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The effects of mental simulation on attitudes and motivations towards exercise

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Abstract

The World Health Organisation (WHO; 2018a) suggests that regular exercise may help to prevent diseases such as, diabetes, cardiovascular disease, and obesity. Currently, it is estimated that inactivity costs the National Health Service (NHS) £7.4 billion each year (Public Health England, 2019a). Therefore, interventions need to be developed to help inactive individuals to become more physically active. This study looked at the effects of different mental simulation tasks as a method to improve both exercise attitudes and motivations in non-exercisers. It investigated whether positive exercise mental simulations could improve both exercise attitudes and motivations, compared to the positive or neutral simulation tasks. Fifty-six participants that identified as non-exercisers were recruited in the two-part study. The first part of the study, participants were required to answer a range of different questionnaires asking them about their behaviour, attitudes, and motivations towards exercise and studying, and general optimism. Participants returned the next day, where they completed one of the three simulation tasks (neutral, positive, or positive exercise), before repeating the questionnaires, they completed in the first part of the study. The results showed that for autonomous regulation there was a main effect of time, and a simulation task x time interaction. There was also a main effect of simulation task, and time for amotivation. The results are discussed in the context of the implications of these findings. This study found that a single mental simulation session, did not improve exercise attitudes, motivations, nor general optimism in non-exercisers. However, it may be feasible that repeated mental simulations are more effective when the individual has been presented with them over a longer duration (e.g. one- week, two- weeks, or four- weeks). Future research needs to investigate the duration of which repeated mental simulations interventions may improve exercise attitudes and motivations in non-exercisers.

Chapter 1 – literature review

The purpose of this thesis is to investigate the effects of mental simulations as a method of improving exercise attitudes and motivations. More specifically, whether positive mental simulations, relative to a neutral mental simulation, can indeed improve attitudes and motivations towards exercise or whether the mental simulations need to be specifically focused on towards exercise scenarios. This literature review will explore the nature of physical activity (PA)/exercise and what the recommended amounts of PA/exercise are to gain positive health benefits from it. It will then explore the effects of engaging in regular PA/exercise across the general population. It will highlight the current interventions that have been provided by the UK Government and other agencies to help promote an active lifestyle. Then it will highlight the different barriers that restrict individuals from engaging in regular PA/exercise across the general population. Then it will explore the theoretical framework that shows that behaviours such as attitudes and motivations can be modified. It will look at using mental simulations as an intervention to improve behaviours using evidence-based research. Finally, it will provide an overview of what this study has investigated and why this study is important to research.

Physical activity and exercise

Physical activity (PA) is described as bodily movements that are produced from the skeletal muscles, that requires energy expenditure to perform those desired movements. (Casperson, Powell & Christenson, 1985; World Health Organisation: WHO, 2018a). PA can involve a range of different activities which can be conducted whilst at work, undertaking household chores and travelling (WHO, 2018a). Engagement in PA involves conducting bodily movements, that are not intended to maintain or improve one's physical fitness (Casperson et al., 1985). Exercise is a sub-component of PA, it is similar to physical activity except it involves planned, structured and repetitive movements, with the aim of maintaining or improving ones physical fitness. Therefore, individuals that engage in exercise explicitly seek to gain health benefits from their activities (Casperson et al., 1985; WHO, 2018a). In addition, exercise for some individuals can be directed at helping them improve their athletic performance (Bouchard and Shepard, 1994). Exercise can involve recreational sports (e.g. ice hockey or tennis) and/or fitness maintenance activities (e.g. running or spinning classes; Biddle & Mutrie, 2008).

Extensive scientific research has led the WHO (2010) to develop a global initiative which provides the recommended amounts of PA/exercise for individuals to engage in to live a healthy lifestyle. Currently, it is recommended that adults should engage in 150 minutes of moderate intensity PA (e.g. brisk walking or water aerobics) or 75 minutes of vigorous intensity PA (e.g. running or fast cycling) per week, or the equivalent of combined moderate-vigorous intensity PA (Department of Health, 2011; National Health Service: NHS, 2018a; WHO, 2018a). The NHS (2018a) suggests that individuals who are seeking to achieve a healthier lifestyle can do so by engaging in 30 minutes of moderate PA five times a week. Additionally, it is also recommended that adults should engage in muscle-strengthening activities at least two days per week (Department of Health, 2011; NHS, 2018a; WHO, 2018a). However, these figures for PA engagement differs when discussing the appropriate amount of regular exercise for children and adolescents. The World Health Organisation (2018a) recommends that children and adolescents should engage in 60 minutes of moderate-vigorous on a daily basis, although PA that exceeds more than 60 minutes will still provide additional health benefits. Additionally, three of these daily exercises should involve strength-based exercises (Department of Health, 2011; NHS, 2018b; WHO, 2018a).

Benefits of physical activity/exercise

Physical benefits.

Previous research has demonstrated the physiological benefits of PA/exercise with reducing the risk of developing a range of different chronic health conditions such as, obesity, musculoskeletal conditions, cancer, type 2 diabetes, coronary heart disease (CHD), cardiovascular disease (CVD), dementia, Alzheimer's disease and stroke (Department of Health, 2011; WHO, 2018a). Furthermore, whilst regular PA/exercise has shown to be a protective factor against the development of a range of chronic health conditions, it has also been shown to improve the quality of life for those that have those conditions.

Cardiovascular conditions.

Regular PA/exercise has shown to be a protective factor against CVD, blood vessel functioning and high blood pressure (Chobanian et al., 2013; Ashor et al., 2014). Maeseen et al. (2016) reported a curvilinear relationship between regular exercise and cardiovascular mortality. In a review Kacher et al. (2017) suggested that moderate to vigorous forms of exercise can help to develop a cardioprotective mechanism, and this can help to reduce the

risk of non-fatal and fatal cardiovascular events occurring. This suggests that regular PA/exercise may be a preventative factor that reduces the risk of early death by cardiovascular disease. These findings suggest that engaging in regular exercise can not only help to prevent individuals from developing cardiovascular conditions but also can help to improve the health of individuals with cardiovascular conditions. However, Devrome et al. (2019) used a multivariable logistic regression on 23,215 patients with peripheral arterial disease (PAD) that were referred to a 12-week exercise cardiac rehabilitation programme. The results showed an association between completion of the cardiac rehabilitation programme and improve fitness for PAD patients compared to baseline measures. Completion of cardiac rehabilitation programme was also associated with higher survival rates compared to those that did not participant in the cardiac rehabilitation programme. This suggests that cardiac rehabilitation programme may help to improve physical fitness and quality of life for patients with PAD. Overall, research suggests that PA/exercise may help to improve quality of life for individuals with cardiovascular diseases.

Cancer.

Research has shown that there may be a relationship between engaging regular PA/exercise and protecting against developing different types of cancer such as colon, breast, lung, prostate, pancreatic carcinomas and gastrointestinal (Courneya et al., 2011; Crawford-Williams et al., 2018; Devin et al., 2018; Edvardsen et al., 2015; Hayes et al., 2013; Kushi et al., 2012; Michaud et al., 2001; Wolin, Yan, Colditz & Lee, 2009). Research shows that engaging in regular PA/exercise may help to improve the quality of life for individuals with cancer and cancer survivors. In a recent meta-analysis that investigated the effects of aerobic exercise and resistance training in cancer survivors, out of 140 published articles on this topic, 75% of these were statistically significant (Fuller, Hartland, Maloney & Davison, 2018). In addition, Fuller et al. (2018) showed that there were many clinical benefits towards engaging in regular PA/exercise such as physical, functional, psychosocial outcomes and treatment-related side effects. This suggests that engaging in regular PA/exercise may be a beneficial treatment for individuals with cancer and cancer survivors. They concluded that PA/exercise may be a useful tool in helping to improve quality of life for individuals with cancer and cancer survivors. Furthermore, in a review Courneya (2003) reported that PA/exercise may be a useful intervention to improve quality of life for breast cancer survivors. In a six-month follow up study Courneya et al. (2007) found that aerobic exercise and resistance training improved quality of life and self-esteem in breast cancer

patients. This suggests that PA/exercise may be a useful intervention to help improve quality of life for individuals with cancer and cancer survivors.

Dementia and Alzheimer's disease.

Thus far research has been unable to develop a treatment that can prevent, slow down or cure dementia's such as Alzheimer's disease (Yu, Vock & Barclay, 2018). However, research suggests that regular PA/exercise may provide improvements in quality of life for patients with Alzheimer's disease. Heyn, Aberu and Ottenbacher (2004) found that aerobic exercise programmes may be a potential tool that helps reduce the cognitive decline found in patients with Alzheimer's disease. In a recent study Yu et al. (2018) found that aerobic exercise may help to maintain executive functioning in mild to moderate elderly Alzheimer's patients. This suggests that aerobic exercise may be a method in which it may help to slow down the potential cognitive deficits found in patients with Alzheimer's disease. Hoffman et al. (2016) found in a moderate-to-high intensity aerobic exercise programme could help to decrease the neuropsychiatric symptoms (e.g. agitation, delusions, hallucinations, paranoia, apathy and sleep disturbances). They also found that the intervention group improved their cognitive performance (Symbol Digit Modalities Test scores) from baseline compared to the control group. This suggests that there may be a relationship between engaging in exercise and cognition in patients with mild Alzheimer's disease. Additionally, research has shown that aerobic exercise may help to improve cardiorespiratory fitness and exercise self-efficacy (e.g. the belief that they can perform the selection exercises) in a community with patients with mild Alzheimer's disease (Sobol et al., 2016; Vidoni et al., 2012). This research is promising as it demonstrates the positive health benefits for regular exercise can have on individuals that have developed Alzheimer's disease. Exercise programmes developed for patients with Alzheimer's disease have also found promising results for improvements cognition, behaviour and mobility (Cancela, Ayrán, Varela & Seijo, 2016; Tari et al., 2019). These results suggest that regular exercise may have a range of different health benefits for individuals with mild to moderate Alzheimer's disease. Overall, research has shown that PA/exercise may help to improve the quality of life for individuals with Alzheimer's disease.

Diabetes.

Diabetes is a chronic health condition that is continually rising today amongst the population in low to middle income families (WHO, 2018b). Currently, 422 million individuals across the world have diabetes (WHO, 2018b). There are two common types of diabetes; Type 1 diabetes is characterised as insulin production deficiency that required the individual

to administrate the hormone insulin to help manage their diabetes (NHS, 2019a). According to WHO (2018b) the causes of Type 1 diabetes are not yet known, and neither is it known how to prevent the development of Type 1 diabetes. Type 2 diabetes is characterised as the bodies inability to effectively use the hormone insulin this leads to higher levels of blood sugar in the body as the pancreas progressively develops less insulin over time (WHO, 2018b; NHS, 2019a). According to WHO (2018b) Type 2 diabetes is a chronic health condition that is mainly developed in adulthood through the individuals lifestyles choices. Sedentary behaviour, physical inactivity and cardiovascular health problems with a high mortality rate are highly prevalent in individuals with Type 2 diabetes (Morrato et al., 2007). According to the WHO (2018b) the consequences of Type 2 diabetes can be avoided through positive lifestyle changes such as exercising regularly, eating a healthy diet, maintaining a healthy body weight and avoiding smoking tobacco.

Research suggests that engaging in regular PA/exercise may help to prevent an individual from developing Type 2 diabetes. The benefits of regular PA/exercise may improve cardiovascular health (Tanasescu, Leitzmann, Rimm & Hu, 2003), weight loss (Chudyk & Petrella, 2011; Sigal et al., 2007) and improving musculoskeletal strength (Duruturk & Özköslü, in press). All of which are protective factors that may help to prevent individuals from developing Type 2 diabetes. Furthermore, research has shown that regular PA/exercise can help to improve the quality of life for individuals with Type 2 diabetes. With regard to individuals managing their diabetes, research has shown that engaging in a long-term exercise programme may help to improve insulin receptors and glucose transporters, which leads to a reduction in insulin resistance for individuals with Type 2 diabetes (Mann et al., 2014; Zanuso, Jimenez, Pugliese, Corigliano & Balducci, 2010). Furthermore, regular exercise may help to improve glycaemic control for individuals with Type 2 diabetes (Umpierre, Ribeiro & Kramer, 2011). Sigal et al. (2007) found that glycaemic control was greatly improved when the exercise programme is a combination of both aerobic exercise and resistance training. With respect to Type 1 diabetes Reddy et al. (2019) found that resistance training exercise may help with glycaemic control. Previous literature has suggested that aerobic exercise may not be suitable for individuals with Type 1 diabetes, as glycogen levels are depleted during, and even long after aerobic exercise (Reddy et al., 2019; Riddell et al., 2017). However, Wróbel et al. (2018) suggested that both aerobic exercise and resistance training are both safe forms of exercise for individuals with well controlled Type 1 diabetes. This suggests that if an individual has their diabetes well under control, then engaging in aerobic exercise may be beneficial for them. Although research is

limited on what is considered acceptable levels of exercise for individuals with Type 1 diabetes, there are some promising results from the current literature. Overall, the general consensus for individuals with Type 2 diabetes is that they should actively engage in regular PA/exercise to gain a range of different health benefits.

Obesity.

Research has shown the health benefits of regular exercise for individuals that are classed as overweight or obese (Petridou, Siopi & Mougios, 2019). According to WHO (2018c) obesity is the accumulation of excessive fat that may lead to a range of different health implications such as, cardiovascular disease, Type 2 diabetes, musculoskeletal conditions, stroke and some cancers (breast, prostate, ovarian, liver, kidney and colon). This is the current problem that the UK faces today, as it is estimated that approximately one in four adults are currently obese, and one in five children aged 10-11 were classed as obese (NHS, 2019b). Across the world obesity levels have almost tripled since 1975 (WHO, 2018c). According to Chu et al. (2019) the primary cause of obesity occurs due to the amount of excess energy that is consumed versus the energy that is expended. In simple, individuals gain weight from either over consuming and not being active enough, or they are not active at all, therefore encouraging individuals to become more active, may help to prevent individuals from developing obesity (Chu et al., 2019). Research has shown that regular PA/exercise may improve quality of life for individuals that are obese. Petridou et al. (2019) found that engaging in regular PA/exercise may help with improving overall cardiovascular health, weight loss and weight maintenance after weight loss. Recent research conducted by Moslehi, Moslehi and Khalvati (2019) found that outdoor aerobic exercise was more effective at helping obese adolescent boys lose weight compared to indoor aerobic exercise. This suggests that PA/exercise programmes may benefit obese individuals if they were based outdoors. However, research suggests that the most effective way of promoting weight loss is through PA/exercise and dieting together. Said et al. (2018) found that aerobic or resistant training exercise programmes matched with a dieting regime led to greater weight loss compared to dieting alone. Furthermore, they found that aerobic exercise, led to improved cardiovascular fitness compared to the resistant training PA/exercise programme plus dieting. However, resistance training led to improved muscular strength and pliability. This suggests that engaging in a regular exercising programme along with a dieting regime yields the best results for weight loss and other health benefits. The effects of dieting and exercise programmes have found to be effective tools with weight loss in obese individuals (Jakicic et al., 2011; Larson-Meyer, Redman, Heilbronn, Martin & Ravussin, 2010; Ross et

al., 2000). This suggests that individuals diagnosed with obesity, may benefit greatly from an PA/exercise programme that is paired alongside a diet regime. As it may help them to lose weight and gain positive health benefits at the same time. In a recent review, Petridou et al. (2019) suggested that regular PA/exercise may help to benefit individuals with obesity, with both weight loss and management. They also suggested that regular PA/exercise may help to improve psychological and sociological well-being for the individual. They suggested that if an individual pursued exercise instead of dieting, medication, or surgery to tackle their obesity. Then the individual would gain a range of positive health benefits that may reduce their risk of developing potentially harmful health complications. Overall, research has shown that regular PA/exercise may help to promote positive health benefits for obese individuals.

Overall, the evidence suggests that regular exercise may help many individuals that present with a chronic health condition. However, research has shown that individuals with a chronic health condition may also present with a comorbid mental health problem as well (WHO, 2018c). Research has also shown that regular PA/exercise may help to produce positive psychological benefits that may improve mental wellbeing and mental health problems (Atlantis, Chow, Kirby, & Singh, 2004).

Psychological benefits.

Previous research has shown that regular PA/exercise may help to improve mood, positive wellbeing, self-esteem and reduce stress and anxiety symptoms (Barton et al., 2016; Biddle, Mutrie, & Gorley, 2015; Rogerson, Brown, Sandercock, Wooller, & Barton, 2016) According to Biddle, Mutrie and Gorley (2015) PA/exercise increases positive emotions as well as reducing negative mental health problems such as depression or stress. In a recent study, Klaperski, Kock, Hewel, Schempp and Müller (2019) found that from pre to post questionnaires, after a single bout of exercise, improved individuals mood and subjective wellbeing, it also reduced state anxiety and state stress levels. This research suggests that there may be a link between engaging in regular PA/exercise and promoting positive psychological wellbeing.

However, research has shown that individuals with mental health problems are less physically active compared to the general population (Schuch et al., 2017). Research has shown that engaging in regular exercise may help to produce both physical and psychological benefits for individuals with mental health problems (Blake, 2012).

Furthermore, it has also been well documented the antidepressant effect of exercise on individuals with mild to moderate depression (Cooney et al., 2013). Khanzada, Soomro and Khan (2015) found in a cross-sectional study that regular exercise was positively associated with lower depression and reduced anxiety. Interestingly, in a recent meta-analysis, it demonstrated that engaging in regular physical activity may reduce the risk of developing depression (Schuch et al., 2017). This suggests that engaging in regular exercise may act as a protective factor against developing depression.

Research has shown that engaging in regular PA/exercise may help to improve quality of life for individuals with mental health problems. Research has shown that regular PA/exercise may help an individual's mood, feelings of well-being, self-esteem and perceived quality of life (Budde & Wegner, 2018; Dale, Vanderloo, Moore & Faulkner, 2019; Liao, Shonkoff & Dunton, 2015). Balchin, Linde, Blackhurst, Rauch and Schönbächler (2016) found that both moderate- and high-intensity exercise programmes helped to reduce depressive symptoms over a six-week exercise programme. This suggests that adherence to a regular exercise programme may be a useful method to help individuals with mild to moderate depression. With respect to major depressive disorder (MDD) Bartholomew, Morrison and Ciccolo (2005) found that moderate-intensity exercise had a greater effect of positive valance compared to the control. This is also supported by Olson, Brush, Ehmann and Alderman (2017) who found that using an eight-week moderate-intensity aerobic exercise programme reduced depressive symptomology amongst individuals with MDD. This evidence suggests that engaging in regular exercise may help to reduce depressive symptoms and improve positive thoughts in individuals with MDD. Overall, the evidence suggests that engaging in regular exercise may help to reduce depressive symptoms, whilst providing both physical and psychological benefits.

Research has shown that engaging in exercise may help to improve anxiety symptoms in individuals that do not have a diagnosed anxiety disorder (Conn, 2010; Herring et al., 2014; Rebar et al., 2015). This suggests that feelings of anxiety can be reduced through exercising, which may help an individual to manage their anxiety symptomatology. Research has shown that low-to-moderate intensity exercise programmes could help to reduce state anxiety in low to high anxious individuals (Lucibello, Parker & Heisz, 2019). Research suggests that exercise may help individuals with high anxiety in reducing high trait anxiety (Cooper & Tomporowski, 2017; Motl et al., 2004), and high state anxiety (Guszkowska, 2009; Hale & Raglin, 2002). In a recent meta-analysis conducted by Stubbs

et al. (2017) found that engaging in exercise may be a useful treatment for improving anxiety symptomatology and stress-related disorders. However, the authors err on the side of caution before making any conclusive remarks about the interpretation of the results found in the studies. This is mainly due to the limited number of papers used in the meta-analysis, and the quality of the trials within those papers. However, they do suggest that regular exercise may have positive health properties such as, improved cardiovascular health and subjective wellbeing, which are beneficial for individuals with anxiety disorders. The authors suggest that the benefits of regular exercise may provide as an alternative intervention for individuals with anxiety disorders, that do not want to use pharmaceuticals methods, therapy or are unable to access either of these services. Overall, this research suggests that engaging in regular PA/exercise may help to improve the quality of life for individuals with mental health problems.

Physical activity/exercise interventions

There has been a plethora of research that has demonstrated the positive health benefits of engaging in regular PA/exercise. Currently, it is estimated that inactivity costs the NHS £7.4 billion each year (Public Health England, 2019a). Therefore, encouraging individuals to become more active may help to reduce this burden on the NHS. Thus, helping individuals to live positive healthy lives (Public Health England, 2019a). This has led the UK Government and other agencies to develop interventions that may encourage individuals to become more active.

Public Health England (2014) co-developed a framework to promote physical activity in the UK called “Everybody Active, Every Day”. They used an evidence-based approach that identified four key areas to help increase the populations physical activity levels, across the UK these are, creating environments for individuals to become more active, developing more active networks through professionals, scaling up interventions to reach the wider community, and creating a more active society (Public Health England, 2014).

Public Health England (2014) suggest that moulding our environment to become an open space to encourage communities to become more active, may lead to increases in physical activity levels across the population. They recommend that this can be achieved through using existing spaces such as, unused railway lines, and river and canal pathways. They suggest that installing benches and toilets may encourage the elderly to become more physically active. They also suggest that workplaces should provide facilities such as,

showers for staff, more cycle parking to encourage individuals to implement activity in their work lifestyle and make stairs a more attractive option than lifts. Through modifying the environment, it may open up to the normalisation of physical activity/exercise for all of society. Research suggests that our environment plays an important role in our physical and psychological wellbeing (Handy, Boarnet, Ewing & Killingsworth, 2002). Therefore, through developing well designed walkways, paths and cycle lanes, this may help to encourage individuals to become more active in their lifestyles (Handy et al., 2002). Allen, Balfour, Bell, and Marmot (2014) found that individuals that lived near to parks were more likely to achieve the weekly recommended physical activity levels and had a reduce risk of being overweight or obese. Additionally, children's activity levels were much higher in those that lived near to playgrounds, parks or recreational areas compared to those that did not (Maas et al., 2009).

