefs were not related to subsequent behaviour.

Regression analyses revealed that the behavioural beliefs were able to explain 42% of the variance in post-university exercise intentions, with the beliefs of being fit and healthy, better mental health, positive body image, and lack of time, all significantly contributing to the explained variance in intention. The normative beliefs explained 13% of the variance in intention with friends as the only significant predictor. The control beliefs explained 17% of the variance in intention, with set regular routine being the sole significant predictor. These findings indicate that positive intentions to exercise post-university are associated with the beliefs that it will help participants to be fit and healthy, improve mental health, improve body image, and will not result in a lack of time; that their friends will support post-university exercise; and that forming a regular exercise routine will facilitate exercise post-university. When predicting exercise behaviour, none of the regression analyses were significant at either six-month or 18-month follow-up. The only significant correlation with behaviour at six-month follow-up was for the control belief, having ‘less time’ for exercise. This indicates that participants who believed that they would have less time for exercise after leaving university, subsequently exercised less frequently. The only significant belief at 18-month follow-up was exercise was ‘too expensive’. This indicates that participants who believed that to participate in exercise post-university was too expensive, subsequently exercised less frequently. Interventions to help promote exercise behaviour post-university need to prepare students for this change in free time and encourage students to plan how to use their free time effectively, as well as educate how one can exercise cheaply (i.e., not needing to have a gym membership). This could be achieved through a development of a post-university transition pack where, for example, students are alerted to the likely reduction in free time and encouraged to think of ways in which exercise can be fitted into a new routine.

The transition of graduating from university had a negative impact on participants’ beliefs about exercise, including beliefs that exercise was expensive and tiring, that they would have less support from friends, and that the lack of set exercise routine, less time for exercise, and less money for exercise were important barriers to exercise. The transition therefore had a clear impact on graduating students’ behavioural, normative and control beliefs about exercise. Interestingly, participants reported having less time for exercise and not having a set regular routine for exercise. This finding may warrant further exploration to examine whether these two factors are related. For example, the lack of a set routine may make participants feel that they have less time to fit in exercise. Again, these results could help the design on future interventions to help graduating students how to plan to fit in exercise into a new, post-university, routine.

Regarding the prediction of intention, positive behavioural beliefs and control beliefs were the most important predictors. Focusing on improved health (physical and mental), social benefits, improved financial situation, set routines were therefore identified as key beliefs to target in interventions to strengthen intentions to exercise post-university. Considering the prediction of exercise behaviour at 18-month follow-up, the positive beliefs being fit and healthy and having a positive body image were identified as important correlates of behaviour. Interventions that seek to promote longer-term maintenance of exercise behaviour after graduating university should highlight these positive consequences of exercise, which are also likely to feed into a strong exerciser identity.

### Chapter 3. Extended TPB Study

All direct measures of the TPB constructs correlated significantly with intention, with the exception of descriptive norm. The non-significant correlation for descriptive norm may be the result of the transition, as participants are likely to be unable to observe significant others’ exercise regimes, thus minimising the descriptive norm effect. In line with this finding, it was interesting to note that descriptive norm scores reduced with time across the transition. Descriptive norm has been previously found to have a significant relationship with intention (Rivis & Sheeran, 2003; Sheeran & Orbell, 1999); however, in the current thesis, it was not predictive of either intention or behaviour. This may be a result of the transition and the consequent changes in students’ social networks.

The TPB variables explained 67% of the variance in exercise intention, with affective attitude, instrumental attitude, and perceived control emerging as significant predictors. Thus, those with positive intentions to exercise post-university were more likely to perceive exercise as beneficial to their health (instrumental attitude), as enjoyable (affective attitude), and believe that they have control over their exercise levels post-university. Subjective norm did not significantly contribute to the prediction of exercise intentions post-university. Again, this finding might be attributed to the volatile nature of a significant life transition in which social groups and influences are likely to be unstable. The current findings are broadly in line with a recent meta-analysis of the TPB and health behaviours (McEachan et al., 2011), which found attitude to be the strongest predictor of intention, followed by PBC and then subjective norm. Subjective norm was, however, still a significant predictor in the meta-analysis.

The extended TPB variables, past behaviour, habit strength, and self-identity, all significantly correlated with intention to exercise post-university, suggesting that future exercise behaviour has a close relationship with previous behaviour, current exercise behaviour, and how meaningful exercise is to oneself. They also significantly correlated with exercise behaviour at 6-month follow-up, suggesting that these factors were still important for exercise across the transition of graduating university. The final step of the regression equation (for time 2 behaviour) saw self-identity as a sole significant predictor. Self-identity and attitude significantly correlated together as well, supporting previous findings (e.g., De Bruijn et al., (2012)) and suggesting that as attitudes towards exercise become more positive, this strengthens exercise-identity. Rise et al.’s (2010) meta-analysis found that the addition of self-identity significantly added to the prediction of intention, over and above the TPB variables. The final stage of the regression equation included a measure of past behaviour. Even though past behaviour had a strong significant correlation with exercise intention, it did not make a significant contribution to the prediction of participants’ exercise intentions. This may be due to the volatile (i.e., unstable) nature of the transition, in contrast to previous studies (De Bruijn, 2011; Hagger et al., 2002b). For example, many aspects of students’ lives are likely to change in a relatively short space of time, including their social groups, location, financial situation, daily routine, work, etc.

Intention, affective attitude, habit strength, self-identity, and past behaviour all significantly correlated with exercise behaviour at six-month follow-up. The extended TPB variables were able to explain 20% of the variance of exercise behaviour. This is in line with previous meta-analyses (McEachan et al., 2011). At 18-month follow-up, however, the only extended TPB component that correlated significantly with behaviour was planning, although it did not correlate significantly with behaviour at time 2. This is likely to be a result of participants having completed the transition of graduating university at 18-month follow-up, and thus feel able to plan their exercise regimes again as their lives are more stable when compared to shortly after the transition. It would be interesting to examine whether planning continued to correlate with exercise behaviour over an extended follow-up period (i.e., more than 18-months) or whether other factors, such as exercise identity, help to maintain exercise behaviour. The regression analysis predicting exercise behaviour at 18-month follow-up revealed no significant predictors of behaviour, although planning was close to significance (*p* = .054). This may have been due to low statistical power as a result of reduced participant numbers at time three. Planning therefore could be an important factor when considering exercise post-university over the longer term, although this possibility requires further investigation. Previous research has highlighted the usefulness of planning as a post-intentional variable, finding that it mediates the intention-behaviour link (Carraro & Gaudreau, 2013; Conner et al., 2010; Luszczynska et al., 2011).

At six-month follow-up, the transition of graduating university was found to have a significant negative impact on affective and instrumental attitude, descriptive norm, perceived control, self-efficacy, and habit strength. The transition, however, did not have a significant impact on subjective norm, self-identity, planning, or intention. Thus, six months after graduating university participants viewed exercise to be less enjoyable and beneficial, felt that significant others exercised less frequently, felt they did not have as much control over their exercise behaviour, felt less confident to be able to exercise, and felt exercise behaviour was less habitual than when they were at university. Although the decrease in exercise behaviour across the transition was found to be non-significant, changes in these cognitions may have a negative influence on future exercise behaviour. Nonetheless, many students were able to maintain their exercise behaviour across the transition despite these more negative perceptions of exercise. This may have due to these students holding a strong exercise identity which was able to buffer, or protect, students from the negative impact of the life transition on various factors related to exercise (e.g. time, money). Interestingly, exercise self-identity remained relatively stable across the transition. Further research could investigate the ways in which participants were able to maintain their exercise self-identity and behaviour despite changes in their beliefs about exercise. This, in turn, may have important implications for the design of interventions to support exercise across life transitions.

Interestingly, of the extended TPB variables assessed at six-months follow-up, instrumental attitude (i.e., the perception of a behaviour to be beneficial or not) was the only cognition to significantly correlate with exercise behaviour at 18-month follow-up, as well as being the only cognition to be significant in the regression analysis predicting exercise behaviour at 18-month follow-up. Thus, participants who thought that exercise was beneficial in some way shortly after graduating university, were more likely to be exercising 18-months post-university. This finding is in line with other studies that have highlighted the importance of instrumental attitude for exercise and other behaviours (Ajzen, 1991; McEachan et al, 2011). Further research is needed to find out how to continue to positively influence graduating participants’ exercise behaviour over longer time periods.

### Chapter 4. Qualitative Study on Exercise Beliefs

The aim of the qualitative study was to gain an in-depth knowledge of participants’ experiences of exercise across the transition of graduating from university. This was achieved through the analysis of 10 telephone interviews with participants who had graduated university six months previously.

