Determinants of exercise intention and behaviour in individuals diagnosed with schizophrenia using a revised version of the Theory of Planned Behaviour

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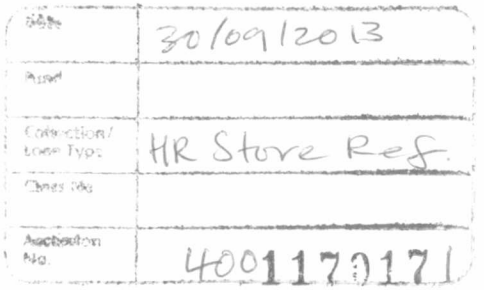
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Abstract

Objective: The physical inactivity of people with schizophrenia, presents a risk for cardiovascular disease and other physical and mental health problems. To date, current research applying the Theory of Planned Behaviour to understand exercise behaviour has been carried out with the general public, with little consideration for those with a psychiatric disability. The aim of the present study was to test the applicability of the Theory of Planned Behaviour, with additional variables of self-efficacy and health professional support in the prediction of exercise intention and behaviour in people with schizophrenia.

Method: A total of 214 participants took part in the study, 105 individuals with a diagnosis of schizophrenia and 109 from the general population completed a questionnaire containing measures of the Theory of Planned Behaviour variables, self-efficacy, health professional support and exercise behaviour using Godin Leisure time activity questionnaire (GLTQ).

Results: Findings showed that people with schizophrenia did significantly more walking than the general population but significantly less moderate to strenuous exercise. Major predictors of exercise intention in people with schizophrenia were self-efficacy, perceived behavioural control and health professional support, accounting for 33.4% of the variance in intention. Exercise behaviour was predicted by self-efficacy and fruit and vegetables intake, accounting for 13% of the variance. The addition of self-efficacy and health professional support increased the applicability of the Theory of Planned Behaviour to individuals with schizophrenia

Conclusion: These findings provide evidence that psychiatric services need to respond to the low levels of exercise in schizophrenia by providing exercise programmes that enhance self-efficacy and provide adequate support. It is hoped that this study will encourage mental health practitioners to be more open to less conventional alternatives and guide clinicians to the development of exercise interventions for individuals with schizophrenia.

Chapter 1: Introduction

1.1 The physical health of individuals with schizophrenia

Schizophrenia is a severe long-term mental illness characterised by hallucinations, delusions, muddled thoughts and changes in behaviour which is caused by a combination of genetics and environmental factors (Frangou & Murray, 2004) and affects as many as 1% of people in the general population (Varcarolis & Halter, 2010). The burden of schizophrenia extends beyond the distress associated with psychotic symptoms. People with schizophrenia are at increased risk for multiple chronic social, cognitive and behavioural deficits that may lead to inadequate health and self-care practices (Holmberg & Kane, 1999).

It is well recognised that people with schizophrenia have a reduced life expectancy, with a relative mortality risk of two to three times greater than that of the general population, dying at least 25 years earlier (Cabassa, Ezell & Lewis-Ferbabdez, 2010). A meta-analysis by Brown (1997) estimated that 40% of this excess mortality was due to unnatural causes, such as suicide and accidents, with approximately 60% accounted for by natural causes. Research by Osby et al. (2000) reported that natural causes were mostly responsible for this excess mortality in patients with schizophrenia and the largest single natural cause of death was cardiovascular disease (Hausswolff-Juhlin, Bjartveit, Lindstrom, & Jones, 2009). This has been consistent with reports of patients with schizophrenia being more vulnerable to many chronic physical diseases such as diabetes, coronary heart disease, hypertension and emphysema (Brown, 1997). More than two thirds of patients with schizophrenia, compared with approximately one-half in the general population, die of coronary heart disease (CHD) (Hennekens, Hennekens, Hollar, & Casey, 2005). Although a certain level of natural cause mortality appears to be inherent to the disease itself, other factors such as behaviours, lifestyle

and pharmacological treatment play a major part in the health outcomes of this population (Joukamaa et al., 2006).

The increasing risk of physical health problems in individuals with mental illness, specifically schizophrenia has been known for a long period of time, yet has only more recently become a part of clinical practice (Brunero & Lamont, 2010). Obesity is known as a risk factor for total mortality and several other forms of morbidity such as cardiovascular disease, hypertension, respiratory problems, non-insulin dependent diabetes mellitus and certain cancers (Bryden & Kopala, 1999).

There are a number of factors that contribute to the increased mortality of individuals with schizophrenia. Obesity is a common problem for people with schizophrenia, a problem that has been exacerbated more recently with the increased use of second generation antipsychotic medications, many of which are associated with the risk of weight gain and metabolic disturbance (Casey et al., 2004). Antipsychotic medication has marked central, metabolic and endocrine effects resulting in increased appetite, ingestion of high caloric drinks because of dry mouth and decrease in energy expenditure as a result of sedation, contributing factors to the increased risk of obesity (Taylor & McAskill, 2000). It has been found that antipsychotic induced weight gain occurs in up to 50% of patients who are prescribed these drugs (Baptista, Kin, Beaulieu, & Baptista, 2002). The prevalence of obesity in people with schizophrenia has been reported to be anywhere from one and a half to four times higher than the general population (Coodin, 2001). A meta-analysis by Allison and Casey (2001) provided an estimate of the mean weight gain in patients receiving standard doses of antipsychotic medication over a 10 week period, which showed an increase of 4.45 kg, suggesting pharmacological treatment for schizophrenia may be contributing to their increased mortality.

This has led to the untenable situation that, despite improved outcomes with respect to psychiatric symptoms, social functioning and quality of life as a result of antipsychotic medication, the mortality gap between patients on antipsychotic medication and the general community has not narrowed, but may actually be worsening (Saha, Chant, & McGrath, 2007). Previous research has neglected the physical health needs of those diagnosed with schizophrenia in the community and outpatient settings (Friedli & Dardis, 2002). A review examined options for the pharmacological management of obesity in patients treated with atypical antipsychotic medication and concluded that current evidence did not support the general use of pharmacological interventions (Werneke, Taylor, & Sanders, 2002). Due to the long-term use of antipsychotic medication for treating schizophrenia symptoms and increased risk of weight gain, research needs to look more closely at non-pharmacological treatments, such as dietary and exercise counselling and behaviour modification, as a way of improving their physical health outcomes and reducing their mortality rates (Faulkner, Soundy, & Lloyd, 2003).

Undoubtedly much of the excess morbidity and mortality of schizophrenia is preventable though lifestyle modification. Although there is a clear evidence base acknowledging the poor physical health of people with schizophrenia, the potential for improving outcomes in this area has been largely neglected in both research and clinical practice (Connolly & Kelly, 2005). With changing clinical practice, outcome studies have tended to concentrate on psychiatric outcomes, level of functioning and quality of life (Collony & Kelly, 2005). The general lifestyle and physical health of patients with schizophrenia that are known factors related to cardiovascular disease are under researched.

Research has shown that people with schizophrenia adopt poorer health behaviours than the general population (Felker & Yazel, 1996). A study by McCreadie et al. (1998) found that patients with schizophrenia consumed substantiality less dietary fibre, and antioxidant vitamins (C & E) than matched controls. The patients also consumed fewer fruits and vegetables (McCreadie et al., 1998). Similarly a review of smoking behaviour and schizophrenia published by Kelly and McCreadie (2000) and Hahn and Hahn, (2012) showed the prevalence of smoking in schizophrenia patients greatly exceeded that of the general population at 75-92% compared to 30-40% in the general population. The high prevalence of smoking also poses another risk as cigarette smoking induces hepatic microsomal enzymes, which increases the metabolism of psychotropic medication, therefore smokers then require higher levels of antipsychotic medication, which in turn may increase the risk of weight gain and make them more vulnerable to cardiovascular diseases (Leon, 2004).

Evidence also states that inadequate exercise is more prevalent in individuals with schizophrenia than the general population (Brown, Birtwhistle, Roes & Thompson, 1999, Davidson, Judd, Jolley, Hocking, & Thompson, 2000). In a cohort of 234 people with serious mental illness, 12% reported vigorous exercise during the previous two weeks, compared with 35% in the general population (Davidson et al., 2001). The Health Survey for England (NHS Information Centre, 2008) found that when adults from the general population were asked to report their physical activity based on the previous 4 weeks, 39% of men and 29% of women aged 16 and over met the Chief Medical Officer's (CMO) minimum recommendations for physical activity. These are that adults should be active at moderate or greater intensity for at least 30 minutes a day on at least five days a week. Low levels of physical activity have also been reported among minority ethnic groups in the UK. A recent systematic review of the literature on participation in sport and recreation by black and minority ethnic communities

confirms the relatively low levels of participation in sport among these communities compared with white groups (Higgins & Dale, 2009). The lowest levels of exercise participation have been reported among Black or Black British Other (14.8%), Bangladeshi (15.5%) and Black or Black African British (17.2%) compared to 22.6% of the general population and 22.4% among the White British Population (Sports for Communities, 2007).

Research on exercise patterns among people with psychiatric disabilities has indicated that sedentary behaviours are commonly reported in this population (Brown, 1997). Studies have shown that as many as 60% of people with schizophrenia reported below average levels of physical activity (Davidson et al., 2001). A number of studies have found that people with schizophrenia do some levels of exercise, however low level activity such as walking seems to be their most common form of exercise (Soundy, Faulkner, & Taylor, 2007; Ussher, Stanbury, Cheeseman, & Faulkner, 2007 & Mcleod, Jaques, & Deane, 2009). Research suggests that lower socio-economic status forces those with schizophrenia to use walking as the primary form of transport and so may explain the higher levels of walking compared to the general population (Mcleod et al., 2009).

More importantly individuals with schizophrenia spend little time in vigorous activity (Soundy et al., 2007), significantly less than the general population (Elmslie, Mann, Silverstone, Williams, & Romans, 2001). Of 140 individuals with schizophrenia, none reported vigorous exercise during the previous week, 19% of men and 15% of women reported participating in at least one session of moderate activity (Richardson et al., 2005). People with schizophrenia need to engage in more moderate and strenuous physical activity, easy walking, often referred to as mild exercise are not strong contributors to health benefits (Godin, 2011). Research by Soundy et al. (2007) found that individuals walk as a means of

getting about and not necessarily for health benefits, which may suggest their walking behaviour does not lead to increased heart rate and sweating. The International Organization of Physical Therapy in Mental Health guidelines do recommend that for substantial health benefits, patients with schizophrenia should do at a minimum 150 minutes a week of moderate-intensity, or 75 minutes of moderate-to vigorous- intensity aerobic activity (Vancompfort et al., 2012). This lack of exercise in schizophrenia is yet another problem contributing to increased morbidity and mortality and was the focus of the current study.

Physical inactivity is the fourth leading cause of global mortality and many of the leading causes of ill health, such as coronary heart disease, cancer and type 2 diabetes, could all be prevented if more inactive people were to become more active (World health Organisation, 2010). The cost of physical inactivity in England, including direct costs of treatment for the major lifestyle-related diseases, and the indirect costs caused through sickness absence has been estimated at £8.3 billion a year, not including the cost implications of other diseases and health problems influenced by physical activity, such as osteoporosis and falls which affect many older people (Department of Health, 2009). With regards to schizophrenia specifically, Andrews, Knapp, McCrone, Parsonage and Trachtenberg (2012) reported the costs of schizophrenia at £11.8 billion per year to society. Around one third of societal costs are accounted for by direct expenditure on health and social care but more than half is incurred as a result of lost productivity or people through unemployment and premature death.

High rates of preventable illnesses represent a burden to the health care system because tertiary prevention health care costs are more expensive than primary prevention (Egger, 1990). There is a need for innovative, cost-effective strategies to be offered to clinical populations as part of their rehabilitation process, which could also contribute to a reduction in health care costs (Daley, 2002). Given that many common treatments, including medication

and cognitive behavioural therapy are expensive and often in short supply, there is much to commend other strategies (Fox, Boutcher, & Faulkner, 2000). Schizophrenia-specific factors may be amenable to change in the long term through the development of new psychopharmacological treatments. Lifestyle factors on the other hand, represent more immediately accessible targets for intervention in the form of primary prevention.

Despite this higher prevalence of poor health behaviours, little is known about the ability or motivation of individuals with schizophrenia to initiate and maintain modifications to their health behaviours (Leas & Mccabe, 2007). Although efforts have been made to reduce the physical health problems in this population with some effect (Poulin, Cortese, Williams, Wine, Mcintyre, 2005) an understanding of their motivation towards lifestyle change would enable clinicians and health promoters to develop programmes that target distinct diagnostic groups. The challenge now is to ensure that the physical health of patients with schizophrenia is given the priority it deservers, helping them to face their future with the lowest morbidity and mortality odds stacked against them (Connolly & Kelly, 2005). Understanding the determinants of exercise behaviour in individuals with schizophrenia could inform routine clinical practice and target interventions that promote physical activity in this marginalised population.

Therefore to summarise individuals with schizophrenia are at increased risk of physical health problems leading to increased mortality, however this problem has not been addressed in mental health services. Whilst pharmacological treatments that treat the symptoms of schizophrenia may improve in the long term to reduce side-effects such as weight gain, lifestyle factors are more likely targets for intervention to prevent the occurrence of such

common diseases in this population. Exercise in particular is inadequate in individuals with schizophrenia and creates a target for intervention to improve their health outcomes.

1.2 The importance of exercise for individuals with schizophrenia

Physical inactivity is recognised to be an independent risk factor for coronary artery disease, or equivalent and greater risk than other major risk factors. It is also related to other cardiovascular risk factors such as hypertension, hypercholesterolemia, overweight and obesity (Bauman & Owen, 1999). Regular aerobic physical activity increases exercise capacity and plays a role in both primary and secondary prevention of cardiovascular disease and represents an important area in health promotion (Morris & Froelicher, 1991). Physical activity has a number of health benefits for both physical and mental wellbeing. The physical benefits of exercise were summarised by Smith and Jacobson (1989), which included improved cardiovascular function, increased muscle size, strength, posture, preventing joint instability and decreasing back pain, improved work effort and changing body consumption. Both men and women who reported increased levels of physical activity and fitness were found to have reductions in relative risk (about 20%-35%) of death (Physical Activity Guidelines Committee, 2008).

Recent investigations have revealed even greater reductions in the risk of death from any cause and from cardiovascular disease. For instance, being fit or active was associated with a greater than 50% reduction in risk (Myers et al., 2004). Crespo (1999) summarised the mechanisms by which exercise may prevent heart disease including: reduction in severity of coronary arteriosclerosis both directly and through favourable effects on the other heart disease risk factors: reduction in myocardial oxygen demands as evidenced by decreased heart

rate and systolic blood pressure; increased myocardial oxygen supply through lengthening of diastole, slowed heart rate and increased vascularisation and reduction in risk of coronary thrombosis by decreased platelet adhesiveness.

Interestingly, while smoking is a major concern amongst individuals with schizophrenia, research has found that smokers in the general population who engage in regular exercise can reduce their risk of mortality. A study of 10,224 men and 3,120 women showed that all-cause mortality rates declined across physical fitness, even after adjusting for smoking status (Blair et al., 1989). Therefore even if those with schizophrenia struggle to quit smoking, promoting other health behaviours, such as exercise can reduce health risks. In addition to this, evidence suggests that physical activity can indirectly influence health by acting through other health behaviours, such as smoking and overeating. Evidence suggests that exercisers are more likely to demonstrate positive dietary habits, and less likely to smoke compared to those that are physically inactive (ABS, 2001b). This would suggest that increasing the physical activity of individuals with schizophrenia could have a positive impact on encouraging them to adopt other healthier behaviours.

Both aerobic and resistance types of exercise have also been shown to be associated with decreased risk of type 2 diabetes (Sigal et al., 2006). In a large prospective study, each increase of 500 Kcal in energy expenditure was associated with a decreased incidence of type 2 diabetes of 6% (Helmrich, Ragland, & Paffenbarger, 1994). This benefit was particularly evidenced among people at risk of diabetes, a finding that has been supported by several other investigators (Manson et al., 2003). Furthermore, exercise protects against type 2 diabetes by decreasing insulin resistance and improving insulin sensitivity, therefore normalising blood glucose (Crespo, 1999). Based on the evidence that individuals with schizophrenia are at

increased risk of both diabetes mellitus and cardiovascular disease (Bryden & Kapola, 1999 & Hausswolff-Juhlin et al., 2009), exercise needs to become one of the front-runners for adjunct treatment for schizophrenia (Varcarolis & Halter, 2010).

Whilst exercise can improve the physical aspects of life and reduce health problems, exercise has also been shown to have a number of psychological benefits. These include reducing depression and anxiety, increasing confidence and self-esteem. Steptoe, Kearsley, & Walters (1993) investigated the effect of exercise on mood and found that exercise leads to positive mood changes and suggested that greater attention to be paid to improving adherence to exercise programmes to improve overall health and mental wellbeing. In more recent years research has focused on the effects of exercise on mental illness. There has been particular attention paid to the effects of exercise on depression and anxiety (Carek, Laibistain & Carek, 2011). Research has consistently found exercise to be as effective as antidepressant medication for people suffering from depression (Berk, 2007). In a high quality randomised control trial, 80 participants with mild to moderate depressive disorder were randomised to four different exercise groups. The higher energy expenditure, showed greater reduction in depression scores than the lower energy expenditure group (Dunn, Trivedi, Kampert, Clark & Chambers, 2005). It has also been suggested that regular physical activity may have a role as both important preventative and treatment strategy for depression (Berk, 2007). Whilst the mechanism of action, of physical activity on mental health is not definitively established, it is thought to involve more endorphin release, distraction from negative cognitions and stimuli, promotion of sense of self-efficacy and social interaction (Larun, Nordheim, Ekeland, Hagen, & Heian, 2006).

More specifically in people with schizophrenia exercise has a number of benefits. A review of exercise interventions for people with schizophrenia identified that exercise could have both positive effects on positive and negative symptoms of schizophrenia (Faulkner & Biddle, 1999 & Bernard & Ninot, 2012). The negative symptoms (social withdrawal, lack of concentration & motivation) were reduced and self-esteem, motivation and social interaction increased. For some individuals exercise was also found to be a coping strategy for positive symptoms of the illness such as hallucinations and delusions. Blecher (1988) observed a 92% reduction in the occurrence of hallucinations among people with long-term schizophrenia as a consequence of taking regular exercise. It has been suggested that participation in regular exercise, specifically for those with schizophrenia can promote a sense of normalization and offer opportunities for social interaction (Richardson et al., 2005) and therefore improving their overall quality of life.

Participation in regular physical activity has numerous mental and physical health benefits for healthy and disease prone populations (Tulloch, Fortier, & Hogg, 2006). The lack of exercise by individuals with schizophrenia is a concern. Current health promotion research and interventions target the general population, rather than those with a psychiatric disability which may explain the differences in physical activity levels and the greater risk of common diseases. Studies that have developed exercise interventions for people with schizophrenia have found that doing 30 minutes of moderate exercise 3 times a week leads to reduction in weight and body mass index and better health outcomes (Mei-Kuei, Chin-kung, Ya-Mei, Chih-Yang, Shin-Da, 2007 & Centorrino et al., 2006). Thirty minutes of exercise 3 times a week has also been defined as the recommended amount to bring about muscular fitness and flexibility in healthy adults (American college of Sports Medicine 1998). An exploratory study by Fogarty, Happell, & Pinikahana, (2004) was conducted using 6 participants in a 3-

month physical conditioning programme. The findings showed that most participants increased their physical strength and endurance and exhibited improvements in weight control and flexibility. The majority of patients reported increased fitness levels, exercise tolerance, reduced blood pressure levels, perceived energy and upper body and hand grip strength levels.