Interestingly, Public Health England (2016) found in a survey that one in four patients would engage in PA/exercise if their GP or Healthcare professional recommended it to them. This may be a vital intervention point that may help encourage individuals to become more active. Therefore, Public Health England (2014) encourages local authorities, professionals and different sectors to all work together and spread the positive benefits of PA/exercise to make it become part of society's normal behaviour. Educating the population about the positive health benefits of PA/exercise may be a useful tool to help create a more active society. Furthermore, Public Health England (2014) set out the initiative to scale up their interventions to target the wider population. They recommended expanding the current infrastructure such as parks, woodland, community halls, streets, common land and workspaces to provide a more enabling environment that can encourage every individual to become more active (Public Health England, 2014). Through this expansion it can help widen the span for exercise interventions to reach the wider community thus, improving the lives of many individuals.

Public Health England (2014) identified that modifying society's perceptions and attitudes towards becoming more active may encourage the wider population to normalise an active lifestyle. There has been a range of different campaigns aimed at encouraging children, families, and adults to become more active. One of these campaigns is called Change4Life. This is a social marketing programme that campaigns towards promoting healthy living for children and their families. The campaign offers to educate children and their families on their child's weight, sports and activities for them to engage in, facts about food, and recipe ideas (Public Health England 2018a). In a survey, Change4Life and Disney

found that four in five children would engage in regular PA/exercise if they saw their favourite character exercising as well. (Public Health England 2018a). This led to the campaign called train like a Jedi programme to encourage children to get physically active (Public Health England, 2018a). This campaign was developed by Sports England, which was in partnership with Disney, UK (Public Health England, 2018a). This campaign saw a quarter of a family's sign up to this campaign within the first month of it being launched. In a recent survey, it found that 66% of children reported they would be more likely to be physically active if they saw their favourite character being active, and 61% of children agreed that they would enjoy sports and physical activity if it was fun to them (Public Health England, 2019b). This led to the latest campaign developed by Change4Life called 10-minute Shake Up in partnership with Disney, UK and local partners. This has allowed children to train like their favourite Disney character to help them become more active (Public Health England, 2019b). This campaign is promising as it may help encourage and motivate children to be more physically active. However, it is unclear whether this campaign has had any impact on increasing activity levels in children across the UK.

There are campaigns aimed at adults such as the One You online campaign. This is aimed at adults between 40 to 60 years old (Public Health England 2019a). This online resource encourages individuals to make changes in their lifestyle such as, becoming more active, eating healthier, and reducing their alcohol consumption (Public Health England, 2018b). The One You campaign offers two apps online that aim to encourage adults to become more physically active (Active 10 and Couch to 5k). The Active 10 app is a walking tracker app that encourages adults to take brisk walks for 10 minutes each session (Public Health England, 2018b). The Active 10 app was developed based upon a report conducted by Public Health England (2017). The results showed that 10 minutes of brisk walking (moderate exercise intensity) may provide health benefits and reduce the risk of early death in these individuals by 15%. Since the apps launch in 2017, there has been 600,000 people who have downloaded the app and it has been estimated that within one month there were 2 million Active 10's (10 minute brisk walks) completed by its users (Public Health England, 2018b). This app allows their users to track the intensity of their walks combined with the amount of time they have spent walking (Public Health England, 2018b). Furthermore, the Active 10 app enables individuals who have restricted amounts of time to fit in some exercise into their daily routine. However, the couch to 5k is an app and podcast that is aimed at adults to become more physically active, by encouraging them to get off their couch and train towards running a 5k run (Public Health England, 2016). The couch to 5k app allows

its users to track their progress and, provides fitness guidance and exercise tips (NHS, 2017). It has been reported that the couch to 5k app was downloaded 209,000 times within its first month (Public Health England, 2014). These are promising figures as it suggests that individuals are wanting to become more active. As the population is becoming more technologically advanced the development of fitness apps may prove to be an important tool in encouraging individuals to exercise and become more active.

One fitness initiative that has helped communities to come together and encourage individuals to become more active is known as parkrun. This is a volunteer organised event that is held across the globe on every Saturday morning, and encourages individuals to run or walk five kilometres (parkrun, 2018). The first ever parkrun was established in London on October 2004, which saw 13 runners and five volunteers come together to organise the event (parkrun, 2018). Now in 2019, parkrun holds 147,805 events across 647 different locations around the UK, they currently have over 2.1 million registered runners (parkrun, 2019). These are promising figures as parkrun enables individuals to all come together to form a community that encourages them all to be more active. In 2018, it was announced that parkrun UK had teamed up with the Royal College of General Practitioners to prescribe an active lifestyle for both patients and practice staff (parkrun, 2018). This partnership is important as it opens the opportunity for individuals to seek an alternative method to help them manage with their physical and/or mental health problems.

Currently, it is unclear how effective parkrun, and Public Health England's campaigns have been on encouraging the UK's population to become more physically active. However, in a recent survey, Sport England (2019) reported a 0.8% increase in adults becoming more physically active (achieving Chief Medical Officers recommendation of 150 minutes of activity per week). They reported that there has been an increase of 498,100 more active adults in the past year (November 17/18). These are promising results as it suggests that the population is becoming more physically active. However, these figures were based upon the responses of 179,747 adults (aged 16 and over) and were scaled up to estimate the overall bigger picture in England. This may not reflect the true reality of what is happening within the population. Sports England (2019) included a range of different activities to measure physical activity engagement, such as, walking, cycling and dance all of which differ in their impact on fitness and health. This means that some individuals in the survey may have gained lots of health benefits from the physical activity they engaged in, compared to some individuals that engage in a physical activity, that may not provide as much health

benefits. Furthermore, the survey was unclear as to whether the individuals were physically active due to them travelling to work (a means of transportation) or they were explicitly seeking the health benefits of exercising. Overall, it is unclear whether these findings can be applied to the wider populations physical activity behaviour. In contrast the WHO (2018a) they suggest that the world's population is becoming more inactive, as it has found that one in four adults are currently not active enough, and approximately 80% of the worlds adolescent population is insufficiently active. Inactivity is the leading risk factor for a range of different noncommunicable diseases (NCD's) such as, Type 2 diabetes, cardiovascular disease and cancer (WHO, 2018a). Individuals that are inactive, increase their risk of death by 20% to 30% compared to individuals who are regularly active (WHO, 2018a). In the UK, it has been reported by Public Health England (2016) that the population is 20% less active than they were in the 1960's, and they predict that if this trend continues then this figure will increase to 35% by the year 2030. These figures are a cause for concern as research has shown the positive health benefits of engaging in regular PA/exercise may have on an individual. Furthermore, research has also shown that regular PA/exercise may be a protective factor that may prevent individuals from developing NCD's. However, there may be some fundamental barriers or reasons as to why these individuals may not be seeking to engage in regular PA/exercise.

Barriers preventing individuals from physical activity/exercise

Barriers are classified as factors that play a role in either discouraging or preventing individuals from engaging in PA/exercise (Biddle, Mutrie & Gorely, 2015). In a survey conducted by Withall, Jago and Fox (2011) they reported a range of different barriers that individuals reported for why they do not engage in regular PA/exercise. One factor that is repeatedly reported by individuals is that they do not have enough time to fit exercise in to their daily routine (Booth et al., 1997; Owen & Bauman, 1992; Withall et al., 2011). For instance, lack of perceived time was one of the main factors that was reported more frequently by individuals aged between 25 to 54 years old, compared to those who were aged 55 years and over (Owen & Bauman, 1992). Furthermore, in a very recent study, Mason, Faller, LeBouthillier and Asmundson (2019) found that individuals reported time constraints such as, work commitments, school, or families, often restricted their availability to engage in exercise. The respondents reported that making time to exercise would prevent them from completing other tasks that they perceive as more important to them. Furthermore, they reported that if they make time to exercise, they would feel guilty whilst

exercising because they were giving up time that could have been allocated for higher priority tasks.

Withall et al. (2011) found that exercise attitudes were discussed as a barrier for not engaging in regular PA/exercise (e.g. *I'd rather be doing something else. I know that sounds awful*). Interviewee's reported that exercise was something not relevant to them. This suggests that individuals attitudes may prevent them from engaging in PA/exercise, as it is not a priority to them. However, they did find some inactive individuals report positive views towards PA/exercise, even though they did not engage in it (e.g. *I used to do keep fit a couple of years ago. I was great, you feel active, you feel fit*). This suggests that for some individuals they have positive attitudes towards PA/exercise, but they still do not engage in it. Whithall et al. (2011) found that some individuals terminated their engagement in PA/exercise because they found it boring, and no longer had the motivation to continue exercising. Individuals also reported that they felt that their weight issues prevented them from wanting to engage in PA/exercise. They also reported other barriers such as not having a lot of confidence, poor physical health, and mental health problems prevented them from engaging in PA/exercise. Whithall et al. (2011) asked session leaders as to why they thought individuals do not engage in PA/exercise. They reported that costs, low confidence, and individuals self-efficacy to complete the PA/exercise sessions were perceived barriers. In clinical populations, Awotidebe, Adedoyin, Afolabi and Opiyo (2016) found that individuals with Type 2 diabetes reported that they had good knowledge of PA/exercise however, had negative attitudes towards engaging in it. Mason et al. (2019) interviewed 16 individuals with anxiety disorders and asked them about their thoughts of what facilitates them or prevents them from engaging in PA/exercise. They found that a lack of PA/exercise knowledge, being judged by peers (social evaluation), increased stress, lack of social support, time and money are all barriers that prevent individuals from engaging in PA/exercise. They also reported that the physical sensations that exercise can produce were found to be misattributed towards their anxiety (e.g. sweating, increase heart rate, difficulty breathing). This may have contributed to them avoiding PA/exercise. For individuals with disabilities, they reported in an interview that the barriers that prevented them from exercising included, costs, equipment, social evaluation, natural environment and psychological and emotional barriers (Rimmer, Riley, Wang, Rauworth, & Jurkowski, 2004). In a review, conducted by Glowacki, Duncan, Gainforth and Faulkner (2017) for adults with depression, they reported a range of different barriers that prevented them from engaging in PA/exercise, such as, lack of exercise knowledge (Wright, Armstrong, Taylor, & Dean, 2011), lack of motivation (Azar,

Ball, Salmon, & Cleland, 2010; Bush et al., 2016; Faulkner & Biddle, 2004; Fraser, Chapman, Brown, Whiteford, & Burton, 2015), cost (Wright et al., 2011), lack of social support (Azar et al., 2010; Bush et al., 2016), and emotions (Azar et al., 2010; Bush et al., 2016; Carpiniello et al., 2013; Faulkner & Biddle, 2004; Wright et al., 2011). This research demonstrates the various barriers that individuals encounter that prevents them from exercising. Interestingly, individuals have repeatedly reported that lack of motivation, poor perceptions, attitudes about PA/exercise, and emotions all prevent them from engaging in PA/exercise. Research has provided a theoretical framework that demonstrates that attitudes and motivations are modifiable behaviours. Furthermore, research studies have also shown that the theoretical frameworks can be used to manipulate attitudes and motivations to change a behaviour towards a more desirable behaviour.

Exercise Behaviour Frameworks

There are two theoretical frameworks that can help to demonstrate the behavioural processes that underline an individual's engagement towards a chosen behaviour. The following theories show how attitudes and motivations can be modified to change a person's perceptions or beliefs to then influence their behaviour towards more positive health behaviours.

Theory of Planned Behaviour.

Theory of Planned Behaviour (TPB; Azjen, 1985; 1991) is the framework that explains how an individual's attitudes may predict their behaviour. TPB proposes that behaviour engagement is primarily established through the intention to act by which three cognitive concepts (attitudes, perceived behavioural control, and subjective norms) guide those intentions towards a particular behaviour (Azjen, 1985; 1991). One of these cognitive concepts are attitudes, these can be positive or negative beliefs about the outcome of the behavioural performance. Those attitudes can be either affective (these represent the positive or negative beliefs that an individual may hold about engaging in a particular behaviour), or instrumental (these are the beliefs that an individual has about the particular outcomes from engaging in that behaviour). The second cognitive concept is perceived behavioural control, this is the individual's belief or their confidence in their ability to engage in a particular behaviour. The last cognitive concept is, subjective norms, this is the outside influences of others, as to whether they think that they should be engaging in the behaviour (the individuals thoughts about what their friend or family member thinks of them engaging in that behaviour). Therefore, when all three concepts are positive then this improves

intentions to conduct the behaviour thus, leading the individual to engage in the particular behaviour. For example, a young teenage boy who regularly plays the electric guitar may engage in this behaviour, because they have positive attitudes towards playing the guitar, they may also believe in their own ability, and they may have supportive parents whom encourages them to continue engage in this behaviour. According to TPB, all three of these cognitive concepts may lead the young teenage boy to continue with their intentions to play the electric guitar.

Researchers have extensively applied the TPB towards the exercise domain which it has deemed to be sufficient in explaining how individuals are influenced towards engaging in exercise (Godin, 1994; Hagger, Chatzisarantis, & Biddle, 2002; Hausenblas, Carron, Mack, & Godin, 1997). According to McEachen, Conner, Taylor, and Lawton (2011) in combination, the cognitions of TPB can predict 44% of the variance towards behavioural intentions to exercise. It has been reported that affective attitudes are found to be the most influential variable towards behavioural intentions to exercise, within the TPB framework (Rhodes, Fiala, & Conner, 2009). Perceived behavioural control and intentions were found to predict behavioural performance. McEachen et al. (2011) found that approximately 24% of the variance can predict exercise behaviour across the studies. However, the gap in the variance that can be accounted for is one of the issues with TPB, as it does not explain the unaccounted variance within the model (Rhodes, Bowie, & Hergenrather, 2003). Although, Ajzen (1991) explains that the TPB should be used as a flexible guideline for researchers to investigate intentions and behavioural engagement. Therefore, researchers can add various variables within the TPB as long as there are theoretical grounds for the inclusion of those variables.

Self-Determination Theory.

Self-Determination Theory (SDT; Deci & Ryan, 1985; Ryan & Deci; 2000) is a framework that may help to explain the motivational mechanisms that underline exercise participation (Emms-Collinson, Jago, Salway, Thompson, & Sebire, 2019). According to SDT individuals are motivated to participate in a range of different behaviours based upon their competency, relatedness, and autonomy (Ryan & Deci, 2000). These three variables appear to be crucial elements in developing individual growth and subjective well-being, as well as creating social connectiveness and integration (Ryan & Deci, 2000). According to Ryan and Deci (2000) individuals may engage in a particular behaviour because they internally motivated (e.g. the individual goes swimming every morning because it makes them feel good about

themselves), or because they are externally motivated (e.g. the individual goes to gym classes because their partner is telling them they need to loose weight). According to SDT there are broad distinctions between both autonomous and controlled types of motivation (or regulation) (Deci & Ryan, 1985; Ryan & Deci, 2000). These types of motivations differ in respect to whether they are internally or external determined (Biondolillo & Pillemer, 2014). There are three different types of autonomous motivation (or regulation). Intrinsic motivation is regarded as the most autonomous form of motivation as it is characterised as individuals explicitly seeking to engage in the activity through enjoyment and satisfaction. Integrated regulation is when the individual has aligned their behaviour as part of their identity, and identified regulation is when the individual knowingly regards the behaviour they are engaging in (Emms-Collins et al., 2019; Ryan & Deci, 2017). In regard to controlled motivation (or regulation) there are two different types. Introjected regulation is when the individual engages in the behaviour because of sanctions they have posed on themselves such as, pride, shame or guilt (Deci & Ryan, 2002), and external regulation is when external forces drive the individual to engage in the particular behaviour through rewards or punishments. These external forces may be family members, friends, or coaches that try to motivate the individual to engage in the desired behaviour (Deci & Ryan, 1987; Ryan & Deci, 2000). However, in absence of both autonomous and controlled forms of motivation (or regulation), then this is classified as amotivation (Ryan & Deci, 2000). This essentially means that the individual possesses no motivation to engage in a particular behaviour. In regard to exercise behaviour, autonomous motivation is linked towards higher intentions to exercise and increased exercise engagement compared to controlled motivation (Standage & Ryan, 2012; Stanley, Cummings, Standage, & Duda, 2012; Texeira, Carraça, Markland, Silva, & Ryan, 2012). Ryan and Deci (2000) have suggested that improving autonomous forms of motivation may help to improve task persistence. This is because autonomous forms of motivation lead the individual to actively engage in a particular behaviour. This is due to the individual finding either satisfaction, or enjoyment from the behaviour, and/or the behaviour forms part of their identity. Therefore, targeting autonomous forms of motivation towards exercise, may help individuals to persist in exercise related behaviours. Multiple studies have shown that increasing autonomous motivation may facilitate changes in exercise behaviour (Anderson & Moss, 2011; Rodgers, Hall, Duncan, Pearson, & Milne, 2010; Standage, Sebire, & Loney, 2008; Stanley et al., 2012). Research interventions that has used the SDT framework to modify exercise behaviour has employed a range of different methods such as counselling sessions, explicit instructions or peer-based trials (Fortier, Sweet, O'Sullivan, & Williams, 2007; Giacobbi, Dreisbach, Thurlow, Anand, &

Garcia, 2014). This suggests that an individual's motivation towards exercise could be modified. Therefore, encourage them to actively engage in exercise behaviours. According to Wilson, Rodgers, Blanchard, & Gessell (2006) using SDT may be a useful method for researchers to employ to help improve their understanding of exercise behaviour.

Types of attitudes/motivations

According to TPB attitudes are measured in two constructs: affective and instrumental (Ajzen, 1985; 1991). Affective attitudes are the representations the individual feels about the consequences of behaviour they engage in (e.g. positive or negative, enjoyable or unenjoyable; Ajzen, 1991). Instrumental attitudes are the individuals beliefs about the particular outcomes for engaging in the behaviour (e.g. wise or foolish, harmful or beneficial; Ajzen, 1991). Therefore, an individual's attitude that possess both positive and beneficial outcomes for them may drive them towards engaging in a particular behaviour.

Within the SDT (Deci & Ryan, 1985; Ryan & Deci; 2000) there are two broad constructs of motivation (or regulation): autonomous and controlled. There are three different types of autonomous motivation (or regulation) within this broad construct. Intrinsic motivation (or regulation) is the most prominent form of autonomous motivation. Intrinsic motivation (or regulation) is when the individual seeks to engage in an activity or behaviour because they gain satisfaction and enjoyment from it (Emms-Collins et al., 2019; Ryan & Deci, 2017). Another type of autonomous motivation is integrated regulation, this is when the individual seeks to engage in the activity or behaviour as they feel that it is a part of their identity (Ryan & Deci, 2000). The final type of autonomous motivation is identified regulation, this is when the individuals consciously values the behaviour they engage in (Emms-Collins et al., 2019; Ryan & Deci, 2017). Within the SDT there are two different types of controlled motivation (or regulation). Introjected regulation is when the individual assigns particular sanctions upon themselves that drives their motivation to engage in the behaviour such as guilt, shame, or pride (Deci & Ryan, 2002). External regulation is when the individual is motivated to engage in a behaviour from outside forces through punishment or rewards (Deci & Ryan, 1987; Ryan & Deci, 2000). However, outside of motivation there is a construct called amotivation, this is when the individual lacks any type motivation. Therefore, the individual is not motivated to conduct any type of behaviour (Ryan & Deci, 2000).

Research has shown that attitudes and motivations are modifiable cognitions that may be altered to encourage individuals to engage in positive lifestyle behaviours. One

potential mechanism that may be able to modify an individual's cognitions are mental simulations.

Mental simulation

Mental simulations are defined as generated mental representations of specific or hypothetical events (Taylor and Schneider, 1989). Research has shown that mental simulations can be temporally orientated towards personal past experiences (to re-live them), or to project oneself towards possible future events - this is referred to as mental time travel (Corballis, 2013; Suddendorf and Corballis, 2007). Furthermore, mental simulations can be constructed to represent a range of different future events either episodically (e.g. thinking about a job interview later in the week) or semantically (e.g. thinking about the economic effects of Brexit). However, it is important to point out that mental simulations cannot easily be categorised as being either semantic or episodic, as they can be generated in to more hybrids forms (e.g. thinking about becoming a manager of a financial firm and what changes they might implement to the firm, when they reach their goal). This is outlined by Szpunar, Spreng and Schacter (2014), who proposed a taxonomy of future-orientated cognitions, that I will discuss later. According to Taylor and Pham (1996) mental simulations allow the individual to re-live past experiences, reassess situations to see what could have been done differently, and to formulate multiple different endings (e.g. re-experience an argument with a friend that has a different outcome). Mental simulations enable the individual to construct future goals or scenarios, whereby they can visualise the processes they need to go through in order to reach their ambitions (e.g. visualising the steps to take in order to gain employment as a chartered psychologist). Mental simulations are an important aspect of cognition as it allows individuals to formulate a vast range of multiple possibilities, which helps individuals to plan, rehearse and reconstruct their behaviour (Taylor and Pham, 1996).