Four main themes were identified; the transition, influencing factors, social factors, and supportive strategies. Considering the first theme, *the transition*, this included reports on exercise levels and behaviour and how they have changed from during university to six months post-university. Pre-transition, participants predicted the transition of graduating university would negatively impact their exercise behaviour in some way. Participants were anxious about various unknown parameters including perceived control over their exercise behaviour post-university. In general, participant predictions were accurate as it was reported that the transition of leaving university had impacted on their exercise regimes. This is a novel finding. Previous research that has investigated the impact of a significant life transition on exercise behaviour has adopted quantitative methods, whereas the current study utilised qualitative methods, allowing for a more detailed understanding to how the transition impacted exercise behaviour.

Post-university (six months after graduating), most participants reported that they had been able to sustain previous exercise levels, which is in contrast to previous studies that have shown significant life transitions to have a negative impact on exercise behaviour (Kwan et al., 2009). One of the most frequently reported reasons for participants being able to maintain their exercise levels was that they had more free time for exercise post-university. However, this perceived increase in time could be partly due to some participants not having completed the transition at the point of the interview (six months post-university), i.e., they were still seeking a full time job. Additionally, participants reported using planning as a way of ensuring that that they maintained their levels of exercise, which have also added to the perception of having sufficient time for exercise. Although participants’ exercise levels were sustained across the transition, it was reported that participants’ exercise behaviour had changed (i.e., time and nature of exercise). This was mainly due to the change from being relatively flexible during university (having gaps in their time table) to having strict and structured days (at work). This finding that participants were able to continue exercising across the transition is another novel finding, although it may reflect a bias in the recruitment of participants which may have resulted in a highly motivated and committed sample. Nonetheless, the findings are informative for highlighting specific factors and constructs that might help students continue exercising across the significant life transition of graduating university. For example, having a strong exercise identity was an important factor in the maintenance of exercise behaviour, in line with the previous research (Rise et al., 2010). Thus, those with a strong exercise identity are likely to be resilient when faced with an increased number, or stronger, barriers to behaviour (De Bruijn et al., 2012).

Considering the second theme, *influencing factors*, participants highlighted both benefits and barriers to exercise post-university, with most participants stating that it was more difficult to exercise post-university due to an increased number of barriers. These barriers included psychological (i.e., low motivation) and physical barriers such as time constraints, disposable income and cost of facilities, unknown living and facility location, bad weather, potential danger, and finally, physical fatigue and injury. The number of reported barriers and their importance is noteworthy, particularly when considering the impact of a significant life transition. Participants’ perceived barriers often focused on facilities, or lack of facilities, and expense. For example, participants reported their new location was typically further from leisure facilities such as a gym and, in addition, these leisure facilities were now more expensive (as participants no longer had access to student discount for these facilities). In terms of intervention design, graduating students could be encouraged to identify other ways to exercise that are not dependent on the availability and cost of facilities. Time was one of the more salient barriers, with reports of this being a result of a rigid working day (i.e., 9-5). This is in line with the modal salient beliefs identified in Study 1a. Participants also reported that disposable income was an issue as they now were fully self-sufficient. Although their income had increased, their daily living expenses had also increased (i.e., rent, bills, and food). Again, making graduating students aware of these issues could help them plan how to continue exercising across the transition when time and income may be limited. Both time and income have been reported as barriers to exercise in other studies (Bellows-Riecken, Mark, & Rhodes, 2013; Pastor et al., 2015; Peterson, Bell, & Hasin, 2009); however, they were reported as being particularly important across the transition of graduating university.

The psychological benefits included improved mood, to either reduce or maintain low stress levels, increased feeling of happiness, for enjoyment, improved wellbeing, feeling energized, increased general motivation, feeling relaxed and reflective, and being competitive. This was achieved through participants reporting exercise to be a specific time where they could mentally switch off from stress, interact with others, enjoy the fresh air, and due to the positive physiological factors associated with exercise (i.e., release of endorphins such as serotonin and dopamine). These psychological benefits of exercise were key motivators for participants to continue exercising after leaving university. Physical benefits to exercise included being physically healthy, fitness levels, weight management, management of physique, and increased muscle mass. Physical benefits motivated participants because their general health was important to them. Opportunities to exercise post-university were also reported to increase, as increased income (i.e., afford facilities), more free time, a structured routine allowing planning, friendship support, and their new location all facilitated exercise post-university. This supports previous research that has reported both physical and psychological benefits of exercise as being important reasons to engage in regular exercise (Ashton et al., 2015; Byers et al., 2002; Downs & Hausenblas, 2005; HSE, 2012; Pate et al., 2007). Most participants in the current study were able to maintain their exercise levels across the transition of graduating university, and although they encountered numerous barriers post-university, which may be particularly salient across the transition of graduating university, their attitude towards the benefits of exercise remained positive. This is likely to have played an important role in the maintenance of exercise behaviour across the transition, as well as being a product of the sample’s strong identity with exercise. In contrast to the results reported in Chapters 2 and 3, where the transition had a negative impact on participants’ attitudes towards exercise, the current participants’ evaluations remained positive. This finding requires further investigation, but may be related to strong exercise identities.

Participants reported that because exercise was habitual, they reverted back to their habitual exercise habits across the transition. This likely contributed to the reported positive exercise intentions, use of planning, and strong exercise identity. Exercise frequency, commitment of large portions of their free time to exercise, talking about exercise, the enjoyment of exercise (both psychological and physical), their passion for sport, and feelings of anticipated regret from not being able to perform exercise, all attributed to having a strong exercise identity. Although this may reflect the (biased) nature of the sample, the findings are still important in highlighting what factors are important for maintaining exercise behaviour across the significant life transition of graduating university.

Considering the third theme, *social factors*, these were reported to have both a positive and a negative influence on exercise intention and behaviour post-university. The specific referents, whose views were important to participants, were broadly in line with previous research (Downs & Hausenblas, 2005). There were three major social groups reported; family and partner, friends, and work colleagues, with family/partner and friends being the most influential. Participants reported that in general they had a positive experience in relation to significant others and exercise post-university. Significant others were found to motivate participants to engage in exercise post-university, as well as increase their opportunities as they had more friends or colleagues with whom they could exercise.

Social support was received by participants through a variety of means, including encouragement, physical support, engaging in group exercise, and wanting to continue to exercise because they felt that significant others would approve of this behaviour. It was thought that the importance of significant others’ views may increase during a significant life transition as participants seek advice or try to gain some routine and structure from those they are closest to.

A few participants reported some negative social experiences regarding post-university exercise behaviour. Some participants’ family and colleagues thought the participant exercised excessively, reporting that they wanted to spend more time with that individual, worries over their general health, and wanting the individual to attribute more of their time on other important factors within this significant life transition, such as searching for a job. These influences, however, were not reported to affect exercise intentions or behaviour.

The fourth theme that emerged from the data was *supportive strategies,* which included two sub-themes, positive intentions and making plans. All participants reported having strong, positive intentions to continue to exercise post-university. It was reported that this was because of the benefits that exercise behaviour brought about (i.e., improved mood and happiness, enjoyment, reduced stress levels, social factors, physical health, etc.). In general, participants were able to translate their intentions into behaviour. Participants reported using planning for exercise as it helped them to achieve their exercise behaviour. This finding supports previous research that has shown that planning helps to bridge the intention-behaviour gap (Conner, Sandberg, & Norman, 2010; Schwarzer et al., 2008) and is in line with stage models of health behaviour. For example, the HAPA model (Schwarzer et al, 2008) highlights the importance of both pre-intentional and post-intentional factors. Considering post-intentional factors, action planning and coping planning are critical. In the current study, it is clear that participants had strong exercise intentions, and were using both action planning and coping planning for the transition of graduating university. For example, planning was used to schedule exercise into their week, finding facilities, opportunities, safe exercise outdoor routes, contacting sports teams and clubs, and sourcing sporting equipment to continue exercising.

Overall, Chapter 4 did not support previous research that a transition has negative implications for exercise behaviour (Kwan et al., 2009), instead finding that students who had positive attitudes towards exercise, high perceived control, social support, strong exercise-identity, and used planning, were able to sustain their positive exercise behaviours across the significant life transition.

### Chapter 5. Exercise Intervention Study

The results reported in Chapters 2-4 were used to develop an online intervention, designed to promote exercise across the post-university transition, through the use of an online video that targeted key beliefs about exercise.