Despite the positive outcomes obtained from recent exercise interventions for this population group the majority have been short term (Ball, Coons & Buchanan 2001; McKibbin, Golshan, Griver, Kitchen & Wykes, 2010; Direk & Ucok 2008), and showed high drop-out rates (Gorczynski & Faulkner, 2009). Archie, Hamilton, Osborne, Hobbs, and McNiven, (2003) provided free access to a fitness facility to 20 outpatients with schizophrenia for 6 months and monitored their exercise behaviour. Drop-out rates were 40% after 4 months, 70% after 5 months and 90% after 6 months. These rates compare unfavourably with exercise cessation in the general population, which is approximately 50% after 6 months. Research has shown that patients' cognitions during activity have an important influence on exercise attendance and that these cognitions often occurred in new situations where patients experience a lack of personal control (Carless, 2007), due to the unknown and uncertainty of a situation (Crone, 2007). It is possible that high drop-out rates reported by Archie et al. (2003) were a result of the motivational techniques used, providing individuals with schizophrenia free access to a gym may have taken into account financial barriers to exercise, but the limited support and new situation may have led to negative experiences if individuals perceived the situation as threatening (Faulkner & Sparks, 1999). Adherence is a great concern and whilst previous interventions demonstrate a move in the right direction, unless more is understood about what motivates individuals with schizophrenia to exercise health benefits are unlikely to be maintained.

There are a number of limitations in current exercise intervention, making the effectiveness of such interventions inconclusive. A related knowledge gap in the development of exercise interventions for persons with severe mental illness is which theoretical models identify targets most amenable to change among persons with mental illness. Only a small percentage of studies have identified an underlying theoretical framework for their interventions (Kwon et al., 2006; Umbricht, Flury, & Bridler, 2001 & Weber & Wyne, 2006). Other interventions have utilised theory based techniques such as motivational interviewing, but the interventions themselves were not theory driven (Menza et al., 2004). Theories based on constructs amenable to change among person with severe mental illness need to be identified and incorporated into health promotion interventions. Understanding more about the determinants of health behaviours such as exercise and the application of theoretically based interventions may significantly impact the effort to increase physical activity across such populations (Bezyak, Berven, & Cahn, (2011) and the potential prescription of exercise therapy for people with schizophrenia by examining the determinants of exercise in this population.

Exercise interventions have been developed for individuals with schizophrenia and whilst motivational factors have not really been identified, there is another element that needs to be considered. The majority of exercise interventions that have been developed were carried out under in-patient settings (Wu, Wang, Bai, Huang, & Lee, 2007), with limited research looking at those living independently in the community. In-patients have constant input from staff with regards to encouraging health behaviours, which is not something that continues at the same level when living independently. Research has shown that 87.7% of those diagnosed with schizophrenia live independently in the community (Srivastava, Stitt, Thaka, Shah, & Chinnasamy, 2009). It is important to consider out-patients with schizophrenia when researching motivations to exercise as they have greater independence and autonomy over

their health and so information gathered on this particular group can then be used to enhance their physical activity and improve their health outcomes within the community.

It is known that people with schizophrenia engage in low levels of exercise (Mcleod et al., 2009), and report more walking as opposed to the general population (Soundy el al., 2007 & Ussher et al., 2007). However despite their high levels of walking behaviour they are more overweight than the general population, suggesting that their levels of physical activity are insufficient to counteract the weight gain associated with their antipsychotic medication and reduce risks of common diseases (Mcleod et al., 2009). Beyond this information, virtually nothing is known about modifiable, theory-based determinants of physical activity in this population. We must adopt innovative approaches to develop personalised preventative and therapeutic approaches for those in need. There is a requirement to promote new psychosocial intervention trials that focus on the moderators and predictors of exercise behaviour (Gorczynski & Faulkner, 2009).

In summary, the poor exercise behaviour of individuals with schizophrenia puts them at increased risk of diabetes, cardiovascular disease and certain cancers (Bryden & Kapola, 1999; Sigal et al., 2006; De Hert et al., 2006, & Hausswolff-Juhlin et al., 2009). Evidence shows that adequate exercise can help prevent the occurance of these common health problems and play a role in reducing the symptoms associated with schizophrenia, including hallucination and delusions, with the added bonus of increasing self-esteem, confidence and social interaction (Richardson et al., 2005; Faulkner & Biddle, 1999 & Bernard & Ninot, 2012). Increasing the physical activity of people with schizophrenia is worthwhile and should be considered as one of the treatment tools for schizophrenia. Current exercise interventions have shown limited consideration of motivational factors related to exercise for those with

psychiatric disabilities. Increased understanding about these motivational factors would enable more effective exercise intervention to be developed.

1.3 Predictors of exercise

Research has found a number of factors associated with reduced physical activity in people with schizophrenia. Exercise barriers include, apathy, poor concentration, sedative effects of medication, poverty and lack of access to exercise education and programmes (Beebe & Smith, 2010). Given that benefits accrue only for those who consistently exercise, increasing and sustaining exercise behaviour is critical in improving the health of this specific group (Beebe & Smith, 2010). This was also supported by Ussher et al. (2007) who investigated physical activity preferences and perceived barriers to exercise in people with severe mental illness. Findings showed that the main reasons for not exercising were fatigue, illness and bad weather. Results also showed that they lacked confidence in their ability to exercise when feeling sad or stressed and received little support from family and friends. In addition to this Archie et al. (2003) also found that barriers to exercise in persons with serious mental illness included motivation, poverty and lack of access to facilities and education.

These barriers identified in individuals with schizophrenia differ to those found in the general population. One of the main reasons for lack of exercise in the general population was time, family and work commitments (Williams, Hendry, France, Lewis & Wilkinson, 2007). Research has shown that one of the major reasons for reduced physical activity in adults is due to stress from full-time work. (Cohen, Schwartz, Bromet, Parkinson, 1991). Research also revealed that under times of stress people are more likely to smoke, eat poor diets, consume more alcohol and show reduced levels of physical activity (Chandola et al., 2007). Work stress has been linked to anxiety, depression and negative moods, which may spill over into

home life and have an impact on health behaviours in the general population (Jones, Conner, Conner, Mcmillian, & Ferguson, 2007). It is likely that lack of time and work commitments would not be a barrier for individuals with schizophrenia as 45-90% of individuals are unemployed (Gureje, Herrman, Harvey, Morgan, & Jablensky, 2002 & Marwaha et al., 2007), suggesting differences between these two populations on factors related to exercise.

While little is known about exercise motivation in persons with schizophrenia, studies have documented significant similarities in the causes of inactivity between elderly populations and those with severe mental illness, including lack of motivation (Archie et al., 2003 & Resnick & Spellbring, 2000), coexisting disease states (Green, Patel, Goisman, Allison, & Blackburn, 2000), unpleasant exercise sensations (Resnick, 1998), cognitive deficits (Alexopoulos et al., 2005), and little knowledge regarding exercise benefits (Vreeland et al., 2003). Other barriers that have been reported are limited time, interest, social support (Ebrahim & Rowland, 1996) previously reduced childhood exercise (Schutzer & Graves, 2004). However the main barriers to exercise were chronic health problems, pain and the perception that they were already active enough. Top motivations included feeling better, improved health and physical abilities (Schuler, Roy, Vinci, Phillipp, & Cohen, 2006). This may suggest that motivational factors in individuals with schizophrenia and the general population in relation to exercise may vary.

Understanding the factors that predict physical activity behaviour among people with schizophrenia would provide important information for the design and implementation of interventions to increase their physical activity and improve their health outcomes. Such interventions could then be integrated into mental health community services. This would be worthwhile for a number of reasons, firstly, physical activity is more cost-effective than psychopharmacological interventions, secondly, those with schizophrenia have frequent

contact with mental health services, thirdly changing behaviours can be difficult and frequent reinforcement can play a critical role in long-term adoption of physical activity. Finally, physical activity may play a role in mental health recovery (Richardson et al., 2005). Research was urgently needed to examine how to help individuals with schizophrenia become more active, and how best to deliver physical activity interventions in this population (Faulkner & Biddle, 2001). To promote physical activity, one must first have an understanding of the factors that predict physical activity in people with a diagnosis of schizophrenia.

Over the past decade, researchers have attempted to gain a better understanding of the antecedents of individuals' initiation and adherence to physical activity. Social cognition models of health behaviour have driven most of this research. The models that have received the most empirical investigation and support for explaining exercise behaviour include: the Health Belief Model (Rosenstock 1974); Protection Motivation Theory (Maddux & Rogers, 1983); The Theory of Planned Behaviour (Ajzen, 1985) and Self-efficacy Theory (Bandura, 1986). Despite the use of these models to explain predictors of health behaviours such as smoking, diet and exercise in a number of populations, few have investigated its applicability to people with mental illness and consequently, psychosocial factors predicting behaviours such as exercise in people with schizophrenia has received little attention.

One model that has been used in an attempt to understand the predictors of exercise behaviour in people with mental illness compared to the general population is the protection motivation model (Maddux & Rogers, 1983). Leas and Mccabe (2007) looked at the utility of the Protection Motivation Theory in predicting exercise, low-fat diets and smoking cessation in people with schizophrenia and depression. Despite partial support for this model, findings

showed that it was more predictive of low fat diets and smoking than exercise and was a better predictor of exercise in the general population than those with schizophrenia and depression. The Protection Motivation Theory specifically aims to predict health-related intentions from individuals' cognitive responses to health-related interventions (Fry & Pentice-Dunn, 2006). It suggests that intentions are determined by their appraisals of the threat and of the recommended behaviour (Rogers, 1975). People are considered likely to intend to adopt the recommended behaviour, when their perceived threat is high and when they believe the recommended behaviour will be effective. Results from Leas and Mccabe (2007) study showed that fear and vulnerability of cardiovascular disease negatively influenced intentions to exercise and that the strongest predictor of exercise behaviour in those with mental illness was self-efficacy. In contrast in the general population vulnerability of cardiovascular disease was found to be a significant predictor of exercise intention, suggesting that individuals with schizophrenia and depression required more extensive education to adopt health protective behaviours. Evidence suggests differences between those with and without a psychiatric disability and using this model to develop interventions to increase exercise would require targeting different determinants. Despite individuals with mental illness reporting higher perceived vulnerability to cardiovascular diseases and attitudes towards exercise similar to people from the general population, it is their lower sense of self-efficacy and greater perceived barriers that contribute to their low levels of intention to engage in physical activity and their low levels of current physical activity (leas & Mccabe, 2007).

Whilst such research has been an important step in understanding more about psychosocial determinants of exercise behaviour in this population, limitations need to be addressed. Rather than focusing on a number of behaviours, it may be more worthwhile to focus on one specific

health behaviour. At this stage the limited models that have been applied to this psychiatric population have not provided enough evidence to be able to tailor effective exercise interventions and introduce them into mental health services to increase their physical activity.

1.3.1 Theory of Planned Behaviour

The one model that has guided the majority of research on leisure and exercise behaviour is the Theory of Planned Behaviour (Ajzen, 1991). The reasons for its effectiveness are down to a number of factors. Firstly, it can be used to predict and explain any behaviour in terms of few constructs. Secondly, it has been frequently used to study a variety of health behaviours and is probably the most common social cognition model used in health psychology (Conner & Sparks, 2005). The Theory of Planned Behaviour suggests that the proximal determinants of behaviour are a person's intention to engage in the behaviour, i.e, their motivation to perform the behaviour and perceived behavioural control, i.e, the extent to which a person feels that the behaviour is easy to perform and/or under their control. In turn, intentions are determined by attitude towards the behaviour (global evaluation of the consequences of performing the behaviour), subjective norms (the perceived social pressure to perform the behaviour), and perceived behavioural control. The basis of attitude, subjective norm and perceived behavioural control are posited to be behavioural, normative and control beliefs. Attitude is determined by behavioural beliefs, i.e. the perceived consequences of engaging in that behaviour, weighted by the evaluation of these consequences (Azjen & Fishbein, 1980). Subjective norms are determined by normative beliefs, i.e. perceptions of whether important others think a person should or should not engage in a behaviour, weighted by a person's motivation to comply with those salient referents expectations (Azjen & Fishbein, 1980). Perceived behavioural control is determined by control beliefs, i.e. factors or conditions that

make it difficult or easy to perform the behaviour, weighted by the perceived power of these factors or conditions to facilitate or inhibit the behaviour (Azjen, 1991).

Meta-analytic reviews of the Theory of Planned Behaviour have provided empirical support in terms of its capacity to predict many health behaviours (Conner & Sparks, 2005). More importantly it has proven highly effective in predicting exercise behaviour in a number of population samples, including individuals with coronary heart disease (Prapavessis et al., 2005), kidney disease (Eng & Ginis, 2007), intermittent claudication (Galea & Bray, 2006) and also across a number of age ranges from children to the elderly (Hagger, Chartzisarantis, & Biddle, 2001, Conn, Tripp-Reimer, & Mass, 2003).

The Theory of Planned Behaviour has been widely applied to the general population to understand more about the determinants of exercise to develop interventions to address reduced physical activity. Research by Boudrea and Godin (2007) found that the Theory of Planned Behaviour explained 66% of the variance in intention to exercise in obese adults. This was also supported by Eng and Ginis (2007) who found the Theory of Planned Behaviour explained 61% in the variance in intentions to perform moderate physical activity and 28% variance in actual behaviour. In addition to this Galea and Bray (2006) investigated the Theory of Planned Behaviour in predicting walking intention and activity in people with intermittent claudication. Results showed that attitudes, subjective norms and perceived behavioural control accounted for 67% of the variance in intentions. This was also consistent with people diagnosed with congenital heart disease where components of the Theory of Planned Behaviour accounted for 69% of the variance of intentions, demonstrating its applicability to a variety of populations with various physical health problems.

The strong support of the Theory of Planned Behaviour in predicting exercise in the general population has led to the development of interventions to increase physical activity and thereby improve health. Interventions that have been conducted across work place sites have showed promising results using the Theory of Planned Behaviour as a framework. McEachen et al., 2011) tested a work site intervention to increase physical activity based on the Theory of Planned Behaviour. Findings showed a slight increase in physical activity and more importantly reductions in blood pressure and resting heart rate. These findings are encouraging based on evidence that suggests reductions in blood pressure of 2mm hg are associated with 10% lower stroke rate and 7% lower mortality of cardiovascular related diseases in middle aged populations (Lewington, Clarke , Qizilbash, Peto, & Collins, 2002).

Individuals with schizophrenia are at increased risk of cardiovascular diseases compared to the general population (Hausswolff-Juhlin et al., 2009), positive health outcomes following theory-based interventions should not be limited to those in the general population as those with a psychiatric disability are more at risk of health problems. It is worthwhile using this model to investigate predictors of exercise behaviour in people with schizophrenia. It cannot be assumed that those with mental illness have the same predictors of exercise as those without a mental illness and that similar interventions will be effective. Further research is warranted as it has already been shown that they have different barriers to exercise than the general population and maybe predictors as well.

Similarities between the elderly population and those with schizophrenia may be an important consideration in understanding more about the determinants of exercise in individuals with schizophrenia. Research has shown the Theory of Planned Behaviour to be applicable to older adults. Gretebeck et al. (2007) investigated physical activity and function in older adults using

the Theory of Planned Behaviour. Findings revealed that the Theory of Planned Behaviour accounted for 72% variance in intention to exercise. In this study findings showed perceived behavioural control and attitudes to be the strongest predictors of intention, indicating that older adults with more positive attitudes towards physical activity, less difficulty and more control had greater intention to perform physical exercise. This was also supported by Galea and Bray (2006) who also found that attitudes, subjective norms and perceived behavioural control accounted for 67% of the variance in intention to exercise. The applicability of this model to various populations shows promise for its applicability to individuals with schizophrenia to help achieve the ultimate goal of increasing their physical activity and improving their physical health.

1.3.2 Applicability of the theory of planned behaviour in individuals with schizophrenia

There is a need to address the deficiency in the literature and there is value in extending the research to consider individuals with psychiatric disability. This model may capture previously neglected areas regarding the promotion of healthy behaviours among those with serious mental illness in that it examines health behaviours in terms of the magnitude of relationships among attitudes, beliefs, behavioural intention and actions regarding health behaviour change. The Theory of Planned Behaviour is compelling because of its appropriateness in studying motivational factors involved in health promotion among persons with schizophrenia. Research suggests that there may be deficits in the decision making process used by individuals with schizophrenia when they evaluate their ability to engage in health promoting behaviours (Lambert, Velakouis, & Panteles, 2003). However research by Findlay (2012) identified that people with schizophrenia were able to engage in a system of rational systematic decision-making regarding health behaviours, especially when not experiencing symptoms of psychosis, such as delusion and hallucinations. Previous research

has suggested that more robust studies are needed using such models in understanding the predictors of exercise in this population (Findlay, 2012).

Recent studies on physical activity suggest that individuals with mental illness, in fact have high levels of knowledge and attitudes about exercise that are similar to that of the general population (Leas & Mccabe, 2007). However in this study both individuals with schizophrenia and major depressive disorder were recruited and it was not clear whether those with schizophrenia had more positive attitudes than those with depression or both. These was supported by Soundy et al. (2007) in a qualitative study, people with schizophrenia valued physical activity as a beneficial copying strategy for their mental health problems and were receptive to taking up more physical activity. Despite this promising evidence only sixteen participants were interviewed in this study which was not a representative sample. Ussher et al. (2007) used a more representative sample including 120 patients and found that individuals with schizophrenia had high levels of interest in being more physically active and a vast majority reported that they believed in the benefits of exercise and had high levels of motivation to participate, showing increasingly positive attitudes towards exercise. This study however only included male in-patients, not taking into account female attitudes and also those that live independently in the community. The Theory of Planned Behaviour proposes that attitudes are predictive of exercise intention and intentions then predict behaviour, found in a number of populations (Hagger et al., 2002). Research has continuously found attitudes to be a strong predictor of exercise intentions (Armitage & Conner, 2001). Understanding more about whether attitudes predict exercise in people with schizophrenia, including both male and female out-patients could then lead to the development of interventions to increase their physical activity levels by targeting their attitudes.

Another important component of the Theory of Planned Behaviour in predicting exercise intention, is subjective norms, the influence of people in one's social environment on his/her behavioural intentions; the beliefs of people, weighted by the importance one attributes to each of their opinions, will influence one's behavioural intention. In relation to people with schizophrenia research has consistently shown that people with serious mental illness who lack social influence are more likely to be physically inactive, compared to those with social support (Daumit, Goldberg, Anthony, 2005). Research has shown that in order for patients with schizophrenia to initiate activity, social support was essential. If individuals were not encouraged by family and friends they are unlikely to initiate or maintain exercise (Crone, 2007). Social support can be problematic if dependent on one or few people involved in the activity or at the end of an exercise programme where no further provision for support has been accounted for (Faulkner & Sparkes, 1999). This suggests an important role for subjective norms in predicting exercise behaviour in people with schizophrenia, a valuable part of the theory of planned behaviour in predicting exercise.

The Theory of Planned Behaviour has continuously been used as a framework for developing interventions to help high risk groups increase their physical activity levels and in turn improve health outcomes. For example perceived behavioural control has consistently been found to be the strongest predictor of exercise in the general population (Galea & Bray, 2006). In that the belief that one has control over performing the behaviour leads to the intention to carry out the behaviour (Darker, French, Eves, Sniehotta 2010). Darker et al. (2010) investigated whether an intervention targeting perceived behavioural control would increase the walking activity of people in the general population. Findings revealed that the intervention led to changes in control beliefs and as a result lead to significant increases in walking activity. Therefore providing support for the use of the Theory of Planned Behaviour in designing interventions and improving health behaviours and it is one that could result in

positive benefits to people with schizophrenia once the specific predictors of exercise intentions and behaviour are discovered.