Research suggests that future episodic mental simulations rely upon the episodic memory system. Through activating the episodic memory system, it allows the individual to call upon past lived experiences, this enables them to revisit or relive their past experiences. (Tulving, 2002). Hassabis, Kumaran, Vann, & Maguire (2007) found that patients with brain damage, that was profoundly restricted to the hippocampus, had difficulties with generating specific mental images of both their personal past and future. Previous research suggests that the hippocampus plays a crucial role in memories towards specific personal experiences (Addis & Schacter, 2012). Schacter, Addis, and Buckner (2007) found in a

review of neuroimaging studies, that the human memory system activates a core network of brain regions that are associated with the generation of simulations of both past and future events. This suggests that the brain activates specific regions, to enable the generation of both past lived experiences and the construction of future simulations. Stawarzyck and D'Argembeau (2015) found in a meta-analysis that these core network of brain regions overlapped with the brain regions associated with the default network, when the individual is engaged in episodic future simulation. The default network is made up by a range of different brain regions which are associated with particular functions such as, thinking about the self or others, remembering past events, and thinking about the future (Stawarzyck and D'Argembeau, 2015). Research suggests that the default network and these core network regions of the brain are activated for both episodic future simulations and episodic memories (Benoit & Schacter, 2015). Collectively, these findings have led to the development of the constructive episodic simulation hypothesis by Schacter and Addis (2007). According to the constructive episodic simulation hypothesis, the episodic memory system facilitates episodic future mental simulations, by enabling the individual to retrieve and reconstruct aspects from past experiences to generate possible future events. This demonstrates the adaptive nature of the episodic memory system, as it enables the individual to retrieve past experiences and then modify them to envisage a potential future. Klein (2013) suggests that through natural selection processes the memory system may access past experiences to help plan towards the future. Therefore, episodic simulations may be an important adaptive function, that enables individuals to generate a range of hypothetical events in order to help them plan towards the future.

Research has shown that generating mental simulations to replicate real-life future experiences can have a powerful impact on an individual, on both an emotional and motivational level (Ji, Kavanagh, Holmes, MacLeod & Di Simplicio, 2019). This is because mental simulations can serve as a self-regulation process. It enables individuals to envisage a future scenario which allows them to adjust and regulate their emotions and behaviour, towards making that future scenario become possible (Taylor et al., 1998). This suggests that mental simulations could potentially modify cognitions, which may help to influence changes in an individual's future behaviour.

Szpunar, Spreng and Schacter (2014) proposed a taxonomy of future-orientated cognition. They suggested that there are four components within future-orientated cognition that all interact with one another. The four components are, simulation (the generation of

specific future events), prediction (the perceived estimation of an event occurring), intention (setting oneself a specific goal), and planning (formulation of specific steps to take to achieve the set goal). According to Szpunar et al. (2014) these four components of future-orientated cognition vary in their representations across the episodic – semantic continuum. Along this continuum can be more hybrid forms of future-orientated cognition that involve a combination of episodic and semantic representations. This suggests that future-orientated cognition may function towards modifying thoughts that may change future behaviours. Interestingly, Szpunar and Schacter (2013) found that repeated mental simulations of possible future events led the individuals to feel that those future events are more plausible to occur in their lives. This suggests that the more an individual generates the same mental simulation, the more likely they feel that the event will occur in their future. Therefore, the generation of repeated mental simulations may influence an individual's predictions about possible future events occurring to them. This shows the interaction between the two variables (simulation and prediction) within the taxonomy of future-orientated cognitions.

In a recent meta-analysis, Conroy and Hagger (2018) looked across studies that researched mental imagery on health behaviours. They found out of the 33 studies used, 26 of these studies showed that mental imagery interventions could help to change participants intentions, behaviours and perceived control. This finding suggests that mental imagery interventions may be a useful tool in helping to improve an individual's health behaviour. Interestingly, Vasquez and Buehler (2007) investigated the effects of mental simulation on academic motivation in university students. They also investigated the effects of mental simulations from two different perspectives (the first vs third person). The authors explain that the first-person perspective is when the individual visualises the event through their own eyes. The third person perspective is explained as though the individual visualises themself as though they are looking through the eyes of an observer. The participants were required to highlight one area of their studies that they would like to improve (e.g. an essay or assignment). They were required to fill out a questionnaire regarding their motivation to accomplish the task. The participants were randomly assigned to the mental simulation tasks, in either the first-person or the third-person perspective. The results showed that mental simulations from the third-person perspective enhanced motivation in university students. This suggests that thinking abstractly about a task enhances an individual's motivation to complete that task.

Research to date has shown that mental simulation interventions may be a viable tool to help improve general optimism and positive affect. Blackwell et al. (2013) found in a survey of 237 participants that there was an association between vividness ratings for positive future images and general optimism. They also found that this effect existed even when accounting for socio-demographic factors along with the individuals everyday use of mental imagery. This finding suggests that individuals that regularly use mental imagery and visualise positive future images have higher levels of general optimism. Supporting this research, Ji, Holmes and Blackwell (2017) found in a laboratory-administrated task that vividness of positive prospective mental imagery was significantly associated with general optimism levels. They also found that individuals who were depressed, that could generate positive future images were more optimistic, and were able to improve their general optimism levels quicker than those who could not. This suggests that positive prospective mental imagery may be a useful method to improve general optimism in individuals with depression. Pictect, Coughtrey, Mathews and Holmes (2011) investigated whether picture – word cues that help to formulate mental simulations could improve positive mood in individuals with dysphoria. In their study, they randomly allocated the participants to either the one of the three conditions, positive, negative, or neutral. The participants received 200 picture – word cues for them to mentally simulate. They were required to visualise the picture – word cues, as though they were in the present moment seeing them happen. The results showed that the positive mental simulation condition significantly improved positive mood in participants with dysphoria, compared to the negative and neutral conditions. This suggests that providing individuals with positive cues for them to mentally simulate, may help them to enhance their mood towards more positive feelings. Previous research has shown that mental simulation interventions may be a useful tool to help to positively improve an individual's thought processes. This may help to improve an individual's behaviour, psychological wellbeing, and/or mental health. For example, Boland, Riggs, and Anderson (2018) found that engaging in a positive episodic simulation training task, led individuals to believe that those positive events were more likely to occur in their future. They also found that individuals felt that they had more control over accomplishing positive outcomes; these effects were found in individuals experiencing both mild and moderate levels of depressive symptoms. This research demonstrates that using a positive mental simulation intervention may be a useful tool towards modifying future-orientated thoughts in individuals that are experiencing depressive symptoms.

Research has also looked at using a mental simulation intervention to improve PA/exercise behaviour in individuals from different PA/exercise levels. Andersson and Moss (2011) looked at the effects of using a guided imagery script on exercise behaviour. They assigned the participants to either the guided imagery group, the relaxation group, or the attention group (control group). The guided imagery group were given a 790-word CD. This 790-word CD was a guided imagery script that contained a range of different mental images for the individuals to visualise. These mental images were developed to target intrinsic forms of motivation. The participants were instructed to listen to the CD that was five minutes long, every day for two weeks. The results showed that the guided imagery group improved their exercise behaviour, compared to the other two groups. This suggests that guided mental imagery may help to improve an individual's PA/exercise behaviour. Research has shown that different forms of mental imagery may help to enhance different types of motivations in physically active individuals. Duncan, Hall, Wilson and Rodgers (2012) investigated the effects of a mental imagery intervention in conjunction with an aerobic exercise programme on improving integrated motivation. Female participants from the general population were recruited for the study that did not engage in enough exercise but wanted to increase their participation. The participants were randomly assigned to either the mental imagery intervention condition, or the comparison condition. Participants in the imagery condition met with the researcher and they were instructed to listen to the audio script of the guided imagery intervention. This was delivered through the computer speakers. The participants were told that the most effective forms of imagery involve engaging in all the senses. The participants in the comparison condition met with the researcher and received health information about the benefits of engaging in exercise (e.g. cardiovascular health, reduced state stress and anxiety). The participants for both conditions attended their respective condition sessions once per week for eight weeks. The results showed that the imagery condition improve integrated and intrinsic motivation, compared to the comparison condition. This suggests that combined mental imagery and exercise may help to improve motivation, in individuals that want to become more active. Stanley, Cumming, Standage and Duda (2012) found that more autonomous forms of motivation were increased when enjoyment or technique imagery was administrated, and that controlled motivation improved when appearance imagery was shown to the participants. This suggests that different forms of motivation can be enhanced through the type of imagery that has been administrated. Stanley and Cumming (2010) investigated whether using mental imagery techniques combined with a bout of moderate exercise, compared to just simply exercising on its own, could improve enjoyment and positive affect towards exercise. The results showed that all

the imagery conditions combined with exercise, improved enjoyment and positive affect towards exercise, compared to the exercise alone. This suggests that mental imagery may be a useful tool to help enhance enjoyment and positive feelings towards exercise. Research has found that implicit attitudes towards exercise may be improved by implementing a guided imagery intervention, in frequent and less frequent exercisers (Markland, Hall, Duncan, & Simatovic, 2015). This suggests that using a mental simulation intervention may be a useful tool to help improve exercise attitudes in active individuals. Giacobbi et al. (2014) found that mental imagery techniques increased more autonomous forms of exercise motivation in inactive (nondepressed) individuals. These findings have been extended towards motivating adolescent girls to engage in exercise (Najafabadi et al., 2017). In a randomized control trial Chan and Cameron (2012) found that combined approach and process imagery, and just approach imagery alone could improve cognitions about exercising. Therefore, implementing mental imagery type interventions in inactive individuals may be a useful tool to help encourage them to engage in PA/exercise. This research is encouraging as it demonstrates the effects of using mental simulation interventions as a tool to help modify an individual's behaviour towards exercise. More recently, Renner, Murphy, Ji, Manly, & Holmes (2019) found that mental simulations may serve as a motivational amplifier to promote activities. They found that the motivational imagery group reported on higher levels of motivation, anticipated reward for planned activities, and anticipated pleasure compared to the control groups. This suggests that motivational imagery may help to encourage individuals to engage activities they would like to get involved in.

Rationale and hypotheses

Previous research has shown that mental simulation interventions may be a viable tool to help modify attitudes and motivations towards exercise (Chan & Cameron, 2012; Cumming et al., 2012; Giacobbi et al., 2014; Markland et al., 2015;). It has also shown that different types of mental simulations may lead to improvements in motivations and attitudes (Chan & Cameron, 2012; Markland et al., 2015; Stanley & Cumming, 2010). Recent literature has shown that positive mental simulations may improve wellbeing, mood and optimism in individuals (Blackwell et al., 2013; Pictet, Coughtrey, Mathews, & Holmes, 2011). More recently, Boland et al. (2018) found that positive episodic mental simulations could improve future predictions in dysphoric individuals. Pulling together both these lines of research, it may be possible that thinking positively about PA/exercise may help to improve exercise attitudes and motivations in individuals that do not exercise (non-

exercisers). Currently, the previous literature has not investigated the effects of positive mental simulations on improving exercise attitudes and motivations. This study will fill this gap in the research, as it will investigate whether positive mental simulations could improve exercise attitudes and motivations in non-exercisers. More specifically, it will investigate whether mental simulations need to be specifically focused towards exercise to help improve exercise attitudes and motivations in non-exercisers.

The current study was completed over two sessions, with the second testing session taking place the day after the first testing session. In the first testing session the participants were required to complete a range of different questionnaires that asked them about their current mood, general optimism, attitudes, motivations and behaviour towards exercise and academia. In the second testing session, the participants completed a mood questionnaire. They then received one of the three simulation tasks (positive exercise, positive or neutral). Once they completed the simulation task, they received another mood questionnaire. After which they were given a jigsaw for five minutes. Then they received the final set of questionnaires that asked them about their general optimism, attitude and motivations towards exercise and academia.

The hypothesis is that positive exercise mental simulations will improve attitudes and motivations towards exercise. It is unclear whether positive exercise mental simulations will improve general optimism. It is expected that neutral mental simulations will have no effect on attitudes and motivations towards exercise. In turn, it is hypothesised that positive mental simulations will improve general optimism, but it is unclear ether they will also improve attitudes and motivations towards exercise.

Chapter 2 - Method

Participants

A total of 144 participants were recruited and completed the first testing session. Seven participants withdrew prior to the second testing session, therefore 137 participants completed both stages of the study. All the participants provided informed consent, and all procedures were approved by the University of Hull's Faculty of Health Sciences Ethics Committee.

The participants recruited for the study were first- and second-year undergraduate psychology students from the University of Hull. The students are required as part of their research skills modules to participate in psychological research in order to gain research credits for the research skills modules. The students can sign up to any of the research studies available to them, that they would like to participant in. Therefore, it is important not to restrict the students from being able to participate in the research.

However, in order to reduce the potential of demand characteristics, advertisements did not indicate that the research question was focused on individuals that do not currently exercise. Therefore, participants who identified as exercisers and non-exercisers on the Godin Leisure Time Exercise Questionnaire (Godin & Sheppard, 1985) were recruited for the study. All the participants that were recruited completed all the experimental tasks. However, the data collected from the exercisers were excluded from analyses. Thus, 81 participants were removed from the data set at this stage. This resulted in a total of 56 participants, in the final data set (48 female), all of whom were non-exercisers, with ages ranging from 18 to 46 years (M = 20.66, SD = 4.25).

Materials

Godin Leisure Time Exercise Questionnaire.

Participants exercise behaviour was assessed using the Godin Leisure Time Exercise Questionnaire (GLTEQ: Godin & Sheppard, 1985). The purpose of this questionnaire was to help the researcher establish whether the participants were an exerciser or a non-exerciser. Individuals that were shown to be exercisers were excluded from the positive exercise mental simulation task. Respondents were asked to indicate how frequently (number of times) they engage in strenuous, moderate and mild physical activity

for 30 minutes or more in their free time during an average week. This questionnaire asks them about three types of exercise; strenuous (e.g. *running, jogging, hockey, football*), moderate (e.g. *fast walking, baseball, tennis, easy bicycling*) and mild e.g. *yoga, archery, fishing from river bank, bowling*). This study used the original scoring methods suggested by Godin and Sheppard. The reported frequency of strenuous activity is multiplied by 9, moderate activity by 5, and mild activity by 3. These values are summed to calculate the individuals overall exercise behaviour. An overall score of 24 or more indicates that the person is active (substantial benefits), a score of 14 to 23 indicates moderate activity (some benefits) and scores less than 13 indicates the person is insufficiently active (low benefits). This overall score was used to determine whether the participants were an exerciser (active) or non-exerciser (moderately active and insufficiently active).

The Behavioural Regulation in Exercise Questionnaire.

Exercise motivation was assessed using the Behavioural Regulation in Exercise Questionnaire (BREQ-2: Markland & Tobin, 2004). This was used to assess participant's behavioural regulation towards exercise within the self-determination theory framework (Deci & Ryan, 1985, 1991; Ryan & Deci, 2000). The purpose of this questionnaire was to measure whether exercise motivation had changed from pre-simulation task to post-simulation task. The BREQ-2 is a 19 item self-reported measurement scale that has been adapted from the original BREQ (Mullen, Markland and Ingledew, 1997). Each item on the scale was rated on a 5 point-Likert scale that ranges between 0 = *not true for me* to 4 = *very true for me*. The BREQ-2 is broken down in to five subsections of behaviour regulation including external (e.g., *I exercise because other people say I should*), introjected (e.g., *I feel like a failure when I haven't exercised in a while*), identified (e.g., *I get restless if I don't exercise regularly*), intrinsic (e.g., *I get pleasure and satisfaction from participating in exercise*) and also amotivation (e.g., *I don't see why I should have to exercise*). A composite score for controlled motivation was obtained by averaging from the external and introjected regulation subscales. Additionally, a composite score for autonomous motivation was formulated by averaging scores from the identified and intrinsic regulation subscales. Therefore, three variables drawn from the BREQ-2 were used in analyses: controlled motivation, autonomous motivation and amotivation. Previous research supports the BREQ-2 in its factorial structure, the invariances between gender and the BREQ-2's subscales ability to differentiate between physically active and non-active groups (Markland and Tobin 2004; Mullan and Markland 1997; Mullan et al. 1997; Wilson et al. 2002). Furthermore, these

variables have shown to be effective in predicting exercise behaviour (Standage et al., 2008).

Exercise Attitudes Questionnaire.

Exercise attitudes were assessed using a scale developed by Rhodes and Courneya (2003). The scale requires the participants to indicate how exercising regularly makes them feel. The purpose of this questionnaire was to measure whether there were any changes in exercise attitudes from pre-simulation task to post-simulation task. Exercising regularly was defined as *exercise done at least 3 times per week, for at least 30 minutes in duration, and at least at a moderate intensity*. The participants were given six pairs of adjectives of opposing valances. Each pair was presented on a 7-point bipolar scale as suggested by Ajzen (2002). Scale items measuring instrumental attitudes were *beneficial – harmful*, *wise – foolish* and *useful - useless*. With a composite score for instrumental attitudes formulated by averaging scores across these three items. Scale items measuring affective attitudes were *relaxing – stressful*, *enjoyable – unenjoyable* and *interesting – boring*. Again, the composite score for affective attitudes was formulated by averaging scores on these three items. Creation of composite scores is not always used in the literature but is suggested as an option by the scales authors (Rhodes and Courneya, 2003; Rhodes, personal communication).

Academic Study Time Questionnaire.

The academic study time questionnaire was developed by the researcher to mask the true purpose of the investigation, and was not used for analysis. Participants were required to indicate, across four items, how many hours and minutes are spent studying on average per day, (i.e. [ ] *hours* and [ ] *minutes*). Two items asked participants to quantify the time spent studying in the week (including lectures and seminars) and at the weekend. The other two items asked the participants to quantify the time spent studying at home/university accommodation and at the university (not including lectures or seminars).

Self-Regulation Questionnaire - Learning.

Black and Deci's (2000) Self-Regulation Questionnaire - Learning (SRQ-L) was adapted to assess academic motivation. The original measure asked questions about chemistry but for the purpose of this investigation the questions were altered to be specific to the study of psychology. The questionnaire had three partial statements (*I will participate actively in my psychology degree.., I am likely to follow my lecturer's suggestions for*

studying psychology.. and *The reason that I will work to expand my knowledge of psychology is..*). Each of these partial statements was completed by four sub-statements (e.g. *because I would feel proud of myself if I did well in the course, because it's easier to follow his/her suggestions than come up with my own study strategies* and *because a good grade in psychology will look positive on my record*). This created a total of 12 statements and participants rated the extent to which each was true of themselves. Using a 7 point-Likert scale ranging between 1 = *not true at all* and 7 = *very true*. This questionnaire was used as a filler task designed to mask the true focus of the research and was not used for analysis.

Academic Attitudes Questionnaire.

To assess academic attitudes, adaptations were made to Rhodes and Courneya's (2003) Exercise Attitudes Questionnaire. The scale required the participants to indicate how studying regularly makes them feel. The participants were given six pairs of adjectives of opposing valances, presented to them on a 7-point bipolar scale. The measures testing instrumental attitudes were *beneficial – harmful*, *wise – foolish* and *useful - useless*. The items measuring affective attitudes were *relaxing – stressful*, *enjoyable – unenjoyable* and *interesting – boring*. This was a filler task designed to mask the true focus of the research and was not used for analysis.

Life Orientation Test – Revised.

The Life Orientation Test - Revised (LOT-R; Carver, Scheier & Bridges, 2010) assess optimism versus pessimism with a high overall score indicating that a participants general optimism is high. The LOT-R is a 10-item questionnaire that asks participants to provide responses using a 5-point scale (e.g. 0 = *strongly disagree* to 4 = *strongly agree).* Three items are worded positively (e.g. *in uncertain times, I usually expect the best*) and three items are worded negatively (e.g. *I hardly ever expect things to go my way*). The negative items are reversed coded and scores are summed to provide an overall LOT-R score. The remaining four items are all filler questions (e.g. *It's easy for me to relax* and *I enjoy my friends a lot*) and are not used to calculate the participants LOT-R score. This study used the original scoring method suggested by the authors (Carver et al., 2010). Previous research has used the LOT-R in the context of mental imagery studies (Blackwell et al., 2013; Meevissen, Peters & Alberts, 2011). Research suggests that engaging in positive mental simulations is linked to optimism (Blackwell et al., 2013). The purpose of this

questionnaire was to measure whether the positive or positive exercise simulation task could improve general optimism in inactive individuals.

International Positive and Negative Affect Schedule - Short Form.

The International Positive and Negative Affect Schedule – Short Form (I-PANAS-SF; Thompson, 2007) was used to assess participant's momentary mood. This is a 10-item questionnaire that asks the participants to rate their mood 'right now'. The scale consists of five positive adjectives; active, attentive, determined, inspired and ashamed, and five negative adjectives; upset, hostile, ashamed, nervous and afraid. Participants indicated their response to each on a 5-point scale (1 = *not at all*, 2 = *a little*, 3 = *moderately*, 4 = *quite a bit* and 5 = *very much so*) with scores for positive and negative affect summed separately to provide overall scores ranging between 5 to 25. Higher scores indicated higher levels of positive or negative affect. The purpose of this questionnaire was to ensure that the participants mood was stable throughout the experimental tasks.

Centre for Epidemiological Studies Depression Scale – Revised.

The Centre for Epidemiological Studies – Depression Scale - Revised (CESD-R; Eaton, Muntaner, Smith, Tien & Ybarra, 2004) was used to measure severity of depressive symptoms. This is a 20-item self-report questionnaire that requires the participants to rate their responses on a five-point scale, with regards to their experiences of each of the symptoms over the previous week ranging from: *not at all or less than one day (scores 0)*, *one to two days (scores 1)*, *three to four days (scores 2)*, *five to seven days (scores 3)*, *nearly every day for two weeks (scores 3)*. The scores are summed to calculate an overall score ranging between 0 to 60, with a higher score indicating a higher level of depressive symptomology. The CESD-R has shown strong internal consistency across different community samples (Van Dam & Earleywine, 2011). Research suggests that individuals that present with high levels or dysphoria, or are clinically depressed have difficulty with producing vivid mental images, more specifically positive mental images (Holmes et al., 2008). The purpose of this questionnaire was to establish whether participants were experiencing high levels of dysphoric or depressive symptomatology as this may have affected their ability to generate the positive, or positive exercise mental simulations. This enabled the researcher to see whether the participants CESD-R scores may have been the reason for low vividness ratings in the simulation task.

Positive Simulation Task.