Immediately post-intervention, despite the intervention targeting key beliefs about exercise post-university (i.e., improved mental health, physical health, time), the intervention had a non-significant impact on exercise intentions. In addition, the effects of the intervention on the extended TPB variables were, in the main, non-significant but in the predicted direction. Significant intervention effects were only found on subjective norm and self-efficacy, with the intervention condition scoring higher than the control condition in each case.

At six-month follow-up, exercise levels had significantly decreased in both the intervention and control conditions, in line with previous research on transitional effects (Kwan et al., 2009). In addition, the transition of graduating university negatively impacted on participants’ beliefs about exercise, as significant main effects of time were found for some of the extended TPB variables, i.e., affective attitude, descriptive norm, perceived control, self-efficacy, and self-identity. It is possible that participants consciously decreased their exercise levels in order to focus more of their attention on other aspects of their lives, such as moving house, finding a job, and other such commitments that are apparent in this transition (see Chapter 4). Although there is little research investigating competing goals, some studies suggest that exercise is often not a top priority, especially when a competing priority is of perceived higher importance (Hurst & Visek, 2010; Singh, 2014). Additionally, Hurst and Visek (2010) state that there are gender differences in the impact of competing priorities on exercise behaviour. Thus, the exercise levels of males are significantly less affected than those of females when there are other competing priorities, especially when participants are asked to think about health outcomes (i.e., the health benefits of exercise).

Participants in the intervention condition scored significantly higher on subjective norm, indicating that the intervention had a lasting effect on how participants perceived their friends, family and work colleagues to positively affect their exercise intention and behaviour. Study 1b found a non-significant result of subjective norm in relation to predicting intention and behaviour, even though it correlated with both intention and time 2 behaviour. In the current study, the mean scores of subjective norm were higher in the intervention condition than both the control condition and in Study 1b; therefore the intervention had a reliable positive effect on subjective norm. Because of the nature of this significant life transition, it is likely that participants have had to establish new friendship and colleague groups. The intervention may have served to highlight the importance of these significant others in relation to exercise over the transition.

Two significant time x condition interactions were found, one for self-efficacy and one for self-identity. Both interactions indicated that the immediate effect of the intervention wore off over time. The transition of graduating university therefore has a large overall negative affect on exercise beliefs, in line with previous research (Kwan et al., 2009). Hardeman et al.’s (2002) systematic review of TPB intervention studies found that across various health behaviour and interventions, about half of the interventions were successful in positive intention change, and two-thirds were successful for behaviour change. This is in contrast to the findings reported in Chapter 5 and may be due to the non-stable context (i.e., a significant life transition). Further research is needed to develop the current intervention and/or test other interventions that can be used across a life transition. Encouragingly, a couple of studies have reported that combining a TPB-based intervention with self-affirmation and implementation intentions can have a positive impact on students’ health behaviour as they transition into university (Cameron et al., 2015; Epton et al., 2014b). Other approaches, including those based on the COM-B model and BCT taxonomy, could also be utilised to increase the effectiveness of the intervention.

## Overall Implications

The results reported in the thesis provide some support for the utility of an extended version of the TPB for explaining exercise intentions and behaviour across a significant life transition. The extended TPB explained 72% of the variance in exercise intentions and 43/12% of the variance in exercise behaviour at time 2/3. It also provided strong support for including self-identity in the TPB as an additional predictor of both intention and behaviour, given that it was predictive of intention and the sole significant predictor of exercise behaviour at time 2, over and above the effect of TPB variables. Self-identity was also identified as an important factor in the qualitative study of recent graduates’ beliefs and experiences of exercise after leaving university. Self-identity is therefore a key component to target in future interventions in order to maintain exercise levels across a significant life transition. Further research into how to bolster exercise identity during a transition is also needed, as there is a lack of research on how to promote a strong exercise identity. Planning was the only extended TPB variable to correlate significantly with behaviour at time 3, which suggests that it could be included as a volitional (post-intentional) variable, similar to the Health Action Process Approach (HAPA; (Schwarzer et al., 2008)). The implication of this finding is that planning could be used to overcome the disruptive nature of a significant life transition. Future research could also test a specific planning intervention, such as instructing participants to form implementation intentions. In the present intervention study, participants were only informed of the benefits of making plans to exercise after graduating university; they were not asked to form specific if-then plans. In addition, they were not encouraged to form coping plans to overcome specific barriers to exercise behaviour in the post-university period.

Considering the intervention, the current results only partly support the utility of using the TPB to design an intervention to promote positive exercise behaviour across a significant life transition. There were limited immediate significant differences between the intervention and control groups post-intervention; the intervention only had a significant effect on subjective norm and self-efficacy, with the effect on subjective norm being maintained at six-month follow-up. No significant intervention effects were found on behaviour. However, the study was limited by low participant numbers and statistical power. Further research is needed to develop and test more effective interventions. First, a more impactful intervention may be needed to have a more positive initial impact on intentions to exercise across the transition. Second, exposing participants to the intervention more frequently across the transition may be of benefit given the volatile nature of the transition in which multiple significant life changes occur in a short space of time. Third, given that the brief online video was not sufficient on its own to promote exercise across the transition, it could potentially be combined with other techniques such as discussion groups or instructions to form implementation intentions and/or coping plans. Overall, the present findings indicate that the TPB is a successful model for predicting exercise behaviour across a significant life transition, consistent with recent reviews (McEachan et al., 2011), but a weaker model for developing interventions to change exercise behaviour. It is evident that for behaviour change, a more rigorous intervention may be needed (e.g., more frequent exposure to the intervention) as some of the intervention effects wore off over time. The current thesis has, however, established a foundation of modal salient beliefs about exercise across a significant life transition that future studies could explore and use to develop more intensive interventions. Additionally, the mixed methods approach to the thesis has given insight to both the predictors of exercise intentions and behaviour, but also an in-depth understanding of why and how participants exercise motivations and behaviour were affected by the transition.

The findings of Study 2 can be contrasted to those of Studies 1 and 3, as participants were able to maintain their exercise levels across the significant life transition. Study 2 outlines specific components that are integral to the maintenance of exercise behaviour across a difficult transition such as graduating university. For example, a favourable attitude towards exercise, positive support from significant others, high perceived control through a set routine, strong exercise intention, planning, and a strong positive exercise-identity, are all important components for maintenance of exercise levels. This study therefore provides an outline of behaviours to target in future studies to promote in order to negate any negative effects of a life transition.

The current thesis adds to the literature on the effects of a significant life transition on health behaviour (i.e., exercise), as there is limited research on such transitions. The TPB provided a strong theoretical framework for the prediction of exercise intention and behaviour across the significant life transition, in line with previous research that has applied the model to a range of health behaviours (McEachan et al., 2011). However, there was less evidence to support the use of the TPB as a theoretical framework for developing interventions. As a result, other models such as COM-B or the BCT taxonomy which are increasingly being used to design behaviour change interventions could be utilised to further develop the current intervention. The research presented in this thesis supports the idea that a significant life transition can have an adverse impact on exercise levels (Studies 1 and 3) and that a significant life transition increases the perception of exercise barriers. A novel finding from Study 2 was that many participants were able to continue exercising across the significant life transition, through adapting their behaviour and through positive attitudes, normative perceptions, perceived control, a set routine, having a strong exercise-identity, and through the use of planning.

## Strengths

There were both strengths and weaknesses to the current thesis. The strengths of the thesis were that firstly, it investigated an under-researched topic, i.e., how the transition of graduating university would affect exercise intention and behaviour. This is an important area of research as previous literature has highlighted a rapid decline in fitness levels (closely linked to exercise frequency and intensity) at the 16-24 age range (HSE, 2008, 2012), that continually declines with age. The importance of maintaining a healthy lifestyle is imperative to overall health (Pate et al., 2007), with regular exercise being an important component of a healthy lifestyle. Additionally, cardio-respiratory fitness levels have been found to be the number one predictor of early onset of death (Xuemei et al., 2013), over and above that of smoking or diet. There are many significant life transitions that occur in the 16-24 age bracket such as finishing school, moving home, starting a family, entering university and graduating university that have the potential to have a negative impact on exercise behaviour. Given that exercise is a preventative behaviour for many diseases, the development of interventions that help individuals to maintain fitness and exercise levels across such transitions should be a high priority. Secondly, the thesis adopted a strong theoretical framework to help understand the impact of a significant life transition on exercise, and accordingly to design an intervention to promote exercise across a significant life transition. The TPB provided a good theoretical framework for identifying the determinants of exercise across this transition, but there was less evidence to suggest that the TPB provides a good theoretical framework for developing an intervention to promote exercise across this transition. Using more applied models such as COM-B or the BCT taxonomy may provide more fruitful avenues for future research. Thirdly, the thesis utilised both quantitative (correlational and experimental) and qualitative methods to provide a fuller understanding of the effects of graduating from university on exercise intention and behaviour. In doing this, the current thesis has been able to highlight modal salient beliefs associated with exercise across a significant life transition. This work is important given the negative implications of a life transition has on exercise behaviour (Kwan et al., 2009) and that exercise can provide significant health benefits for people in later life, especially when considering cardio-respiratory fitness (Xuemei et al., 2013). Future research should look to build on the current findings to create a more robust intervention designed to negate any negative transition affects. An estimated 225,000 students graduate across the UK every year (HESA, 2017). As a result, any brief intervention that is found to support exercise across this life transition has the potential to have important and long-lasting health benefits at a population level.