1.3.3 Additional variables in determining exercise behaviour in schizophrenia

Although the Theory of Planned Behaviour has proven sufficient in predicting intentions to exercise in the general population (Hagger et al., 2001; Conner & Sparks, 2005; Conn et al., 2003; Prapavessis et al., 2005; Eng & Ginis, 2007; Galea & Bray, 2006 & Gretebeck et al., 2007), there is still some variance that is left unexplained resulting in the need to move towards investigating additional predictors of intention to exercise and behaviour. With the exception of those not being able to exercise due to health reasons, the Theory of Planned Behaviour has shown to be a useful predictive model. Research has reported attitudes and perceived behavioural control to be significant predictors of behavioural intention (Biddle, Goudas, & Page, 1994; Armitage & Conner 2001). In contrast the majority of studies have found a lack of association between subjective norms and intention to exercise (Courneya & McAuley, 1995). Where significant associations have been reported (Wankel et al., 1994), the social influence component has contributed less than the attitudinal component to the prediction of intentions, and the explained variance has been frequently low.

In response to the typically lesser role of subjective norms in the Theory of Planned Behaviour, some researchers have argued that the operational definition of subjective norms insufficiently captures social influences (Grube, Morgan, & McGee, 1986). Subjective norms suggest that the pressure of those around us makes us more likely to engage in exercise, when in fact it has been found that people do the opposite and that social pressure impedes, rather than enhances motivation (Chartzisarantis et al., 2007). Therefore subjective norms may not

predict intentions because pressuring forms of social influence, reflected in the construct of subjective norms, do not always facilitate intentions (Chartzisarantis et al., 2007).

Due to the lack of significance of subjective norms in predicting intention to exercise, research has considered the component of social support as a more predictive factor of exercise intention and behaviour. Social support, which is defined as the perceived encouragement to engage in behaviour has received much attention and has been applied to various social cognition models to help improve its predictability (Leas & Mccabe 2007, Hamilton & White, 2008)

Research in older adults has found social support to be a significant predictor of exercise behaviour and maintenance. Cousins (1993) found that social support was a highly significant predictor of later life exercise in women over the age of 70. The social support for exercise was the best predictor of six cognitive beliefs, explaining on its own 13% of intention to exercise. The main reasons that women were active was due to high levels of social support to be active and the fact that they felt capable of participating in fitness type activities. This was also supported by Hardy and Grogan (2009) who reported that social support was a motivational factor for exercise behaviour in older adults. It has also been found that various types of social support have proven influential in encouraging older adults adhere to exercise. Telephone counselling as a source of social influence and support, which can enhance motivation has proved to be beneficial. Moreover in a comparison between the use of prompts and the use of motivational or educational interventions, simple prompting was found significantly more effective than lengthy education programmes in encouraging exercise adherence (Schutzer & Graves, 2004).

Research into schizophrenia suggests that intentions to exercise and motivation to adopt behaviour change are not just influenced by perceptions and cognitions, but social support has also been found to be influential in health-related decisions made by people with schizophrenia and depression (Dixon, Hass, Weiden, Sweeney, & Frances, 1991). The social environment has been recognised as being important for health seeking behaviours (Cohen & Willis, 1985). Leas and Mccabe (2007) investigated the value of adding social support to the Protection Motivation Model in the prediction of health behaviours among people with mental illness. Findings from this study showed no significant value to the model in predicting exercise behaviour when social support was added. There are a number of reasons why social support did not prove significant. Most importantly the social support instrument that was utilised, did not measure specific elements of social support relevant to the health behaviour under study, but global social support and satisfaction. This may have impacted the significance of social support on health behaviours in this investigation.

Whilst the majority of work in the area of social support for exercise has focused on family and friends (Hardy & Grogan, 2009), results from later studies suggest that experts could also play a key role in promoting physical activity. Tulloch et al. (2006) found a significant increase in physical activity in older adults after health professional social support. This was also upheld by Schuler et al. (2006) who found that older women were more likely to exercise when given advice from their GP and surprisingly was the strongest predictor of exercise up take and maintenance. However despite optimum exposure to the general public, research findings have indicated physicians are not regularly counselling their patients about exercise. Balde, Figueras, and Hawkins (2003) found only 62% of the respondents in their survey received advice about exercise from physicians, even though the inactive elderly generally preferred to receive exercise support and advice from their own physician or health care

professional. In a selected sample of 301 medical care beneficiaries, 40 % of the patients who initiated an exercise programme did so because of their physician's influence. It was concluded that because patients respect their physician's advice, the elderly are more likely to change their levels of physical activity. This suggests that physicians play a pivital role in promoting exercise behaviours among the elderly. This is also enhanced by the fact that the elderly population generally have more contact with their GPs' and are more likely to be prompted about their health (Schutzer & Graves, 2004).

Health professional support in the Theory of Planned Behaviour has been neglected in research involving the general public, possibly due to their limited contact with health professionals. However health professional support could play a role in motivating people with schizophrenia to exercise, having frequent contact with health professionals including General Practitioners and Mental Health Practitioners. Research by Ussher et al. (2007) showed that individuals were more likely to exercise if their doctor or health care professional encouraged them to, suggesting the influence of health professionals on individuals with schizophrenia, regarding health promoting behaviour. This was also supported by Carless (2007) who reported it was the support from health professionals directly involved in the delivery of exercise activities that proved crucial.

Health professional support may be of significance with regards to people with schizophrenia who represent an extremely isolated population, often reporting weak social networks (Cohen & Sokolosky, 1978). Social networks have been studied in non-psychiatric as well as psychiatric illnesses and there is consistent evidence that has found those with schizophrenia to have significantly fewer social linkages than non-psychotics (Cohen & Sokolosky, 1978). This is a result of the negative symptoms of schizophrenia which tends to lead to social

withdrawal and lack of social skills which in turn leads to limited social interactions. Due to their limited social network it would suggest that social pressure from friends and family may be substantially reduced or non-existent and so not a predictor of exercise in this population. This was supported by Ussher et al. (2007) who reported that people with serious mental illness received little if any support from family and friends in regards to physical activity.

The majority of people with schizophrenia have frequent contact with mental health professionals and reinforcement by them can play a pivotal role in the long term adoption of exercise (Richardson et al., 2005). Bezyak and Chan (2011) investigated stages of change among individuals with severe mental illness, findings from this study showed that 59.5% indicated that the relationship between exercise programme staff members did encourage them to be more active. This was also supported by Ussher et al. (2007) who reported that consistent with findings from the general population, people with schizophrenia also value the support of health professionals. In addition to this research by Soundy et al. (2007) concluded that the promotion of physical activity may benefit from considering social support as a provision to exercise initiation and adherence in a community setting.

To date limited research (Leas & Mcabbe, 2007; Ussher et al., 2007; Soundy et al., 2007 & Mcleod et al., 2009) has investigated the role of health professional support with regards to health related behaviours, such as exercise in people with mental illness. Research suggests that health professional support my influence exercise intention and behaviour of individuals with schizophrenia due to their limited social contact and interaction and so was included in the present study.

Another variable that has received a great deal of attention with regards to establishing determinants of health related behaviours is self-efficacy. The awareness of the cognitive processes specific to motivation and behavioural change is fundamental to understanding exercise initiation and adherence and more recently research has highlighted self-efficacy as central to this process. Due to this increased interest in the concept of self–efficacy, this has been integrated into to a number of social cognition models in order to gather more of an understanding of motivational factors related to exercise and to increase their predictive value. (Orsega-Smith, Payne, Mowen, Ho, & Godbey, 2007 & McAuley, 1992).

The concept of self-efficacy is consistently identified as an important determinant of exercise behaviour in various populations and in many types of behavioural learning throughout scientific literature. Self-efficacy is defined as an individual's belief in their ability to successfully perform a specific behaviour (Bandura, 1977). The stronger ones' self-efficacy, the more likely the individual will imitate and persist with a specific behaviour. Whilst research has shown that perceived behavioural control within the Theory of Planned Behaviour is a significant predictor of exercise intention and behaviour (Armitage & Conner, 2001) more recently researchers have provided evidence supporting a distinction between self-efficacy and perceived behavioural control (Dzewaltowski, Noble, & Shaw, 1990). Empirically researchers have extended the study of relations between self-efficacy and intentions by successfully incorporating the construct into or alongside variables from the Theory of Planned Behaviour. Studies have demonstrated that self-efficacy predicts intentions alone (Terry, 1993), behaviour alone (Conner & Armitage, 1998), or both intentions and behaviour (Biddle, Goudas, & Page, 1994). Terry and O'Leary (1995) made the distinction by proposing that self-efficacy reflects a person's abilities (internal aspects of control) with respect to performing physical activity behaviour and that perceived behavioural control

reflects barriers (external aspects of control) towards performing physical activity behaviour. An example of internal factors is an individual's perceived confidence in engaging in physical activity and an example of external factors includes things like 'bad weather'. Researchers have conducted studies of exercise behaviour and condom-related behaviour in which self-efficacy was found to be an independent predictor of intentions, whereas perceived behavioural control measures were not (Tavousi et al., 2009). In general, the majority of research affirms self-efficacy beliefs as crucial in the initial adoption of an exercise routine. Feelings of pleasure and satisfaction along with self-regulatory skills are more important in sustaining behaviour.

Self-efficacy is an independent predictor of exercise intention and behaviour in older adults (Walcott-McQuigg & Prohaska, 2001). Orsega-Smith et al. (2007) investigated the role of social support and self-efficacy in physical activity in older adults. Findings showed that social support from family and friends and the self-efficacy domain of perceived physical ability were significantly related to leisure time physical activity in older adults. These theory-based determinants led to the development of interventions to increase self-efficacy and social support and were significant in increasing the exercise of older adults with success (Allison & Kelly, 2004). Whilst there are fundamental differences between the elderly population and those with schizophrenia they are well matched on their physical restrictions to exercise.

Evidence suggests that self-efficacy may be a stronger predictor of exercise intention and behaviour than perceived behavioural control for individuals with schizophrenia. Low levels of control and autonomy have been widely implicated in mental health problems (Carless, 2007). A study by Holmberg and Kane, (1999) looked at the health behaviours and health locus of control in people with schizophrenia and bipolar disorder compared to non-

psychotics. Results showed that people with psychotic illnesses had significantly higher scores for powerful others compared to non-psychotics, suggesting that people with psychotic illness feel that their health is more in the control of others around then. This may suggest that perceived behavioural control may not be predictive of exercise intention and behaviour in this population if they feel they have little control over their health, compared to those without a mental illness. If individuals with schizophrenia demonstrate even greater externality of health locus of control compared to non-psychotics, it would therefore provide an important focus of clinical interventions, as it places healthcare professionals in a very favourable position to exert their influence by means of health promotion and active therapeutic interventions that reduce modifiable risk factors for physical disease and improve health outcomes.

Support for the importance of self-efficacy in regards to exercise over and above control in people with schizophrenia comes from a study by Leas and Mccabe (2007) who studied health behaviours in people with schizophrenia and depression using the protection motivation theory. Findings from this study showed that self-efficacy and intention to exercise were the strongest predictors of physical activity in people with schizophrenia. This showed that whilst people with mental illness showed less physical activity compared to the general population it was self-efficacy that was the most significant predictor of intention to exercise and exercise behaviour. This was also highlighted with regards to eating a low fat diet. Research has also shown that low self-efficacy is one of the strongest determinants of inactivity in this population (Leas & Mccabe, 2007 & Mcleod et al., 2009).

Information such as this highlights a need to develop interventions to increase physical activity in this population by increasing their perceived ability to perform the behaviour.

Research has looked into the effects of motivational group interventions upon exercise self-efficacy in people with schizophrenia based on the self-efficacy theory (Bandura, 1977) and research in older adults (Beebe et al., 2010). Findings showed support for the self-efficacy theory in that scores of self-efficacy were higher for the experimental groups compared to the controls, suggesting that motivational interventions to increase confidence in ability to exercise can lead to higher scores of self-efficacy which in turn may lead to increased levels of physical activity (Beebe et al., 2010). One of the main aims of improving the physical health outcomes of schizophrenia and reducing cardiovascular disease is increasing their levels of physical activity. If self-efficacy is a predictor of exercise in this population then such information could then lead to the development of interventions to increase their confidence in carrying out physical activity. Based on these findings self-efficacy will be an additional measure in this present study added to the Theory of Planned Behaviour, which may help to reveal whether it is their confidence that leads to their exercise behaviour or the control they have over that behaviour.

Therefore in summary there are a number of individual factors related to exercise in this population and there was a need to use empirically supported and widely applied frameworks, such as the Theory of Planned Behaviour. Furthermore the addition of health professional support and self-efficacy were important considerations in this study investigating the determinants of exercise behaviour in individuals with schizophrenia. Understanding the predictors of exercise in this population will guide the future development of exercise interventions as an additional more cost-effective treatment within services to improve the health of individuals with schizophrenia.

1.4 The present study

There is a clear need to improve the health outcomes of people with schizophrenia. Interventions aimed at improving the physical fitness of those with schizophrenia have the potential to improve physical, mental and social wellbeing. In order to appropriately direct clinical efforts to promote physical fitness by implementing effective exercise interventions in this population, it is necessary to understand the determinants of individuals with schizophrenia current exercise behaviour.

This study is the first to explore the determinants of exercise behaviour in individuals with schizophrenia using the Theory of Planned Behaviour. Whilst there is a breadth of research aimed at understanding the predictors of exercise behaviour in the general population, this has not been addressed in mental health practice with those diagnosed with a psychiatric disability. There is merit in using an empirically supported and widely applied model, such as the Theory of Planned Behaviour, specifically components of the Theory of Planned Behaviour including, behavioural beliefs, attitudes, subjective norms and perceived behavioural control. Furthermore, health professional support and self-efficacy are considerations in this study of the potential determinants of exercise behaviour in individuals with schizophrenia. Examination of these factors would promote an understanding of naturally occurring exercise in individuals with schizophrenia. In turn this knowledge will guide the design and implementation of targeted interventions to improve the health and overall quality of life of individuals with schizophrenia.

Previous research has focused primarily on individuals without a mental illness, therefore current interventions to increase exercise may not be applicable to those with a psychiatric illness. Including a comparison group of the general population in the present study will shed

light on whether similar or alternative interventions and exercise determinants need to be targeted to increase their exercise behaviour, it cannot be assumed that current research evidence using the general public could translate to those with schizophrenia.

This study will contribute to the already growing body of literature and provide valuable information about the best way to promote exercise in individuals with schizophrenia with the ultimate goal of increasing exercise motivation and behaviour in order to facilitate overall health (Beebe & Smith 2010). Findings could then be incorporated into the mental health services, further bridging the gap between the physical and mental health of such individuals.

The present study aims to test the applicability of the Theory of Planned Behaviour to the prediction of exercise in individuals with schizophrenia and the general population, to look at differences between the two population samples on current exercise behaviour and predictors of exercise intention and behaviour. In addition, the role of health professional support and self-efficacy in the prediction of exercise behaviour is also investigated. The aim of this study is to test whether: a) individuals with schizophrenia report more walking than the general population, b) individuals with schizophrenia report less moderate-strenuous activity than the general population, c) the general population engage in more exercise in total than those with schizophrenia, d) the Theory of Planned Behaviour predicts exercise intention and behaviour in individuals with schizophrenia and the general population, e) the addition of health professional support and self-efficacy increased the predictability of the Theory of Planned Behaviour for individuals with schizophrenia, f) health professional support and self-efficacy were stronger predictors of exercise than subjective norms and perceived behavioural control in individuals with schizophrenia.

Chapter 2:

Methodology

2.1 Design

A cross-sectional research design was employed in this study whereby participant groups with a diagnosis of schizophrenia and the general population were asked to complete a questionnaire about their exercise activity. This between-groups design looked at differences between individuals with schizophrenia and the general population on exercise behaviour and the predictors of exercise.

2.2 Participants

Individuals diagnosed with a psychotic disorder attending treatment centres in the community were invited to take part in the study. Inclusion criteria ensured that all participants had a diagnosis of schizophrenia and were aged 18 years and over (for the purpose of informed consent), including both men and women. Participants with schizophrenia were all associated with Milton Keynes Adult Mental Health Services and were currently attending the East and West Mental Health Community Services. Part of the inclusion criteria was that all individuals diagnosed with schizophrenia were living independently in the community; in-patients with schizophrenia were not included in the study. Individuals who met the criteria but who were unable to understand/provide informed consent or speak English, or who were deemed too mentally unwell by their care co-ordinators were excluded from the study.

Participants from the general population who worked in local recruitment companies in Milton Keynes were invited to take part. Inclusion criteria ensured that all participants were aged 18 years and over and included both men and women with no history of mental illness.

As can be seen in table 1 a total of 214 participants took part in the study. Of those 105 were diagnosed with schizophrenia (age range 19-65 years, M 38.27, SD 12.39; 79% were males, 21% females) and 109 were taken from the general population (age range 20-63 years, M 36.08, SD 11.27; 46 % were males, 54% females). The total sample consisted of 62% males, 38% females with a mean age of 37 years (SD 11.88). Although the likely effect sizes for individuals with a diagnosis of schizophrenia were unknown a power calculation using GPower revealed a total sample size of 210 for both groups to permit the identification of medium effects with a power of .95.

The psychiatric sample with a diagnosis of schizophrenia recruited from community mental health services were less likely to work (14% compared to 100% in the general population sample), more likely to live alone (65 % compared to 18% in the general population) and more likely to smoke than those from the general population (65% compared to 28 % of the general population).

***Table 1*-Demographic characteristics of the schizophrenia and general population group**

	General Population		Schizophrenia Population		Total Sample	
	N	%	N	%	N	%
Gender						
Male	50	46	75	79	125	62
Female	59	54	20	21	79	38
Ag (years)e						
18-25	22	20	9	9	31	14
26-35	43	40	36	34	79	37
36-45	20	18	33	32	53	25
46-55	10	9	16	15	26	12
56-65	14	13	11	10	25	12
Work						
Yes	109	100	15	14	124	58
No	0	0	90	86	90	42
Live alone						
Yes	20	18	68	65	88	41
No	89	82	37	35	126	59
Smoke						
Yes	30	28	68	65	98	46
No	79	72	37	35	116	54

2.3 Measures

All participants were asked to complete a questionnaire adapted from Godin and Shephard's (1985) Leisure-Time Activity Questionnaire (LTEQ) and from Ajzen's (2002) constructing a Theory of Planned Behaviour questionnaire (appendix A, p-194). Both participant groups completed the same questionnaire. The questionnaire measured 8 domains and included 40 items looking at participants current exercise behaviour and factors associated with exercise behaviour using components of the Theory of Planned Behaviour (behavioural beliefs, attitudes, subjective norms, perceived behavioural control) and additional variables measuring self-efficacy and professional social support. Demographic characteristics were also obtained from the questionnaire by self-report, including age, gender and whether they smoke of not using a *Yes or No* response. Other demographic information included, whether they live alone and whether they work (work will be defined as paid or unpaid, eg voluntary) using a *Yes or No* response. A question was also included about their diet, which specifically ask the participants how many portions of fruit and vegetables they eat per day, examples of what constitutes a portion was provided on the questionnaire (appendix A, p-194).

2.3.1 Current exercise/ physical activity

The exercise section of the questionnaire was adapted from Godin and Shephard's (1985) Leisure- Time Activity Questionnaire (GLTEQ). The GLTEQ is a self-administered measure of usual physical activity over a typical seven day period. The questionnaire had been validated and used in a number of studies looking at exercise intensity and duration (Chatzisarantis, Hagger, & Smith, 2007). It has been shown to have good test-retest reliability (alpha=.81) (Sallis, Buono, Roby, Micalem & Nelson, 1993) and validity (Jacobs, Ainsworth, Hartman, & Leon, 1993). For this research only the first part of the questionnaire was used. The first part of measuring exercise behaviour consisted of 3 items. The items measured the

frequency of strenuous (running, jogging), moderate (easy swimming, brisk walking), mild (easy walking) exercises. For examples, *over a typical week how often do you participate in strenuous activities, such as running, tennis, jogging or swimming etc?* The questionnaire was slightly modified, rather than having open questions about their exercise frequency, they were required to choose using on a 4-point likert scale how often they take part in these activities (1-2 days, 3-4 days, 5-7 days) frequency scores for each exercise level were then given by working out the average frequency for each exercise. The reported weekly frequencies of strenuous, moderate and mild activities are then multiplied by 9, 5, 3 metabolic equivalents (MET's) and further summated into a measure of total leisure activity. GLTEQ scores could range from 0- 119. A health contribution score for physical activity was also calculated, only using the scores on moderate and strenuous exercise as these have been identified to have the most health benefits. These are classified as 24 units or more (physically active, many health benefits), 14-23 units (moderately active, some benefits) and less than 14 units (insufficiently active, low benefits).