This task was taken from Boland et al. (2018) with the scenario cues adapted from to create the positive simulation task for this study. The participants were presented with a series of simulation cues, each of which described a positive scenario that could occur in their future (e.g. A phone call offers you your dream job and you get given an award that acknowledges your hard work). Using OpenSesame software each cue was presented for 15 seconds, after a one second fixed white dot was shown on the screen. All cues were presented in Cambria (body) size 22 black font within a white text box and centralised on a black screen. For each cue participants were instructed to vividly imagine each of the visual scenes that was shown to them on the screen. After completing the mental simulation, participants were required to rate for how vividly they were able to imagine that scenario, using a 7-point rating scale ranging from 0 = *not very vivid* to 6 = *very vivid.* Participants completed a block of five practice mental simulations before the experiment trails begun. Twenty different cues were used, with each cue presented twice; therefore, each participant generated 40 simulations in total.

Positive Exercise Simulation Task.

This task was identical in structure to the positive simulation task, except the participants were required to mentally simulate positive scenarios that were primarily exercise-related. Fifteen positive exercise-specific cues were created for this task (e.g. *You feel rejuvenated during a soothing yoga session* and *you feel connected with nature while enjoying a long hike*). With an additional five cues taken from the positive simulation task (e.g. *A decision you make turns out to be a good one* and *you receive a flirty text from someone you find attractive*). The task was created in this way to try and mask the focus on exercise.

Neutral Simulation Task.

This task was identical in structure to the positive exercise task and positive simulation task, except that participants were required to simulate neutral rather than positive scenarios. Similar to Boland et al. (2018), this task used 20 neutral cues originally devised by Nolen-Hoeksema and Morrow (1993) (e.g. *a plane flying overhead* and *a truckload of watermelons)*.

Jigsaw Task.

The jigsaw task was a 169-piece puzzle within the Jigsaw Puzzles Epic app by Kristanix studios (2014). The jigsaw was presented using a Kindle fire HD (7”inch screen). Participants were required to fill in as much as the jigsaw puzzle as they could within five minutes. The specific jigsaw puzzles used were randomly selected from the “great nature” range of puzzles in the app. The jigsaw task was employed as a distractor task before the participants would complete the final set of questionnaires.

Design.

For assessments of change in exercise attitudes, exercise motivations and optimism, a 3 (Simulation task: positive exercise vs positive vs neutral) x 2 (Time: pre – post simulation) design was employed, with repeated measures implemented on the last factor. The non-exercisers were systematically assigned to one of the three mental simulation tasks (positive exercise, positive or neutral). The dependent variables were exercise attitudes, exercise motivations and optimism as measured on the Exercise Attitudes Questionnaire, BREQ-2 and the LOT-R.

Procedure.

The study was completed in two parts, with the second testing session occurring a day after the first session. Participants were informed that the experiment was investigating how individuals use imagery and think about a range of different scenarios. The true purpose of the experiment was to investigate changes in exercise attitudes and motivations in non-exercisers; however, this was not made explicit in an attempt to limit demand characteristics.

In the first testing session participants completed the questionnaires in the following order, LOT–R, GLTEQ, BREQ–2, Exercise Attitudes Questionnaire, Academic Study Time Questionnaire, SRQ–L, Academic Attitudes Questionnaire, I–PANAS–SF, CESD–R.

Participants returned to complete the second session the next day. In the second session, all the participants completed the I–PANAS–SF at the outset of this session. Those participants categorised as non-exercisers were systematically assigned to complete one of the three mental simulation tasks (positive exercise, positive or neutral). Participants that were categorised as exercisers completed either the positive simulation task or the neutral simulation task (assigned alternatively). Although data from the exercisers was to be excluded from analyses it was important that they completed all aspects of the study in order

to prevent the true purpose of the study being revealed. However, the ethical concern was raised about potential over-exercisers taking part in the positive exercise simulation task. The ethical issue was that if the over-exercisers engaged in the positive exercise simulation task, that it may cause them to engage in unhealthy amounts of exercise, which may lead to health issues to them as a result. Therefore, it was decided to restrict the exercisers to the two other simulation tasks.

After completing the simulation task, participants completed another I–PANAS–SF. Then they were given a jigsaw task for five minutes. Finally, the participants were given a further I–PANAS–SF, completing the following questionnaires; LOT–R, BREQ–2, Exercise Attitudes Questionnaire, SRQ–L, and Academic Attitudes Questionnaire.

Chapter 3 – Results

Within this study, the participants that were identified as non-exercisers, were assigned to one of three simulation tasks. Therefore, the first stage of analyses established whether these three groups of participants were equivalent, in terms of age, depression severity (CESD-R score) and their ability to perform the simulation task (intra-task vividness ratings). Descriptive statistics for these three variables, as a function of simulation task type, can be found in Table 1.

Table 1

Means (and standard deviations) for age, depression severity (CESD-R score) and intra-task vividness ratings as a function of simulation task.

	Positive exercise	Positive	Neutral
Age	19.89 (1.24)	20.74 (3.79)	21.39 (6.36)
CESD-R score	24.32 (17.65)	16.79 (16.29)	19.61 (14.02)
Vividness rating	3.66 (0.81)	4.00 (0.79)	4.43 (0.53)

Two separate one-way ANOVA's were conducted to check whether the participants assigned to the three different simulation tasks varied in age or level of depression severity. These showed that neither age, $F(2, 53) = .565$, $p = .572$ nor CESD-R scores, $F(2, 53) = 1.06$, $p = .354$, varied across the three sets of participants.

A further one-way ANOVA assessed whether intra-task vividness ratings were equivalent across the three simulation tasks, thus ascertaining whether the simulations produced by participants were of equal vividness across the three tasks. One participant failed to provide any vividness ratings during the neutral simulation task, therefore their data was excluded from this analysis. The ANOVA was significant, $F(2, 52) = 4.871$, $p = .012$, suggesting there were differences in the intra-task vividness ratings across the three simulation tasks. Bonferroni adjusted post-hoc t-tests established there was no significant difference between the neutral simulation and positive simulation tasks, $t(34) = 1.868$, $p = .261$ or between the positive simulation and the positive exercise simulation tasks, $t(36) = 1.286$, $p = .490$. However, there was a significant difference between the neutral simulation and the positive exercise simulation tasks, $t(34) = 3.275$, $p = .009$, whereby intra-task

vividness ratings were significantly higher in the neutral simulation task compared with the positive exercise simulation task.

The primary aim of the study was to test whether using a mental simulation intervention improves attitudes and motivations towards exercise. More, specifically it investigated whether the positive exercise simulation task compared with the positive simulation and neutral simulation task, improves attitudes and motivations towards exercise. As a subsidiary aim, it also examined whether more general changes in optimism occurred as a result of engaging in the different simulation tasks. The analyses pertaining to each of these dependent variables (exercise attitudes, exercise motivation and optimism) will be considered in turn.

Table 2

Means (and standard deviation) scores for exercise attitudes, motivation, and optimism across the three simulation tasks (positive exercise vs positive vs neutral) from pre to post-simulation.

	Positive Exercise task		Positive task		Neutral task		ANOVA	
	Pre-simulation	Post-simulation	Pre-simulation	Post-simulation	Pre-simulation	Post-simulation	Main effects	Interactions
Attitudes								
Instrumental	3.52 (0.44)	3.34 (0.35)	3.57 (0.39)	3.66 (0.47)	3.47 (0.65)	3.29 (0.33)	Mental sim task Time	Mental sim task x time
Affective	3.71 (0.65)	3.96 (0.77)	3.68 (0.51)	3.64 (0.53)	3.84 (0.63)	3.71 (0.48)	Mental sim task Time	Mental sim task x time
Motivation								
Controlled Reg.	0.99 (0.72)	0.89 (0.79)	0.68 (0.71)	0.60 (0.79)	0.90 (0.66)	0.83 (0.61)	Mental sim task Time	Mental sim task x time
Autonomous Reg.	1.77 (0.81)	1.98 (0.85)	2.05 (0.82)	1.97 (0.97)	1.72 (0.71)	1.87 (0.58)	Mental sim task Time *	Mental sim task x time *
Amotivation	1.14 (1.14)	0.94 (1.16)	0.42 (0.65)	0.21 (0.38)	0.65 (0.69)	0.44 (0.48)	Mental sim task * Time *	Mental sim task x time
Optimism	11.68 (5.35)	12.78 (6.06)	11.57 (4.85)	11.84 (4.05)	12.22 (4.09)	11.44 (3.89)	Mental sim task Time	Mental sim task x time

*Note. * p< .05*

Exercise Attitudes

Exercise attitudes were measured using the Exercise Attitudes Questionnaire (Rhodes & Courneya, 2003), which measures both instrumental and affective attitudes. Descriptive statistics, as a function of simulation task, are displayed in Table 2. Two separate mixed 3 (simulation task: positive exercise vs positive vs neutral) x 2 (time: pre-simulation vs post-simulation) ANOVAs were conducted to assess changes in instrumental and affective attitudes, with repeated measures on the latter factor in both cases.

With respect to instrumental attitudes, the analysis showed that the main effect of simulation task was not significant, $F(2, 53) = 1.853$, $p = .167$. Furthermore, the main effect of time was not significant, $F(1, 53) = 2.038$, $p = .159$. Finally, the interaction between simulation task and time was not significant, $F(2, 53) = 2.004$, $p = .145$.

With respect to affective attitudes, the analysis showed that the main effect of simulation task was not significant, $F(2, 53) = 0.532$, $p = .590$. The main effect of time was not significant, $F(1, 53) = 0.119$, $p = .731$, and neither was the Simulation x Time interaction, $F(2, 53) = 2.092$, $p = .133$.

Exercise Motivation

Exercise motivation was measured using the BREQ-2 (Markland & Tobin, 2004), which measures three aspects: controlled regulation, autonomous regulation and amotivation. Descriptive statistics, as a function of simulation task, are displayed in Table 2. Three separate mixed 3 (simulation task: positive exercise vs positive vs neutral) x 2 (time: pre-simulation vs post-simulation) ANOVAs were conducted to assess changes in controlled regulation, autonomous regulation and amotivation with repeated measures on the latter factor in all cases.

With respect to controlled regulation, the analysis showed that the main effect of simulation task was not significant, $F(2, 53) = .944$, $p = .359$. Furthermore, the main effect of time was not significant, $F(1, 53) = 2.652$, $p = .109$. Neither was the Simulation x Time interaction, $F(2, 53) = .019$, $p = .981$.

With respect to autonomous regulation, the analysis showed that the main effect of simulation task was not significant, $F(2, 53) = .340$ $p = .715$. However, the main

effect of time was significant, $F(1, 53) = 4.130$, $p = .047$. This suggests that autonomous regulation improved from pre- to post- simulation task. Post-hoc Bonferroni corrections found that there was a significant effect of time that showed there was a decrease in autonomous regulation from pre-simulation task to post-simulation task p = .047. Additionally, the Simulation task x Time interaction was also significant, $F(2, 53) = 3.329$, $p = .043$. Post-hoc Bonferroni corrections found that there was no significant effect between neutral and positive simulation task $p = > 1$. There was no significant effect between neutral and positive exercise simulation task $p = > 1$ and there was no significant effect of positive exercise simulation and positive simulation task $p = > 1$. This suggests that the simulation task x time interaction was driven by the effect of time from pre-simulation to post-simulation.

With respect to amotivation, the analysis showed that the main effect of simulation task was significant, $F(2, 53) = 4.506$, $p = 016$. Post-hoc Bonferroni corrections found that there was no significant between the neutral simulation and the positive simulation task, $p = 1$ or between the positive exercise simulation and the neutral simulation task, $p = .106$. However, there was a significant difference between the positive exercise simulation and the positive simulation task, $p = .015$. The results showed the positive exercise simulation task scored higher than the positive simulation task. This suggests that the positive simulation task had lower amotivation compared to the positive exercise simulation task. The main effect of time was significant, $F(1, 53) = 7.357$, $p = .009$. This suggests that amotivation decreased from pre-simulation to post-simulation. However, the interaction between simulation task and time was not significant, $F(2, 53) = .003$, $p = .997$.

Optimism

General optimism was measured using the Life-Orientation Scale – Revised (Carver, Scheier & Bridges, 2010) and descriptive statistics, as a function of simulation task, are displayed in Table 2. A mixed 3 (simulation task: positive exercise vs positive vs neutral) x 2 (time: pre-simulation vs post-simulation) ANOVA was conducted to assess changes in general optimism, with repeated measures on the latter factor.

The analysis showed that the main effect of simulation task was not significant, $F(2, 53) = .067$, $p = .935$. Additionally, the main effect of time was not significant, $F(1, 53) = .315$, $p = .577$. Finally, the interaction between simulation task x time was not significant either, $F(2, 53) = 2.387$, $p = .102$.

Chapter 4 – Discussion

The purpose of the current study was to investigate whether mental simulations could improve attitudes and motivations towards exercise. More specifically, whether positive mental simulations could improve attitudes and motivations towards exercise or whether mental simulations need to be specifically focused towards exercise to improve attitudes and motivations. The results for general optimism showed that there were no improvements from pre- to post- simulation task as a result of any of the three simulation tasks. Therefore, neither positive simulation nor, the positive exercise simulation task improved general optimism. The results for exercise attitudes showed that there were no improvements from pre- to post- simulation task, as a result of any of the three simulation tasks. Therefore, neither the positive simulation task nor, the positive exercise simulation task improved attitudes towards exercise. The results for exercise motivation showed that there were improvements from pre- to post- simulation task. With respect to amotivation, the results showed that there was a decrease in amotivation from pre- to post- simulation task for all three of the simulation tasks. Therefore, this suggests that amotivation levels decreased as a result of time rather than simulation task. With respect to autonomous regulation, the results showed that there was an increase from pre- to post- simulation tasks. The results showed that this improvement was a function of time, rather than of simulation task. Therefore, the results found for exercise motivation suggest that the improvements found in exercise motivation were a function of time rather than simulation task. With respect to controlled regulation, the results showed there were no improvements from pre- to post- simulation task, as a result of any of the three simulation tasks. Therefore, neither positive simulation nor positive exercise simulation tasks improved controlled regulation. In contrast to the hypothesis, the results suggest that neither positive exercise mental simulations nor, positive mental simulations had any effect on exercise attitudes and motivations. The implications of these findings will be discussed accordingly.

Previous research suggests that mental simulations may be a viable tool to help improve an individual's attitudes or motivations. It is argued that mental simulations may enable the individual to construct many different possible future events, this enables the individual to plan, rehearse and reassemble their behaviour towards achieving their future goals (Taylor & Pham, 1996). It is suggested that mental

simulations may serve as a self-regulatory process that can evoke strong emotions and can motivate an individual towards their desired goals (Pham & Taylor, 1999). According to Szpunar and Schater (2013) they suggested that repeated mental simulations of future events may lead to the individual believing they are more likely to occur in their future. Therefore, it is theorised that through using a mental simulation intervention in turn may help to encourage individuals to modify their attitudes and behaviours towards conducting more favourable positive lifestyle changes (Ji et al., 2019). However, the current study did not find that mental simulations modified attitudes and motivations towards exercise.

This is in contrast to previous studies such as Markland et al. (2015) who investigated whether an exercise imagery intervention could improve implicit and explicit exercise attitudes in frequent and less frequent exercisers. The results showed that the exercise guided imagery condition improved implicit attitudes, and increased positive exercise attitudes compared to the comparison imagery group. This suggests that using a guided mental imagery intervention may help to improve exercise attitudes for individuals that are exercisers. However, in comparison to the current study that investigated the effects of mental simulations in non-exercisers. The study found that mental simulations did not improve exercise motivation and attitudes in non-exercisers. In addition, the current study used different types of mental simulations compared to Markland et al. (2015) which used guided mental imagery. Therefore, the type of mental imagery technique that is implemented may be an important component towards improving an individual's attitudes and motivations towards exercise. In a different study, Stanley and Cumming (2010) investigated whether using mental imagery techniques after a bout of moderate exercise would improve enjoyment and positive affect towards exercise compared to just simply exercising. The participants were randomly allocated to one of the four different experimental conditions, exercising and energy imagery, exercising and technique imagery, exercising and enjoyment imagery and exercising with no imagery (control condition). All the participants engaged in a single bout of 20 minutes of moderate exercise on a cycle ergometer. The results showed that all of the imagery conditions improved enjoyment and positive affect towards exercise post-exercising compared to the exercise alone control condition. This suggests that mental imagery may be a useful tool to enhance enjoyment and positive feelings towards exercise. Furthermore, it suggests that mental imagery may be a useful tool to use when an individual is engaging in exercise, as it

boosts those positive feelings about exercising compared to just exercising alone. This study looked at the effects of mental imagery whilst the participants were exercising. This shows that engaging in mental imagery whilst exercising may be a useful tool for individuals to feel positive about exercise. This may help them to sustain their exercise behaviour as it makes them to feel positive about it. Furthermore, this study investigated different types of mental imagery which found that all of them enhanced positive feelings and enjoyment whilst the participants engaged in exercise. Therefore, it may be that mental imagery combined with exercising leads to positive feelings and enjoyment for exercising, rather than simply the engaging in mental imagery.

Furthermore, with respect to exercise motivation, Giacobbi et al. (2014) investigated whether a peer-based mental imagery intervention may improve self-determined motivations in women that were enrolled to university. They randomly assigned the participants in to either a peer-mentored group or a peer-mentored group with mental imagery. The study design involved a 10-week randomised control trial (RCT), where participants would receive pre- and post-tests that would assess cardio-respiratory fitness, rate of perceived exertion and self-determined motivation towards exercise. The results showed that individuals in the peer mentored mental imagery group had improved motivation towards exercise at post-test, compared to the other condition. Interestingly, both conditions showed significant results for cardio-respiratory fitness, and better ratings for perceived exertion (better endurance). This suggests that a peer mentored intervention in conjunction with mental imagery may help to improve exercise motivation. In a different study, Chan and Cameron (2012) investigated the effects of different mental imagery types on exercise motivation and behaviour in inactive individuals. In a 4-week RCT inactive individuals were randomly assigned to either neutral imagery, approach imagery (goal orientated), process imagery or approach and process imagery combined. They found that approach imagery alone and both combined process and approach imagery improved cognitive thoughts about exercise in the short term. They also found that approach imagery alone led to higher increases in exercise motivation at week four. They also found approach imagery improved exercise intentions which has an influence on action planning to exercise. Action planning was enhanced further when approach imagery was combined with process imagery. They also found that combined approach and process imagery led to increases in exercise activity at week four compared to the all conditions. In a different study investigating the effects of a 6-week mental imagery

training programme on physical activity levels, Najafabadi et al. (2017) found an increase in physical activity levels in adolescent girls aged 15-16 years old. They also found that mental imagery led to increases in positive self-concept. This suggests that mental imagery may be a positive method to help promote positive psychological well-being in individuals. However, the participants in this study were already physically active as they were in school undergoing the national physical activity curriculum. Furthermore, the participants were school children aged 15-16 years old which makes it difficult to suggest that the results found can be applied to all adolescent children and adults. It is unclear as to whether these results would be found across a range of different populations. In contrast to the current study, these studies investigated the effects of mental imagery interventions over a time period. Such as Chan and Cameron (2012) investigated the effects of mental imagery in a 4-week RCT and, Giacobbi et al. (2014) investigated the effects of mental imagery in a 10-week RCT. The current study only investigated the effects of mental simulations in absence of an exercise programme running alongside it. The current study did not find that mental simulations improved exercise motivation. However, it may be that mental simulations improve motivation when they are repeated over a time period found in those studies. This may support Szpunar and Schater's (2013) suggestion that repeated mental simulations, may make future events seem plausible to them. Therefore, repeated mental simulations that are conducted over time may improve exercise motivations. Future research may need to investigate the effectiveness of mental simulations to improve exercise motivation over different time periods (e.g. one- week, two- weeks and four-weeks). This may help researchers to understand how long it takes for a mental simulation intervention to modify an individual's motivation towards PA/exercise.

In contrast to the current study, previous research suggests that mental simulations may improve general optimism in individuals. Blackwell et al. (2013) investigated in a survey of 237 participants found that there was an association between vividness for positive future images and optimism. This finding suggests that individuals who can vividly imagine positive future events may be more optimistic than those who cannot vividly imagine positive future events. They suggest that vividness of positive future events may be a potential cognitive indicator of optimism. Ji et al. (2017) administrated an imagery intervention over a 4-week period, that involved 12 sessions for the participants to complete at home via the internet. The results showed that there was a significant association between the vividness of positive prospective

mental imagery and optimism levels (both at baseline and in the future). Interestingly, individuals that were depressed who could visualise positive future events were more optimistic and could improve their optimism quicker over time. This suggests that individuals who can visualise positive future events are may be more optimistic than those who cannot visualise positive future events. Interestingly, it suggests that individuals with depression who could visualise positive future events reported improved levels of optimism. Research conducted by Blackwell et al. (2013) found that there may be a relationship between vividness of positive future events and optimism. Therefore, it is unclear whether visualising positive future events leads to better levels of optimism, or if it is a by-product of other variables influencing it. The study conducted by Ji et al. (2017) required the participant to engage in mental imagery over a 4-week period. The current study only administrated a single session of a mental simulation intervention to see if there were any changes in general optimism. Therefore, changes in general optimism may occur when the individual is exposed to repeated sessions of a mental simulation intervention.

The current study did not find that mental simulations improved exercise attitudes and motivations in non-exercisers. The current study found that neither thinking positively about exercise nor, thinking positively in general, improved exercise attitudes or motivations. The findings in the current study suggests that mental simulations may not be able to modify an individual's attitudes and motivations towards exercise contrary to previous research. Therefore, the implications of the findings of the current study suggest that mental simulation interventions may not be an effective tool towards improving attitudes and motivations towards exercise in non-exercisers.