## Limitations

The thesis also had some weaknesses. Firstly, the recruited samples may have been biased, especially for the qualitative study. Thus, the results may be limited to a population of moderate to high exercisers who have positive evaluations of exercise. The results may not therefore generalise to those who are currently sedentary, or who are low exercisers. Future research on the effect of the transition of graduating university on exercise behaviour should seek to recruit a wider selection of exercisers and non-exercisers. However, in relation to the qualitative study, the recruitment of participants with a strong commitment to exercise provided an insight into the beliefs and behaviours necessary to negate any negative impact of a significant life transition on exercise intention and behaviour. Secondly, the sample sizes for some of the studies were relatively small, especially at follow-up and for the intervention study. As a result, some of the analyses may have been under-powered and led to Type 2 errors. Future research should therefore seek to recruit larger sample sizes. Thirdly, the quantitative (predictive) study examined exercise behaviour up to 18 months after graduating, whereas the qualitative study and the intervention study only focused on exercise behaviour up to six months after graduation. Due to the time constraints of the thesis, it was not possible to include longer-term follow-ups for these studies. However, a six-month follow-up is longer than reported in most TPB studies (McEachan et al., 2011). Nonetheless, longer-term follow-ups would be beneficial to examine changes in exercise behaviour over extended periods of time (beyond the initial transition period). Fourthly, the thesis was conducted in a single UK university; therefore the generalisability of the results can be questioned. Replicating these studies in other universities across the UK would be beneficial. Finally, the study did not consider different post-university routes (i.e., post-graduate study, employment, unemployment). It is possible that these different routes may differentially affect exercise post-university. For example, students who go on to post-graduate study may be in a similar position in terms of the access to, and cost of, facilities. Future research should also therefore focus on the impact of these different post-university routes on exercise behaviour and whether the different determinants differ.

## Conclusion

The present thesis provided partial support for the utility of the TPB in relation to predicting exercise intentions and behaviour across the significant life transition of graduating university. The results are broadly in line with previous research (McEachan et al., 2011) and provide additional support for the TPB as a predictive model of health behaviour. In addition, the research reported in the thesis provides support for the inclusion of self-identity as an additional predictor of intention and behaviour in the TPB, as well as planning as a post-intentional additional predictor. However, there was less evidence for the utility of the TPB for developing an intervention to change exercise behaviour. Future research may benefit from incorporating insights from broader models of health behaviour change, such as the COM-B model, and techniques included from the BCT taxonomy that have been found to promote exercise behaviour. In addition, a more thorough evaluation of the intervention would include an increased sample size, increased frequency exposure to the intervention, and a longer-term follow-up.

The focus of the current thesis is important because significant life transitions have been shown to negatively affect health behaviours such as exercise, and the HSE (2008, 2012) provides evidence that fitness and exercise levels begin to deteriorate from early adulthood, which coincides with the time that young people graduate from university. Low levels of exercise have been linked to many negative health risks such as obesity, type 2 diabetes, and cancer (Byers et al., 2002; Erikssen, 2001; HSE, 2008; Kromhout et al., 2001), as well as being a strong predictor of premature death (Xuemei et al., 2013). Thus, preventing this decline in exercise levels is important.

The present thesis used both quantitative (both correlational and experimental) and qualitative methodologies in order to investigate exercise across a significant life transition, which contributes a key strength of the programme of research. However, the quantitative research would benefit from recruiting larger sample sizes as this would reduce the likelihood of Type 2 errors. In addition, larger sample size may increase the representativeness of samples which would increase the generalisability of the findings. Despite these limitations, the results point to some key conclusions regarding the importance of having a strong exercise identity for maintaining exercise behaviour across a life transition and for the role of planning in overcoming many of the barriers that students encounter as they enter post-university life. Future research should focus on how a strong exercise identity can be supported and which types of planning activities (e.g., action versus coping planning) are most important for encouraging exercise across a significant life transition such as graduating from university. In addition, future research should also investigate whether other behaviour change techniques could be used for people going through significant life transitions. Finally, results from the programme of research reported in this thesis could be incorporated into “graduation packs” to help students maintain a healthy lifestyle across this transition. There are currently no government initiatives or policies that encourage universities to promote healthy lifestyles post-university. This would be an important next step to pursue, although further research would be needed to identify the best health messages and/or advice to include in such initiatives and how best to deliver them. Advice and tips to maintain exercise is likely to be a central component of such initiatives due to cardio respiratory fitness being the strongest predictors for early onset of death and strong links to many diseases (e.g., type 2 diabetes and cancer). Such interventions have the potential for a large (i.e., national) reach and to be low cost. They are also likely to have important and long-lasting health benefits at a population level.

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# Appendix A

## Belief Elicitation Questionnaire

Beliefs About Exercise After Leaving University

**Welcome - A few initial questions about you**

Thank you for agreeing to take part in this research on beliefs about exercise after leaving university.

We would like to start by asking you three demographic questions:

1. What is your age?

****

2. Gender?

****Male

****Female

****Other

3. Are you in your final year of your undergraduate degree?

****Yes

****No

**Your views about exercise after leaving university…**

Thinking about the future – for example, six months into the future…

4. What do you think would be the advantages of (or positive things about) engaging in regular exercise after you have left university?



5. What do you think would be the disadvantages of (or negative things about) engaging in regular exercise after you have left university?



6. What do you think are the things that would make it easier to engage in regular exercise after you have left university?



7. What do you think are the things that would make it more difficult to engage in regular exercise after you have left university?



8. Are there other people whose views would be important to you in relation to engaging in regular exercise after you have left university?

... Who would approve of you engaging in regular exercise after you have left university?

9. Who would disapprove of you engaging in regular exercise after you have left university?

**Exercise – Now and the future**

10. What are the reasons you exercise and what motivates you?



11. Do you believe leaving university will affect your exercise regime? Why?



12. Any additional thoughts on exercise after leaving university?



Thank you for completing this survey.

# Appendix B

## An Extended TPB and Belief Questionnaire

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# Appendix C

## Semi Structured Telephone Interview Schedule

*Before recording: For the purpose of this interview, a Dictaphone is being used to record our conversations, and I will also be taking some notes to ensure that I get all the relevant information needed.*

My name is Gareth Jones, and I am studying a PhD in Exercise Psychology. This research study is part of my PhD.

The purpose of my research is to look into the transition of university to post-university life, and how this affects exercise levels. I wish to look into people’s thoughts and experiences of exercise over this transitionary period.

**Exercise definition**

For the purpose of this study exercise is defined as “vigorous physical activity, which is ‘strenuous activities which usually make you sweat, breathe harder, and feel your heart beat’. Examples of vigorous physical activities are jogging/running, working out in the gym, playing sports like football badminton, and squash. The term ‘regular’ exercise is defined as ‘at least three times per week for at least 30 minutes each time’.

Participants instructed to answer all questions based on this definition of regular vigorous physical activity.

**Opening questions**

What kinds of exercise did you engage in at university? (Team, individual, gym, running partner etc?)

What kinds of exercise do you engage in now?

Attitudes towards Exercise

I’m interested in your thoughts about exercise since you have left university…

What do you think have been (or are, or would be) the advantages and disadvantages of engaging in regular exercise since you have left university?

Advantages/good things? Why?

Disadvantages/Bad things? Why?

What have you liked/disliked? Why?

Has it been beneficial/useful? Why/Why not?

Has it been pleasant/enjoyable? Why/Why not?

**Perceptions of control**

What have been the things that have made it easier or more difficult to engage in regular exercise since you have left university?

Things that have made it easier? Why?

Things that have made it more difficult? Why?

How much control do you think you have had over this? Why?

Has it been easy or difficult to exercise since leaving university? Why?

**Views of Others**

Are there other people whose views have been important to you in relation to engaging in regular exercise since you have left university?

Who has approved or wanted you to engage in regular exercise since you have left university? Why?

Who has disapproved or not wanted you to engage in regular exercise since you have left university? Why?