Participants were also asked to report how many minutes they spend doing these activities each time. This was measured on a 4 point Likert scale (0= none, 1= less than 20 minutes, 2= 20-30 minutes, 3= 30 minutes- 1 hour, 4 = 1 hour or more). Minutes spent doing each activity was obtained by averaging the time spent doing each activity. The minutes spent doing these activities was then multiplied by the number of times they did each activity. This enabled calculation of total minutes spent engaged in strenuous, moderate and mild exercise.

2.3.2 Behavioural Beliefs

A preliminary study was conducted with individuals with schizophrenia to explore behavioural beliefs. Beliefs play a key role in the Theory of Planned Behaviour and

behavioural beliefs are assumed to determine attitudes towards behaviour, but not the direct measure of attitudes. In order to design an appropriate questionnaire it was important to establish their beliefs were around exercise. A sample of 5 participants with a diagnosis of schizophrenia were asked some qualitative questions in a group setting around their beliefs about exercise.

The questions asked were based on Ajzen (2002) constructing a Theory of Planned Behaviour questionnaire. In order to establish individuals' behavioural beliefs about exercise, open-ended questions were asked about *"what they believe are the advantages and disadvantages of exercise and also whether they exercise or not."* Behavioural beliefs from this preliminary study were then formatted following the directions of the Theory of Planned Behaviour authors to create items to be included in the questionnaire (Ajzen, 2002). There were a number of themes identified, the common theme of why they exercised was for *transportation* purposes. They also identified that they believe the advantages of exercise were to assist *weight loss, lift mood and improve overall health.* The only disadvantages were down to their illness and how they were *feeling day to day and having access to gym facilities.* Based on these findings a number of statements were devised to be included in the questionnaire to obtain their behavioural beliefs about exercise. These included," *Regular exercise helps to assist weight loss", "Exercising regularly will help lift my mood", Exercising regularly is my form of transportation" Regular exercise will improve my overall health."*

In the main study these four items were measured on a 7-point Likert scale ranging from *strongly agree to strongly disagree.* Some of the scores of the items were reversed yielding a composite scale with higher scores representing stronger behavioural beliefs. An overall

measure of behavioural beliefs was created for each person by calculating the mean score of the four items.

2.3.3 Attitudes towards regular exercise

Regular exercise was defined as 30 minutes, 3 times a week based on research looking at the exercise behaviour of older adults (Galea & Bray, 2006) and (American College of Sports Medicine, 1998). Direct measures of attitudes towards regular exercise were obtained using 6 items presented on a 7-point evaluative semantic differential scale. These included both instrumental and experiential components for example "*For me to exercise regularly is*", *harmful-beneficial, worthless- valuable, stressful-relaxing (instrumental), enjoyable-unenjoyable, pleasant-unpleasant (experiential) and good-bad* which captures overall evaluation very well. These items have been frequently used in other physical activity studies framed within the Theory of Planned Behaviour (Rhodes & Courneya, 2003). Some of the scores for the items were reversed, yielding a composite scale with higher scores representing more positive attitudes. An overall measure of attitude was created for each person by calculating the mean score of the 6 items.

2.3.4 Subjective norms

Subjective norms were measured using 5 items rated on a 7-point Likert scale rating from 1 (*strongly disagree*) to 7 (*strongly agree*). Three items measured the *injunctive component* of subjective norms (perceived social pressure). For example *"most people who are important to me think I should exercise for 30 minutes, 3 times a week. And "it is expected by others that I should exercise for 30 minutes, 3 times a week"*. Two items also measured the *descriptive component* of subjective norms (perceptions of other people's actions). For example "*Most people who are important to me, exercise for 30 minutes, 3 times a week" and "The people in*

my life whose opinion I value exercise for 30 minutes 3 times a week. "These items were derived from items similar to those generated by Ajzen (2002) and findings by Rhodes & Courneya (2003a). Some of the scores of the items were reversed yielding a composite scale with higher scores representing higher subjective norms. An overall measure of subjective norms was created for each person by calculating the mean score of the 5 items.

2.3.5 Perceived Behavioural Control

Perceived behavioural control was measured on a 5 item scale. Each item was rated on a 7-point Likert scale. Participants were asked to rate the degree to which they believe they have control over taking regular exercise (Ajzen, 2002). Item wording and scale anchors were as follows, "it *is mostly up to me whether I exercise regularly or not."* (1 = *strongly disagree*, 7= *strongly disagree*) and *"Exercising regularly is beyond my control"* (1 = *strongly disagree*, 7= *strongly disagree*). These items were formed on the basis of direct measures of perceived behavioural control used in previous studies (Bozionelos & Bennett, 1999, Norman & Smith, 1995). Some of the scores of the items were reversed yielding a composite scale with higher scores representing higher perceived behavioural control. An overall measure of perceived behavioural control was created for each person by calculating the mean score of the 5 items.

2.3.6 Health professional support

Professional social support was measured on a 5 item scale. Each item was measured on a 7-point Likert scale ranging from *strongly disagree to strongly agree.* A measure of professional social support was adapted from the Social Support and Exercise Survey (Prochaska et al., 2002). This measure was adapted to be specific to the support from health professionals rather than family and friends. This is based on the finding that people with schizophrenia are more likely to exercise with the support of health professionals (Ussher et

al., 2007). Participants were asked to rate the degree to which they agree or disagree with the following statements: *"Health professionals encourage me to do regular exercise", and "Health professionals advise me about the benefits of exercise," (1=* strongly disagree, 7=strongly agree). Some of the scores of the items were reversed yielding a composite scale with higher scores representing higher professional social support. An overall measure of professional social support was created for each person by calculating the mean score of the 5 items.

2.3.7 Self-efficacy

Self-efficacy was measured on a 5 items scale. Each item was measured on a 7-point Likert scale. Participants were asked to rate their ability to overcome potential barriers when carrying out regular exercise. This measure is in concordance with previous studies in the exercise domain (DuCharme & Brawley, 1995). Item wording and anchors were as follows: "*I am confident I can do regular exercise without the support of others "and "I am confident I can do regular exercise even without access to a gym."* Participants were asked to rate their level of self-efficacy from *strongly agree to strongly disagree* on each statement. Some of the scores of the items were reversed yielding a composite scale with higher scores representing higher self-efficacy. An overall measure of self-efficacy was created for each person by calculating the mean score of the 5 items.

2.3.8 Behavioural intention

Measures of intention were taken from Ajzen (2002) recommendations for measuring exercise intention. There were 5 items used to measure participant's intention to exercise regularly. This was measured on a 7-point Likert scale ranging from *strongly disagree to strongly agree.* The wording of the items were as follows, "I *intend to exercise for 30*

minutes, 3 times a week", and "My goal is to exercise for 30 minutes, 3 times a week." These items are based on previous research looking at predictors of exercise intention and behaviour (Eng & Ginis, 2007, Galea & Bray, 2006) Some of the scores of the items were reversed yielding a composite scale with higher scores representing more intention to exercise. An overall measure of intention was created for each person by calculating the mean score of the 5 items.

2.4 Questionnaire trial with schizophrenia group

The questionnaire was piloted with individuals with schizophrenia to make sure that they were able to follow and complete it. This was important as concentration is often affected by their illness. There were 8 participants with schizophrenia that agreed to pilot the questionnaire. Internal consistency was not obtained at this point due to the small sample size. Validity of the questionnaire was carried out based on face value, looking at how the measure appears, does it appear to be gathering the information is was supposed to and does it seem well designed. Ease of use was established with the 8 participants and no difficulties were reported.

2.5 Measures of internal reliability for the scales within the questionnaire

Internal reliability tests were later conducted using Cronbach alpha for each of the items in the questionnaire. Inter-correlations among items are being maximised when all items measure the same construct. Alpha was the most useful test as the questionnaire consisted of different substantive areas within a single construct. The Cronbach alpha for the Theory of Planned Behaviour scales was α =.82. The scales proved internally consistent, with alphas ranging from .77 to .80. None of the items within the questionnaire needed to be deleted as the internal consistency test showed that deleting items would not have increased the alpha

score. Cronbach alpha for the measure of exercise behaviour (GLTEQ) was also run based on modifications to the measure and proved internally consistent (α =.72), deleting items would not have increased the alpha.

Descriptive statistics for the Theory of Planned Behaviour variables and additional variables are included in the study and are shown in table 2.

Table 2- Internal consistency, means and standard deviations for the Theory of Planned Behaviour and additional variables in relation to exercise

Measures	Number of items	Cronbach alpha	M	SD
Behavioural beliefs	4	.80	5.51	1.15
Attitudes	6	.79	5.65	1.32
Subjective norms	5	.80	4.53	1.47
Perceived behavioural control	5	.78	5.58	1.25
Exercise intention	5	.78	5.49	1.34
Self-efficacy	5	.77	5.18	1.20
Health professional support	5	.79	4.67	1.48

2.6 Ethical considerations

Ethical approval was sought and awarded from London Metropolitan University Psychology Ethics committee for the general population sample. In order to access those participants with schizophrenia, ethical approval was sought and awarded from NRES Committee South Central Berkshire.

2.7 Procedure

Participants with schizophrenia were invited to take part when attending the medication management clinics. These clinics were chosen because of the relative ease they afforded in accessing the sample. Five medication management clinics were used across Milton Keynes in order to maximise participation rates. All the clinics were contacted and consent was given

from the manager to approach mental health clients when coming into the medication management clinics to ask if they were interested in taking part in the study. All participants received a plain language statement that clearly outlined the purpose of the study and the nature of their involvement in the research (appendix B, p-200). All participants were given the option of either completing the questionnaire in a private room at the clinic or to take the questionnaire home and send it back in a stamped addressed envelope. There were 8 participants that required additional support in filling out the questionnaire due to learning difficulties and were duly supported. Participants who wanted to take part in the study were required to sign the consent form (appendix C, p-201) and were informed that they could pull out of the study at any time and that this would not compromise their continuing care at the clinics. Participants were provided with the opportunity to discuss any concerns. None of the participants indicated any concerns or distress as a result of the study, those that needed help completing the questionnaire were supported. 72% of the sample chose to complete the questionnaire at the clinic in a private room, 20% chose to take the questionnaire home to complete. The response rates were typical of individuals with severe mental illness taking part in quantitative studies (Leas & Mccabe, 2007). A total of 200 questionnaires were given out to individuals with a diagnosis of schizophrenia, with a 52% response rate across the five medication management clinics. Names and identifiable information were not recorded and all participants were given debriefing information following the study to put there mind at rest about the nature of the study and any future questions they had. (Appendix D, p-202).

Participants from the general population were recruited by approaching local recruitment companies in Milton Keynes. Flyers were sent out to the companies containing information about the nature of the study, this was forwarded onto staff members (appendix E, p-203). Permission was given by the manager of these companies to give out recruitment flyers to

their staff about the study. Contact details were provided on the flyer and those that wanted to take part were sent a questionnaire package. These companies were chosen based on the relative ease of collecting data from a diverse population of gender, age and culture. Interested participants were sent a questionnaire package, containing the physical activity questionnaire (appendix A, p-194), information sheet (appendix F, p-204) and consent form (appendix C, p-201). They were also provided with a stamped addressed envelope to return both the questionnaire and consent form. The questionnaire took approximately 15-20 minutes to complete. Names and identifying information were not recorded. During this process participants were also informed that they could withdraw from the study at any time with no questions asked. A total of 300 questionnaire packages were given out, with a response rate of 36.3% across the recruitment companies. All Participants were given debriefing information following the study to put their mind at rest about the nature of the study and any future questions they might have. (Appendix D, p-202).

2.8 Methods of data analysis

Descriptive statistics were first calculated to determine means and standard deviations of all constructs. Mean values for the constructs of the general population and schizophrenia sample were compared using a one-way between-subjects ANOVA (Analysis of variance) to identify any differences between the two groups on leisure time activity (light, moderate and strenuous exercise), the Theory of Planned Behaviour variables and additional variables self-efficacy and health professional support. Subsequently, bivariate pearsons correlations were conducted to examine the association between psychosocial variables (constructs) for both the original TPB variables (beliefs, attitudes, subjective norms and perceived behavioural control) and then for the expanded model including self-efficacy and health professional support. These correlations also included a total leisure time activity for both population samples. The

Theory of Planned Behaviour is exclusionary and hierarchical in nature. Specifically attitudes, subjective norms and perceived behavioural control are generally hypothesised to be the sole determinants of behavioural intentions. In contrast behavioural intentions are considered the primary determinants of actual behaviour, with perceived behavioural control existing as a potential influence. Because this model allows for a priori predictions concerning the relative importance of intentional and behavioural determinants, hierarchical multiple regression procedures are typically employed to assess model assumptions and their applicability to specific behaviours (Schlegel, d'Avernas, Zanna, DeCourville, & Manske, 1992). When a hierarchical approach is adopted, variables are entered manually into the regression equation in a sequential fashion according to their hypothesised importance (Pedhazur, 1982). In order to assess the contribution of self-efficacy and health professional support within the Theory of Planned Behaviour, supporters of the this model would argue that these variables should be added into the equation after the model components have been entered, therefore assigning priority to the model components. It is difficult to assign a prior importance to either the Theory of Planned Behaviour components or self-efficacy and health professional support. Consequently, in the present study, a stepwise procedure was employed in order to afford a fair assessment for the contribution of variables entered. In this process variables were entered sequentially into the regression equation based on their observed statistical importance (Tabachnick & Fidell, 2007). To the extent that the Theory of Planned Behaviour is a valid framework for predicting exercise intentions and behaviour, variables exclusive to the model should enter into and remain in the equation according to their significance. Statistical significance for this study was set at $p<.05$ as a medium effect size was estimated. Statistical analyses were undertaken with SPSS version 19.0.

Chapter 3:

Results

3.1 Differences between the schizophrenia group and general population on demographic variables, exercise behaviours, TPB variables, self-efficacy and health professional support

As shown in table 3 mean scores on demographic measures between the schizophrenia group and general population were compared using a one way between-subjects ANOVA. Findings showed that individuals with schizophrenia were significantly more likely to live alone ($f=(1,212) = 60.618$, $p<.001$) and smoke ($f= (1,212) = 53.389$, $p<.001$) than the general population but they were significantly less likely to work ($f=(1,212) = 647.888$, $p<.001$) and eat fruits and vegetables than the general population ($f= (1,212) =44.433$, $p<.001$)

In addition to this the schizophrenia group reported more light exercise (walking) than the general population ($f (1,212) =10.368$, $p<.001$). This supports the first hypothesis that individuals with schizophrenia would report more walking behaviour than the general population. It also revealed that the schizophrenia group did significantly less moderate ($f(1,211) =5.21$, $p<.05$) and strenuous activity ($f(1,212) =44.10$, $p<.001$) than the general population. This supports the hypothesis that the general population would report more moderate and strenuous activity than those with schizophrenia. The total amount of exercise between the two groups showed that the general population engaged in significantly more exercise than the schizophrenia group ($f(1,212) = 17.765$, $p<.001$). Findings are therefore in support of the hypothesis that the general population would report more exercise activity than individuals with schizophrenia. Other significant differences found in this analysis were that

the schizophrenia group spent significantly more time walking than the general population (f (1,212) = 6.44, p<.01), but significantly less time doing moderate (f(1,212) = 5.037, p<.01) and strenuous activity (f(1,212) =39.750, p<.001) compared to the general population (shown in table 3).

Table- 3- Differences between the schizophrenia group and general population group on demographic factors, exercise behaviour, TPB variables, self-efficacy, and health professional support

	General Population		Schizophrenia Population		
	M	SD	M	SD	*f*-value
Live alone	18	.38	65	.38	60.62***
Work	100	.00	14	.35	647.88***
Smoke	28	.45	72	.45	53.39***
Fruit & veg intake	3.10	1.35	1.8	1.47	44.43***
Additional variables					
Self-efficacy	5.44	1.07	4.90	1.27	11.08***
Health professional support	4.72	1.32	4.62	1.62	.22
Exercise behaviour					
Light exercise (walking)	3.06	2.08	3.94	1.89	10.39***
Light exercise (minutes)	113.0	120.0	154.7	120.21	6.44**
Moderate exercise	2.46	1.96	1.82	2.10	5.21*
Moderate exercise (minutes)	79.39	99.25	51.73	79.24	5.03*
Strenuous exercise	2.90	1.93	1.23	1.73	44.10***
Strenuous exercise (minutes)	112.18	107.05	34.52	68.12	39.75***
Total current exercise	47.63	27.44	32.44	25.15	17.76***
Total minutes	302.85	252.92	237.96	189.71	4.48*
TPB Variables					
Behavioural Beliefs	5.61	.97	5.42	1.31	1.40
Attitudes	5.93	1.12	5.37	1.45	9.81**
Subjective norms	4.74	1.32	4.31	1.58	4.61*
Perceived behavioural control	5.84	1.14	5.30	1.30	10.35***
Exercise intention	5.68	1.33	5.29	1.32	4.64*

*p<.05 ** p<.01, *** p<.001 *Note*- M=mean SD= standard deviation

When comparing the TPB variables results of the one way ANOVA showed there were significant differences between the schizophrenia group and general population on attitudes (f(1,212) =9.818, p<.01) , subjective norms (f(1,212) =4.619, p<.05), perceived behavioural

control (f(1,212) =10.349, p<.001) self-efficacy (f(1,212) =11.067, p<.001) and intention (f(1,212) =4.647,p<.05) but that there were no significant differences between the two population groups on behavioural beliefs (f(1,212)= 1.400, p>.24) and health professional support (f(1,212)= .227, p>.63).

3.2 Relationships between exercise behaviour and TPB variables

Prior to undertaking the regression analysis to test the main hypotheses, it was necessary to investigate the relationship between exercise, TPB variables, self-efficacy and health professional support. It was considered important to explore these relationships for the purpose of selecting the appropriate variables for inclusion in the main regression analyses. Pearson's correlations were run between all variables for the schizophrenia and general population group separately. For this part of the analysis current exercise behaviour refers to the total amount of leisure time activity over a 7 day period. The correlations for the schizophrenia and general population group are described below.

3.2.1 Relationships between demographics, exercise intention, behaviour, TPB variables, self-efficacy and health professional support in the schizophrenia and general population group.

For those with schizophrenia the correlational matrix (table 4) showed positive correlations between their intention to exercise and their exercise behaviour (r = .22, p<.01). According to the Theory of Planned Behaviour, individuals with schizophrenia intention to exercise is determined by their attitude, subjective norms and perceived behavioural control. Positive correlations were found between intention and behavioural beliefs (r = .36, p<.01), attitude (r = .40; p<.01), subjective norm (r = .32, p<.01), perceived behavioural control (r = .47, p<.01). Additional variables of self-efficacy (r= .48, p<.01) and health professional support (r = .43,

p<.01) were also positively correlated with intention to exercise. For those with schizophrenia the variables most strongly correlated with exercise intention was self-efficacy and perceived behavioural control.