However, there are some limitations within the present study that might account for the lack of significant improvements in exercise attitudes and motivations. Therefore, it is feasible that modification in the methodology, may lead to findings that are more supportive of using a mental simulation intervention, as a method for improving exercise attitudes and motivations. Firstly, the results for intra-intervention vividness ratings were found to be significant. The participants were required to rate the vividness of the simulation scenarios on a 7-point Likert scale (0 = not very vivid to 6 = very vivid). The study found that the vividness ratings for the positive exercise simulation task were rated poorly compared to the neutral simulation task. This suggests that individuals may not have been able to visualise the positive exercise

simulations compared to the neutral simulations. Previous research suggests that the familiarity of mental images may affect how vividly they can generate them. Desrochers and Thompson (2009) found that mental imagery was rated as more vivid for objects the participants encountered or used more frequently compared to ambiguous objects. This suggests that if the participants were not familiar with the particular objects then they may have been unable to mentally simulate these objects vividly. In the context of the current study, participants that identified as non-exercisers may not have been familiar with the positive exercise simulation scenarios. Therefore, they may have not been able to visualise the positive exercise scenarios in their minds. This may explain why the individuals in the positive exercise simulation task were unable to vividly imagine the scenarios.

Another possible explanation might be that non-exercisers may have negative memories about exercising, which may prevent them from visualising the exercise scenarios. Neuropsychological research has proposed that there may be underlying mechanisms that supress vividness of negative images. Maddock (1999) hypothesised that the retrosplenial cortex (which is a section of the posterior cingulate cortex) is involved with memories and emotional processes (Maddock, 1999). It is suggested that the posterior cingulate cortex is linked with memory retrieval and emotional judgement towards a stimulus (Maddock, Garrett, & Buonocore, 2003; Piefke, Weiss, Markowitsch, & Fink, 2005). Research has suggested that the posterior cingulate cortex suppresses the vividness of a negative stimuli (Motoyama & Hishitani, 2016). In a study using fMRI brain scans Motoyama and Hishitani (2016) investigated the underlaying mechanisms that were involved with vividness. They presented participants with positive and negative stimuli for them to imagine as vividly as they could. The results showed that the posterior cingulate cortex activated when the individual was presented with a negative stimulus. Furthermore, they found that the participants could not vividly imagine the negative stimuli either. This suggests that the posterior cingulate gyrus may affect the vividness of negative images. Therefore, in the context of the current study, the participants may have negative memories about exercising, so when they were presented with exercise scenarios, they were not able to visualise them. However, currently it is unclear as to whether non-exercisers have negative memories towards exercise (e.g. negative experiences at school in physical education). Therefore, future research needs to investigate whether non-exercisers have negative or positive memories about exercise.

Recent research has developed the theoretical framework that may outline the relationship between exercise and memory. Ponce and Loprinzi (2018) proposed a bi-directional model of episodic memory and exercise. They posit that there are multiple different relationships between episodic memories and exercise. They suggested that positive memories about exercise may yield the power to motivate individuals to engage in exercise towards the future. One study that supports this concept is Biondolillo and Pillemer (2014) investigated whether a novel memory-based intervention could improve exercise activity levels. They randomly allocated the participants in to either the control group or the intervention group. They required the participants to answer a range of questionnaires that asked them about their exercise behaviour, attitudes and motivations. They were also asked to rate their intentions to exercise towards the future. They asked the participants in the intervention group to describe a positive or negative memory that would motivate them to exercise. The participants in the control group were not instructed to describe a memory. The participants returned after a week from filling out the questionnaires. The results showed that individuals that described a positive memory reported higher levels of exercise activity. This suggests that positive memories may motivate individuals to engage in exercise. It may be possible that non-exercisers do not hold positive memories about exercising, which in turn prevents them from wanting to engage in it. Therefore, future research needs to investigate whether non-exercisers hold negative memories about exercise, compared to exercisers.

The present study investigated whether mental simulations could improve exercise attitudes. However, within the TPB (Ajzen 1985; 1991) it suggests that an individual's behaviour is determined through three cognitive constructs. It suggests that attitudes (instrumental and affective), perceived behavioural control (belief they can do achieve the goal) and social norms (belief that others think they can do it) all play a role in driving behaviour. However, the present study only investigated one of the cognitive constructs within the TPB (Ajzen, 1985; 1991) which was exercise attitudes. Therefore, there may have been some changes in the individuals perceived behavioural control and social norms due to the mental simulation intervention. Future research may need to consider examining all constructs of the TPB (Ajzen, 1985; 1991) to discover whether mental simulation interventions may improve behaviour changes towards exercise in individuals that do not exercise.

In conclusion, research has demonstrated a range of different physical and psychological benefits that individuals could gain from engaging in PA/exercise. Despite this knowledge about the positive benefits of PA/exercise, research has indicated that levels of physically inactivity has increased across the world. This is problematic, as a whole host of non-communicable diseases could potentially be reduced if more individuals became physically active. Therefore, it is important for researchers to develop methods that could be used to help motivate and encourage individuals to engage in PA/exercise. Currently, research has established theoretical frameworks of behaviour that may help researchers to discover methodologies that could be used to help individuals become physically active. Recent research that has investigated the effects of implementing a mental simulation intervention to improve exercise behaviour has shown some promise. These types of interventions may prove to be cost-effective and useful methods to help tackle the levels of physical inactivity. Researchers must continue to strive towards developing these types of methods, that could be used in order to help the wider population to become physically active.

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Appendices

Appendix A – Ethics forms and ethics approval

FHS RESEARCH ETHICS COMMITTEE

SUBMISSION CHECKLIST

Applications by members of Staff:
I have completed the Research Integrity module on the e learning portal **Yes/No**

Indicate with 'X' the documents that have been included with this application.

Fully completed application form	x
Completed risk assessment (see section A11 form available on FHS Sharepoint)	x
Recruitment materials – with date and version number) (e.g. poster or email used to invite people to participate)	D.1
Information sheet(s) – with date and version number (different version for each group of participants)	x
Consent form(s) – with date and version number (different version for each group of participants)	x
Letter or email seeking permission from gatekeeper/host	N/A
Questionnaire(s) – with date and version number	x
If conducting a student survey, confirm that it fits with University policy https://share.hull.ac.uk/Services/Governance/PolicyDocuments/Policy on Student Surveys.docx	N/A
Interview questions / topic guide – with date and version number	N/A
Data management plan (see section E6)	x

Supporting documents should be saved with a meaningful file name and version control (e.g. 'Participant Information Sheet v1.0').

Wherever possible, please ensure that the research title used on consent forms, information sheets, and other supporting documentation is consistent. The title should make clear (where appropriate) what the research is about.

RESEARCH ETHICS COMMITTEE

FORM A – New Application

(Involving human participants, subjects or material)

It is essential that you are familiar with the University Code of Good Research Practice, Research Ethics Policy and the Procedures for Granting Ethical Approval before you complete this form that can be found here. Please confirm that you have read and understood these documents:

◉ **Yes**

○ **No**

Please read each question carefully, taking note of instructions and completing all parts. If a question is not applicable please indicate so. Where a question asks for information which you have previously provided in answer to another question, please refer to your earlier answer rather than repeating information.

Ethics reference number (for office use):	
WorkTribe project URL	

PART A: SUMMARY

A.1 Title of the research The effects of positive exercise mental simulation on attitudes and motivations towards exercise.	
A.2 Principal investigator's contact details	
Name *(Title, first name, surname)*	Mr Adam Boulby
Position	MRes student
Faculty/School	Faculty of Health Science
Telephone number	07960664016
University of Hull email address	a.boulby@2014.hull.ac.uk
A.3 To be completed by students only	
Qualification working towards (e.g. Masters, PhD, ClinPsyD)	MRes
Student number	201402795
Supervisor's name (Title, first name, surname)	Dr Rachel Anderson
Faculty/ School	Faculty of Health Science
Supervisor's telephone number	01482 465582
Supervisor's email address	rachel.anderson@hull.ac.uk
A.4 Other relevant members of the research team (e.g. co-investigators, co-supervisors)	
Name *(Title, first name, surname)*	Prof. Stephen Dewhurst
Position	Professor
Faculty/ School	Faculty of Health Science

Telephone number	01482 465931
Institution	University of Hull
Email address	s.dewhurst@hull.ac.uk

Name (Title, first name, surname)	
Position	
Faculty/ School	
Telephone number	
Email address	

A.5 Select from the list below to describe your research: (Select all that apply)

- ☑ Research on or with human participants
- ☑ Research working with data of human participants
  - ☐ New data collected by qualitative methods
  - ☑ New data collected by quantitative methods
  - ☐ New data collected from observing individuals or populations
  - ☐ Routinely collected data or secondary data
  - ☐ Research working with aggregated or population data
  - ☐ Research using already published data or data in the public domain
  - ☐ Research taking direct measurements from individuals e.g. physiology
- ☐ Research working with human tissue samples
- ☐ Research involving any invasive techniques including administering substances, food (other than refreshments), vitamins or supplements.
- ☑ Research involving discussion of sensitive topics or topics that could be considered sensitive
- ☐ Research involving discussion of culturally sensitive issues
- ☐ Prolonged or frequent participant involvement
- ☐ Research involving members of the public in a research capacity (participant research)
- ☐ Research conducted outside the UK
- ☐ Research involving accessing social media sites
- ☐ Research involving accessing or encountering security sensitive material
- ☐ Research involving accessing websites or material associated with extreme or terrorist communities
- ☐ Research involving storing or transmitting any material that could be interpreted as sympathetic, endorsing or promoting terrorist acts

☐ Research involving financial inducements for participants (other than reasonable expenses and compensation for time)

PART B: THE RESEARCH

B.1 Give a short summary of the research (max 300 words)

*This section must be completed in **language comprehensible to the lay person**. Your answers should be easily understood by someone who is not experienced in the field you are researching, (eg a member of the public) - otherwise it may be returned to you. Where technical terms are used they should be explained. Any acronyms not generally known should be described in full. Do not simply reproduce or refer to the research method or protocol, although these can also be submitted to provide any technical information that you think the ethics committee may require. This section should cover the main parts of the proposal.*

In plain English provide a brief summary of the aims and objectives of the research.

- The summary should briefly describe the background to the research and why it is important,
- the questions it will answer and potential benefits,
- the study design and what is involved for participants.

Mental simulations are described as cognitive constructs of hypothetical events (e.g. attending your graduation) or reconstructions of real events (Sanna, 2000). Thus far the research indicates that using mental simulations or mental imagery interventions may help to improve inactive individuals' attitudes towards exercise. Therefore, by changing individuals attitudes towards exercise this may lead them to become more motivated to engage in physical activity. This may help to improve physical activity levels in inactive or sedentary individuals which may help to reduce the rates of obesity.

This research will look to whether using mental simulation that is specifically crafted towards exercise (positive exercise mental simulation) or using positive mental simulation (positive imagery but not exercise specific) can improve individuals' attitudes towards physical activity. This research may help us to understand whether mental simulations should be crafted specifically towards exercise or whether just generating positive imagery alone can improve individual's attitudes towards physical activity. This may help develop our knowledge of the appropriate strategies to help improve inactive or sedentary individuals motivations to physical activity.

This study will be presented as a two part study with a 24 hour time delay between part one and part two of the study. The participants will be required to apply for both parts to the study before they can participate in part one. At part one of the study participants will be required to fill out a pre-questionnaire which will ask them about their; exercise behaviour, exercise attitudes/motivation, academic attitudes/motivation, academic behaviour, mood, optimism and depressive symptomatology. Once complete the participants will leave and then return to the laboratory the next day (24 hour delay). The researcher will use the results from the exercise behaviour questionnaire to allocate the participants to the appropriate mental simulation group (positive exercise, positive or neutral). Part two of the study the participants will receive a mood questionnaire. Then they will receive the mental simulation intervention, in which they will be asked to mentally simulate a series of different given scenarios as vividly as possible. The different scenarios will be given to them on a computer which will generate 20 different scenarios for them to mentally simulate. They will be asked to rate how vivid these mental simulations are. They will be asked to then re-rate their mood in another questionnaire. After which the participants will be given a filler task (computerised jigsaw puzzle). Then they will be asked to re-rate their mood. Finally, the participants will be asked to fill out the last questionnaire which will ask them about; exercise attitudes/motivation, academic attitudes/motivation, optimism and depression.

B.2 Proposed study dates and duration

Research start date (DD/MM/YY): 01/10/18 Research end date (DD/MM/YY): 30/09/19

Fieldwork start date (DD/MM/YY): 01/01/19 Fieldwork end date (DD/MM/YY): 01/08/19

B.3 Where will the research be undertaken? (i.e. in the street, on University of Hull premises, in schools, on-line etc.)

University of Hull – Psychology Research Laboratories in Applied Sciences Building

Do you have permission to conduct the research on the premises?

◉ Yes ○ No

If no, please describe how this will be addressed.

_____

_____

B.4 Does the research involve any risks to the researchers themselves, or people not directly involved in the research? *E.g. lone working*

◉ Yes ○ No

If yes, please describe and say how these will be addressed (include reference to relevant lone working policies):

The researcher will be the sole person to conduct all of the experiments. The research will be conducted as an individual participation method (i.e. The researcher and the participant). The experimental sessions will be conducted in the psychology laboratory on the 2nd floor Applied Sciences building during the working hours of 9am-5pm. All the participants will be students of the University of Hull. The psychology laboratory is equipped with a telephone for emergency purposes.

If yes, please include a copy of your complete risk assessment form with your application.

NB: If you are unsure whether a risk assessment is required visit the Health and Safety SharePoint site. Risk assessments are required for all fieldwork taking place off campus.

B.5 What are the main ethical issues with the research and how will these be addressed?
Indicate any issues on which you would welcome advice from the ethics committee

The study involved non-trvial deception because it does not outline the full aims of the study at the outset. This is because we want to avoid demand characteristic responses from paricipants and, as such, we have included questions on academic motivation/attitudes as filler items for the purpose of concealing the true purpose of the study. Participants will be fully debriefed on the full aims of the study after participation.

However, the nature of the deception also feeds into another ethical issue. This research will requires the participants in the positive exercise mental simulation to mentally simulate 15 different physical activity scenarios (e.g. you are cycling through the woods on a pleasant sunny day). The purpose of this is to try to modify exercise attitudes/motivations. However, excessive exercising is an acknowledged issue within the literature and we need to be mindful of this in the process of recruitment. Whilst we are particularly interested in individuals who are currently inactive, the nature of the study means that it is not appropriate to advertise explicitly for inactive individuals as it may jeopardise the underlying aims and reveal the true purpose of the study.Therefore, prevention measures have been put in place to protect regularly active individuals. To prevent any harm this study will use the first stage of the study as pre-screening stage. The questionnaires asking the participants about their exercise behaviour will help the researcher to determine the inactive individuals from the regularly active individuals. Regularly active individuals will only be placed into the control condition (neutral mental simulation) or the positive mental simulation condition. Research has shown that both neutral and positive mental simulation can improve mood in dysphoric individuals (Boland, Riggs & Anderson, 2018; Holmes, Long, Moulds & Steele, 2008; Nolen-Hoeksema & Morrow, 1993). Therefore, these two conditions might have positive benefits from a mood perspective, but will also not focus their attention on exercise any further. The inactive individual will be allocated to all three experimental conditions.

The research will be looking at improving attitudes and motivations towards physical active in inactive individuals. This may make individuals feel uncomfortable and possibly body conscious as a result. This issue will be managed by providing the participants with information of the appropriate services that they can get in contact with (University health and wellbeing service and university athletic union). This will be provided to them on the debriefing information sheet.

Participants will be required to fill out Centre for Epidemiological Studies – Depression scale Revised (CESD-R) (Eaton et al, 2004). Some of the questions in the depression scale ask about personal issues such as suicidal thoughts. The participants will be informed that the researcher is not a trained clinician and therefore, cannot discuss their reponses on this inventory. However, if the participant scores high and would like the details of their scores from this inventory passed on to their GP or another relevant healthcare professional they can. This will be provided to them by them filling out their details and their GP details on the consent form. Additionally, the debrief form will contain relevant services for the participant to contact if they need support (e.g. University health and wellbeing service and the Samaritans).

B.6 Does the research involve an international collaborator or research conducted overseas:

○ Yes ◉ No

If yes, describe any ethical review procedures that you will need to comply with in that country:

Describe the measures you have taken to comply with these:

Include copies of any ethical approval letters/ certificates with your application.

PART C: HUMAN PARTCIPANTS AND SUBJECTS

C.1 Are the participants expected to be from any of the following groups? (Tick as appropriate)

- ☐ Children under 16 years old. ***Specify age group:*** _____
- ☐ Adults with learning disabilities
- ☐ Adults with other forms of mental incapacity or mental illness
- ☐ Adults in emergency situations
- ☐ Prisoners or young offenders
- ☑ Those who could be considered to have a particularly dependent relationship with the investigator, e.g. members of staff, students
- ☐ Other vulnerable groups
- ☐ No participants from any of the above groups

Include in Section D5 details of extra steps taken to assure their protection.

Does your research require you to have a DBS check ○ Yes ◉ No

It is the researcher's responsibility to check whether a DBS check (or equivalent) is required and to obtain one if it is needed. See also http://www.homeoffice.gov.uk/agencies-public-bodies/dbs

C.2 What are the potential benefits and/ or risks for research participants in both the short and medium-term?

Risks may include health and safety, physical harm and emotional well-being

The main focus of this study is to improve inactive individuals' attitudes towards exercise. Previous research has shown that using mental imagery interventions can help to improve inactive individuals attitudes towards exercise (Chan & Cameron, 2012; Giacobbi, Dreisbach, Thurlow, Anand & Garcia, 2014). Furthermore, Chan and Cameron (2012) showed that using a mental imagery intervention in inactive individuals may have short term effects as they found an improvement in their attitudes towards exercise which lasted up to four weeks. However, this research aims to differentiate whether specifically crafting mental simulations towards different exercise scenarios can improve inactive individuals' attitudes towards exercise (positive exercise mental simulation) or if it is mentally simulating different positive scenarios (positive mental simulation) can improve attitudes and motivations towards exercise. Changing individuals attitudes towards exercise may encourage and motivate them to engage in physical activity. This may help their overall health in the short-term and possibly the long-term.

The risks of this study have been outlined in section B.5.

What will be done to avoid or minimise the risks?

Please see section B.5.

C.3 Is there a potential for criminal or other disclosures to the researcher requiring action to take place during the research? (e.g. during interviews/group discussions, or use of screen tests for drugs?)

○ Yes ◉ No

If yes, please describe and say how these will be addressed:

C.4 What will participants be asked to do in the study? *(e.g. number of visits, time involved, travel required, interviews)*

This study will be broken down in to two separate studies with a 24 hour delay between the first part and the second part.

Part one.

Participants will be required to fill out a number of different questionnaires:

1. **The behavioural regulation in exercise questionnaire (BREQ-2).**
   - 19 items measuring exercise motivation using a 4-point Likert scale (0 – not true for me to 4 – very true for me.
2. **Godin leisure time exercise questionnaire (LTEQ).**
   - 4 items measuring how frequent someone exercises (strenuous, moderate and mild).
3. **Exercise attitudes questionnaire (EAQ).**
   - 1 item 'exercising regularly for me is..' rates on 6 semantic values (enjoyable - unenjoyable, boring – interesting and relaxing – stressful).
4. **Learning Self-Regulation Questionnaire (SRQ-L).**
   - 12 item questionnaire measuring studying attitudes using a 7-point Likert scale (1 – not true at all to 7 – very true).
5. **Student studying attitudes questionnaire (SSAQ).**
   - 1 item 'studying regularly for me is..' rates on 6 semantic values (enjoyable - unenjoyable, boring – interesting and relaxing – stressful).
6. **Life orientation test (LOT).**
   - 10 items measuring optimism using a 4-point Likert scale (0 – strongly disagree to 4 – strongly agree).
7. **International positive and negative affect schedule (I-PANAS-SF).**
   - 10 items measuring mood on a 5-point Likert scale (1 – never to 5 – always).
8. **Centre for Epidemiological Studies – Depression scale Revised (CESD-R).**
   - 20 items measuring for depression, participants rate the mood or behaviour they may or may not have experienced over different time periods (e.g. not at all/only one day to nearly every day for two weeks).
9. **Academic study time (AST).**
   - 4 items asking to roughly calculate how often students study for per day and how often they study at university and at home.

Part two.

Participants will return back to the laboratory and will complete the following:

1. **I-PANAS-SF** (as described for part 1)**.**
2. **Intervention:** - Participants will be randomly selected in to either one of the conditions; positive exercise mental simulation, positive mental simulation or neutral mental simulation. The different types of mental simulation will be presented on OpenSesame software. This will randomise the order of the different scenarios in each specific group and will be repeated them in a different order. Therefore, participants will mentally simulate 40 scenarios. Positive exericise mental simulation (15 different positive exercise mental simulation scenarios along with 5 different positive mental simulation scenarios to be used as fillers). Positive mental simulations (20 positive mental simulation scenarios). Neutral mental simulation (20 neutral mental simulation scenarios).

3. **I-PANAS-SF (**as described for part 1)
4. **Filler task jigsaw** on Amazon kindle
5. **I-PANAS-SF (**as described for part 1)
6. Questionnaires – **BREQ-2, EAQ, SRQ-L, SSAQ, LOT, CESD-R** (as described for part 1).

PART D: RECRUITMENT & CONSENT PROCESSES

How participants are recruited is important to ensure that they are not induced or coerced into participation. The way participants are identified may have a bearing on whether the results can be generalised. Explain each point and give details for subgroups separately if appropriate. Also say who will identify, approach and recruit participants. Remember to include all advertising material (posters, emails etc) as part of your application.

D.1 Describe how potential participants in the study be identified, approached and recruited and who will do this:

The sample that has been identified are a volunteer sample which will consist of student members from the University of Hull.

The sample will be mainly recruited through the Psychology Research Participation Scheme. This is where students are required to participate in research as part of their course for Research skills modules levels 4 and 5. The students have the choice to select which studies they would like to take part in which will contribute towards their experiential learning experience. The study will be advertised through this research participation scheme as a study investigating imagery and thoughts about possible future scenarios using the following description:

“Participants are required for a study investigating how individuals use imagery and think about different scenarios. You will be asked to mentally simulate a range of different future scenarios as vividly as possible. You will be asked to rate these different scenarios on how vivid you can visualise them. This study also requires the completion of some questionnaires that will ask you about your academic studies, everyday activities, and current mood.