Have any others helped you to exercise since leaving university? Who? How?

Have any others made it more difficult for you to exercise since leaving university? Who? How?

**Now?**

What are the reasons you exercise since you have left university? In other words, what motivates you to exercise?

Main motivations? Why?

Why they came about – distraction/fitness?

Do you consider yourself to be an exerciser? Is a part of your self-identity? (Might need to explain this – an exerciser is perhaps someone who if you asked your friends/family, that this term is something that they would use to describe you with, someone who exercises would not be described like this as a main feature of themselves).

Can you give me an idea of what exercise means to you? Prompt: Is it important to you as a person? Explain/expand why.

Anticipated regret? – Feelings around missing exercise. Do you ever regret it if you don't exercise? Explain.

Exercise = habitual? In what way? Would you say that your exercise is habitual? If so, why/how?

**Looking back**

Before leaving university, did you think that leaving university would affect your exercise regime?

Why/Why not?

Has leaving university affected your exercise regime?

How? Why/Why not?

Have you used any plans or strategies to help you keep exercising?

What has worked/not worked? Why?

**Closing**

Any final thoughts?

# Appendix D

## Example Transcript

**Participant 2**

At university what types of exercise did you engage in?

*Err, regular vigorous exercise.*

Ok, so was it team or individual or?

*Ok, erm, I went to the gym and I went spinning, and I also did yoga and palates. Erm I went jogging outside as well, and for one year I was a cheerleader.*

Ok, so you generally did quite a lot at university then? (*Yea*.) Ok so how many times a week was that, say on average as well?

*Erm, about 5.*

5 times a week, so pretty regular as well.

*Yea anywhere between 3 and 8 times.*

Ok, cool. So erm what kinds of exercise do you engage in now your post university?

*More of the same* (sorry) *Err more of the same, I go to the gym and I do the same kind of classes.*

Ok and is it the same sort of regularity as it was as well or?

*Yup.*

Ok, so would you say that exercise has gone up or down or stayed the same, would you say over the transition?

*I think it’s stayed the same.*

Stayed the same, ok that’s cool. So looking towards your sort of attitudes towards exercise now, ok. So I’m interested in your thoughts about exercise since you left university. So what do you think erm, what do you think have been the advantages or regular exercise since you left university?

*I think, the adjustment that I need because, erm and to introduce a routine, which is like the one I had at uni, because that’s kind of helped me transfer to a new place erm, and also to keep my stress levels down, that’s helpful (laugh).*

Ok, so erm, your routine, how’s that erm, how’s that been like an advantage to you?

*I think its given me a sense of continuity, so there are a lot of things change after university, its been one thing that’s stayed the same and that I could rely on.*

Ok so its helped sort of a base being created or something like that? *(yea)* Ok cool, so are there any other sort of advantages you can think of since you left or?

*Erm just keeping up my fitness, but that’s always been an advantage so…*

Yea yea, fair enough ok. So adverse to that, what do you think have been the disadvantages of exercising erm since university?

*Erm I guess the amount of exercise I do means that erm I don’t have as much time for socialising, which when your trying to create a new circle of friends erm you know, I could spend more time doing other things. And the sports I do aren’t social so, you know, it doesn’t create kind of friend groups. So if I did a different sport maybe that would be better.*

Ok so is it erm, why erm, do you think that over all its been an advantage or a disadvantage or… so socially do you think its been an advantage or a disadvantage or?

*Erm probably a disadvantage really because I just go and don’t really talk to anyone and then come back and its taking up social time.*

Ok, so it’s taking up quite a lot of your social time is it?

*Yea because I go quite a lot of evenings.*

Yea ok, if you don’t mind me asking, what are you actually doing post university now? Are you at work now or?

*Yea Im at work, its quite similar because erm, because im a researcher* (ok)*, so my timetable in quite new still which is why my routine hasn’t changed that much.*

Ok, that’s great so err. The sort of social aspect is the main disadvantage? *(yea)* ok. So this is quite similar but erm, they are going at different aspects and different angles to the question but, so what have you liked about exercising since you left university?

*Erm, I guess I get a lot of endorphins from it erm and I like feeling fit.*

Ok, so it’s the more sort of physical aspects that you’ve liked. *(yea)*. Ok, and why do you think you’ve like that.

*Erm well I think if I don’t do exercise I feel a bit more grumpy, if I do exercise I just sort of feel good and I have more energy erm and I just don’t sort of like it if I put on weight and feel a bit unfit and get out of breath going upstairs you know. I think I have more opportunities if I’m fitter.*

Yea ok that’s great. And so adversely to that again, so what have you disliked about erm exercise after university.

*Erm just the time that it takes up erm because I do have to spend more time working than I did doing my degree so erm yea the time isn’t as necessarily available to me.*

Ok have you found that the time has impacted you quite a lot as far as erm, or how has it impacted your life, the sort of time?

*Erm well I used to not do erm, exercise on the weekends, I used to always do it Monday to Friday and I’d go kind of twice a day sometimes, where as now I have to do it at weekends and I have to do it twice a day to get my classes in. So its taking away my weekends where as it didn’t used to.*

Ok, so its eating more into your sort of personal time than it used to? *(yea)* ok, so overall would you say exercise post-university has been beneficial and useful to yourself?

*Yea but only in the same ways as it was when I was at university. It hasn’t been a greater benefit.*

Ok so if you could like name for example three main reasons, what would be your, or three main benefits to exercise, what would you say they are?

*Erm fitness and health, erm feeling happy and making me get up in the morning or go out in the evening… it gets me out the house.*

Yea so giving you that sort of routine again sort of thing?

*Yea, encouraging me to get out of the house is good. I do research from home so, inside of four walls.*

Ok, and erm, the last thing about your attitude sort of towards it, do you find it to be pleasant and enjoyable?

*Yea definitely, I love it.*

Ok so could you expand on that slightly, so what do you find pleasant and enjoyable?

*Erm, well I really enjoy spinning and running because you just try so hard and you really give it your all, and I just really love being pushed and I find that when I’ve been working for a certain amount of time of pushing myself really hard, I reach a level of just happiness and getting endorphins rushing around my body, and I love being tired afterwards. Erm and then from like palates and yoga I kind of get, you feel really stretched out and lovely afterwards, its quite calming.*

Ok so a few different reasons to what your doing it there for, so almost a sense of achievement some of them, but then the other ones..

*Yea all the time, yea.*

Ok that’s great. So moving on from that sort of section, we’re going to go onto, sort of, how much control you feel you have over exercise, sort of now rather than at university. So, erm, what do you think, or what have been the things that have made it easier for you to exercise since leaving university?

*Erm having more money, erm because I pay for a gym subscription, that’s made it easer because I have more disposable income. Whereas at university, I did the most expensive gym thing, but that kind of cost me all the time through the year so.*

Yea, so how has that majorly impacted err being able to exercise then?

*Erm its just that it’s not a financial worry and I’m not spending the time trying to make more… I mean I do spend the time trying to make sure I get my money out, but when I was at university I felt more pressured to do that, cause I sort of gave up other things so that I could go to the gym, so I felt like I really had to do to make it worth it financially.*

Yea, so the erm the monetary concerns are being the main sort of things to make it easier. *(yea).* Erm so have there been any other things since leaving university that made it easier? Travel, are you closer to the gym or maybe have you got a car or something like that?

*No I just walk there, I live quite close.*

Ok, so maybe just the monetary reasons then? Ok, so whats, is there anything that has made it perhaps more difficult to exercise then, since leaving university?

*Erm, yea I mean time constraints erm, do, I have to go to sort of evening classes rather than the early morning ones because I need to be working at my desk. And also I used to live next to the gym and now my new gym is like 20 minutes away, so it does take up like 40 minutes just getting there and back, which is more than at uni.*

Yea ok, so has that sort of, does that impact on your motivation do you think towards it or?

*I don’t think it has so far but I think it would if I wanted to go to the early morning ones, erm and the idea of kind of squeezing it in erm you know, there’s less chance for me to squeeze it in because it’s not just an hour and 10 minutes, it’s near on 2 hours with getting there and back so.*

Ok, so again it’s sort of the time theme is coming through. (yea) ok. So erm, I know you said you were in a reasonably similar situation but how much do you think erm, how much control do you think you have over your exercise levels at the moment?

*Erm I wouldn’t say that I kind of feel my own pressure to go just as often as I used to, even though its more difficult now, so I would say it controls my life a bit because if I book myself in I have to go, and if I hadn’t booked myself in I might of done something else. So I would say it controls me a bit.*

So do you feel that, so do you priritise the exercise over other things or is it other things get prioritised over the exercise?