Table 4- Pearson Correlations with exercise behaviour and intention in the Schizophrenia group

	1	2	3	4	5	6	7	8	9	10	11	12	13
1) Live alone													
2) Work	.02												
3) Age	.24*	-.09											
4) Gender	-.11	.01	.05										
5) Smoke	.12	-.11	-.10	-.15									
6) Fruit and veg	.01	.04	-.06	.07	-.20*								
7) Behavioural Beliefs	.02	.02.	-.01	-.04	.01	.14							
8) Attitudes	.04	.08	.04	.01	-.15	.16	.37**						
9) Subjective norms	.08	.16	-.17	.03	-.09	.12	.29**	.23*					
10) Perceived behavioural control	.13	.03	.04	.00	-.01	.14	.29**	.61*	.33**				
11) Self-efficacy	.15	.03	.03	.00	-.11	.18	.39**	.55**	.33**	.49**			
12) Health professional support	-.06	.13	.29**	-.00	-.00	.10	.29**	.41**	.53**	.32**	.36**		
13) Intention	.16	.10	-.14	-.13	.04	.12	.36**	.40**	.32**	.47**	.48**	.43**	
14) Exercise behaviour	.04	.23*	-.04	-.13	-.07	.29**	.22*	.10	.22*	.12	.30**	.12	.22*

* Correlation is significant to 0.05 level (2-tailed)

** Correlation is significant to 0.01 level (2-taileed)

Exercise behaviour for those diagnosed with schizophrenia was found to be positively related to behavioural beliefs (r =.22, p<.05), subjective norms (r = .22, p<.05), self-efficacy (r = .30, p<.01) and exercise behaviour (r = .22, p<.01). There was no correlation between attitudes, perceived behavioural control and health professional support in relation to exercise behaviour. There was however a strong correlation between fruit and vegetable intake and exercise behaviour (r = .29, p<.01). For those with schizophrenia, self-efficacy, and fruit and vegetable intake were most strongly correlated with exercise behaviour.

Table 5- Pearson Correlations with exercise behaviour and intention in the general population group

	1	2	3	4	5	6	7	8	9	10	11	12
1) Live alone												
2) Age	-.09											
3) Gender	-.13	.05										
4) Smoke	.13	-.04	-.09									
5) Fruit and veg	.25**	.23*	.19*	-.09								
6) Behavioural Beliefs	-.05	-.06	.15	.18	-.06							
7) Attitudes	.07	-.01	.10	.18	-.05	23*						
8) Subjective norms	.06	.10	.21*	.28**	.09	.29**	.14					
9) Perceived behavioural control	.11	-.05	.05	.28**	.08	.32**	.46**	.19				
10) Self-efficacy	.05	-.02	.10	.20*	.14	.35**	.37**	.36**	52**			
11) Health professional support	.14	-.21*	.06	.21*	-.03	.27**	.29**	.38**	.38**	.55**		
12) Intention	15	-.02	.09	.29**	-.06	.44**	.31**	.34**	56**	.42**	.28**	
13) Exercise behaviour	-.06	-.06	.13	.05	.22*	.28**	.22*	.16	.30**	.29**	.25**	.24*

* Correlation is significant to 0.05 level (2-tailed)

** Correlation is significant to 0.01 level (2-tailed)

In the general population group the correlational matrix (table 5) shows positive correlations between intention to exercise and exercise behaviour ($r = .24$, $p<.01$). According to the Theory of Planned Behaviour, individuals from the general population intention to exercise is determined by their attitude, subjective norms and perceived behavioural control. Positive correlations are found between intention and behavioural beliefs ($r = .44$, $p<.01$), attitude ($r = .31$; $p<.01$), subjective norm ($r = .34$, $p<.01$), perceived behavioural control ($r = .56$, $p<.01$). Additional variables of self-efficacy ($r = .42$, $p<.01$) and health professional support ($r=.28$, $p<.01$). Running correlations also show that smoking was positively correlated with exercise intention ($r=.29$, $P<.01$). In the general population group behavioural beliefs and perceived behavioural control are most strongly correlated with exercise intention.

In the general population, exercise behaviour is found to be positively correlated with intention ($r=.24$, $p<.05$) behavioural beliefs ($r=.28$, $p<.01$), attitudes ($r=.22$, $p<.05$), perceived behavioural control ($r=.30$, $p<.01$). Additional variables including self-efficacy ($r = .29$, $p<.01$) and health professional support ($r = .25$, $p<.01$) is also positively correlated with

exercise behaviour. No correlation is found between subjective norms and exercise behaviour. In this analysis fruit and vegetable intake is also found to be strongly correlated with exercise behaviour ($r = .22$, $p<.05$). Self-efficacy and perceived behavioural control is most strongly correlated with exercise behaviour in the general population.

In summary there were positive correlations between behavioural beliefs, attitudes, subjective norms, perceived behavioural control, self-efficacy and health professional support for exercise intention, all variables were considered in the prediction of exercise intention in the regression analysis. With regards to exercise behaviour in the schizophrenia group there were positive correlations between fruit and vegetable intake, behavioural beliefs, subjective norms, self-efficacy and intention, so all were considered in the prediction of exercise behaviour for the main regression analysis. There were no significant relationships between attitudes, perceived behavioural control and health professional support and exercise behaviour so were excluded from further analysis.

In the general population there were positive correlations between, behavioural beliefs, attitudes, subjective norms, perceived behavioural control, self-efficacy, and health professional support for exercise intention so all variables were considered in the prediction of exercise intention in the regression analysis. With regards to exercise behaviour there were positive correlations between intention, fruit and vegetable intake, behavioural beliefs, attitudes, perceived behavioural control, self-efficacy and health professional support, so were all considered in the prediction of exercise behaviour for the main regression analysis. There was no significant relationship between subjective norms and exercise behaviour and so was excluded from further analysis.

3.3 Predictors of exercise intention in schizophrenia group

It was difficult to assign a prior importance to either the Theory of Planned Behaviour components or self-efficacy and health professional support. In the present study, a stepwise procedure was employed in order to afford a fair assessment for the contribution of variables entered. In this process variables were entered sequentially into the regression equation based on their observed statistical importance.

Stepwise regression analyses were employed to determine intention to exercise and exercise behaviour in the schizophrenia group and general population group. These regression analyses were run separately for both groups, presented below. Firstly regression analyses for exercise intention were run for each group followed by exercise behaviour. To identify determinants of intention to exercise, all the variables positively correlated to intention were included in the analysis (behavioural beliefs, attitudes, subjective norms & perceived behavioural control) as well as the addition of self-efficacy and health professional support was entered as predictor variables.

As shown in table 6, for the schizophrenia group, self-efficacy emerged as a significant predictor of intention to exercise accounting for 22.5% of the variance ($f = 31.14$, 1,103, $p<.001$). The addition of health professional support on step 2 accounted for a 6.6% increase in r squared ($f = 22.31$, 2,102, $p<.001$). Finally when perceived behavioural control was included there was a further increase of 4.3% ($f = 18.36$, 3, 101, $p<.001$). In total these variables accounted for 33.4% of the variance in intention to exercise. Variables that were excluded from the model for non-significance were beliefs, attitudes and subjective norms. The analysis showed self-efficacy, health professional support and perceived behavioural control to be significant predictors of intention to exercise for individuals with schizophrenia,

with self-efficacy being the strongest predictor of intention. This was not surprising as these variables showed the strongest correlations with exercise intention in the correlational analysis. Individuals with schizophrenia who feel they have the confidence and ability to exercise, have support from health professionals and feel they have control over exercise are more likely to have a greater intention to exercise. Surprisingly attitudes were not predictive of intentions.

Table 6- Stepwise regression analysis for prediction of exercise intention among schizophrenia and general population group

Step	Variable	Beta	Adj R squared	R squared changed
Schizophrenia				
1	Self-efficacy	.48	.225***	N/A
2	Health Professional support	.29	.291**	.066
3	Perceived behavioural control	.26	.334**	.043
General population				
1	Perceived behavioural control	.58	.304***	N/A
2	Behavioural Beliefs	.29	.373***	.069
3	Subjective norms	.19	.399**	.026

**p<.01 ***p<.001

3.4 Predictors of exercise intention in the general population group

As shown in table 6, for the general population, perceived behavioural control emerged as a significant predictor of intention to exercise accounting for 30.4% of the variance (f= 48.18, 1,107, p<.001). The addition of beliefs on step 2 accounted for a 6.9% increase in r squared (f =33.12, 2,106, p<.001). The model explained 37.3% of the variance in intention to exercise. Finally when subjective norms were added to the equation there was a further increase of

2.6% (f =24.94, 3,105, p<.001). In total these variables accounted for 39.9% of the variance in intention to exercise. Variables that were excluded from the model were self-efficacy, health professional support, and attitudes. The analysis showed that perceived behavioural control, beliefs and subjective norms to be significant predictors of exercise intention for the general population with perceived behavioural control being the strongest predictor of intention. This is consistent with the correlational analysis which found perceived behavioural control to have the strongest correlation with intention. The general population have a greater intention to exercise if they have more control over exercise, are influenced by pressure from others and have positive beliefs to towards exercise. Surprisingly attitudes towards exercise did not act as a significant predictor of intention.

3.5 Contribution of self-efficacy and health professional support in predicting exercise intention in the schizophrenia and general population group

It was hypothesised that health professional support would be a stronger predictor of exercise intention than subjective norms in the schizophrenia group. This was supported as subjective norms was excluded from the model, but health professional support remained, showing it was a significant predictor of intention to exercise for those with schizophrenia. Similarly in the general population as predicted health professional support did not contributed to the model of predicting exercise intention, as subjective norms remained and health professional support was excluded. It was also hypothesised that self-efficacy would be a stronger predictor of exercise intention than perceived behavioural control in the schizophrenia group. This was supported as self-efficacy was found to be the stronger predictor of exercise intention over and above perceived behavioural control. With regards to the general population self-efficacy did not add any value to the model and perceived behavioural control remained the significant predictor.

3.6 Predictors of exercise behaviour in the schizophrenia group

Stepwise regression analyses were also used to predict actual exercise behaviour in both population groups. To identify determinants of exercise behaviour, the Theory of Planned Behaviour variables (intention, beliefs, attitudes, subjective norms & perceived behavioural control) as well as the addition of self-efficacy and health professional support was entered as predictor variables. Fruit and vegetable intake was also added as an additional predictor due to strong correlations between fruit and vegetable and exercise reported in the correlational analysis for both population groups. These regression analyses were run separately for the schizophrenia group and general population.

A shown in table 7, for those with schizophrenia, fruit and vegetable intake at step one accounted for 7.6% of the variance in exercise behaviour ($f = 9.60$, 1,103, $p<.01$). The addition of self-efficacy in step 2 accounted for a 5.1% increase in r squared ($f =8.56$, 2,102, $p<.001$). In total these variables accounted for 12.7% of the variance in exercise behaviour. Variables that were excluded from the model for not being significant included intention, beliefs, attitudes, subjective norms, perceived behavioural control and health professional support. The analysis showed that fruit and vegetable intake and self-efficacy were significant predictors of exercise behaviour in people with schizophrenia, with fruit and vegetable intake being the strongest predictor of exercise behaviour. This suggests that individuals with schizophrenia are more likely to exercise if they consume fruits and vegetables and feel they have the confidence and ability to exercise. Interestingly intention was not predictive of exercise behaviour in the schizophrenia group. These findings do however support the hypothesis that self-efficacy would be a stronger predictor of exercise behaviour than perceived behavioural control for those with schizophrenia These results concluded that self-efficacy was the strongest predictor or exercise for the schizophrenia group.

Table 7- Stepwise regression analysis for prediction of exercise behaviour among the schizophrenia and general population group

Step	Variable	Beta	Adj R squared	R squared changed
Schizophrenia				
1	Fruit & Veg intake	.29	.076**	N/A
2	Self-efficacy	.25	.127**	.051
General population				
1	Perceived behavioural Control	.30	.083**	N/A
2	Fruit & Veg intake	.20	.114*	.031
3	Behavioural Beliefs	.22	.150*	.036

*p.05

**p<.01

3.7 Predictors of exercise behaviour in the general population group

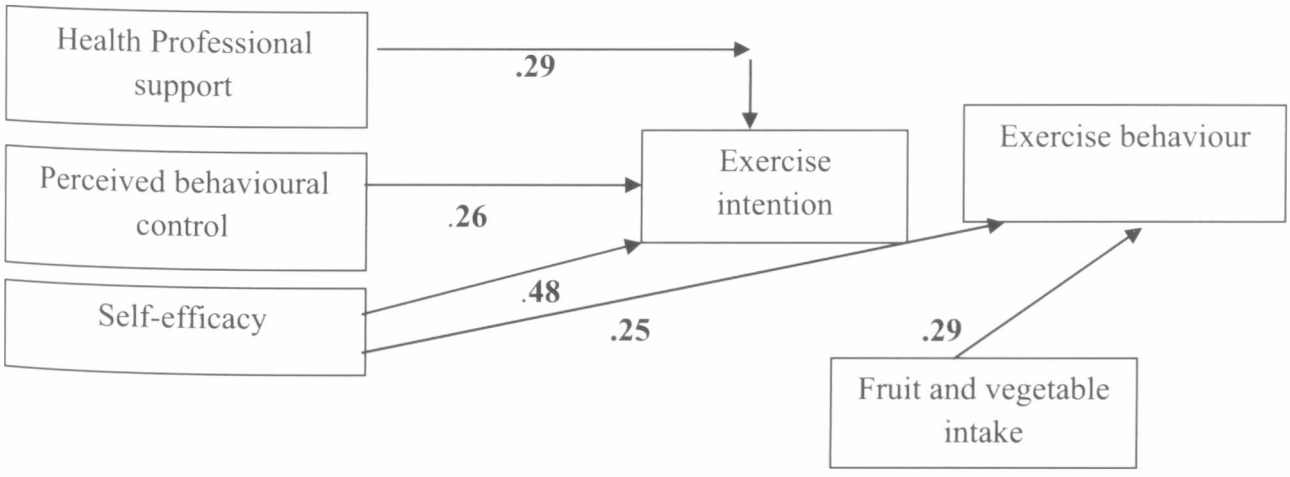
As shown in table 7, for the general population perceived behavioural control in step 1 emerged as a significant predictor of exercise behaviour accounting for 8.3% of the variance in exercise behaviour (f= 10.75, 1,107, p<.001). The addition of fruit and vegetable intake in step 2 accounted for a 3.1% increase in r squared (f = 7.97, 2,106, p<.001). Finally when behavioural belief was added there was a further increase of 3.6% (f =7.36, 3,105, p<.001). In total these variables accounted for 15% of the variance in exercise behaviour. Variables that were excluded from the model for not being significant included self-efficacy, health professional support, attitudes, subjective norms and intention. The analyses therefore showed that perceived behavioural control, fruit and vegetable intake and beliefs were all predictors of exercise behaviour in the general population, with perceived behavioural control being the strongest predictor of exercise behaviour. This suggests that individuals were more likely to

exercise if they perceived they have control over that behaviour and consumed fruit and vegetables.

3.8 Summary of the differences between the schizophrenia and general population groups in predictors of exercise intention and behaviour

When comparing the schizophrenia group and general population on predictors of exercise intention and behaviour, there were a number of differences and similarities. With regards to exercise intention findings showed that both the schizophrenia and general population group had a greater intention to exercise if they felt they had control over exercise (figure 1 & 2). Although with the schizophrenia group exercise intention was determined by their confidence and their ability to exercise as well as their health professional support (figure 1), whereas the general population group showed greater intention to exercise through the social pressure of others and their behavioural beliefs about exercise (figure 2). Neither the schizophrenia nor general population groups' exercise intention was determined by attitudes.

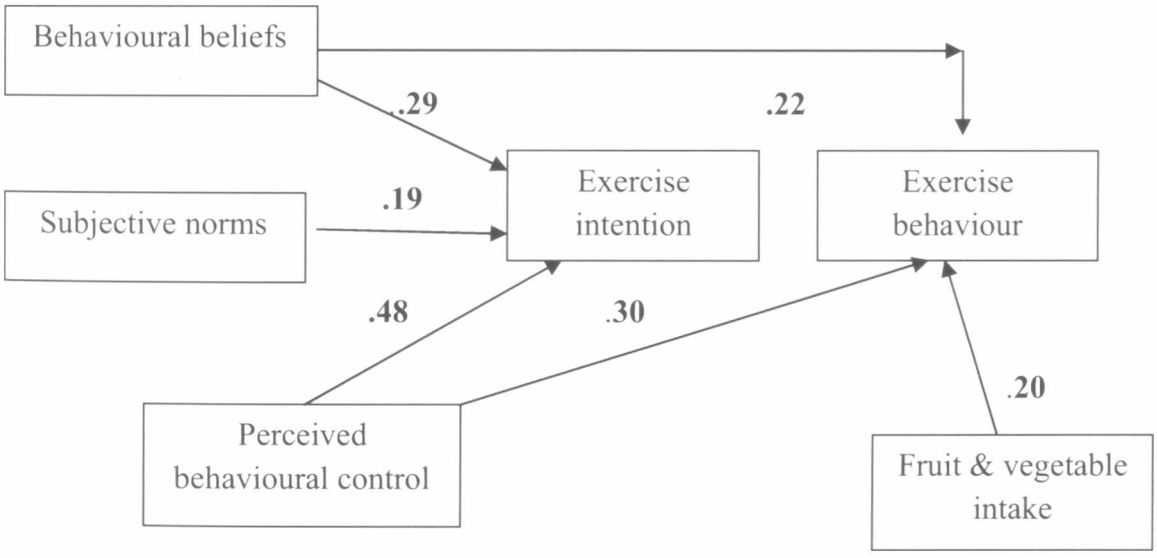
Figure 1 –TPB model of standardised beta coefficients for exercise intention and behaviour in the schizophrenia group



With regards to exercise behaviour both the schizophrenia group and general population were more likely to exercise if they consumed fruits and vegetables (figure 1 & 2), but for the

schizophrenia group their exercise behaviour was determined by their confidence and ability to exercise (figure 1), whereas for the general population exercise was determined by their behavioural beliefs and their level of control over exercise (figure 2). Neither the schizophrenia nor general population groups exercise behaviour was determined by their intention to exercise.

Figure 2 –TPB model of standardised beta coefficients for exercise intention and behaviour in the general population group



Chapter 4

Discussion

4.1 Summary of key findings

The present study investigated the utility of the Theory of Planned Behaviour in predicting exercise intention and behaviour in individuals with schizophrenia. The findings showed that individuals with schizophrenia reported undertaking more light exercise (walking) than the general population but significantly less moderate and strenuous activity. For individuals with schizophrenia only perceived behavioural control from the original theory significantly predicted exercise intentions, the additional variance was explained by self-efficacy and health professional support, in total accounting for 33.4% of the variance in intention to exercise. Behavioural beliefs, attitudes and subjective norms did not add any value to the model. In relation to exercise behaviour self-efficacy and fruit and vegetable intake were the strongest predictors of exercise behaviour over and above intentions. The present study only partially supported the utility of the Theory of Planned Behaviour in predicting exercise intention and behaviour in individuals with schizophrenia. Findings did demonstrate that the addition of self-efficacy and health professional support to the Theory of Planned Behaviour did improve the applicability of this model for those with schizophrenia.

In the general population group, findings showed that behavioural beliefs, subjective norms and perceived behavioural control were the most significant predictors of exercise intentions accounting for 39.9% of the variance. Attitudes, self-efficacy and health professional support provided limited predictive utility. In relation to exercise behaviour in the general population, behavioural beliefs, perceived behavioural control and fruit and vegetable intake accounted

for 15% of the variance over and above intentions. This therefore highlighted differences and similarities between the two populations on determinants of their exercise behaviour.