Please click on the link ‘View Study Website’ and this will take you to the Participant Information Sheet. This gives you the opportunity to read the full details of the study in advance of the research session. You will also have chance to read the same information again, at the start of the research session, before you are asked to complete the consent form.”.

Participants will be informed that they will be required to attend two sessions with a 24 hour delay between the sessions (30 minutes & 60 minutes).

D.2 Will you be excluding any groups of people, and if so what is the rationale for that?
Excluding certain groups of people, intentionally or unintentionally may be unethical in some circumstances. It may be wholly appropriate to exclude groups of people in other cases

Participants are required to have a fluency of English language to understand the experimental tasks. These tasks involve answering multiple questionnaires and to mentally visualise the mental simulation tasks which will be written and presented to them on a computer screen. This should not be an issue for the University of Hull student population as any international student should have passed the English proficiency tests before studying at the University of Hull.

The experiment requires participants to read information off a computer screen. Therefore, participants with a visual impairment would be excluded from the experiment. The reason for this exclusion is that research has shown that visually imagery tasks differ in visual vs. visually impaired individuals, this may affect the results results. Also, although the cues could be used in auditory form research has shown that visual vs. auditory cues may lead participants to give different responses which will affect the results.

D.3 How many participants will be recruited and how was the number decided upon?
It is important to ensure that enough participants are recruited to be able to answer the aims of the research. The number of participants should be sufficient to achieve worthwhile results but should not be so high as to involve unnecessary recruitment and burdens for participants. This is especially pertinent in research which involves an element of risk. Describe here how many participants will be recruited, and whether this will be enough to answer the research question.

Previous literature Boland, Riggs and Anderson (2018) used a sample size of 63 participants across three conditions (21 in each). This research found a significant effect in positive episodic mental simulation. Power analysis using G Power 3 software (Faul et al, 2007) showed a sample size of 30 per condition was suitable, and would provide adequate power (1-0.8) to yield a similarly large effect (*d* = .88).

D.4 Will the research involve any element of deception?

◉ Yes ○ No

If yes, please describe why this is necessary and whether participants will be informed at the end of the study.

As explained in section B.5, revealing the full nature of the study will potentially lead to demand characteristic responses from participants. Therefore, we wish to not inform the participants that the study is focused on exercise attitudes/motivations at the outset and have included filler items about academic studies to try and hide the true purpose. Participants will be fully informed of the aims after completion of the study, but will be asked not to tell others about the true purpose of the study and the reasons for this will be explained.

D.5 Will informed consent be obtained from the research participants?

◉ Yes ○ No

If yes, <u>give details</u> of how it will be done. Give details of any particular steps to provide information (in addition to a written information sheet) e.g. videos, interactive material. If you are not going to be obtaining informed consent you will need to justify this.

All the participants will be able to read the information sheet before signing up to the study and will then read it again at the start of part 1. This will provide participants all the information they need regarding what the experiment is about and what is required of them. This would provide them with the opportunity to ask any questions they may have before they would sign the consent form.

(Please see attached the information sheet in appendices).

If participants are to be recruited from any of potentially vulnerable groups, <u>give details of extra steps</u> taken to assure their protection. Describe any arrangements to be made for obtaining consent from a legal representative.

The majority of participants will be students from the University of Hull. Therefore, the participants in this study do have a dependent relationship with the supervisor and co-supervisor (Dr. Rachel Anderson and Prof. Stephen Dewhurst). However, the research will be conducted by the principle investigator (Adam Boulby). The participants do not have a dependent relationship with the principle investigator. The participants should only contact the supervisor or co-supervisor of this project if their answers cannot be answered by the principle researcher who will be running the study. The supervisors will not have access to any of the participants' names/details, only the collated data at the end of the project.

Copies of any written consent form, written information and all other explanatory material should accompany this application*. The information sheet should make explicit that participants can withdraw from the research at any time, if the research design permits. Remember to use meaningful file names and version control to make it easier to keep track of your documents.*

D.6 Describe whether participants will be able to withdraw from the study, and up to what point (e.g. if data is to be anonymised). If withdrawal is <u>not</u> possible, explain why not.
Any limits to withdrawal, e.g. once the results have been written up or published, should be made clear to participants in advance, preferably by specifying a date after which withdrawal would not be possible. Make sure that the information provided to participants (e.g. information sheets, consent forms) is consistent with the answer to D6.

The participants will be able to withdraw from the study during the experimental stages of the study. However, on completion of part 2 all data collected will then be anonymised so that there is not indentifiable link between the participants names and numbers. Therefore, after this point, data collected cannot be withdrawn. This will be highlighted to the participants in the information sheet as a reminder to them that they cannot withdraw after the experimental phase is complete due to their data being anonymised.

D.7 How long will the participant have to decide whether to take part in the research?
It may be appropriate to recruit participants on the spot for low risk research; however consideration is usually necessary for riskier projects.

Advertisement for the study will be on the Research Participation Scheme (SONA) website. This allows participants to select which studies they would like to take part in. A link from SONA will allow them to read the Participant Information Sheet prior to signing up to the study and at any point before they attend the experimental session. At the start of the session participants will be given a paper copy of the information sheet to read again and if the participant is happy to continue then they shall be given a consent form and once that is signed they will continue straight on to the experimental stage of the study. If participants have any questions after reading the information sheet on the SONA system then they can email the principle investigator or they can raise them at the start of the first experimental session prior to providing consent.

D.8 What arrangements have been made for participants who might have difficulties understanding verbal explanations or written information, or who have particular communication needs that should be taken into account to facilitate their involvement in the research? *Different populations will have different information needs, different communication abilities and different levels of understanding of the research topic. Reasonable efforts should be made to include potential participants who could otherwise be prevented from participating due to disabilities or language barriers.*

The information sheet can be presented to individuals verbally if that is their requirement. Additionally, participants are welcomed to ask any questions they need if they required clarifications on any aspects of the study. However, if participants need the information verbally then we would potentially need to apply the exclusion criteria outlined in section D.2.

D.9 Will individual or group interviews/ questionnaires discuss any topics or issues that might be sensitive, embarrassing or upsetting, or is it possible that criminal or other disclosures requiring action could take place during the study (e.g. during interviews or group discussions)? *The information sheet should explain under what circumstances action may be taken.*

◉ Yes ○ No

If yes, give details of procedures in place to deal with these issues.

These issues have been outlined and appropriate measures have been provided in section B.5.

D.10 Will individual research participants receive any payments, fees, reimbursement of expenses or any other incentives or benefits for taking part in this research?

◉ Yes ○ No

If Yes, please describe the amount, number and size of incentives and on what basis this was decided.

Participants who apply through the Research Participation Scheme will receive '1.5 hours course credit' towards their Research Skills module.

PART E: RESEARCH INVOLVING HUMAN TISSUES OR MATERIAL

E.1 Will the research involve the use of any of the following? (Select as appropriate)

- ☐ Foetal material
- ☐ The recently deceased
- ☐ Cadavers
- ☐ Human bodily fluid
- ☐ Human tissue
- ☐ Human organs
- ☐ Human gametes

Go to Section F if the research does not involve any of the above material.

E.2 Will the material to be accessed be collected as part of this study or 3rd party accessed (E.g. material collected as part of another study or purchased)?

If yes to 3rd party access, please provide details on appropriate consent for this use.

E.3 What type of tissue or material will be collected?

E.4 How will the tissue or material be collected and who will do this?

E.5 How many samples will be collected?

E.6 How long will samples be stored?

E.7 Do you require a regulatory licence to use or store this material?

○ Yes ◉ No

All material is expected to be stored in line with the Human Tissue Authority storage expectations.

E.8 Do you have the appropriate Health and Safety procedures in place for the researchers to handle the samples?

○ Yes ◉ No

PART F: RESEARCH DATA

F.1 Explain what measures will be put in place to protect personal data. E.g. anonymisation procedures and coding of data. Any potential for re-identification should be made clear to participants in advance.

Participants will be taking part in two experimental sessions. Therefore, their data will need to be linked to their personal details in between these two sessions. This information will be kept in a password protected file accessible only by the principle researcher (A.Boulby). As soon as a participant has complete experimental session 2 (or has withdrawn) their data will be anonymised and their details removed from this password protected file.

The data that will be collected will be anonymised after experimental session 2. The participants shall be coded with a number when they agree to take part in the study. The names of the participants will be only collected on the consent forms and stored in a locked postgraduate research office within the Psychology department. All the hard copies of the questionnaires collected with participant number will be stored separately from the consent forms in a locked postgraduate research office within the Psychology department. On completion of the research all paperwork will be passed over to the supervisor, who will store it safely within the psychology department.

The study will use a separate password protected file for individuals that indicate they would like their CESD-R scores passed on to their GP or other healthcare professional. This information will be collected at the time of testing and will be passed forward to their GP or healthcare professional after the scores have been scored and a letter will be sent to the relevant individual. As soon as the letter has been sent then their details will be removed from this password protected file.

All the information will be saved on the University of Hull's servers and stored on the G:Drive.

F2. What security measures are place to ensure secure storage of data at any stage of the research?

Provide details on where personal data will be stored, any of the following: (Select all that apply)

- ☐ University approved cloud computing services
- ☐ Other cloud computing services
- ☐ Manual files
- ☐ Private company computers
- ☐ Portable devices
- ☑ Home or other personal computers (not recommended; data should be stored on a University of Hull server such as your G,T, X or Z: drive where it is secure and backed up regularly)

Please attach the data management plan in the appendices; for further information visit http://libguides.hull.ac.uk/researchdata

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F.3 Who will have access to participant's personal data during the study?

Hard copies of the consent form will be stored in a locked postgraduate research office within the Psychology department. Any electronic files containing personal data will be password protected and these will be only accessible to the principle researcher. The supervisors will not have access to participants' personal data – they will have access to collated mean data in spreadsheets and will be responsible for storing the consent forms and questionnaire data (separately, with no identifiable link) at the end of the study.

F.4 Where will the data generated by the research be analysed and by whom?

All the data collected will be anonymised and will be inputted using Microsoft Excel and SPSS software. The information will be collected using the principle researchers laptop but will be stored on the University of Hull's servers and saved on the G:Drive. All the data will be saved in password protected files. Therefore, access to the data will require a two-stage vertification process.

F.5 Who will have access and act as long term custodian for the research data generated by the study?

The supervisor (Dr. Rachel Anderson) will have access and will act as the long term custodian for the research data for this study.

F.6 Have all researchers that have access to the personal data that will be collected as part of the research study, completed the University (or equivalent) data protection training?

◉ Yes ○ No

It is mandatory that all researchers accessing personal data have completed data protection training prior to commencing the research.

F.7 Will the research involve any of the following activities at any stage (including identification of potential research participants)? (Select all that apply)

- ☐ Examination of personal records by those who would not normally have access
- ☐ Access to research data on individuals by people from outside the research team

- ☐ Electronic surveys, please specify survey tool: _____
- ☐ Other electronic transfer of data
- ☑ Use of personal addresses, postcodes, faxes, e-mails or telephone numbers
- ☐ Use of audio/ visual recording devices (NB this should usually be mentioned in the information for participants)

F.8 Are there any reasons to prevent or delay the publication of this research? E.g. Commercial embargoes, sensitive material.

○ Yes ◉ No

If yes, provide details:

F.9 Where will the results of this study be disseminated ? (Select all that apply)

- ☑ Conference presentation
- ☑ Peer reviewed journals
- ☐ Publication as an eThesis in the Institutional repository HYDRA
- ☐ Publication on website
- ☑ Other publication or report, please state: MRes research project assignment.
- ☐ Submission to regulatory authorities
- ☐ Other, please state: _____.
- ☐ No plans to report or disseminate the results

F.10 How long will research data from the study be stored?

10 years.

The data collected from this research will be transferred from the principle researchers password protected laptop and will move them to the university of Hull's secure internal drives. This data will only be accessible to the principle researcher and the supervisor. The hard copies of consent forms, questionnaires and personal information (date of birth and gender) will be locked away in a separate filing cabinet located in the supervisors office. This information will be stored for 10 years and will then be disposed of through the University of Hull's confidential waste disposal procedure.

F.11 When will the personal data collected during the study be destroyed and how?

Personal information that will be collected through this research will only keep the information until the participant has completed the two parts of the experiment. After which all personal information will be deleted and will therefore, be all anonymised.

The hard copies of the consent form will be kept in a locked filing cabinet in the supervisors office. These will be kept for 10 years and then will be disposed of through the Universitys confidential waste disposal procedure.

Researchers must comply with the General Data Protection Regulations that are live from May 2018.

PART G: CONFLICTS OF INTEREST

G.1 Will any of the researchers or their institutions receive any other benefits or incentives for taking part in this research over and above normal salary or the costs of undertaking the research?

○ Yes ◉ No

If yes, indicate how much and on what basis this has been decided

G.2 Is there scope for any other conflict of interest? *For example, could the research findings affect any ongoing relationship between any of the individuals or organisations involved and the researcher(s)? Will the research funder have control of publication of research findings?*

○ Yes ◉ No

If so, please describe this potential conflict of interest, and outline what measures will be taken to address any ethical issues that might arise from the research.

G.3 Does the research involve external funding? (Tick as appropriate)

○ Yes ◉ No

If yes, what is the source of this funding? _____

PART H: TRAINING

Please provide details of any training required to conduct this research by any member of the research team.

PART I: DECLARATIONS

Declaration by Principal Investigator

1 The information in this form is accurate to the best of my knowledge and belief.

2. I take full responsibility for the information I have supplied in this document.

3. I undertake to abide by the University's ethical and health and safety guidelines, and the ethical principles underlying good practice guidelines appropriate to my discipline.

4. I will seek the relevant School Risk assessment/COSHH approval if required.

5. If the research is approved, I undertake to adhere to the project protocol, the terms of this application and any conditions set out by the Faculty Research Ethics Committee.

6. Before implementing substantial amendments to the protocol, I will submit an amendment request to the Faculty Research Ethics Committee seeking approval.

7. If requested, I will submit progress reports.

8. I am aware of my responsibility to be up to date and comply with the requirements of the law and relevant guidelines relating to security and confidentiality of participants or other personal data, including the need to register when necessary with the appropriate Data Protection Officer.

9. I understand that research records/data may be subject to inspection for audit purposes if required in future.

10. I take full responsibility for the actions of the research team and individuals supporting this study, thus all those involved will be given training relevant to their role in the study.

11. By signing the validation I agree that the Faculty Research Ethics Committee, on behalf of the University of Hull, will hold personal data in this application and this will be managed according to the principles established in the Data protection Act (1998).

Sharing information for training purposes: Optional – please tick as appropriate:

☐ I would be content for members of other Research Ethics Committees to have access to the information in the application in confidence for training purposes. All personal identifiers and references to researchers, funders and research units would be removed.

Principal Investigator

Signature of Principal Investigator: 
(This needs to be an actual signature rather than just typed. Electronic signatures are acceptable)

Print name: Adam Boulby. Date: 30/11/2018.

Supervisor of student research: I have read, edited and agree with the form above.

Supervisor's signature: 
(This needs to be an actual signature rather than just typed. Electronic signatures are acceptable)

Print name: Dr. Rachel Anderson Date:(dd/mm/yyyy): 14/12/2018.

Remember to include any supporting material such as your participant information sheet, consent form, interview questions and recruitment material with your application. Version control should be adopted to include the version number and date on relevant documents in the appendices.

These should be pasted as Appendices to this form.
Multiple documents will not be accepted.

Please submit your form **by email** to **FHS-ethicssubmissions@hull.ac.uk**

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UNIVERSITY OF HULL

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PRIVATE AND CONFIDENTIAL
Adam Boulby
Faculty of Health Sciences
University of Hull
Via email

9th January 2019

Dear Adam

REF FHS104 - The effects of positive exercise mental simulation on attitudes and motivations towards exercise.

Thank you for your responses to the points raised by the Faculty of Health Sciences Research Ethics Committee.

Given the information you have provided I confirm approval by Chair's action.

Please refer to the Research Ethics Committee web page for reporting requirements in the event of any amendments to your study.

I wish you every success with your study.

Yours sincerely

Professor Liz Walker
Chair, FHS Research Ethics Committee

UNIVERSITY OF HULL

Liz Walker | Professor of Health and Social Work Research | Faculty of Health Sciences
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FHS RESEARCH ETHICS COMMITTEE

FORM C: Notice of Substantial Amendment

Principal Investigator contact details	
Name:	Adam Boulby
Address:	8 Rainford Square Kirk Sandall Doncaster DN3 1NS
Telephone	07960664016
Email:	a.boulby@2014.hull.ac.uk

Full title of study	**Using positive simulation training to improve expectations about the future in depression – Theme 1**
REC reference number (from original authorisation letter)	REF FHS104
Date study commenced	28th January 2019
Insert amendment number & date	Amendment 1 (08/02/2019)

Tick all that apply	**Type of amendment**	**Effective date for amendment**
☐	Changes to the design or methodology of the study, or to background information affecting its scientific value	
☐	Changes to the procedures undertaken by participants; any change relating to the safety or physical or mental integrity of participants, or to the risk/benefit assessment for the study	
x	Significant changes to study documentation such as participant information sheets, consent forms, questionnaires, letters of invitation, letters to GPs or other clinicians, information sheets for relatives or carers etc.	ASAP
☐	Appointment of a new chief investigator	
☐	Temporary halt of a study to protect participants from harm, and the planned restart of a study following a temporary halt;	
☐	A change to the definition of the end of the study	
☐	Any other significant change to the protocol or the terms of the original approved ethics application	

Is this a modified version of an amendment previously notified to the REC and given an unfavourable opinion?	○ Yes ◉ No

Summary of changes

Participants complete a depression questionnaire (CESD-R; Eaton et al, 2004) as part the research. This includes two questions that relate to thoughts of self-harm/suicide. As our research is recruiting participants from the university population, the Health and Wellbeing Team have requested that the researchers should rause a welfare concern about any students who indicate having thoughts of self-harm/suicide on this questionnaire.

In order to do this we have had to make changes to the information sheet and consent form to reflect the conditions under which we would break the participant's confidentiality. The amended sections have been highlighted on the attached information sheets and consent forms.

We will continue to send full copies of the depression questionnaire to a participant's GP or chosen healthcare provider if they request us to do so.

Any other relevant information

List of attached documents (these should be added to the end of this document)		
Document	Version	Date
Participant Information Sheet	1.2	8 Feb 2019
Consent Form	1.2	8 Feb 2019

DECLARATIONS:

I confirm that the information in this form is accurate to the best of my knowledge and I take full responsibility for it.

I consider that it would be reasonable for the proposed amendment to be implemented.

Principal Investigator:

Signature of Principal Investigator: 

(This needs to be an actual signature rather than just typed. Electronic signatures are acceptable)

Print name: Adam Boulby Date: (dd/mm/yyyy) 05/02/19

Supervisor of student research: I have read, edited and agree with the form above.

Supervisor's signature: 

(This needs to be an actual signature rather than just typed. Electronic signatures are acceptable)

Print name: Dr Rachel Anderson Date: (dd/mm/yyyy) 05/02/19

This application should be emailed to the ethics submission email address
FHS-ethicssubmissions@hull.ac.uk

No actions relating to the amendment should be Undertaken until approval has been obtained.

UNIVERSITY OF HULL

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PRIVATE AND CONFIDENTIAL
Adam Boulby
Faculty of Health Sciences
University of Hull
Via email

27th March 2019

Dear Adam

REF FHS104 - The effects of positive exercise mental simulation on attitudes and motivations towards exercise.

Thank you for submitting your Form C: Notice of Substantial Amendment to the Faculty of Health Sciences Research Ethics Committee.

Given the information you have provided I confirm approval by Chair's action.

Please refer to the Research Ethics Committee web page for reporting requirements in the event of any amendments to your study.

I wish you every success with your study.

Yours sincerely

Professor Liz Walker
Chair, FHS Research Ethics Committee

UNIVERSITY OF HULL

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Appendix B – Information sheet, consent forms and debrief

UNIVERSITY OF HULL | FACULTY OF HEALTH SCIENCES

Version 1.0 14/12/18

Information sheet.

Title: Mental Imagery and thoughts about everyday activities.
Researcher: Adam Boulby, Dr. Rachel Anderson and Prof. Stephen Dewhurst.

Purpose of the study
The purpose of this study is to investigate how individuals use imagery and think about a range of different scenarios.

Procedure
Before signing on to this study you must ensure you have signed on to the second part before commencing on to the second part of the study. The first part of this study will require you to fill out a range of different questionnaires. These will ask you about a variety of everyday experiences, including your academic studies, daily activities, and mood. In the second part of the study, which will be the following day, you will be required to sit in front of a computer screen where you will be asked to use mental imagery to imagine a range of possible scenarios as vividly as possible. Across the course of this second session you will be asked to complete some further questionnaires; some will ask you about your mood at that moment in time and others will be more general questions about everday experiences similar to those completed in the session the day before.

How much of your time will participation involve?
The study takes places across two sessions. The first session is likely to take approximately 30 minutes to complete. The second session must take place the day after the first session and is likely to take approximately 60 minutes to complete.

Payment
Participants will receive 30 minutes of research participation credits for completing the first part of the experiment. Participants will receive 60 minutes of research participation credits for completing the second part of this experiment.

Potential risks and ethical consideration
One of the questionnaires asks you to think about how you have been feeling recently, including possible symptoms of depression and suicidal thoughts. These questions are being asked for research purposes. The researchers are not clinicians and, therefore, are not qualified to discuss your responses on this questionnaire. However, if you wish for your responses to be passed onto your GP (or an alternative healthcare professional) then please provide their details on the consent form. One of the experimental tasks asks you to consider negative events that might occur in the future (e.g. A friend tells you that you are being really annoying), which may make you feel upset. Other questionnaires ask about your academic studies and everyday activities; whilst we don't anticipate that these would be upsetting, we take this opportunity to remind you that you are free to withdraw from the study at any time and if you would like to talk with someone about any issues raised by the questionnaires or experimental tasks then appropriate contact details are supplied on the debriefing sheet. No other risks are known to the investigator at this time.