*No, I prioritise exercise over other things.*

Ok, so are you finding that you still have erm, so do you still have control over it do you think or?

*Yea I think because it’s my decision, it’s just at the start of the week I erm plan all my meals, plan erm sort out my days cause I work from home, make a timetable for myself and book myself in for the exercise sessions. Erm and I do that at the start of the week, so that then dictates other social opportunities that sort of come off the cuff.*

Ok, so you’ve got sort of a plan then that you’ve sort of started.

*Yea, a really detailed plan.*

Yea ok that’s good. So in general then, do you think that it’s been more difficult to exercise since leaving university or easier or, or has it stayed the same?

*I’m not sure, erm I think in some ways it’s been more difficult because I found myself having to make the time, and I’m aware that it’s taking away from other things, whereas at university I could just go at two o’clock if I wanted to. Where as, on the other hand I want to go more because I’m on my own more at home erm, I don’t live with other people I just live with my boyfriend and he’s at work so I do just want to go so that I can talk to someone.*

Yea, so there’s a sort of social aspect, is that the classes you go to is it?

*Yea I mean you have a bit of chitchat before and after, I wouldn’t say I’ve made friends but sort of seeing people and having an instructor chatting to you and things, you feel like you’ve seen people.*

Ok, so do you find it, so its kind of stayed the same then or?

*Yea I think it’s kind of evened out yea.*

Ok, that’s cool, so now moving onto sort of, the views of other people around you. So are there any people’s views that have been important to you in relation to yourself, engaging in regular exercise since leaving university? So anyone’s opinion you erm hold quite high and they’ve sort of influenced your engagement in exercise?

*Erm my boyfriends really sporty and active, so erm because he’s quite active because he plays on a couple of teams erm I think I always feel sort of, not unequal, but I would notice if I’m not doing any sport we would both notice and he would encourage me if I wasn’t really doing it, to get back into sport.*

Yea so he’s a sort of major influence would you say or?

*Yea, because I would feel like he was outdoing me if I wasn’t doing as much sport as he was so.*

Ok, and do you see this in a sort of positive light?

*Yea I think it’s good that we encourage each other, because I think he kind of feels the same on weeks where he doesn’t train and then I go out to the gym, he sometimes comes with me erm and we both kind of enjoy that, a bit of healthy competition.*

Yea, that’s good. Erm So is there anyone else that you can think of or is that sort of the main person, is there like any other social groups or?

*My mum tells me not to exercise too much erm, she thinks if I’ve gone 8 times a week erm, and 2 in one day, she thinks that that’s possibly a bit too much but erm, she sort of tells me to tone it back a bit.*

Ok, do you think that that sort of influences your decision to go or does it, or do you kind of just take it with a pinch of salt, or… how does that influence you?

*Erm I don’t think that I exercise too hard to be honest erm so I… it does make me think about, am I doing too much today, but I think I would know because obviously I’d be too tired kind of thing, as seen as my time management is ok, then yea I just sort of ignore her.*

Ok, so that kind of brings me onto the next question. So who sort of approved, or wanted you to engage in exercise then, erm since you left university, who are the main people who have promoted exercise to you?

*Erm, my dad I suppose because he goes spinning at home and then when were home together we go on like cycling trips and things and we talk about exercise together and then I guess my boyfriend as well because you know he sort of is in my life and is doing exercise all of the time.*

So erm, your dad and your boyfriend has helped a lot as well erm, and then is there anyone at the spinning classes, or the other sort of yoga classes, do they, anyone over there sort of social aspects, has that helped encourage you or not too much?

*Not really, I used to have a few friends at uni that I would go with and my boyfriend would come with me, but I don’t have that any more so…*

Ok, and then sort of adverse to that, so apart from your mum that you just mentioned, is there anyone else that has particularity disapproved you engaging in regular exercise since leaving university?

*Err, I don’t think so.*

Why do you think your mum has maybe disapproved of it at all?

*Erm, just because I tend to do a lot, so I would be kind of doing 12 hour days in the library and then come home and do a 10k run and she thought that was kind of too much and she was worried about me burning out, erm which I managed not to do. Erm and also, I think she just thinks that it’s quite extreme because she does exercise kind of twice a week and if im there doing it 8 days a week and that includes one day off, I think she just thinks that’s kind of, a lot, for her to kind of visualise so.*

Ok, so erm so maybe think about, because you’ve talked about family and your boyfriend quite a lot which is great erm, but maybe thinking about colleagues or erm or people that your studying with have they maybe made it more easy or more difficult to exercise or have they just not influenced it at all or?

*Yea I think they have made it easier actually because my colleagues at the moment who I do see about once a week they all do exercise and some of them play squash together and things, so we can talk about sports together. And we’re all quite fit and enjoy that aspect of life, so.*

Yea, and how does that affect you then does it sort of motivate you or?

*Yea I think it’s nice, its nice to talk to other people about exercise and know that there’s some people who have the same interest.*

Yea, ok that’s great. So now if we move on to sort of what you’re more doing now. So what are your main sort of reasons to exercise since you left university? So, in other words what are your main motivations to exercise?

*Ok, so to keep stress levels down, and because it makes me happy and I’m probably a bit addicted to it in some ways in that, if I don’t go for a while I find that I really want to, erm and all to make sure that I stay fit.*

Ok so why do you think those reasons are so important to yourself?

*Erm because it makes such a difference, I didn’t used to do as much exercise, I’ve always done sport all of my life. My parents made sure we did sport at school and things and I went to university and joined some teams, and there were periods on my year abroad erm, which was the year before last, I didn’t do any exercise because I was only there for kind of 5 months and Germany and France don’t really have gyms and I didn’t have a car, so I couldn’t get to any, erm and I noticed such a difference when I came back, and got my fitness levels back up, so I guess I’m kind of aware that I need to do it, because it makes me a nicer person I suppose (laugh).*

Ok, so it affects your mood quite a lot would you say, in a positive way, in a positive way?

*Yea definitely, I think it helps with how I interact with others because if I’ve kind of done some exercise I will feel really chatty and happy, and if I haven’t I just kind of get a bit grumpy.*

Ok, and do you find that exercise, is it a daily thing that you need to do that to keep your sort of mood set higher or is it?

*I can miss a day or two erm, that would be fine, but on the third day I would need to do some.*

Ok that’s fine. So why do you think these motivations came about do you think? Is it maybe for fitness reasons, distraction, the mood as you’ve mentioned, what would be the main sort of reasons do you think these exercise habits came around?

*Erm well in my first year I was at Cambridge and I found it very stressful and I would notice that if I did just go for a good run or if I went for a yoga session it helped me a bit, so when I knew that fourth year was coming up I spent the money and joined the gym erm because I thought that I would be quite stressed so I should introduce an element of exercise before that stress level even hit. Erm and then to make sure I got my money back I was going a lot of times a week and then I just started enjoying it and just became a part of my life so.*

Oh ok, so erm so thinking about now then, if I asked the question, do you consider yourself to be an exerciser so as part of your self-identity what would you think to that?

*Erm yea I would say that I’m an exerciser yea, it’s quite a big part of my life so.*

Ok, so what do you think makes up that sort of self-identity of yourself as an exerciser?

What do you think sort of constitutes you as an exerciser?

*The fact that I get up and go to the gym erm, and that I make it a part of my kind of evening free time you know, anyone else if they ask what do you do like when your at home like what are you kind of hobbies and stuff, what do you do in the evening, if we’re chatting at work, and if some people are like oh I go home watch some tele and have some tea, you know a bit part of mine is that I’ll mention I go to spinning or I go to yoga or whatever. Erm I probably talk about it quite a lot, so I would say it constitutes my personality, erm, that’s the impression people get of me.*

So do you think if I was to, if I came and asked your best friend or your boyfriend or your parents or something, if I came and asked them to describe you, do you think that they would use exercise as one of those words?

*Yea I think spinning would be mentioned, because I go a lot.*

Ok, erm, that’s great. So could you like, this is maybe more of a difficult sort of question but can you give me an idea of what exercise means to yourself? So why it’s important to you as a person?

*Ok erm that is quite difficult. I think that exercise if definitely very broad for me, I’ve done a lot of different things, I’ve done karate, dancing, cheerleading, erm, I live in the lake district so when I go home we do lots of hill walking, cycling, go to the gym. So, I’m kind of aware that it can be a big part of life because everyone does it differently and I’m quite happy to do pretty much any type of exercise. I guess it’s just about getting myself moving, out of breath, heart rate up, and it’s something I feel I should be doing erm you know a certain number of times a week.*

Yea and so what does it, is more a guilt thing is it or..?