4.2 Exercise behaviour in schizophrenia and the general population

Findings from this study revealed as predicted that individuals with schizophrenia reported significantly more walking activity than the general population. Walking on average 4 times a week for a total of 2 ½ hours, whereas the general population walked on average 3 times a week for 1 hour 88 minutes. This supports research by Soundy et al. (2007) who found in a qualitative study that the majority of mental health service users demonstrated walking to be fundamental to their daily lives. This was also identified by Mcleod et al. (2009) and Ussher et al. (2007) who also found that a greater proportion of individuals with severe mental illness engaged in more walking than the general population. In the case of the present study this may have explained why people with schizophrenia reported more light exercise (walking) than the general population. It is possible that lower socioeconomic status forces many of individuals with schizophrenia to use walking as their primary form of transportation (Mcleod et al., 2009). Research by Judd, Jolley, Hocking, and Thompson, (1999) found individuals with schizophrenia often reported walking was their mode of transport and not necessarily a means to improve fitness. This would explain the higher number of walking sessions reported by this population.

Measures of moderate and strenuous activity were also obtained in this study due to their importance in bringing about substantial health benefits. Results revealed as predicted that the general population did significantly more moderate and strenuous activity than those with schizophrenia. The general population reported doing on average 5.5 sessions of moderate-strenuous activity for over 3 hours over a 7 day period, whereas those with schizophrenia

reported taking 3 sessions of moderate-strenuous activity for 1 hour 25 minutes. As predicted the general population reported engaging in significantly more exercise than those with schizophrenia over a typical week. This supports previous research by Beebe et al. (2005) who found that people with serious mental illness are less physically active than people with no mental illness. In the present study 54% of those with schizophrenia reported no strenuous activity at all over a typical week, compared to only 13% of the general population. This is less than what was reported by Faulkner, Cohn and Remington (2006), who found 75% of individuals with schizophrenia, reported not doing vigorous activity at all. This difference may be a result of differences in participants. In the study by Faulkner et al. (2006) only 35 outpatients were included in the study, compared to 105 in the present study and they also used the international physical activity questionnaire (IPAQ) which may account for the differences in activity levels. It is important to note that whilst physical activity tends to be relatively stable over time it can be difficult to ascertain whether differences in exercise reporting are due to problems with the questionnaire or recall. The differences described in physical activity reporting may also be due to other factors including, clinical symptoms, body mass, illness chronicity, medications and side-effects which may underpin the variability in the precision reported on exercise.

The UK Chief Medical Officers (CMO's) recommend that adults should achieve at least 150 minutes of at least moderate intensity physical activity a week (Start Active, Stay Active 2011). Findings from this study showed that on average people with schizophrenia did 1 hour and 26 minutes of moderate-strenuous activity over a typical week, whereas the general population reported over 3 hours of moderate-strenuous activity a week. There is still some uncertainty about the optimal level of exercise for therapeutic effects, as exact guidelines have not yet been developed for specific mental health disorders, although the available evidence

does indicate that moderate intensity would be best (Daley, 2002). Whilst individuals with schizophrenia are exercising less than the general population their levels of moderate physical activity match that of older adults. Merom et al. (2012) reported that older adults engaged in 1 hour and 45 minutes of moderate-strenuous activity per week. It has been found that people with schizophrenia and older adults experience similar barriers to exercise (Green, et al., 2000; Resnick, 1998 & Alexopoulos, et al., 2005) which may account for their similar levels of physical activity. The differences between individuals with schizophrenia and the general population on the time spent doing moderate-strenuous activity may be an important contributor to the higher rates of excess body fat found in this population (Mcleod et al., 2009).

According to Godin (2011) only a sufficient amount of strenuous and moderate activity on a regular basis will lead to health gains. In the present study physical activity was calculated using Godin's (2011) scoring system. Weekly frequencies of strenuous and moderate activity were multiplied by 9 and 5, these values correspond to MET value categories of activities listed. The total weekly exercise is computed in arbitrary units by summing up the products of the separate components. Findings showed that the general population showed an average of 38 units, which is seen as physically active and will result in substantial health benefits, whereas those with schizophrenia showed a score of 20 units, which is moderately active and will show some health benefits. Whilst people with schizophrenia do report moderate levels of activity over a typical week, they still face the combined challenge of weight gain as a result of antipsychotic medication (Coodin, 2001) and other lifestyle factors, such as diet (Brown, 1997). Evidence suggests that in order for people with schizophrenia to feel the benefits of exercise in the future, they need to engage in more moderate and strenuous activity to counteract the effects of antipsychotic medication that tends to lead to substantial weight

gain in this population (Allison & Casey, 2001). This study suggests that people with schizophrenia are still not doing enough physical activity to lead to substantial health benefits in the future as the majority of their physical exercise is low intense. Both aerobic and resistance types of exercise have been shown to be associated with decreased risk of type 2 diabetes (Signal et al., 2006). As people with schizophrenia are 3 times more likely to develop diabetes than the general population (De Hert et al., 2006; Brown, 1997; Bryden & Kopala, 1999, & Hausswolff-Juhlin et al., 2009), exercise needs to become one of the front runners for treatment of schizophrenia (Varcarolis & Halter, 2010). High rates of preventative illnesses in this population represent a burden to the health care system (Egger, 1990). Exercise represents a more immediately accessible target for intervention than the development of new psychopharmacological treatments. This study provided insight into determinants of exercise behaviour in individuals with schizophrenia to help guide the development of appropriate interventions to increase their exercise

4.3 Applicability of the Theory of Planned Behaviour in predicting exercise in individuals with schizophrenia and the general population

For individuals with schizophrenia 33.4% of the variance of intention to exercise was explained by the Theory of Planned Behaviour, although only perceived behavioural control from the original theory was predictive, the remaining 29.1% was explained by self-efficacy and health professional support. In comparison in the general population 39.9% of the variance in exercise intention was explained, with behavioural beliefs, subjective norms and perceived behavioural control as significant predictors. Attitudes were not predictive of exercise intention in either population, and for individuals with schizophrenia behavioural beliefs and subjective norms were not significant as expected according to the Theory of Planned Behaviour (Ajzen, 1991). These results are similar to those reported in the literature

for the general population which showed the components of the Theory of Planned Behaviour to explain 44.5% of the variance in intentions to exercise (Hagger et al., 2002). Although the findings for those with schizophrenia did not support previous literature as only 4.3% of exercise intention was explained by the original components of the Theory of Planned Behaviour.

Exercise behaviour in individuals with schizophrenia was predicted by self-efficacy and fruit and vegetable intake accounting for 13% of the variance. Neither intention nor perceived behavioural control were significant predictors of exercise. This is inconsistent with previous research using the Theory of Planned Behaviour (Hagger et al., 2002). In the general population exercise behaviour, behavioural beliefs, perceived behavioural control and fruit and vegetable intake were significant predictors accounting for 18% of the variance, like those with schizophrenia, intention was not predictive of exercise behaviour as would have been expected. This is less than what has previously been explained the by Theory of Planned Behaviour, which has averaged 27.4% of variance explained by components of the Theory of Planned Behaviour in the exercise domain (Hagger et al., 2002). The differences in variances explained compared to previous literature as well as the differences in predictors of exercise between those with schizophrenia and the general population are discussed.

According to the Theory of Planned Behaviour, individuals use information around them to make reasonable decisions about whether to perform a behaviour (Ajzen, 1985). Surprisingly attitudes were not predictive of exercise intention in schizophrenia or the general population which was unexpected as attitudes are generally a strong predictor of physical activity intention (Hagger et al., 2002 & Armitage & Conner, 2001). Even though the general population showed more positive attitudes towards exercise than participants with

schizophrenia, they did not predict intentions. One explanation for this was individuals from the general population in low-involvement situations do not put energy into their decision making process and maybe were more likely to act without using much rationale consideration and showed their attitudes after the behaviour had occurred (Khatun, Boonyasopun, Jittanoon, 2010). The predictive power of perceived behavioural control may have also played a role in attitudes lack of significance due to the significant correlation between perceived behavioural control and attitudes which may have attenuated the relationship between attitudes and intention (Hagger et al., 2002). Based on the extensive evidence that supports attitudes as a predictor of exercise intention (Armitage & Conner, 2001 & Hagger et al., 2002), it is more plausible that in the present study the significant correlation between perceived behavioural control and attitudes, made the relationship between attitudes and intention extinct. This may also explain why behavioural beliefs were more predictive than attitudes, based on the significant correlation between behavioural beliefs and attitudes, resulting in behavioural beliefs being the stronger predictor.

Similarly the lack of predictive power of attitudes in individuals with schizophrenia may be explained by the significant correlation between self-efficacy and attitudes, which may have attenuated the relationship between attitudes and intention (Hagger et al., 2002). However research investigating attitudes towards exercise in people with schizophrenia has shown that they do have positive attitudes towards exercise (Leas & Mccabe, 2007 & Ussher et al., 2007). When interpreting these findings amongst people with schizophrenia there maybe other more plausible reasons as to why attitudes did not predict intentions. People with schizophrenia have unstable thinking and as a result their attitude or opinion towards intention to perform exercise intention may not have crystallised because they devalued the benefits of exercise (Khatun et al., 2010). This is in line with research that has shown people with severe

mental illness are often ambivalent about changing their behaviours and whilst they have positive attitudes towards exercise and understand the value, this does not always translate into intention to exercise (Soundy et al., 2007). Similarly it is likely that behavioural beliefs did not predict intentions to exercise as people with schizophrenia have high cognitive dissonance, which leads to conflicting beliefs (Baker & Morrision, 1998). Targeting attitudes using motivational interviewing techniques (Miller & Rollnick, 2002) appropriate for mental health clients to overcome barriers and promote the benefits of exercise could be an important avenue for intervention as although attitudes were not an independent predictor in this study a positive correlation was still found between attitudes and intention in individuals with schizophrenia.

Consistent with the Theory of Planned Behaviour, subjective norms were found to be a significant predictor of exercise intentions in the general population, but not for those with schizophrenia. Subjective norms have consistently been found to be the weakest predictor of exercise intention in the Theory of Planned Behaviour (Courneya & McAuley 1995; Hagger et al., 2002 & Hausenblas, Carron, & Mack, 1997). This was confirmed in the current study as subjective norms only accounted for 2.6% of the variance in intention to exercise, and although this was low, results showed that people in the general population had a greater intention to exercise when they perceived social pressure from others. This supports previous research that has also shown subjective norms to predict exercise intentions (Armitage & Conner, 2001 & Hagger et al., 2002). Several authors who have viewed subjective norms as the weakest component have removed it from the model (Sparks, Shepherd, & Frewer, 1995). The present study supports previous research and may suggest that the reason it is the weakest stems from a minority of individuals whose actions are driven primarily by perceived social pressure. A possible explanation for this was the fact that subjective norms do not look at

social support but social pressure and it has been suggested that perceived social pressure impedes rather than enhances motivation (Ryan & Deci, 2000). Subjective norms may not have predicted exercise intentions because pressuring forms of social influence, reflected in the construct of subjective norms, do not always facilitate intentions (Chatzisarants et al., 2007). It has been suggested that this lack of significance comes down to the fact that the subjective norm measure usually only consists of a single item as opposed to more reliable multi-item scales (Nunnally, 1978). However in the present study a number of items were used to address social pressure so it can be assumed from the study that whilst social pressure was likely to lead to greater intentions to exercise in the general population, it was not as powerful as their own perceived control and positive beliefs about exercise.

In comparison for those with schizophrenia, subjective norms were not found to be a significant predictor of exercise intention. This was predicted as people with schizophrenia represent an extremely isolated population (Leas & Mccabe, 2007), often reporting weak social networks (Cohen & Sokolosky, 1978). Research has consistently found that people with schizophrenia have fewer social networks than the general population (Magliano, Fiorillo, Malangone, De Rosa, & Maj, 2006 & Cohen & Sokolosky, 1978) and report little support or influence from family and friends (Mcleod et al., 2009). This may provide some explanation as to why social pressure was not a significant predictor of exercise intention for people with schizophrenia. The lack of significance of subjective norms is also supported by the finding that 65% of participants with schizophrenia reported living alone compared to 18% in the general population. This is in support of previous research that only 20% of people with schizophrenia live with family or friends and 70% live alone independently in the community (Hansson et al., 2002) which would suggest that the general population receive more social influence from others and more likely to intend to exercise. This however does

not support research by Hansson (2002) who found that schizophrenia's social network was better irrespective of whether they lived alone or not, or with family or not. However their sample consisted of mainly patients with schizophrenia living in the Netherlands and Luxemburg who have significantly higher levels of satisfaction with family and relationships than other countries, including the UK and have lower levels of reported loneliness (81%) (Burholt et al.,2003). There higher satisfaction with family and relationship may explain these differences in social networks regardless of whether they live alone or with others.

It has also been identified that occupation is related to the social network of individuals, frequency of all relationships is related to occupational status. Individuals with competitive employment are those with the most frequent regular contacts to several persons (Ruesch, Graf, Meyer, Rössler, & Hell, 2004). Subjects without work have the smallest social networks with few contacts to close friends, colleagues or relatives (Ruesch et al., 2004). The findings showed that only 14% of those with schizophrenia were employed which may suggest a lack of social pressure and the finding that subjective norms were not predictive of exercise intention in this population. In comparison in the general population all were employed and more likely to have stronger social influence. This has also been supported by previous research that has shown that one of the reasons people with schizophrenia struggle to exercise is lack of social support (Ussher et al., 2007; Mcleod et al., 2009 & Soundy et al., 2007). Whilst these findings suggest a possible role for subjective norms in the development of exercise intervention in the general population, evidence suggests that this determinant alone would not lead to sufficient changes in exercise behaviours in individuals with schizophrenia.

Consistent with the assumptions of the Theory of Planned Behaviour, perceived behavioural control was the strongest predictor of both exercise intention and behaviour in the general

population (Godin & Kok, 1996; Hagger et al., 2002 & Armitage & Conner, 2001) Perceived behavioural control accounted for 30.4% of the variance in intention to exercise and 8% of the variance in exercise behaviour. This is in support of previous research that has found perceived behavioural control to have a direct effect on intention and behaviour in a number of populations (Hagger et al., 2002 & Armitage & Conner, 2001). Contrary to previous research (Hagger et al., 2002) intentions were not found to be a significant predictor of exercise behaviour. This significant contribution of perceived behavioural control on exercise intentions and behaviour suggests that the more perceived control they have the more likely they are to exercise. This would suggest that individuals without a mental illness would benefit from interventions designed to increase perceived control, looking at ways to overcome physical activity barriers and to assist people in making specific activity plans (Latimer, 2006).

However for those with schizophrenia, perceived behavioural control was a significant predictor of exercise intentions accounting for 5.1% of the variance. Similarly to the general population sample, intention was not a significant predictor of exercise behaviour, contrary to previous literature (Armitage & Connor, 1998 & Hagger et al., 2002). The finding that perceived behavioural control predicted exercise intentions but not behaviour in those with schizophrenia may be due to the fact that perceived behavioural control was rated high in the setting, where they were not taking part in exercise, as opposed to ratings of perceived behavioural control in an exercise context, individuals may find that exercise is not under their control when faced in an exercising situation (Cooke, Sniehotta, & Schuz, 2007).

Research has shown that people with schizophrenia have lower scores on internal control when it comes to health with the belief that their own health is not within their control

(Holmberg & Kane, 1999) but higher levels of external control than people with non-psychotic illnesses (Buhagiar, Parsonage, & Osborn, 2011). Individuals with schizophrenia have often reported not feeling in control of their mental illness because of its unpredictability which may extend to their perceived level of control over their physical health, specifically with regards to exercise as the side effects of their medication leads to reduced physical activity (Buhagiar et al., 2011 & Casey et al., 2004). Similarly with regards to older adults they are increasingly faced with events of which they have little control, such as health problems and a deceases sense of control (Rodin, Timko, & Harris, 1985 & Mence & Chipperfield, 1997).

It has been identified that higher socio-economic status is related to a greater sense of mastery or perceived control (Bailis, Segall, Mahon, Chipperfield, & Dunn, 2001). It is well known that individuals with schizophrenia have lower socio-economic status due to lower levels of income (Dohrenwend, 1990). In the present study only 15% of individuals with schizophrenia were employed which may suggest that they have limited resources to carry out exercise (Shiner, Whitley, Van Citters, Pratt, & Barlets, 2008). This is in support of previous research that has identified one of the main barriers to exercise in people with schizophrenia is the cost involved with the activity. The problem of finances is compounded by the problem of frequent unemployment and dependence on benefits (Hodgson, McCulloch, & Fox, 2011). This suggests that it was not only the internal but the external aspects of perceived control that limited its predictive power in individuals with schizophrenia.

It is also worth mentioning that this difference between the two populations may be due to the individual's perception of control. It has been found that perceived behavioural control provides an accurate predictor of behaviour only when individuals have a realistic perception

of control (Armireault, Godin, Vohl, & Pérusse1, 2008). Perceived behavioural control may not be a predictor of exercise in people with schizophrenia as they do not have a realistic perception of control (Ajzen & Madden, 1986). If this theoretical formulation is accurate, then the present findings suggest that the general population's appraisal of the amount of control they have over exercise is more accurate than that of those with schizophrenia.

The lack of predictability of perceived behavioural control in people with schizophrenia raises the question as to whether exercise behaviour is under complete volitional control or that the perceived behavioural control measure did not accurately reflect actual control. With evidence indicating that individuals with schizophrenia encounter a variety of unexpected barriers preventing physical activity participation (Beebe & Smith, 2010) clearly exercise is not under complete volitional control. Evidence of unexpected barriers may suggest that the measurement limitations of the perceived behavioural control construct are a plausible explanation and may not have truly reflected physical activity barriers encountered by individuals with schizophrenia.

A surprising finding from this study was that intentions did not account for a significant variance in exercise behaviour for either population. This stands out compared with an average of 18% explained variance in exercise shown in a meta-analysis (Hagger et al., 2002). On the basis of this data one might conclude that that intention is not an important determinant of exercise behaviour in people with schizophrenia, however based on the finding that intention did not predict behaviour in either population warrants investigation. With regards to the general population it is important to note that intention had a significant zero-order correlation with exercise behaviour. The size of this correlation however was less than that of the zero-order correlation between perceived behavioural control and exercise. Hence

it is not surprising that perceived behavioural control and not intention accounted for the majority of the variance in exercise behaviour. Lack of association between intention and behaviour might be explained by the concept of intention stability. Intention to exercise might be constantly changing; focusing on intentions may not be priority. Theory of Planned Behaviour (TPB) and Protection Motivation Theory (PMT) propose that the most immediate and powerful predictor of a person's behaviour is his/her intention to perform it. The assumption is that people do what they intend to do, and not what they do not intend. However, good intentions do not guarantee corresponding actions. Therefore the concept of behavioural intentions alone is insufficient to understand lifestyle changes resulting in a phenomenon termed "the intention-behaviour gap" (Sheeran, 2002). Gollwitzer (1990) has argued that enacting goal intentions is a two-stage process. The first stage is a motivational one, similar to that of the Theory of Planned Behaviour and involves the consideration of costs and benefits of pursuing a goal. In the second stage plans are formed about how to ensure that one's intention is acted upon (Conner & Armitage, 1998). These plans are referred to as implementation intentions and specify what one will do in order to achieve the goal intention. Research has shown that individuals that perform implementation intentions are more likely to act on their intention than those that don't (Orbell, Hodgkins, Sheern, 1997), suggesting an important role for implementation intentions in the general population to aid exercise behaviour.