Confidentiality & Anonymity
All information collected about you and your participation will be kept private and confidential. If information about you is published it will be in a form such that you cannot be recognised.

You will be assigned a 'participant number' that will be used by the researcher only to organise the information gained from your responses. The researchers will keep a copy of all participants' name on the attached consent forms. Intially, your name and participant number will also be kept in a password protected electronic datafile. This is because this study takes place across two sessions and we need to be able to collate your responses across these sessions. As soon as you have completed the second session, the information linking your name with your participant number will be deleted from this file; this is a process known as anonymisation. It is important to highlight that once the experimental phase is complete you will be unable to withdraw your information from the study, as all your information will be anonymised, and the researcher will not be able to locate your details. If you have asked for your questionnaire responses to be passed onto your GP then this information will initially be stored in a password protected file on the university server and once the information has been sent to your GP the file will be amended to remove this information and your data will be anonymised as described above.

All hard copies of consent forms and experimental tasks will be kept in separate locations and any electronic files containing data will be kept on a secure area of the university server. Your participation in the study is voluntary and you are free to choose whether or not to complete the study.

What happens now?

If you are interested in taking part in the experiment you will be asked to complete and sign the consent form. Then you will be given specific instructions. Please do not sign the consent form if you do not wish to take part. Please feel free to ask any questions that you may have.

Contact for further information

You are welcome to keep this information sheet and the debrief sheet that will be given to you after participation. However, if you would like further information about the research, in terms of its aims, procedures and findings then feel free to contact the researcher Adam Boulby(a.boulby@2014.hull.ac.uk) or his supervisor, Dr. Rachel Anderson (Rachel.anderson@hull.ac.uk).

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Version 1.0/14/12/18

CONSENT FORM

Mental imagery and thoughts about everyday activities.

Investigators: Adam Boulby, Dr. Rachel Anderson and Prof. Stephen Dewhurst.
Department of Psychology, University of Hull

The participant should initial to indicate their agreement with the following statements.

	Initial
• I have read and understood the participant information sheet (V1.0/14 Dec 2018)	_____
• I have had the opportunity to ask questions and/or discuss the study	_____
• Any questions I asked have been answered	_____
• I have received enough information about the study	_____
• I understand that I am free to withdraw at any point during the study, and that I do not need to give a reason for doing so	_____
• I agree to take part in the study	_____

By signing here I agree to voluntary take part in the study. The study has been explained to me sufficiently and I understand that I am free to withdraw at any point.

Signature of participant: .....

Name (PRINT): .....

Date:.....

By signing here I give permission for the recent mood questionnaire to be passed onto my GP or an alternative healthcare professional (ONLY COMPLETE THIS NEXT SECTION IF YOU DO WANT US TO PASS ON THIS INFORMATION TO YOUR GP/HEALTHCARE PROFESSIONAL):

Signature of participant: .....

Name & Address of GP/healthcare professional (PRINT):
.....

.....

RESEARCHER COMPLETION ONLY
I have explained the study to the participant and he/she has agreed to take part.

Signature of Researcher:.....

Name (PRINT): .....

Date:.....

Debrief information

Title: Mental Imagery and thoughts about everyday activities.

Name of Principal Investigator and Researcher: Adam Boulby, Dr. Rachel Anderson and Prof. Stephen Dewhurst.

Background and Research Question:
Previous research has shown that using mental imagery can change an individual's attitudes and behaviours (Pham and Taylor, 1999). For instance, Boland, Riggs and Anderson (2017) found that repeatedly imagining positive futures could helped depressed individuals feel more positive about their future and believe they had more control over their future. Research into mental imagery techniques has been extended to physical activity motivation. For instance, Giacobbi, Dreusbach, Thurlow, Arand and Garcia (2014) found that mental imagery techniques may lead to an increase in exercise motivation in inactive individuals (one day or less being physically active).In another study, Markland, Hall, Duncan and Simatovic (2014) found that guided imagery of a pleasant experience of exercising in frequent and less frequent exercisers improved their implicit attitudes towards exercise. This demonstrates that using mental imagery interventions may help to improve individual's attitudes towards exercise. This may in turn motivate them to become more physically active. The aim of this study is to test whether mental simulations need to be specifically crafted towards exercise in order to be beneficial.

Method:
You were asked to complete a range of quesitonnaires in the first session. These looked at your attitudes and motivations towards exercise. You also completed questionnaires about your academic studies; these were filler items to try and ensure you didn't focus on the exercise questions and work out the true purpose of the study. In the second session you completed an imagery task. Different participants completed slightly different tasks: one group completed a task where the images to be generated were all exercise related (positive exercise), another group generated positive, but not specifically, exercise related images (positive), and a final group generated images that were neither positive nor exercise related (neutral). You then completed the same set of questionnaires you had completed in the fist session asking about exercise motivations/attitudes and your academic studies.

Anticipated findings:
It is anticipated that individuals that were placed in the positive exercise imagery condition will have improved attitudes and motivations towards exercise compared with those who just completed the positive or neutral imagery tasks.

Further information:
It will be beneficial to the research if you could refrain from discussing this experiment whilst the research is still being conducted. If other potential participants are made aware that the key aspect of this study is their exercise attitudes/motivations then this may affect the answers they give in the questionnaires..

Contacts for further information:
If you have any questions about this project then please contact the researchers on…..
This study has required you to focus on your mood, your physical activity levels, and your academic studies. If you wish to discuss any issues with someone in confidence then the following details may be useful:

University of Hull Health & Wellbeing Service: 01482 462222 or *studentwellbeing@hull.ac.uk*
Let's Talk (Depression & Anxiety Services Hull): 01482 335627 or pws.letstalk.hull@nhs.net
The Samaritans: 116 123 or jo@samaritans.org

If you now feel motivated to increase your activity levels then you may find the following details useful:

University athletic union: huu-sport@hull.ac.uk or call on (01482) 46625

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Version 1.1 05/02/19

Information sheet.

Title: Mental Imagery and thoughts about everyday activities.

Researcher: Adam Boulby, Dr. Rachel Anderson and Prof. Stephen Dewhurst.

Purpose of the study
The purpose of this study is to investigate how individuals use imagery and think about a range of different scenarios.

Procedure
Before signing on to this study you must ensure you have signed on to the second part before commencing on to the second part of the study. The first part of this study will require you to fill out a range of different questionnaires. These will ask you about a variety of everyday experiences, including your academic studies, daily activities, and mood. In the second part of the study, which will be the following day, you will be required to sit in front of a computer screen where you will be asked to use mental imagery to imagine a range of possible scenarios as vividly as possible. Across the course of this second session you will be asked to complete some further questionnaires; some will ask you about your mood at that moment in time and others will be more general questions about everday experiences similar to those completed in the session the day before.

How much of your time will participation involve?
The study takes places across two sessions. The first session is likely to take approximately 30 minutes to complete. The second session must take place the day after the first session and is likely to take approximately 60 minutes to complete.

Payment
Participants will receive 30 minutes of research participation credits for completing the first part of the experiment. Participants will receive 60 minutes of research participation credits for completing the second part of this experiment.

Potential risks and ethical consideration
One of the questionnaires asks you to think about how you have been feeling recently, including possible symptoms of depression and suicidal thoughts. These questions are being asked for research purposes. The researchers are not clinicians and, therefore, are not qualified to discuss your responses on this questionnaire. However, if you are a student at the University of Hull and you indicate thoughts about selfharm/suicide then we have a duty of care to pass your name onto the University's Health & Wellbeing Team. They will treat this welfare concern sensitively and in accordance with General Data Protection (GDPR) and the Data Protection Act 2018. However, if you wish for your responses to be passed onto your GP (or an alternative healthcare professional) then please provide their details on the consent form. One of the experimental tasks asks you to consider negative events that might occur in the future (e.g. A friend tells you that you are being really annoying), which may make you feel upset. Other questionnaires ask about your academic studies and everyday activities; whilst we don't anticipate that these would be upsetting, we take this opportunity to remind you that you are free to withdraw from the study at any time and if you would like to talk with someone about any issues raised by the questionnaires or experimental tasks then appropriate contact details are supplied on the debriefing sheet. No other risks are known to the investigator at this time.

Confidentiality & Anonymity
All information collected about you and your participation will be kept private and confidential. If information about you is published it will be in a form such that you cannot be recognised. The only exception to this if, as a student at the University of Hull, you indicate thoughts about self-harm/suicide then we have a duty of care to pass your name onto the University's Health & Wellbeing Team.

You will be assigned a 'participant number' that will be used by the researcher only to organise the information gained from your responses. The researchers will keep a copy of all participants' name on the attached consent forms. Initially, your name and participant number will also be kept in a password protected electronic datafile. This is because this study takes place across two sessions and we need to be able to collate your responses across these sessions. As soon as you have completed the second session, the information linking your name with your participant number will be deleted from this file; this is a process known as anonymisation. It is important to highlight that once the experimental phase is complete you will be unable to withdraw your information from the study, as all your information will be anonymised, and the researcher will not be able to locate your details. If you have asked for your questionnaire responses to be passed onto your GP then this information will initially be stored in a password protected file on the university server and once the information has been sent to your GP the file will be amended to remove this information and your data will be anonymised as described above.

All hard copies of consent forms and experimental tasks will be kept in separate locations and any electronic files containing data will be kept on a secure area of the university server. Your participation in the study is voluntary and you are free to choose whether or not to complete the study.

What happens now?
If you are interested in taking part in the experiment you will be asked to complete and sign the consent form. Then you will be given specific instructions. Please do not sign the consent form if you do not wish to take part. Please feel free to ask any questions that you may have.

Contact for further information
You are welcome to keep this information sheet and the debrief sheet that will be given to you after participation. However, if you would like further information about the research, in terms of its aims, procedures and findings then feel free to contact the researcher Adam Boulby(a.boulby@2014.hull.ac.uk) or his supervisor, Dr. Rachel Anderson (Rachel.anderson@hull.ac.uk).

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Version 1.2/05/02/19

CONSENT FORM

Mental imagery and thoughts about everyday activities.

Investigators: Adam Boulby, Dr. Rachel Anderson and Prof. Stephen Dewhurst.
Department of Psychology, University of Hull

The participant should initial to indicate their agreement with the following statements.

	Initial
• I have read and understood the participant information sheet (V1.2/08 Feb 2019)	_____
• I understand the limits to confidentiality detailed in the participant information sheet	_____
• I have had the opportunity to ask questions and/or discuss the study	_____
• Any questions I asked have been answered	_____
• I have received enough information about the study	_____
• I understand that I am free to withdraw at any point during the study, and that I do not need to give a reason for doing so	_____
• I agree to take part in the study	_____

By signing here I agree to voluntary take part in the study. The study has been explained to me sufficiently and I understand that I am free to withdraw at any point.

Signature of participant: .....

Name (PRINT): .....

Date:.....

By signing here I give permission for the recent mood questionnaire to be passed onto my GP or an alternative healthcare professional (ONLY COMPLETE THIS NEXT SECTION IF YOU <u>DO</u> WANT US TO PASS ON THIS INFORMATION TO YOUR GP/HEALTHCARE PROFESSIONAL):

Signature of participant: .....
Name & Address of GP/healthcare professional (PRINT):
.....

.....

RESEARCHER COMPLETION ONLY
I have explained the study to the participant and he/she has agreed to take part.

Signature of Researcher:.....

Name (PRINT): .....

Date:.....

Appendix C – Risk assessment and data management plan

FHS RESEARCH ETHICS COMMITTEE

RISK ASSESSMENT

Title of the research	The effects of positive exercise mental simulations on attitudes and motivations towards exercise.
Name of Principal Investigator	Mr. Adam Boulby
Location of research	University of Hull

Brief description of research activity

This research will require the participants to mentally simulation different scenarios and rate them on how vividly they can picture them. Also, participants will fill out some questionnaires that will ask them about their mood, optimism, exercise attitudes/motivations, exercise levels, academic attitudes, academic motivations and depressive symptomology.

RISK IDENTIFICATION

Please identify all risks related to this research and indicate WHO is at risk and the measures that are in place or are required to mitigate these.

RISK(S)	**MEASURES IN PLACE / REQUIRED** *(e.g. alternative work methods, training, supervision, protective equipment)*
Training / supervision: *(e.g. information or training required, level of experience, supervisor's input and oversight)*	The research will be conducted by the principle researcher (Adam Boulby) who is a MRes student. The student has completed four research skills modules and a research dissertation as part of their UG programme. They have also engaging in research training as part of their MRes programme. The supervisor (Dr. Rachel Anderson) will help to oversee and guide the principle researcher.
Location: *(e.g. remote area, laboratory, confined space, entry or exit, level of illumination, heating etc.)*	The research will be conducted in the psychology laboratory on the 2nd floor in the Applied science building in single sessions (e.g. researcher and participant). The experiments will be conducted between the working hours 9:00am – 5:00pm. The laboratory is equipped with an emergency phone in case of an emergency. Fire exits are located in numerous places around the Applied Science building.
Research processes: *(e.g. use of electrical systems, gas, liquids, tissue, potential for contamination, flammability etc.)*	The research will use a computer that will be using OpenSesame software to produce the different mental simulation scenarios for them to mentall simulate as vividly as possible. The electronic equipment will be PAT tested to ensure no harm will happen to all those involved in the experiment.
Equipment use: *(e.g. manual handling, operation of emergency controls etc.)*	The equipment used for this experiment will be a computer using OpenSesame software and Microsoft Excel. All files will be password protected/ It will also use hard copies (paper forms) of questionnaires, consent forms, information sheets and debrief forms. The hard copies will be locked away in the postgraduate research office located in the psychology department.

Violence / upset / harm: *(e.g. potential for violence, sensitivity of topic, previous incidents etc.)*	This research aims to see whether mental simulations can improve attitudes and motivations to exercise. This may leave some participants feeling body conscious. At the end of experimentation the participants will receive a debrief form which will contain contact information of services to speak to about these issues (e.g. University health and wellbeing team and the University athletic team). Also, this study will test participants using the Epidemiological Studies – Depression scale Revised (CESD-R) (Eaton et al, 2004). This questionnaire will ask some personal issues such as suicidal thoughts. The participants will be informed that the researcher is not a trained clinician but if they would like their scores sent to their GP or other related healthcare professional. They can do this by filling out their details and GP details on the consent form. At the end of experimentation on the debrief form will contain contact details of the university health and wellbeing team and the Samaritans). If they feel they would like to speak to someone about the answers they gave on the questionnaire.

CONTINUED…..

Individuals: *(e.g. medical condition, young, inexperienced, disability etc.)*	Individuals that regularly exercise will be placed in to the neutral mental simulation condition or the positive mental simulation condition. The purpose to exclude the regular exercisers from the positive exercise mental simulation is to ensure that they do not over exercise which may lead to unhealthy behaviours or health conditions (e.g. chronic exercise behaviour or anorexia). The study could advertise for non-exercisers but this may give away what the study is testing when participants receive the exercise questionnaires. The study required participants to read the mental simulation scenarios off a computer screen. Therefore, individuals with a visual impairment will be unable to participate in the study. The study could use auditory cues instead of visual. However, research has shown auditory cues produce different responses and may interfere with the overall results.
Work patterns: *(e.g. lone working, working out of hours, working off site, isolated or remote location etc.)*	The research will be conducted in the psychology laboratory on the 2nd floor in the Applied science building in single sessions (e.g. researcher and participant). The experiments will be conducted between the working hours 9:00am – 5:00pm. The laboratory is equipped with an emergency phone in case of an emergency.
Other:	N/A.

Name of Principal Investigator:	Adam Boulby
Signature:	
Date:	30/11/2018.
Name of Supervisor (if relevant):	Dr. Rachel Anderson
Signature:	
Date:	14/12/2018.

University of Hull

Data Management Plan

(NB: This form should be completed <u>at the start</u> of all projects where data management is not dealt with otherwise). Shaded areas are considered essential, particularly when a data management plan is required for a grant application.

Date	30/11/2018.
Researcher(s)	Mr. Adam Boulby. Dr. Rachel Anderson. Prof. Stephen Dewhurst.
Project title	The effects of positive exercise mental simulation on attitudes and motivations towards exercise.
Brief description	Research has shown that mental simulations can help improve individual's attitudes/motivations. This may be a useful tool to help change individual's attitudes towards exercising. This study will look at the effects of positive exercise mental simulation on individual's attitudes/motivations towards exercise. Participants will be given some questionnaires to fill out that will ask them about their exercise levels, motivations, attitudes, academic motivations, attitudes, their mood, optimism and depressive symptomology.

For detailed, updated explanations of the various parts of the document that require completion, please refer to the accompanying Appendices.

This University of Hull History Data Management Plan (HDMP) applies the DCC Checklist for Data Management (v3.0 17 March 2011)

Section 1: Project Information

A summary of the project details and associated data management requirements

1.1 Project title: The effects of positive exercise mental simulations on attitudes and motivations towards exercise.
1.2 Project duration (01/10/18 - 30/09/19)
1.3 Partners (if applicable) Dr. Rachel Anderson and Prof. Stephen Dewhurst.
1.4 Brief description Research has shown that mental simulations can help improve individual's attitudes and motivations. This may be a useful tool to help change individual's attitudes towards exercising. This study will look at the effects of positive exercise mental simulation on individual's attitudes and motivations towards exercise. Participants will be given some questionnaires to fill out that will ask them about their exercise motivations, attitudes, levels, academic motivations, attitudes, their mood, optimism, depression and about sedentary behaviour.
1.5 Faculty or University requirements for data management Completion of data management plan before commencing the research project.
1.6 Funding body(ies) N/A.
1.7 Budget (estimate if necessary) N/A
1.8 Funding body requirements for data management N/A.

Section 2: Data, Materials, Resource Collection Information

This section is used to more fully describe the data

2.1 Brief description of data being created or compiled

The data collected from the participants will be complied through two different formats (electronic and hard copies).

Personal data

- Names, email addresses, age and gender (hard copy).
- Consent form (hard copy).

Research data

- Questionnaire answers (hard copy)
- Vividness ratings using OpenSesame software (electronic).
- Questionnaire and vividness scores will be put in to Excel spreadsheet (electronic)
- Anonymised scores from questionnaires inputted in to SPSS (electronic).

2.2 Data collection process

Personal data such as names, email addresses, age and gender will be collected on through hard copies such (e.g. consent form and questionnaire). This data will be inputted in to a Microsoft Excel spreadsheet. Once the experimental phase has concluded the names and email addresses will be deleted and all data will become anonymised. Participants will be asked to fill out a hard copy of the questionnaires. This data will be collected and inputted in to Microsoft Excel first and then this data will be transferred in to SPSS for analysis. The vividness ratings participants give when they do the mental simulation conditions will be collected through OpenSesame software. These scores will be inputted in to Microsoft Excel first and then will be transferred to SPSS for analysis. Once the data has been collected the data will be all anonymised so the scores cannot be traced back to the participants.

2.3 Are there existing forms of the data that will be used within this research project, or which will be used as the basis for the research? If so, provide a brief description and citation

N/A

2.3 Will data be available in electronic format (if so then state format(s))?

Personal data such as name, email address, age and gender will be available on a password protected Microsoft Excel spreadsheet. The information will be collected on the principle researchers laptop and will be stored on the University of Hulls servers on a G:Drive. The information will all be saved on password protected files. After experimental stage has been completed the names and email addresses of the participants will be deleted so all data will be anonymised. The purpose of this is because the study is two parts therefore, the researcher needs to pair the participants data from session 1 to session 2. However, once this is complete the personal data will be deleted and all data will be then anonymised. This data will be accessible to the principle researcher. The vividness ratings will be collected through OpenSesame software.

This data will be matched to the participants questionnaire answers in the same password protected Microsoft Excel file. This data will be inputted in to SPSS for statistical analysis.

The questionnaire answers will be inputted in to the same Microsoft Excel file which will be password protected. These answers will be transferred in to SPSS for statistical analysis.

The data that will be inputted in to SPSS will all be anonymised so the data cannot be traced back to the participant.

All the information will be anonymised data and will be saved on the University of Hull's servers which will be accessed through the principle researchers laptop. All files will be password protected and will be saved on the Universities G:drive servers.
.

2.4 Will the data be available in non-digital form (if so then state format(s))?

Yes, only the questionnaire scores and the consent forms will be available in hard copies however, the data that will be collected will be anonymised after experimental session 2. The participants shall be coded with a number when they agree to take part in the study. The names of the participants will be only collected on the consent forms and stored in a locked postgraduate research office within the Psychology department.

All the hard copies of the questionnaires collected with participant number on stored separately from the consent forms in a locked postgraduate research office within the Psychology department. On completion of the research all paperwork will be passed over to the supervisor, who will store it safely within the psychology department.

2.5 Will the data stand alone and be comprehensible to a third party or be accompanied by explanatory documentation (e.g., a data dictionary)?

The data will stand alone. The data will be collected on the principle researchers laptop. This information will be saved through the University of Hull's servers and stored there. This is so the information will be backed up regularly and stored securely. Once the participants have completed both experimental phases or withdrawn from the experiment then their personal data will be deleted and they will all be anonymised.

2.6 Describe the quality assurance process for data management

The progress of the project will be assessed through monthly meetings with their supervisor (Dr. Rachel Anderson).

Section 3: Ethics, Intellectual Property

This section is used to address issues surrounding relevant ethical and intellectual property issues the research will encounter

3.1 How will the ethical aspects of data storage and subsequent access be addressed?

- All the data that has been collected will be saved on the University of Hull's servers using the G:drive. All data collected will be saved the using password protected files.
- This data will be backed up on the university servers.
- All personal information will be deleted after experimental phase and all data will be anonymised and cannot be traced back to the participant.
- The data will all be saved on the University of Hull's servers. Once participants have completed all experimental phases or have withdrawn their personal data will be deleted and they will be anonymised.
- All hard copies of the consent forms will be locked in the postgraduate research office within the Psychology department.
- All hard copies of the questionnaires will be locked away in the postgraduate research office located in the Psychology department. This will be kept in a separate location to the consent forms. This is to ensure the information will be not be traceable to the participants.
- The supervisors will not have access to participants' personal data – they will have access to collated mean data in spreadsheets and will be responsible for storing the consent forms and questionnaire data (separately, with no identifiable link) at the end of the study.