*Something that I definitely enjoy, it’s very easy for me to fulfil a certain number of times a week that I think I should. I mean I think everyone should do it kind of twice a week, and I do it a lot more than that because I just love it, so erm, I do find it quite easy to err, it’s a very positive part of my life.*

Ok, that’s great. You mentioned that you consider yourself to be an exerciser, to be part of your self-identity, which is great, how long would you say you’ve considered yourself to be like that?

*Erm well about, since fourth year which was the last academic year, so just over a year I guess.*

Ok, and did you consider yourself to be like that before any time period like that or, did it dip or trough or whatever, or like come and go?

*Yea at school we always did, I was part of school teams and we all, my parents made sure we did two sports outside of school throughout our life so during school I was quite sporty, erm and then in first year I didn’t have time for sport, I was going running at 1am, things like that, the work rate was really high. Second year I was a cheerleader, that was a big part and hard to do because it swallowed you up, so that was another time, third year then I was abroad and I didn’t do any exercise again, but then from fourth year until now, erm then I was exercising, I would of explained myself as an exerciser I guess.*

Ok that’s great. So with the, you mentioned earlier on that if it got to a third day or something without doing exercise erm you may feel like you have to go and do some, so what are your feelings around, so what do you feel when you miss exercise erm for a day or two or something like that?

*Erm well I wouldn’t say that I have to, it’s just that I really want to, I just really want to get to the gym if I haven’t been there, erm go spinning, or do something, erm yea, it’s just I really look forward to it if I haven’t been for a few days.*

Ok so it’s more of err, a need to, or you like to go because you know you enjoy it rather than you regret not going type thing.

*Yea I never get this kind of, if I don’t go for a week it’s because I’ve had something else to do and I know that it’s because I’ve had something else to do because if I could go I would want to, so I never feel guilty because, it’s nice that there’s kind of weight lose comes with it and staying fit and things but that’s not my main motivation it is mostly because it just makes me happy. I don’t really get the guilt trip feeling.*

Ok, so it’s more just that you know that you feel good when you exercise, so you want to go because of that.

*I just miss it if I don’t go.*

Yea ok, that’s great. To you, would you say that exercise is a habit, a habitual behaviour, for yourself or?

*Yea definitely yea.*

Ok in what sort of way?

*Erm it’s just something that I will automatically schedule into my week, it’s one of the things that I kind of base my week around, kind of plan my meals, I’ll go shopping, go do my weekly shop and at the same time I’ll plan Monday to Sunday exercise timetable and then erm, and then I’ll write my list of kind of work that I have to do and I’ll arrange it around that. Erm now that I cant just nip off to the gym at 3 o’clock in the afternoon and I’m aware of that, erm if I am spinning at 18:30, I’ll sort of work around that, so.*

Ok, did you erm, why do you think it has become habitual, is it just because erm, maybe the enjoyment factor or the endorphins it releases or the social aspects or anything like that or?

*Erm I think it’s the enjoyment, I just want to make time for it because I enjoy it.*

Ok, that’s great. So sort of looking back at it, before you left university, so 6 months ago, erm did you think that leaving university would affect your exercise regime?

*I was worried that it would because I didn’t know what I was going to be doing erm in September. It was only when I went home briefly that my exercise levels dipped because my parents don’t pay to go to a gym so, I was going running occasionally and a couple of big bike trips but that was a different routine to the one that I had at uni when I was next to the gym.*

Ok, so did you think about it much do you think before you left university or was it kind of something that you just went along and just went with the flow type thing?

*Erm, well I had to go with the flow a bit and erm, because it was uni finals, and I wasn’t really thinking into the future that much, but then when I started planning where to live this year I was looking at where a gym was. That was kind of part of my decision, so I suppose I was kind of thinking about it, you know in advance.*

Yea erm, ok so has leaving university affected your exercise regime in general then?

*I don’t think that it has too much really.*

What would you say your main reasons are to why it hasn’t?

*Erm Cause I’m committed to erm, keeping it part of my life because it’s such an enjoyable happy part of my life, I want to make sure I kind of make the time for it.*

Yea ok, is there any other sort of reasons apart from the enjoyment, maybe the sort of fitness levels, or something like that?

*I think it’s important to stay fit and planning to keep like a high level of fitness for as long as I can during my life because I just think that you can see that that erm has all kinds of health benefits. And then my plan is to let it deteriorate to like, sports like golf and things, I’ve seen in my grandparents that’s kind of made a big difference if they were active and if they stayed active, so yea I’m keen to stay fit as long as I can.*

Ok that’s great. So erm and finally we kind of touched on plans a bit earlier on so. Have you sort of over this whole transition, so from university to post-university, have you used any significant plans or strategies to help you carry on exercising?

*Erm, not necessarily but I, erm I have kind of given myself a minimum distance that I need to be able to run so, I kind of planned for, although my fitness level might dip during the transition erm, limited to how much it could dip down to erm because I would be doing 6 mile runs at uni and Sheffield quite hilly, and I was getting out at least for a 3 mile runs at least 3 times a week kind of thing.*

Yea and how did you sort of implement that? Did you erm, did you just say it in your head type thing saying that that was what you were going to do or did you write it down or did you have like reminders maybe or something or?

*Erm at university I wrote it down and I now do that again in my job, but in the summer I had free time I didn’t, I wasn’t working and I wasn’t at uni so I could just kind of do what I wanted in my day. What I would do it get up and go for a run before breakfast. So that just meant that it happened as I just went out came back and had breakfast.*

Yea ok, so was there anything that you’ve, erm so maybe that plan that you’ve just mentioned there about a run before breakfast is there anything that hasn’t worked now so maybe you used to do that, as you said you didn’t have any other major sort of commitments, but now you’ve got other commitments does that not translate not so easily or?

*Yea erm, I do a couple of hours a week, I mean I did this morning go to an early class erm, and work, so I sort of go before breakfast, come back and have breakfast and start work, but because it delays me starting work I can’t do that 5 days a week like I used to. And also I am quite tired, I find it just more difficult to get up at kind of half six erm do exercise and then start work, I find it much easer to get up at 8 and start work then.*

Yea, that makes sense. So finally, do you have any sort of final closing thoughts that maybe there’s something that you thought would maybe be helpful to the study that I haven’t covered maybe or?

*Erm, I don’t think so, I feel like it’s been quite thorough.*

That’s good I hope.

*(laugh) yea I don’t think that I can think of anything else think about so.*

# Appendix E

## Intervention Questionnaire

Beliefs about exercise after leaving University

Q19 Welcome - A few questions about you...

Q1 Thank you for agreeing to take part in this research on beliefs about exercise after leaving university. This questionnaire will take approximately 10 minutes to complete.

Q2 We would like to start by asking you some quick demographic questions:

Q3 1. What is your age?

Q5 2. Gender?

* Male (1)
* Female (2)
* Other (3)

Q6 3. What is your nationality?

Q7 4. What is your ethnic group or background?

* White (1)
* Asian/Asian British (2)
* Black/Black British (3)
* Mixed (4)
* Other (5) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Q8 5. Are you studying for an undergraduate degree, masters degree, or PhD?

* Undergraduate degree (1)
* Masters degree (2)
* PhD (3)
* Other (4) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Q9 6. Are you in your final year of your undergraduate degree, masters degree, or PhD?

* Yes (1)
* No (2)

If No Is Selected, Then Skip To End of Survey

Q10 We would now like to ask you a few questions about your current exercise behaviour...

Q60 During a typical 7-day period (a week), how many times on average do you do the following kinds of exercise for more than 15 minutes during your free time (write a number in each box).

|  |  |
| --- | --- |
|  | Times per week (1) |
| STRENUOUS EXERCISE (HEART BEATS RAPIDLY) (e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling). (1) |  |
| MODERATE EXERCISE (NOT EXHAUSTING) (e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing). (2) |  |
| MILD EXERCISE (MINIMAL EFFORT) (e.g., yoga, archery, fishing from river bank, bowling, horseshoeing, golf without using a cart, easy walking). (3) |  |

Q78 We like to you to view a short video (2 mins) about people's experiences of exercise after leaving university. Please click on the video now to view it...

Q81 Please indicate whether or not you watched all of the video...

* Yes, I watched all of it (1)
* I watched some of it (2)
* I didn't watch it (3)

Q84 Please click on the button below to answer some questions on your views about exercise...

Q90 Please click on the button below to answer some questions on your views about exercise...

Q13 For the purpose of this questionnaire regular exercise is defined as a minimum of 30 minutes of vigorous-intensity physical activity, at least three days a week. Please answer the following questions about engaging in regular exercise...