It is widely acknowledged that adherence to many therapeutic interventions in people with schizophrenia (Archie et al., 2003, Gorczynski & Faulkner, 2009), including exercise is typically less than optimal and that treatments with unpleasant side effects have higher rates of non-adherence (Archie et al., 2003). Participants with schizophrenia may have trouble adhering to exercise despite reporting positive intentions to engage in regular physical activity at the time the questionnaire was completed. This supports research by Ussher 2007 et al., and Faulkner, Cohn, and Remington, (2007) who found that individuals with schizophrenia have

high levels of interest in being more physically active and believed in the benefits but that this did not always translate into exercise behaviour. A mismatch between intentions and behaviour could have presented itself. For instance despite strong intentions to exercise, some individuals might have given greater consideration to proximal factors such as tiredness when opportunities to exercise presented themselves. Although intention was correlated with behaviour to a moderate level, which does suggest that there is a relationship between intentions and behaviour in those with schizophrenia. Antipsychotic medication often influences individuals' level of drowsiness, motivation and could slow patients down, taking the shine off their ability to exercise (Carter-Morris & Faulkner, 2003). One of the biggest factors that have been shown to influence participation in exercise in this population was changes in symptoms (Carless, 2007). Intentions to exercise may not have predicted exercise behaviour due to changes in their mental state that did not always translate intentions into exercise behaviour. It is also worth noting that self-efficacy captures motivation a domain theoretically tapped by intentions (Rhodes & Courneya, 2003a). In the present study for those with schizophrenia, intentions may not have emerged as a significant predictor of behaviour because of the overlap between these two constructs.

Another plausible explanation is that people with schizophrenia do not view their current activity as exercise. Findings from the study showed that a lot of the physical activity that individuals took part in was walking. Research by Soundy et al. (2007) found that individuals walk as a means of getting about but did not view this as regular exercise as they were not necessary doing it for health benefits but for transportation purposes. People with schizophrenia may not view walking as exercise and so did not form intentions to do it as a means of physical fitness but a part of everyday life, and as a result may be more of a habit than intention to exercise. The influence of past behaviour is an area that has attracted

considerable attention. It is argued that health behaviours are determined by one's past behaviour rather than cognitions described by the Theory of Planned Behaviour (Sutton 1994). Research has shown habit to be a predictor of both intention and behaviour (Towler & Shepard, 1991, & Godin, Valois, Lepage, 1993). Research looking at factors related to exercise in people with schizophrenia have found that a history of participation in physical activity was shown to increase the likelihood of subsequent participation (Bucksworth, 2000), and predisposed individuals to a resumption of physical activity. Prior exercise behaviour may play an important role in predicting exercise behaviour, but future research would also need to consider the element of psychological resistance as some patients who may have had poor exercise experiences in the past may use this as a barrier to actual exercise uptake (Daley, 2002).

Like the general population, the relationship between exercise intention and behaviour may be strengthened by the inclusion of implementation intentions. For individuals with schizophrenia, the action plans may be particularly important, given that these individuals often formulate plans with their mental health workers with regards to maintaining their mental health, it may suggest that such an approach would be helpful for improving their physical health as well. This supports research that has found people with schizophrenia are more likely to exercise in a structured environment with the support of health professionals (Bezyak & Chan, 2011). Implementation intention interventions could be promoted by forming the plans that enable individuals to deal effectively with self-regulatory problems that might otherwise undermine goal striving (Gollwitzer, 1990). Involving mental health professionals may be a practical strategy for strengthening the intention-behaviour relationship in people with schizophrenia and promote effective management of problems in goal striving that mental health clients often face.

One of the most interesting findings from this study was the significant correlation between fruit and vegetable intake and exercise behaviour and its predictive power over and above intentions in both population samples. Findings showed that fruit and vegetable intake accounted for 7.6% of the variance in exercise behaviour for schizophrenia and 3.1% of the variance in the general population, for those with schizophrenia fruit and vegetable intake was actually the strongest predictor of exercise behaviour. Such findings suggest that both the general population and those with schizophrenia are more likely to exercise if they eat fruit and vegetables. This was not a surprise as research has shown that targeting one health behaviour improves others, for example Berrigan, Dodd, Troiano, Krebs-Smith, and Barbash, (2003) found an untargeted increase in physical activity in interventions to promote fruit and vegetable consumption. Furthermore randomised controlled trials have shown that individuals that adopted one health behaviour were more likely to adopt other health behaviours. Although these findings were among adults without a mental illness, it shows promise that by focusing on one health behaviour others can be adopted in order to improve overall health (Johnson, Boyle & Heller, 1995). In the present study it would suggest that focusing on developing interventions that target fruit and vegetable consumption would increase physical activity levels in both those from the general population and schizophrenia. Research by Powell (1988) also suggested that physical activity may have indirect benefits by increasing other behaviours. For example analyses of the National Heart Foundations 1989 Risk Factor Prevalence Survey data demonstrated that participation in leisure time physical activity was weakly associated with not smoking, following a special diet and moderate alcohol consumption (Johnson et al., 1995), This is concurred by the 2001 Australian National Health Survey, which reported that exercise was more likely to demonstrate positive dietary habits,

with individuals being less likely to smoke compared to those who were physically inactive (ABS, 2001b).

Findings from the present study showed that people with schizophrenia smoke more than the general population and eat fewer fruits and vegetables, in support of previous research (Kelly & McCreadie, 2000 & McCreadie et al., 1998) and whilst there were significant differences between the two population groups on exercise intensity and duration, the finding that fruit and vegetable consumption was related to exercise behaviour in both populations suggests that like research in the general population, one health behaviour can have a positive impact on another. This could therefore create opportunities to develop interventions targeting both exercise and diet. Furthermore a randomised controlled diet and exercise intervention in Sweden resulted in a reduction of cardiovascular risk for both smokers and non-smokers (Nasland, Fredrikson, Hellenius & de Faire, 1996). The authors concluded that those who cannot quit smoking, as may be the case in schizophrenia, should be encouraged to adopt other health promoting behaviours, such as exercise, to compensate for the health risks of smoking. Tackling their exercise and eating behaviour may be a more realistic and achievable starting point for this population, which could later translate to a reduction in smoking. What this information tells us is that people with schizophrenia like the general population have an awareness that healthy eating and exercise are equally important in sustaining health and it would seem from these findings that targeting both diet and exercise would be important in tackling the poor health outcomes of this population.

4.4 The role of health professional support in the prediction of exercise in schizophrenia

In support of study predictions, health professional support was a stronger predictor of exercise intention than subjective norms for people with schizophrenia but not the general

population. Health professional support accounted for 6.7% of the variance in intention to exercise over and above attitudes, subjective norms and perceived behavioural control. People with schizophrenia have frequent contact with health professionals within the mental health service due to the nature of their illness, which suggests that they are likely to have more of a significant influence on exercise behaviour than others, such as family and friends that are limited (Richardson et al., 2005). Ussher et al. (2007) found that people with schizophrenia are likely to exercise more if their doctor of mental health professional told them to. This is also consistent with the elderly population, who also have frequent contact with doctors and are more likely to respond to their advice (Balde et al., 2003).

The importance of health professional support is also consistent with findings with older adults. Research by Tulloch et al. (2006) and Schuler et al. (2006) found that a significant increase in exercise in older adults was due to health professional support and that exercise adoption and maintenance was more likely to be maintained. Individuals with schizophrenia like the elderly have more contact with health professionals due to their mental illness and findings from this study would suggests that health professionals are in a prime position to influence health promotion. Bezyak and Chan (2011) investigated stages of change among individuals with severe mental illness and findings showed that 59.5% indicated that the relationship between exercise programme staff did encourage them to be more active. Health professionals are in a good position of exerting a high level influence in people with serious mental illness with regards to physical health and could be used to its advantage when developing interventions and empowering patients (Buhagiar et al., 2011).

These findings may provide an explanation for the high drop-out rates reported in Archie et al. (2003) exercise intervention for individuals with schizophrenia. Evidence from this study suggests that the support of health professionals is likely to increase their intention to

exercise. Archie et al. (2003) provided free access to gym facilities, but no support from health professionals and results showed that the drop-out rates at 6 months were 90%, considerably higher than that of the general population. Findings suggest that unsupported physical activity interventions are unlikely to be successful in this high risk population (Richardson et al. 2005). Changing health behaviours can be difficult, but frequent reinforcement and support by mental health practitioners attuned to the needs of individuals with serious mental illness may play a crucial role in successful long term adoption of exercise and maintenance and improved health outcomes (Richardson et al. 2005). Leas and Mccabe (2007) who looked at predictors of health behaviours of schizophrenia and depression using the Protection Motivation Theory did not find social support to be a predictor of exercise. However there were a number of limitations, firstly they focused on social support in general including a number of health behaviours and so were not specific, but more importantly they focused on the support from family and friends, due to their lack of social contact it was not surprising the social support from family and friends was not predictive of exercise. In regards to the present study, social support was made specific to physical activity and looked more specifically at the social support from health professionals, of which they have more contact. For those with schizophrenia who do not have significant others, which is often the case, mental health professionals constituting the most important network are in the position to influence health promoting behaviours (Mcleod et al., 2009). The valuable contribution that physical activity participation might make to the promotion of mental health is the opportunity for gradual progression (Carless, 2007). From shielded, supported activity in a mental health setting towards independent autonomous activity in the community (Carless, 2007).

Whilst health professional support may be important from a research perspective, this may not be the case in clinical practice. Research by Soundy et al. (2007) found in a qualitative study that there was a lack of health promotion in primary and secondary services, and only 3 patients recalled receiving advice about exercise from professionals and 1 individual reported receiving inaccurate advice. In this study only 16 patients were interviewed and so it is not possible to conclude that this is the case for the majority of individuals with severe mental illness. Giving the growing acceptance of the high prevalence of obesity and metabolic syndrome in this population, greater attention now needs to be paid to highlighting the important promotional role to mental health professionals and equipping them with the knowledge, skills and resources to support their mental health clients to become more physically active (Soundy et al., 2007). Research investigating the predictors of health professionals' intention and behaviour to encourage physical activity in patients with cardiovascular risk factors has been studied (Sassen, Kok & Vanhees, 2011). Findings have shown that health professionals with more positive attitudes, more positive subjective norms and higher perceived behavioural control were more likely to have positive intentions to encourage physical activity in cardiovascular patients. Health care professionals perceived more advantages than disadvantages to encouraging cardiovascular patients to become physically active. Demonstrating that interventions should therefore endeavour to highlight and clarify the advantages of encouraging exercise and that health professionals should be convinced that being physically active is important for patients with cardiovascular risk factors (Sassen et al., 2011).

With regards to mental health practitioners, many do not view exercise as a worthwhile strategy (Daley, 2002). McEntee and Halgin (1996) reported that, even though many psychotherapists believe in the therapeutic value of exercise, only approximately 10%

recommended exercise to their clients. Suggesting that future developments in this field should focus on attempts to forge greater links and partnerships between exercise/health professionals and those who deliver mental health services so that a greater range of appropriate intervention therapies can be offered to patients (Daley, 2002). The positive findings in health professionals supporting cardiovascular patients and exercise promotion may need to be replicated in mental health professionals. Understanding more about the determinants of encouraging exercise in mental health practitioners would be worthwhile as supporting and encouraging individuals to exercise cannot be provided or successful if mental health practitioners do not see its value. Perhaps an important step forward would be the inclusion of information about the exercise and mental/physical health relationship in the training of clinical staff who are key stakeholders in the therapeutic process and who are often involved in the implementation of treatment plans (Daley, 2002).

Health professional involvement could also play an additional role of receiving support and encouragement from other mental health clients. Creating a successful exercise environment may be encouraged by group physical activity, which enhances social support and develops social skills (Saxena, Van Ommeren, Tang, & Armstrong, 2005). Raine, Truman, and Southerst, (2002) highlighted the benefits of a supportive environment and social network between users and staff in reducing psychological risk of attendance. Social support is central to the uptake and prolonged engagement in physical activity, through encouraging engagement and creating positive experiences for patients and to be with others to share the experiences (Crone, 2007). Social support has also been found to act as a foundation for prolonged engagement and social time had to be a part of any physical activity setting for service users (Faulkner & Sparkes, 1999). The cohesive nature of a group exercise programme helped encourage patients' interest and on-going activity (Fogarty & Happnell,

2005), friendships facilitated positive cognitions and attitudes towards exercise (Faulkner & Sparkes, 1999) and enhanced the possibility of enhanced and prolonged engagement. Thus the development of social skills can be part of a productive process that helps reinforce and maintain identity and in turn indicates a desire to maintain exercise behaviour. The promotion of physical activity may benefit from considering social support as a provision to exercise initiation and adherence in a community setting.

4.5 The role of self-efficacy in the prediction of exercise in schizophrenia

As predicted, self-efficacy was found to be a significant predictor of both exercise intention and behaviour in individuals with schizophrenia but not in the general population. Bivariate correlations for those with schizophrenia and the general population showed a strong correlation between self-efficacy and perceived behavioural control for both populations, this may suggest a possible overlap between constructs. Several investigations have questioned the unitary conception of perceived behavioural control. Items concerned with the ease or difficulty of performing a behaviour, or confidence in one's ability to perform it, are often said to measure perceived self-efficacy and they are contrasted with items that address control over the behaviour. Research has shown there is considerable overlap between control beliefs that predict controllability and self-efficacy (Ajzen, 2002). Although factor analysis of perceived behavioural control items provides clear and consistent evidence for the distinction, there is sufficient commonality between self-efficacy and perceived behavioural control (Ajzen, 2002). It is possible that the measures within this study consisted of both perceived control and self-efficacy within it, which may have resulted in one factor being more predictive than another. It is also important to note that control beliefs for perceived behavioural control and self-efficacy were not included in the present study, identifying these

through preliminary investigations may have led to more accurate statements specifically identifying self-efficacy or intentions and should be considered in future research.

Whilst methodological issues needed to be considered, we must not discount other explanations as to why self-efficacy was not found predictive of exercise intentions and behaviour in the general population but was in those with schizophrenia. Findings from this study showed that people from the general population did above the recommended amount of moderate to strenuous activity, it has been suggested in previous research that self-efficacy is related to the initial adoption of exercise behaviour rather than the maintenance phase (McAuley, 1992). It is possible that those from the general population had been taking part in exercise regimes for some time and therefore self-efficacy was no longer important. Exercise was only recalled over a 7 day period so it was not possible to determine this. This does conflict with other research that has found self-efficacy to be an important predictor of exercise maintenance (Lee, Arthur, & Avis, 2008), therefore it seems unlikely that this is a plausible explanation. It is likely that as self-efficacy and perceived behavioural control were both strongly correlated with intention and behaviour that perceived behavioural control emerged as the strongest predictor. This would therefore suggest those for the general population having their perceived control over performing the behaviour was more influential over exercise than how confident they felt in their ability to exercise.

The finding that self-efficacy was a significant predictor of exercise intention and behaviour in people with schizophrenia does support the literature that has found self-efficacy to predict intention alone (Terry, 1993), behaviour alone (Conner & Armitage, 1998) and intention and behaviour (Biddle et al., 1994). This suggests that individuals with schizophrenia are more likely to exercise if they have confidence in their ability and to a lesser extent how much

control they feel they have. As self-efficacy looks into the internal aspects of control rather than the external, such findings would suggest that individuals with schizophrenia are more likely to exercise if they feel internally capable rather than external factors (perceived behavioural control) , such as bad weather. This may be partly due to the fact that people with schizophrenia do not feel they have any control over their illness or health (Holmberg & Kane, 1999), but are more likely to exercise if they feel confident in their ability. This however does not support research by Ussher et al. (2007) who found one of the main barriers to exercise was external factors, particularly bad weather. Also research has found that patients with schizophrenia were prevented from engaging in activity if the location was too far away (Shiner et al., 2008), and financial cost (Carless, 2007). Whilst external factors of perceived behavioural control have previously been found to be barriers to exercise (Ussher et al., 2007), it would seem from these findings that having the confidence is predictive of exercise behaviour over and above external limitations, such as weather and location of exercise facilities. This may be partially due to the fact that individuals with schizophrenia from this study are required to travel in the majority of conditions and to various locations for their medication and so perhaps these external factors were not as important.

The importance of self-efficacy in individuals with schizophrenia supports research by Leas and Mccabe (2007) who looked at the predictors of exercise behaviour using the Protection Motivation Theory and found that self-efficacy was the most significant predictor of exercise intention and that the reason for their inactivity was low levels of self-efficacy. This has also been supported by Ussher et al. (2007) who identified that one of the main reasons they did not exercise was that they did not feel confident, especially when they were feeling tired or distressed. This is consistent with research in the elderly population who experience similar barriers to exercise as those with schizophrenia. Research in older adults has shown self-

efficacy to be an independent predictor of exercise behaviour (Walcott-McQuigg & Prohaska, 2001 & Orsega- Smith et al., 2007). This again highlights the similarities between the elderly population and schizophrenia in terms of exercise determinants. Physical activity intentions aimed at improving self-perception of exercise self-efficacy can have positive effects on confidence and ability to initiate and maintain physical activity behaviour (Lee et al., 2008). Including self-efficacy in the Theory of Planned Behaviour makes it more applicable to those with a psychiatric diagnosis.

Judging by the findings it would suggest that targeting self-efficacy would be of great importance in order to increase their physical activity and should be the focus of future interventions. This has been supported by an intervention that was conducted using Bandura's (1977) self-efficacy theory based on research with older adults that found that self-efficacy scores were higher for experimental groups who took part in exercise than controls, suggesting the motivational interventions to increase confidence in exercise can lead to higher scores on self-efficacy. This has shown that for people with schizophrenia the internal aspects of control in the face of barriers that affect those with schizophrenia intentions and behaviour rather than the potential external barriers to interfere with exercise intention and behaviour. This suggests that those involved in exercise promotion need to provide an appropriate environment for people with schizophrenia to participate in which will foster personal improvement and competence. This would help people with schizophrenia achieve personal control over their physical activity and may lead to continued participation.

The importance of health professional support already found would suggest that interventions targeting confidence with the support of the health professional could provide a crucial combination for the promotion of physical activity in this population. Research has shown

many forms of increasing self-efficacy that could be applicable to this population. Establishing small goals to enhance exercise self-efficacy among people with schizophrenia may be highly effective. Based on individuals' perceptions of the importance of powerful others with regard to their health (Holmberg & Kane, 1999), realistic positive feedback from significant others may be an important reward to induce individuals to carry out and maintain a specific behaviour (Bandura, 1997). When others, or professionals have confidence in ones' capabilities to succeed, this generates greater self-confidence (Booth, Owen, Bauman, Clavisi, & Leslie, 2000). Although regular fitness improves cardiovascular function and weight loss, the drop-out rate from these interventions is high. Programmes that employ principles of behaviour modification including goal planning, self-monitoring and social support are more effective in people with mental illness (Richardson et al., 2005). Feedback is a crucial component of self-monitoring in behaviour change. Unlike highly trained athletes who are able to accurately assess and regulate their exertion, sedentary and deconditioned individuals frequently overexert themselves, which leads to discouragement and drop out. Feedback that clearly documents gradual improvement could be a powerful motivator (Cameron, 2003). McKibbin et al. (2006) demonstrated that people with schizophrenia that implement physical activity in their daily life improve significantly with self-efficacy related to managing psychosocial aspects, setting and achieving goals, and their readiness for change to an active and healthy lifestyle.

Research with older adults has shown self-efficacy not only to be a predictor of exercise adoption but maintenance (McAuley, 1992), based on the similarities already identified in the present study between these two populations it may suggest that self-efficacy would also be an important predictor of exercise maintenance in schizophrenia. Based on the fact that benefits accrue only for those who consistently exercise, maintaining exercise is critical in

improving the health outcomes of this diagnostic group (Beebe & Smith, 2010). It is important to note that exercise behaviour was only taken over a 7 day period and so it was not possible to determine whether the same factors would determine exercise maintenance. There is value in extending this research with regards to factors determining exercise maintenance in order to bring about sustained health benefits in this population and reduce their mortality rates in the future.

In summary although individuals with schizophrenia report below the recommended amount of exercise, the present study does shed some light on the predictors of exercise behaviour in this population to inform future interventions to increase their physical activity. Whilst the Theory of Planned Behaviour was not as applicable to people with schizophrenia compared to the general population the inclusion of self-efficacy and health professional support did increase its usefulness. Mental health practitioners are particularly well placed to play an important role in making exercise interventions accessible to people with schizophrenia. They have the capacity to develop holistic approaches to the health care of those with mental illness (Hogan & Shattell, 2007) and physical activity is an important part of holistic care (Vreeland et al., 2007). Mental health professional may also be prime candidates for assessing and promoting physical activity in the population, in part because barriers that may be specific to this population, such as low self-efficacy can be effectively addressed by staff that are trained in this field (Richardson et al., 2005).