3.2 Will the data comply with relevant legislation such as Data Protection Act, Copyright, Design and Patents Act, Freedom of Information Act, etc.?

Yes, the research project does comply with the relevant legislation.

- The data collected will be saved on password protected Microsoft Excel spreadsheet.
- All data collected will be anonymised after the experimental phase or if the participant has withdrawn then all their personal information will be deleted.
- All the participants will be coded to a number and their data will not be traceable back to them as they will be anonymised.
- All the data collected will be saved on password protected files and these files will be saved through the University of Hulls servers on the G:drive. The researcher will use their own laptop for data collection but all files will be saved through the Universities servers.
- Participants can have their data removed during the experimental stage but will not be able to get it deleted after the experimental stage has terminated. This has been highlighted on the information sheet.
- Hard copies of the consent forms will be kept locked away in a filing cabinet located in the postgraduate research office located in the Psychology department.
- The hard copies of the questionnaires will be kept locked away in a separate location in the postgraduate research office.
- The electronic data will be stored in password protected documents. This will be saved on the university password protected computers. Following completion of the study research data will be held for 10 years on secure drives at the University of Hull under the custody of the research supervisor.
- The hard copies of the consent forms and questionnaires will be disposed of through the Universitys confidential waste disposal procedure.

3.3 If several partners are involved how will compliance with 3.1 and 3.2 be assured? N/A.

Section 4: Access and Use of Information

This section is used to consider if and how you will share the data once it has been created/compiled

4.1 Are you required, or do you intend, to share the data, and with whom? If so, when? The data that will be collected from this research project will be analysed using SPSS software. The data will then be written up in a research report and will be submitted to be assessed.
4.2 If 'yes' to 4.1, in what format will data be shared? This will be shared in an electronic research report which will be submitted for assessment through the university Canvas site.
4.3 Will the data have to be stored and/or made accessible for a specific period (if so, how long)? 10 years.
4.4 Who may need or wish to have access to the data? The principle researcher will have access to the data for analysis and the write up for this report. The supervisor (Dr. Rachel Anderson) will have access and will act as the long term custodian for the research data for this study.
4.5 How do you anticipate the data being used subsequent to the project? The raw data is not anticipated to be used and will only be needed for analysis of the research project. After which the raw data will no longer be needed once it has been analyzed.

Section 5: Storage and Backup of Data

This section is used to clarify details of how the data will be stored

5.1 Where and how will the data be stored **during the lifespan of the project**?

- Hard copies of the consent forms and questionnaires will be kept locked away in the postgraduate research office located in the Psychology department (These will be kept in separate locations).
- Electronic information containing names, email addresses, age, gender and raw data (e.g. questionnaire and vividness scores). Will be saved on password protected Microsoft Excel spreadsheet. This data will be saved on the University of Hull's servers on the G:Drive. Once the participants have completed the experimental stages or has withdrawn from study their personal data will be deleted and all their data will be anonymised.
- All electronic data will be backed up on the university servers. All electronic data will only be accessible through the University of Hull's servers on the G:drive.

5.2 Where and how will the data be stored **on completion of the project**?

- Electronic data (SPSS data and raw data) will be saved on password protected files. This will be saved on university servers.
- On completion of the research all paperwork (hard copies) will be passed over to the supervisor (Dr Rachel Anderson), who will store it safely within the psychology department in separate locations (e.g. consent forms and questionnaires separate).
- The supervisor (Dr. Rachel Anderson) will have access and will act as the long term custodian for the research data for this study once the project has been completed.

5.3 What provision is being made for backup of the data?

- The data will be saved in password protected files which will be stored on password protected university servers for the duration and completion of the project.

5.4 Will different versions of the data be stored? If so, what frequency of versioning will be appropriate?

If different versions of the files are stored, then they will be organized in in chronological order (e.g. numbered) that is logical and easy to follow. This will show the order of which the files have been saved.

Section 6: Archiving and Future Proofing of Information

This section is used to describe long-term, post-project aspects of managing the data

6.1 What is the long-term strategy for future proofing of the data? The long-term storage of the data will be saved on password protected files on the universities servers. This data will be kept safe under the custody of the research supervisor. On completion of the research all the paperwork will be passed over to the supervisor, who will store it safely within the psychology department.
6.2 How will the data be managed after the life of the project, for how long and in what format (NB this section refers to the detail of preservation and archiving actions, not just how it will be stored – this is addressed in section 5.2)? The hard copies of questionnaires and consent forms will be passed over to the supervisor who will store it safely within the psychology department and kept for 10 years. The electronic data (SPSS and Microsoft Excel data) in password protected files which will be kept for 10 years and will be saved on to secure university servers (All the data will be anonymised). All data will be disposed of through the University's confidential waste disposal procedure. The supervisors will not have access to participants' personal data – they will have access to collated mean data in spreadsheets and will be responsible for storing the consent forms and questionnaire data (separately, with no identifiable link) at the end of the study.
6.3 If the data include confidential or sensitive information, how will these data be managed to prevent possible future breaches? The personal information the participant gives (e.g. names and email addresses) will be deleted from the password protected Microsoft Excel file once the participants has either completed the experimental phases or has withdrawn. All the data will be anonymised and the participants will be coded through a numerical system. This will ensure the answers they give will not be traceable back to them. The data will be saved on the University of Hull's servers on the G:Drive. The principle researcher will be collecting the data on their laptop but it will be saved on the University of Hull's servers.
6.4 If metadata or explanatory information is to be archived, how will this be linked to the data? N/A.
6.5 How will the data be cited? N/A.

Section 7: Resourcing of Data Management

This section is used to outline the staffing and financial details of the data management

7.1 List the specific staff who will have access to the data and denote who will have the responsibility for data management. The principle researcher and the supervisor will have access to the data. The principle researcher will be held responsible for the electronic data which will be saved in password protected files on the University of Hull's servers on the G:Drive. This will be backed up regulary on the University of Hull's servers. Hard copies of the data (consent forms and questionnaires) will be locked away separately in the postgraduate research office located in the psychology department. Once the project has finished the hard copies will be handed over to the supervisor who will store the documents separately in a safe location within the psychology department. The supervisor will have no access to the data during the project however, will gain access once the project is complete and will act as the long term custodian for the research data for this study.
7.2 How will the data management described in this document be funded? The University of Hull.
7.3 How will data storage be funded? No additional funds will be required for the storage of this data and will be safely secure on the university's secure computers/servers for the required duration (10 years) then it will be safely disposed of through the universities confidential waste disposal procedure.

Section 8: Review of Data Management process

This section is used to clarify how data management will be an embedded part of the research project

8.1 How will the data management plan be adhered to? All the necessary steps have been outlined by the principle researcher. These steps will be followed before commencing with the research project. These steps will be adhered to throughout the research project and will be reviewed through monthly meetings with the research supervisor to ensure the necessary steps have been followed.
8.2 Who will review the data management plan? What is the schedule for this review? The research supervisor will ensure the data management plan has been reviewed before submitting it to the University ethics board.

Section 9: Statements and Personnel Details

9.1 Statement of agreement

I/We agree to the specific elements of the plan as outlined:

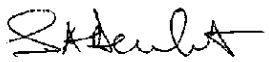
Principal investigator or PhD supervisor

Title	The effects of positive exercise mental simulations on attitudes and motivations towards exercise.
Designation	Senior lecturer
Name	Dr. Rachel Anderson
Date	14/12/2018
Signature	

Researcher

Title	The effects of positive exercise mental simulations on attitudes and motivations towards exercise.
Designation	MRes student.
Name	Mr. Adam Boulby
Date	30/11/2018
Signature	

Researcher

Title	The effects of positive exercise mental simulations on attitudes and motivations towards exercise.
Designation	Senior lecturer
Name	Prof. Stephen Dewhurst
Date	14/12/18.
Signature	

Appendix D - Materials

Version 1.0 14/12/18

Mental simulation interventions

Positive exercise mental simulation.

- You feel connected with nature after coming back from a long hike.
- You are having a good time snorkelling on holiday with your friends.
- You feel loved after being praised by a family member, for helping them with their gardening.
- You are on a scavenger hunt with a close friend.
- You are playing catch with your dog in the local park.
- Setting yourself the challenge of completing a 5k run for a charity of your choice.
- You make some new friends at your first skiing lesson.
- Having fun playing frisbee in the park with friends.
- Enjoying yourself playing crazy golf with your date.
- You are ice skating with a group of good friends.
- You feel relaxed after a soothing yoga session.
- Listening to the birds singing in the local park as you go for a brisk walk.
- You are cycling through the woods on a pleasant sunny day.
- Yourself feeling elated after completing 10 lengths at the swimming baths.
- You are walking to a camp site with your close friends.
- **You receive a flirty text from someone you find attractive.**
- **A spa day leaves you feeling relaxed.**
- **Someone compliments you, saying "you look nice today".**
- **A decision you make turns out to be a good one.**
- **A good night's sleep leaves you full of energy.**

The simulations in **BOLD** writing are positive mental simulations used for this intervention as "fillers". These five positive simulations will also be seen in the positive mental simulation intervention as well.

Positive mental simulations

(Boland et al., 2018).

- A lovely meal out with friends.
- You feel inspired after a conversation at an event.
- A letter arrives containing good news.
- A problem that has been bugging you for ages is finally solved
- Someone compliments you, saying "you look nice today".
- A friend in invites you to go to the cinema
- A phone call offers you your dream job.
- A decision you make turns out to be a good one.
- Your boss praises you for doing a good job.
- You finally complete the lengthy application form and you feel accomplished.
- Chatting to new people at a party and getting on well.
- A spa day leaves you feeling relaxed.
- A good night's sleep leaves you full of energy.
- An email arrives saying you have been selected for the team/project you wanted to join.
- You receive a flirty text from someone you find attractive.

- A friend gives you a box of chocolates as a gift.
- Arriving at a restaurant to find your friends there for a surprise birthday party.
- You get given an award that acknowledges your hard work.
- At the travel agents you book a holiday.

Neutral mental simulations.

- A band playing outside.
- Two birds sitting on a tree branch.
- A boat slowly crossing the Atlantic.
- The structure of a long bridge
- A double decker bus driving down a street.
- The movement of an electric fan on a warm day.
- Clouds forming in the sky.
- A freshly painted door.
- A full moon on a clear night.
- A plane flying overhead.
- The layout of the local post office.
- Raindrops sliding down a window.
- The layout of the local shopping centre.
- A train stopped at a station.
- The shape of a large black umbrella.
- A lone cactus in the desert.
- A group of polar bears fishing in a stream.
- A row of shampoo bottles on display.
- The baggage claim area at an airport.
- The structure of a long bridge.

Questionnaires

The Life Orientation Test - Revised (LOT-R; Carver, Scheier & Bridges, 2010).

Instructions:
Please answer the following questions about yourself by indicating the extent of your agreement using the following scale:

[0] = Strongly disagree
[1] = Disagree
[2] = Neutral
[3] = Agree
[4] = Strongly agree

Be as honest as you can throughout, and try to not let your responses to one question influence your response to other questions. There are no right or wrong answers.

1. In uncertain times, I usually expect the best. ☐

2. It's easy for me to relax. ☐

3. If something can go wrong for me, it will. ☐

4. I'm always optimistic about my future. ☐

5. I enjoy my friends a lot. ☐

6. It's important for me to keep busy. ☐

7. I hardly ever expect things to go my way. ☐

8. I don't get upset too easily. ☐

9. I rarely count on good things happening to me. ☐

10. Overall, I expect more good things to happen to me than bad. ☐

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Godin Leisure Time Exercise Questionnaire (GLTEQ: Godin & Sheppard, 1985).

Version 1.0 - 23/11/18.

1. During a typical **7-Day Period** (a week), how many times on average do you do the following kinds of exercise for **more than 30 minutes** during your free time (write on each line the appropriate number).

Times Per Week

a) **STRENUOUS EXERCISE**
(HEARTS BEATS RAPIDLY)
(e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling). _____

b) **MODERATE EXERCISE**
(NOT EXHAUSTING)
(e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing). _____

c) **MILD EXERCISE**
(MINIMAL EFFORT)
(e.g., yoga, archery, fishing from river bank, bowling, horseshoes, golf, snow-mobiling, easy walking). _____

2. During a typical **7-Day period** (a week), in your leisure time, how often do you engage in any regular activity **long enough to work up a sweat** (heart beats rapidly)?

OFTEN	SOMETIMES	NEVER/RARELY
1. ☐	2. ☐	3. ☐

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The Behavioural Regulation in Exercise Questionnaire (BREQ-2: Markland & Tobin, 2004).

Version 1.0 - 29/11/2018.

WHY DO YOU ENGAGE IN EXERCISE?

We are interested in the reasons underlying peoples' decisions to engage, or not engage in physical exercise. Using the scale below, please indicate to what extent each of the following items is true for you. Please note that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise. Your responses will be held in confidence and only used for our research purposes.

		Not true for me		**Sometimes true for me**		**Very true for me**
1	I exercise because other people say I should	0	1	2	3	4
2	I feel guilty when I don't exercise	0	1	2	3	4
3	I value the benefits of exercise	0	1	2	3	4
4	I exercise because it's fun	0	1	2	3	4
5	I don't see why I should have to exercise	0	1	2	3	4
6	I take part in exercise because my friends/family/partner say I should	0	1	2	3	4
7	I feel ashamed when I miss an exercise session	0	1	2	3	4
8	It's important to me to exercise regularly	0	1	2	3	4
9	I can't see why I should bother exercising	0	1	2	3	4

		Not true for me		Sometimes true for me		Very true for me
10	I enjoy my exercise sessions	0	1	2	3	4
11	I exercise because others will not be pleased with me if I don't	0	1	2	3	4
12	I don't see the point in exercising	0	1	2	3	4
13	I feel like a failure when I haven't exercised in a while	0	1	2	3	4
14	I think it is important to make the effort to exercise regularly	0	1	2	3	4
15	I find exercise a pleasurable activity	0	1	2	3	4
16	I feel under pressure from my friends/family to exercise	0	1	2	3	4
17	I get restless if I don't exercise regularly	0	1	2	3	4
18	I get pleasure and satisfaction from participating in exercise	0	1	2	3	4
19	I think exercising is a waste of time	0	1	2	3	4

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Learning Self-Regulation Questionnaire (SRQ-L) (Black and Deci's, 2000).

Version 1.0 - 28/11/18.

A. I will participate actively in my psychology degree:

1. Because I feel like it's a good way to improve my understanding of the material.

1	2	3	4	5	6	7
Not true at all			Somewhat true			Very true

2. Because others might think badly of me if I didn't.

1	2	3	4	5	6	7
Not true at all			Somewhat true			Very true

3. Because I would feel proud of myself if I did well in the course.

1	2	3	4	5	6	7
Not true at all			Somewhat true			Very true

4. Because a solid understanding of psychology is important to my intellectual growth.

1	2	3	4	5	6	7
Not true at all			Somewhat true			Very true

B. I am likely to follow my lecturer's suggestions for studying psychology:

5. Because I would get a bad grade if I didn't do what he/she suggests.

1	2	3	4	5	6	7
Not true at all			Somewhat true			Very true

6. Because I am worried that I am not going to perform well in the course.

1	2	3	4	5	6	7
Not true at all			Somewhat true			Very true

7. Because it's easier to follow his/her suggestions than come up with my own study strategies.

1	2	3	4	5	6	7
Not true at all			Somewhat true			Very true

8. Because he/she seems to have insight about how best to learn the material.

1	2	3	4	5	6	7
						Very true

Not true at all — Somewhat true

C. The reason that I will work to expand my knowledge of psychology is:

9. Because it's interesting to learn more about the nature of psychology.

1 2 3 4 5 6 7

Not true at all — Somewhat true — Very true

10. Because it's a challenge to really understand how to solve psychological problems.

1 2 3 4 5 6 7

Not true at all — Somewhat true — Very true

11. Because a good grade in psychology will look positive on my record.

1 2 3 4 5 6 7

Not true at all — Somewhat true — Very true

12. Because I want others to see that I am intelligent.

1 2 3 4 5 6 7

Not true at all — Somewhat true — Very true

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The International positive and negative affect schedule short form (I-PANAS-SF) (Thompson, 2007) (Version 1 – 28/11/18).

Thinking about yourself and how you feel right now in this moment, to what extent do you feel now:
(Please circle your answer on the scale).

	Not at all	**A little**	**Moderately**	**Quite a bit**	**Very Much so.**
Upset	1	2	3	4	5
Hostile	1	2	3	4	5
Alert	1	2	3	4	5
Ashamed	1	2	3	4	5
Inspired	1	2	3	4	5
Nervous	1	2	3	4	5
Determined	1	2	3	4	5
Attentive	1	2	3	4	5
Afraid	1	2	3	4	5
Active	1	2	3	4	5

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The Centre for Epidemiological Studies – Depression Scale - Revised (CESD-R; Eaton, Muntaner, Smith, Tien & Ybarra, 2004) Version 1 - 29/11/18.

Below is a list of the ways you might have felt or behaved. Please check the boxes to tell me how often you have felt this way in the past week or so.	LAST WEEK				
	Not at all *or* Less than 1 day	1-2 days	3-4 days	5-7 days	Nearly every day for 2 weeks
My appetite was poor.	☐	☐	☐	☐	☐
I could not shake off the blues.	☐	☐	☐	☐	☐
I had trouble keeping my mind on what I was doing.	☐	☐	☐	☐	☐
I felt depressed.	☐	☐	☐	☐	☐
My sleep was restless.	☐	☐	☐	☐	☐
I felt sad.	☐	☐	☐	☐	☐
I could not get going.	☐	☐	☐	☐	☐
Nothing made me happy.	☐	☐	☐	☐	☐
I felt like a bad person.	☐	☐	☐	☐	☐
I lost interest in my usual activities.	☐	☐	☐	☐	☐
I slept much more than usual.	☐	☐	☐	☐	☐
I felt like I was moving too slowly.	☐	☐	☐	☐	☐
I felt fidgety.	☐	☐	☐	☐	☐
I wished I were dead.	☐	☐	☐	☐	☐
I wanted to hurt myself.	☐	☐	☐	☐	☐
I was tired all the time.	☐	☐	☐	☐	☐
I did not like myself.	☐	☐	☐	☐	☐
I lost a lot of weight without trying to.	☐	☐	☐	☐	☐
I had a lot of trouble getting to sleep.	☐	☐	☐	☐	☐
I could not focus on the important things.	☐	☐	☐	☐	☐

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Exercise Attitude Questionnaire (Rhodes and Courneya, 2003).

Version 1 - 12/12/18

The following questions ask you to rate how you feel about exercising regularly. Exercise is defined here as any activity performed on a repeated basis over an extended period of time with the intention of improving physical fitness and health. Some examples of exercises include jogging, aerobics, weight training, and sports. Regular exercise is defined as exercise done at least 3 times per week, for at least 30 minutes in duration, and at least at a moderate intensity (i.e., light perspiration). Pay careful attention to the words at each end of the scales and circle the number that best represents how you feel about exercising regularly over the next 2 weeks.

For me, exercising regularly is:

1	2	3	4	5	6	7
extremely enjoyable	quite enjoyable	slightly enjoyable		slightly unenjoyable	quite unenjoyable	extremely unenjoyable
1	2	3	4	5	6	7
extremely useful	quite useful	slightly useful		slightly useless	quite useless	extremely useless
1	2	3	4	5	6	7
extremely wise	quite wise	slightly wise		slightly foolish	quite foolish	extremely foolish
1	2	3	4	5	6	7
extremely boring	quite boring	slightly boring		slightly interesting	quite interesting	extremely interesting
1	2	3	4	5	6	7
extremely relaxing	quite relaxing	slightly relaxing		slightly stressful	quite stressful	extremely stressful
1	2	3	4	5	6	7
extremely harmful	quite harmful	slightly harmful		slightly beneficial	quite beneficial	extremely beneficial

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Academic study time Version 1 – 28/11/18.

This questionnaire has been used to mask what the research is looking for. This will be used for the first part of the experiment and will not be analysed.

Please can you indicate roughly how often you spend studying for your university degree (per day):

1. During the week. Hours [ ] Minutes [ ].

2. During the weekend. Hours [ ] Minutes [ ].

Not including lectures and seminars, how often to you study (per day):

3. At University. Hours [ ] Minutes [ ].

4. At Home/University accommodation. Hours [ ] Minutes [ ].

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Studying attitude questionnaire (Adapted from Rhodes and Courneya's, 2003).

Version 1 – 28/11/18.

The following questions ask you to rate how you feel about studying often. During your time at university you will be expected to read up on the module topics outside of lectures and seminars. It is recommended that students study roughly 32-36 hours per week, 4-5 hours per day. Pay careful attention to the words at each end of the scales and circle the number that best represents how you feel about studying regulary over the next 2 weeks.

For me, studying regularly is:

1	2	3	4	5	6	7
extremely enjoyable	quite enjoyable	slightly enjoyable		slightly unenjoyable	quite unenjoyable	extremely unenjoyable
1	2	3	4	5	6	7
extremely useful	quite useful	slightly useful		slightly useless	quite useless	extremely useless
1	2	3	4	5	6	7
extremely wise	quite wise	slightly wise		slightly foolish	quite foolish	extremely foolish
1	2	3	4	5	6	7
extremely boring	quite boring	slightly boring		slightly interesting	quite interesting	extremely interesting
1	2	3	4	5	6	7
extremely relaxing	quite relaxing	slightly relaxing		slightly stressful	quite stressful	extremely stressful
1	2	3	4	5	6	7
extremely harmful	quite harmful	slightly harmful		slightly beneficial	quite beneficial	extremely beneficial