Q14 1. To engage in regular exercise is an important part of who I am.

* Strongly Disagree (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Strongly Agree (7)

Q15 2. I am the type of person who is orientated to engage in regular exercise.

* Strongly Disagree (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Strongly Agree (7)

Q16 3. I would feel at a loss if I was forced to give up regular exercise.

* Strongly Disagree (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Strongly Agree (7)

Q17 4. Do you think your exercise levels are likely to change after leaving university?

* Will increase (1)
* Will stay the same (2)
* Will decrease (3)

Q18 Your views about exercise after leaving university...

Q20 The following questions are about your thoughts about engaging in regular exercise after you have left university. Thinking about the time after you have left university...

Q21 1. How likely is it that you will engage in regular exercise after you leave university?

* Very Unlikely (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Very Likely (7)

Q73 2. I have made a detailed plan regarding when to exercise after I leave university

* Strongly Disagree (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Strongly Agree (7)

Q22 3. I feel in complete control over whether or not I engage in regular exercise after I leave university.

* Strongly Disagree (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Strongly Agree (7)

Q35 4. Engaging in regular exercise after I leave university would be...

* Harmful (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Beneficial (7)

Q24 5. People who are important to me would approve/disapprove of me engaging in regular exercise after I leave university...

* Would Disapprove (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Would Approve (7)

Q25 6. How much control do you have over whether or not you engage in regular exercise after you leave university?

* No Control (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Complete Control (7)

Q75 7. I have made a detailed plan regarding where to exercise after I leave university

* Strongly Disagree (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Strongly Agree (7)

Q26 8. Engaging in regular exercise after I leave university would be...

* Foolish (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Wise (7)

Q27 9. People who are important to me think I should/should not engage in regular exercise after I leave university...

* Think I should not (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Think I should (7)

Q28 10. Engaging in regular exercise after I leave university would be...

* Unenjoyable (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Enjoyable (7)

Q76 11. I have made a detailed plan regarding how to exercise after I leave university

* Strongly Disagree (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Strongly Agree (7)

Q29 12. Of the people you know at university, how many do you think will engage in regular exercise after university?

* None (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* All (7)

Q30 13. If I wanted to, engaging in regular exercise after I leave university would be...

* Difficult (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Easy (7)

Q31 14. Engaging in regular exercise after I leave university would be...

* Unpleasant (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Pleasant (7)

Q32 15. If I wanted to, I could easily engage in regular exercise after I leave university.

* Strongly Disagree (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Strongly Agree (7)

Q33 16. Do you intend to engage in regular exercise after you leave university?

* Definitely Don't (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Definitely Do (7)

Q34 17. Most people who I know at university will engage in regular exercise after leaving university...

* Strongly Disagree (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Strongly Agree (7)

Q36 Your beliefs about exercise after leaving university...

Q37 This set of questions concern your beliefs about the advantages and disadvantages or regular exercise after leaving university.

Q69 1. Engaging in regular exercise after university would be too tiring.

* Strongly Disagree (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Strongly Agree (7)

Q38 2. Engaging in regular exercise after university would lead to feeling fit and healthy.

* Very Unlikely (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Very Likely (7)

Q71 3. Engaging in regular exercise after university would have social benefits.

* Very Unlikely (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Very Likely (7)

Q40 4. Engaging in regular exercise after university would lead to better mental health.

* Very Unlikely (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Very Likely (7)

Q41 5. Engaging in regular exercise after university would lead to feeling good about my body image.

* Very Unlikely (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Very Likely (7)

Q68 6. Engaging in regular exercise after university would be too expensive.

* Strongly Disagree (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Strongly Agree (7)

Q45 The following questions concern your beliefs about what you think the people close to you will feel about you exercising regularly after leaving university.

Q46 1. My friends think that I should/should not engage in regular exercise after university.

* Definitely think I should not (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Definitely think I should (7)

Q66 2. My family/partner think that I should/should not engage in regular exercise after university.

* Definitely think I should not (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Definitely think I should (7)

Q67 3. My work colleagues think that I should/should not engage in regular exercise after university.

* Definitely think I should not (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Definitely think I should (7)

Q51 The following questions concern your beliefs about things that will make regular exercise after leaving university easier or more difficult.

Q52 1. After leaving university, I expect that I will have a set routine that will help with regular exercise.

* Very Unlikely (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Very Likely (7)

Q70 2. After leaving university, I expect that I will have less time for regular exercise.

* Very Unlikely (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Very Likely (7)

Q91 3. After leaving university, I expect that I will have less money for regular exercise.

* Very Unlikely (1)
* (2)
* (3)
* (4)
* (5)
* (6)
* Very Likely (7)

Q55 Contacting you again...

Q56 Finally, could you please provide us with your contact details so that:(i) you can be entered into the £50 prize draw (ii) we can contact you in six months time to participate in our follow-up questionnaire (i.e. after you have graduated from the University of Sheffield) - this is important for the research so that we can find out about people's exercise behaviour after leaving university. Please provide a NON-university email address in the space below

Q57 NON-university email address that you will still be using in six months:

Q58 Mobile number (if you do not have a non-university email address):

Q59 Thank You!   Thank you for taking our survey. Your response is very important to us and greatly appreciated. If you have provided an email address or mobile number you will be entered into the £50 prize draw. We will also contact you again in six months time to ask you to complete a short follow-up questionnaire. Thank you. Gareth Jones PhD Student Department of Psychology

# Appendix F

## Intervention Video Script Outline

To view the intervention video, please follow the following link:

[**https://www.youtube.com/watch?v=D0eeteorbZI**](https://www.youtube.com/watch?v=D0eeteorbZI)

**Doing post uni**

I now work full time

I start full time employment next week.

I’m working full time

*Various people say what they are doing post uni to put it into context a bit.*

**Advantages**

There are loads of advantages for me to carry on exercising now.

It keeps me feeling really fit and healthy (1).

It improves my mood, and makes me feel confident (3).

I now have a good routine that allows me to organise when to exercise (13).

**Disadvantages**

I have more time than I thought (14).

You don’t have to spend a lot of money to exercise, it can be free, going for a jog or cycling outside (6).

You may have less time after university so it's important to plan when and where you will exercise so that it becomes part of your routine (14)

**Self-Identity**

Exercise is a great way for me to carry on being me (16).

**Likes**

I really enjoy exercise, like having more confidence (3).

I feel really happy after exercise (3).

I feel like I have more energy (7).

It’s a great way to meet new people (2).

I just generally feel much fitter and happier (1).

**Dislikes**

Exercise is a really important part of my day as it is something I really enjoy as it makes you feel good after a day at work (3).

**Self-Identity**

Exercise helped me a lot at university and it still helps me a lot now, that’s one reason why it’s so important to me (16).

**Benefits**

Exercise is a great stress reliever after a day at work (3).

I love the feeling of feeling fit and healthy (1).

**TPW& Post TPW**

I thought that my exercise levels would go down after university, but I’ve found a more stable routine has really helped (13).

I made a good plan to make sure that exercise is part of my routine (13).

**Facilitate**

At university there was a massive range of sports or activities to be a part of and join in. There still is, I just had to look into what I can do in my area (13).

**Debilitate**

Since university, a good routine keeps me motivated as well as help me deal with time issues and my work load (13).

**More control?**

Exercise can be really easy, go for a walk… a jog… cycling.. any time (14).

**+’ve Sub-norm**

My friends and family have been really supportive (8/9).

Go to the gym with a friend (8).

It’s a great way to get to know work colleagues, and see them out of the work environment (10).

**Easier post uni**

I have found it easier to exercise now I have a good routine (6).

**Main motivations**

Exercise is really important to me and my life style (16).

Exercise keeps me fit and healthy, helping me to manage my weight, and really helps to reduce my stress levels from work (4).

It’s also a great way to meet new friends and catch up with people (8).

Exercise helps me to feel good about my body (4).

**Planning**

Planning how exercise would fit into my new life after university really helped to carry to on exercising (17).

**Self-Identity**

Exercise is really important and helps me escape from other stresses, like work (16).

**Sum-up**

Exercise to me is… important to who I am… keeps me fit and healthy… gives me a good routine… a great way to make friends… gives me confidence… and makes me feel great.

(all said by different people).

**Final Page (not spoken)**

What’s exercise to you?

Think of how exercise can benefit you after university

**Remember… (not spoken)**

Regular exercise after leaving university will:

Help keep you fit and healthy

Be sociable

Help your mental health

Make you feel good about your body

Give you energy

Is it something that your friends, family, and colleagues are likely to want you to do.

It is easier if it is part of a routine.

And it doesn’t have to be expensive.