4.6 Limitations of study

Although the findings from the present study are encouraging there are issues that limit their interpretation and generalisability and so results must be viewed with caution. One issue is the

use of a self-report recall measure of behaviour over a week may not have provided a representative reflection of participant's typical physical activity regime (Rennie & Wareharn, 1998). Future studies should use more objective measures of exercise behaviour (attendance, accelerometer, heart rate) to improve the accuracy of this critical variable. It is possible that people with schizophrenia who have poor memory and concentration may not have given a true account of their actual exercise behaviour. However the use of retrospective self-report survey provides an unobstructive measure that does not influence regular activity and is particularly useful over short time periods (Dishman, Washburn, & Sschoeller, 2001). Thus from a measurement standpoint, the measure of physical activity used in this study was suitable for the purpose of the study and research has shown that a 7-day recall measure is generally considered representative of activity patterns (Blair et al., 1998).

Another possible limitation was the modification of the leisure time and physical activity questionnaire (Godin, 1985). In the original measure open questions are asked about the frequency of exercise, in the present study participants were given options on exercise frequency and duration to choose from to make it more user friendly for people with schizophrenia. Internal reliability tests did show that the items were internally consistent showing an acceptable alpha score (α =.72), however this was less than the original leisure time exercise measure (Godin 1985). It would be necessary in the future to test the original format with individuals diagnosed with schizophrenia as it has greater internal reliability (α =.81) and comparing participant scores at two time points would also test the instruments reliability further. The modification of the exercise measure in the present study may have also threatened its validity based on the terminology used in the questions and information missed out which may have confused participants with regards to what reflects mild, moderate and strenuous exercise. For example in the present study details around sensations

felt when performing exercise, such as heart beating rapidly, not exhausting and minimal effort were not included. If participants were unclear of what was being asked of them it may not have given a true account of their exercise behaviour and as a result affected the validity of the measure with regards to measuring what was intended. It would be worthwhile to test the reliability and validity of the original Leisure Time Exercise Questionnaire (Godin 1985) with people diagnosed with schizophrenia, which has not yet been determined.

Using a convenience sample had the advantage of avoiding the random recruitment of individuals who were severely mentally unwell to take part in the research. Although this may have contributed to high refusal rates as only 52% took part and it may have resulted in a non-representative sample. It is possible that those individuals who agreed to take part may have already possessed some inherent motivation that threatened external validity. There is thus a need to replicate the study using a larger sample. Participants who took part in the study may have also overestimated the amount of exercise they did, even if they didn't do any due to the nature of the study. There is also the issue that those who volunteered to take part felt they could because they did exercise and those who did not exercise may have not taken part because of this, so it may not give a true reflection of their current exercise behaviour or related factors.

Another limitation that needs to be considered within the present study is that the scores on the questionnaire may have been influenced by psychiatric symptoms, which were not measured in the present study. Research has suggested that whilst people with schizophrenia are able to make rational decisions with regards to their health behaviours (Findlay, 2012), it is possible that participants within this study may have been experiencing symptoms, such as hallucinations and delusions. Experiencing these psychotic symptoms would have had an

impact on their ability to make decisions with regards to their exercise behaviour as their cognitive ability is likely to be affected when experiencing psychotic symptoms. However it is unlikely that individuals experiencing distressing side effects of their illness would have taken part in the study in the first instance, but this cannot be assumed. Previous research using the Protective Motivation Theory included psychiatric symptoms in their investigation of exercise determinants (Leas & Mccabe, 2007), although psychiatric symptoms were not found to be predictive of exercise behaviour in people with schizophrenia they are an on-going part of the illness and should not be ignored (Beebe & Smith, 2010).

Interpretation of these findings is also questioned as a result of limitations of data collection. The majority of participant with schizophrenia completed the questionnaire in the clinics when coming in for their medication, and whilst they were given a private, quiet room to complete the questionnaire it is possible that due to the circumstances by which they were completed, participants may have completed the questionnaire on what they felt we wanted to hear rather than what they were actually doing. This is possible as when they attend the medication management clinics they often have conversations with nurses on various health issues and so may have been influenced by this. In addition to this data collection from the general population was not carried out in the same way. Participants were sent questionnaires to complete and as a result of this there is no way of knowing the conditions in which they completed these questionnaires, they may have been influenced by surrounding noise or distractions which may have had an impact on the responses that were given. It would be appropriate for future research with comparison groups for the conditions to be the same for both groups, in order to reduce possible external influences. Whilst participants with schizophrenia were given the option to complete the questionnaire at home or in the medication clinics, it may be more appropriate to ask them all to take them home to complete

so they do not feel influenced by their surroundings at the clinic, this may have an impact on response rates and would mean that more questionnaires would need to be given out in order to reach adequate numbers for analysis. Although the approach that was used in this study did gather enough data to run the data analyses and should be recognised.

Methodological issues also need to be addressed with regards to the development of the questionnaire. Although behavioural beliefs were identified in this study, these were only identified from a small sample of participants with schizophrenia so may not have been a true representation of their beliefs. In addition to this it would have been more appropriate to assess the beliefs of all Theory of Planned Behaviour constructed, including normative and control beliefs. This would gain a deeper understanding of how to most effectively develop interventions for eliciting change in Theory of Planned Behaviour constructs.

Data collection from these populations was only taken at one time. The cross-sectional nature of the present study precludes making statements of causality and cannot provide information about the way in which exercise intentions and behaviours with regards to exercise change over time. Only prospective longitudinal studies would address such issues. This would be particularly valuable for people with schizophrenia who do have cognitive deficits that may influence their cognitions (Lambert et al., 2003) and so it would be worthwhile to identify whether such exercise intentions and behaviours are stable or change over time.

It is well known that individuals with schizophrenia on antipsychotic medication are at increased risk of weight gain and other physical health problems, such as type 2 diabetes and coronary heart disease (Hausswolff-Juhlin et al., 2009 & Bryden & Kopala, 1999). Research suggests that such medication leads to increased appetite and reduced physical activity

(Taylor & McAskill, 2000). Whilst all the participants with schizophrenia in the present study were in receipt of antipsychotic medication, their specific type and dose of medication was not identified in this study. It is possible that the type and dose of antipsychotic medication could have an impact on exercise behaviour and predictors of exercise and future research needs to look into comparing the various antipsychotic medications to establish if medication type may be a factor with regards to exercise intentions and behaviour. Although pharmacotherapy is likely to remain the cornerstone of the bio-psychological remission-orientation approach, physical activity related interactions might possibly help reduce dosage (Birt, 2003). Physical activity may also enhance medication compliance by counteracting the adverse effects of antipsychotic medication.

It may also be worth investigating the duration of diagnosis. Individuals who have just been diagnosed with schizophrenia may have different physical activity levels and determinants of behaviour may be different. This could be a possible area of intervention in order to introduce more preventive measures within mental health services and reduce their chances of common diseases. If individuals that are newly diagnosed with schizophrenia are participating in physical activity on a regular basis, research may be aimed at determining what maintains their physical activity in order to implement interventions targeting such determinants.

Whist the aim of the present study was to assess the utility of the Theory of Planned Behaviour in determining exercise intentions and behaviour in people with schizophrenia and its comparison to the general population, there were a number of weaknesses with using this comparison group. Firstly the general population sample was taken from recruitment agencies, in which all of them worked and so wasn't well matched with people with schizophrenia with which the majority did not. In addition to this there was no guarantee that

the general population sample did not have a mental illness as this was not assessed in the questionnaire. It would have been more appropriate to have identified this in the questionnaire to improve the validity of the study.

4.7 Future directions

Although the present study has identified some possible determinants to increase physical activity in people with schizophrenia, future research needs to address several issues. Obtaining valid answers is dependent on the social context in which the questions are asked, the perceived role of the researcher and the accuracy of information recalled by respondents. Ideally corroboratory evidence, such as objective medical and psychiatric screening and an examination of previous medical records should be included in future studies. In addition, psychiatric medication and symptoms were not included in the present study and future research needs to thoroughly and systematically investigate the influence of psychiatric medications and symptoms on exercise behaviour. It would also be valuable to look into the duration of diagnosis of schizophrenia, such as those who are newly diagnosed and those diagnosed for some years, as well as in-patients and out-patients with schizophrenia. In-patients are supported on a day by day basis on their mental health by professionals understanding the predictors of exercise behaviour in in-patients would also be important as in-patient services are also well placed to start the process of changing their behaviours in a supportive environment.

Whilst the comparison group used in this study did shed some light on the differences between those with schizophrenia and the general population there were a number of extraneous variables that may have contributed to these differences, such as socio-economic

status and the mental illness itself. There is value in using a better matched sample, such as those in the general population who are unemployed, or on benefits or individuals with a different mental illness such as anxiety and depression in order to limit the these extraneous variables.

One aspect that needs to be seriously considered in future research is the stability of exercise determinants in people with schizophrenia over time. Longitudinal studies would be better placed to identify the determinants of exercise maintained in the long-term in order to lead to health benefits in the future. Whilst cross-sectional studies are a good starting point, it cannot be concluded from this what maintains exercise behaviour in this population. This will involve using more appropriate measures of exercise behaviour, such as observation or pedometers. Seeing as people with schizophrenia struggle with their memory as a result of their psychiatric illness, this may not be as reliable as more observable measures. This may give a more accurate account of the exercise behaviour of this population. Based on the promising findings reported, replication of this study is warranted, only if methodological limitations already raised are addressed.

Interestingly the finding that health professional support was a predictor of exercise intention could also lead to future research. In order to make cardiovascular prevention and implementation of interventions directed at optimising the health status of patients with schizophrenia. A better understanding of mental health professionals' intention to encourage physical activity in these patients and the self-reported behaviour of encouraging patients is warranted. Research addressing health care professional intentions and behaviour to encourage physical activity in patients with cardiovascular risk factors has been conducted in the general population (Sassen et al., 2011). Similar research with mental health practitioners

would be worthwhile judging by the possible influence they have on prompting health behaviours and their role in implementing interventions within the mental health service.

4.8 Implications

The findings of the present study offer a great understanding to clinicians regarding determinants of exercise in individuals with schizophrenia. Study results should remind clinicians that individuals diagnosed with schizophrenia are influenced by health professionals with regards to their health and that clinicians should not dismiss the importance of providing health education and encouragement of participation in health promoting behaviours, specifically exercise. The urgent need to address physical health problems in individuals with schizophrenia by mental health professionals (Hyland, 2003) cannot be overemphasised. Including exercise interventions in the mental health services to increase exercise self-efficacy and providing health professional support may contribute to the reduction of significant health disparities in this population. These findings advocate the inclusion of significant others in interventions designed to promote exercise activity in individuals with schizophrenia. For many individuals with schizophrenia, mental health practitioners may be the sole source of social contact and therefore will be in a position to positively influence exercise activity.

4.9 Conclusion

Despite methodological limitations, the present study represents an important first step towards understanding theoretical determinants of exercise behaviour among individuals with schizophrenia. Although not all the Theory of Planned Behaviour tenets were supported, the theory was able to explain 33.4% and 12.7% of the variance in exercise intention and

behaviour, specifically the importance of health professional support and self-efficacy. The findings have implications for future research and clinical implications for mental health clinicians to play an important role in increasing the physical activity of people with schizophrenia by developing interventions that target self-efficacy with the support of mental health professionals. It is hoped that this research provides impetus for professionals in the field to consider expanding the scope of their practice to consider the physical health needs of individuals with schizophrenia and support the implementation of exercise interventions to reduce their mortality risks and promote healthier lives. In doing so exercise therapy could become a mechanism by which the mind and body are viewed as dependent, rather than separate entities and that over time mental health professionals will accept the benefits of exercise as an additional treatment for individuals with schizophrenia.

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Appendices

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Appendix A- Physical Activity Questionnaire

The following questionnaire will take around 15 minutes to complete

Age: **Gender:**

1) Do you live alone **Yes/ No**

2) Do you work, paid or voluntary **Yes/ No**

3) Do you smoke **Yes / No**

4) How many portions of fruit and vegetables do you eat per day?_
(portion = 1 apple, small glass of pure fruit juice, 3 heaped tables spoons of vegetables etc)

For the questions below, please circle the number that corresponds to your answer

5) Over a week how often do you take a walk to and from places? (to the shops, friends, appointments etc)

Never (0 days)	Not often (1-2 days)	Sometimes (3-4 days)	Often (5-7 days)
0	1	2	3

6) On average how many minutes/hours per day do you spend walking, in a typical week?

None	Less than 20 minutes	20-30 minutes	30 minutes - 1 hour	1 hour or more
0	1	2	3	4

7) In a week how often do you participate in moderate activities, such as brisk walking, easy swimming, stretching, yoga, Ti Chi or similar exercises?

Never (0 days)	Not often (1-2 days)	Sometimes (3-4 days)	Often (5-7 days)
0	1	2	3

8) On average how many minutes per day do you spend doing these light activities, listed above?

None	Less than 20 minutes	20-30 minutes	30 minutes - 1 hour	1 hour or more
0	1	2	3	4

9) Over a typical week how often do you participate in strenuous activities, such as running, tennis, jogging or swimming etc?

Never (0 days)	Not often (1-2 days)	Sometimes (3-4 days)	Often (5-7 days)
0	1	2	3

10) On average how many minutes per day so you spend doing strenuous activities, listed above?

None	Less than 20 minutes	20-30 minutes	30 minutes - 1 hour	1 hour or more
0	1	2	3	4

The next part of the questionnaire will give you statements specific to regular exercise, which is defined as 30 minutes, 3 times a week'

Please circle the number that corresponding to your answer

11) For me to exercise regularly is

Harmful	1	2	3	4	5	6	7	**Beneficial**
Pleasant	1	2	3	4	5	6	7	**Unpleasant**
Good	1	2	3	4	5	6	7	**Bad**
Worthless	1	2	3	4	5	6	7	**Valuable**
Enjoyable	1	2	3	4	5	6	7	**Unenjoyable**
Stressful	1	2	3	4	5	6	7	**Relaxing**

12) Most people who are important to me think I should exercise for 30 minutes, 3 times a week.

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

13) It is mostly up to me whether I want to exercise or not.

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

14) Exercising regularly will improve my overall health.

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

15) My goal is to exercise for 30 minutes, 3 times a week.

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

16) Health professionals encourage me to exercise regularly.

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

17) I intend to do 30 minutes of exercise 3 times a week.

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

18) Exercising regularly is my way of getting to and from places (transportation).

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

19) It is expected by others that I should exercise for 30 minutes, 3 times a week.

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

20) I am confident I can exercise regularly even without access to a gym.

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

21) If I wanted to walk for 30 minutes, 3 times a week I could.

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

22) Exercising for 30 minutes, 3 times a week is beyond my control.

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

23) Regular exercise will help to assist with weight loss.

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

24) I am confident I can exercise regularly even when I'm feeling low.

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

25) Most people who are important to me exercise for 30 minutes, 3 times a week.

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

26) Health professionals advise me about the benefits of regular exercise.

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

27) I am motivated to exercise regularly.

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

28) I will try to exercise for 30 minutes, 3 times a week in the future.

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

29) Exercising regularly will help lift my mood.

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

30) The people in my life whose opinion I value exercise for 30 minutes, 3 times a week.

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

31) I am confident that I can do exercise for 30 minutes, 3 times a week if I wanted to.

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

32) Most people who are important to me want me to exercise for 30 minutes, 3 times a week.

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

33) I feel that health professionals have provided my with the choices and options over whether or not to exercise regularly.

Strongly agree	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Strongly Disagree**

34) I am confident I can exercise regularly without the support of others.

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

35) I am confident I can exercise regularly even if I was feeling tired.

Strongly	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Strongly**

Agree **Disagree**

36) Support from health professionals helps me plan regular exercise.

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

37) For me exercising for 30 minutes, 3 times a week is difficult.

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

38) I want to exercise for 30 minutes, 3 times a week.

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

39) Health Professionals have talked about exercise with me.

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

40) I plan to exercise for 30 minutes, 3 times a week.

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

Thank you for taking the time to complete this questionnaire

Appendix B- Research Information Sheet (Schizophrenia sample)

Thank you for taking the time to read this form.

There has been a great deal of research into the benefits of exercise for people with Schizophrenia. It has become an important avenue of research to find out the exercise patterns of people with schizophrenia and factors that influence it.

We are inviting you to take part in this study, which will consist of filling out a questionnaire and should only take about 10-15 minutes to complete.

The questionnaire is about current exercise patterns and components that are associated with it.

This study is entirely voluntary and you are under no obligation to take part. If you do choose to take part you are able to withdraw at any time if you change your mind with no questions asked.

There are no right or wrong answers to the questions and please be assured that your responses to the questions will remain confidential and you will not be identified by name. You are also able to have support filling out the questionnaire if you choose to.

Before you start completing the questionnaire, please read the consent form attached to confirm that you understand what is involved and please retain the information sheet containing my contact details. You are able to contact me if you would like to know any further details about the study or are interested in the findings.

Thanks again for your support

Jessica Twyford

Work no. *********
Address *********
****
****
****

Appendix C- Consent form

Once you have read the information sheet and if you still want to take part, please answer the following questions and sign at the bottom of the sheet to give your consent.

I have read the above description of the study	Yes/ No
I understand that my participation is voluntary	Yes/ No
I understand that my responses will be confidential and anonymous	Yes/ No
I give my consent to take part in the present study	Yes/ No

Signature_____

Date _____

Appendix D- Debriefing Information

Thank you again for taking part in the study.

The purpose of this study was to look into the predictors of exercise intention and behaviour in people with Schizophrenia compared to the general population. Previous research has looked into the predictors of exercise in other population samples, but it has rarely been studied in those with mental health problems.

If you have any questions regarding the study, or would like to find out about the results, please contact me using the details provided on the information sheet.

I would also like to inform you that if you would like to pull you data out of the study you can do so at any time and your data will be shredded and put in confidential waste.

Thank you

Jessica Twyford

Appendix E- Recruitment flyer (General population)

Fancy being a part of promoting health

Name of study: Predictors of exercise behaviour

Purpose of study: To determine the underlying factors that predict exercise behaviour

Name of experimenter: Jessica Twyford

Location of study: Milton Keynes

Specific requirements: Between the age of 18-65 yrs

Type of activity:

Questionnaire Package *[information sheet, Consent Form and questionnaire that will be sent to you*

Takes around 15 minutes to complete- (A pre-paid stamped addressed envelope will be provided to send questionnaires back)

If you are interested in taking part in the study please contact me on the details provided below

Name: Jessica Twyford
Phone: **********
Email: **********

Thank you for taking the time to read this form.

There has been a great deal of research into the benefits of exercise for reducing risks of common diseases. It has become an important avenue of research to find out the exercise patterns of individuals and also factors that influence it.

We are inviting you to take part in this study, which will consist of filling out a questionnaire and should only take about 10-15 minutes to complete.

The questionnaire is about current exercise patterns and components that are associated with it.

This study is entirely voluntary and you are under no obligation to take part. If you do choose to take part you are able to withdraw at any time if you change your mind with no questions asked. There are no right or wrong answers to the questions and please be assured that your responses to the questions will remain confidential and you will not be identified by name.

Before you start completing the questionnaire, please read the consent form attached to confirm that you understand what is involved and please retain the information sheet containing my contact details. A pre-paid stamped addressed envelope will be provided for you to send back the questionnaire once completed. You can contact me if you would like any further information about the study or are interested in the findings.

Thanks again for your support

Jessica Twyford
Work **********
Email-********** Mobile **********

Address **********
****
****
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