Facilitators of Physical Activity for Individuals Living with Severe and Persistent Mental Illness: A Simultaneous Regression Analysis

By

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A dissertation submitted in partial fulfillment of

the requirements of the degree of

Doctor of Philosophy

(Rehabilitation Psychology)

at the

UNIVERSITY OF WISCONSIN-MADISON

2015

Date of final oral examination: July 27th, 2015

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DEDICATION

This work is dedicated to the many individuals living with a severe and persistent mental illness I have had the pleasure of meeting, treating, and becoming friends with over the past 17 years.

ACKNOWLEDGEMENTS

One of my professors at the University of Wisconsin-Madison (UW-Madison) once said something along the lines of "*I may not excel in many areas, but the one area that I do excel in is surrounding myself with good people*." That statement resonated with me, and certainly holds true over the period of time it has taken me to complete my dissertation and doctoral degree. I have many people I would like to thank for their support these past four years. This achievement would not have been possible without your support.

First and foremost, I would like to thank my beautiful wife Elizabeth. She made the bold decision to marry a poor doctoral student and willingly accepted whatever adventures my pursuit of this degree and eventual employment would take us upon. Knowing that I would get to spend the rest of my life with her made all of the hard work so much more worthwhile. Liz, I love you more than words can express.

I am blessed to have a family that instilled within me not only a drive for success, but also a sense of compassion for other people. Without these two personality characteristics, I certainly would not be here today. Furthermore, never did my family bat an eyelash when I decided to leave my stable job at the age of 33 to return to school for another four years. They offered nothing but encouragement and support, as they have throughout my entire life. Thank you to my wonderful parents Warren and Diane, my sister Sarah and her family, and also to my outstanding extended family. I would also like to thank my wife's family for accepting me with open arms amidst this tumultuous journey. I couldn't have asked for my wife to come from a better family.

This project would not have been possible without the support of my advisor, Fong Chan. Dr. Chan agreed to work with me when my previous advisor, Norm Berven, stepped into retirement. Dr. Chan has challenged me to meet my potential, always letting me know that I could be successful in this field, but also not letting this go to my head. Dr. Chan made me rise up at the moments when I wanted to take it easy, and also made me work a little bit harder when I thought that I had done well enough. I feel lucky, honored, and inspired to call Dr. Chan my advisor, as well as my friend. He is truly an amazing human being who has taught me numerous life lessons. Thank you so very much Dr. Chan.

Norm Berven was the first professor that I met upon entering the UW-Madison Rehabilitation Psychology master's program in 2004. At that time, little did I know that he would be one of the most influential people that I would meet in my career. Dr. Berven is amazing in that he is such a kind, compassionate man, but also one of amazing intellect, knowledge, and strength. He went out of his way to serve as a mentor for me when I was trying to decide whether I should take the next step into doctoral study. He supported my decision, and paved the way for me to pursue my goals. If I am able to be half the rehabilitation counselor and professor that Dr. Berven is, I believe that my career will be an outstanding success.

To my dissertation committee, I would like to thank each one of you for your support throughout this process. Dr. Brian Phillips—I cannot express what your guidance has meant to me these past few years. While you have certainly served as a model for all UW-Madison RPSE students, I truly feel that you offered something very special to the doctoral students that have had the opportunity to work with you these past several years. You are an exemplary individual and professor. Dr. Timothy Tansey—I wish that I would have had a greater opportunity to work more with you these past several years. Your ability to step into the RPSE program and

immediately become a leader is something that we as future doctoral students can only hope to achieve. You have certainly acted as a role model for what UW-Madison graduates can become. I look forward to working together as colleagues as we both move forward in our careers. Dr. William Hoyt—I feel lucky to have had the opportunity to have you as a professor. You serve as a model of a professor who commands a great deal of respect and admiration, while maintaining a very approachable and likeable personality. My work in your statistics course served as an inspiration for my dissertation, and I thank you for your guidance.

Jana Frey took a chance on me as a student fresh out of graduate school. At that time, little did I know that this would influence the remainder of my career. I would like to thank her for her support during my clinical career and also throughout my doctoral studies. Of no less significance, I would also like to thank Christine Ahrens and the rest of the my friends and former teammates at the Program of Assertive Community Treatment.

I would also like to recognize other individuals who supported me and provided guidance and training during the past several years: Dr. Gordon Herz at Forward Psychology, and Drs. Brenda Leske, Donald Mickey, and John Bayless at Counseling Resources and Neuropsychological Associates. Thank you for taking the time to work with me, and also for being accommodating of the whirlwind that the last few years have been for me! I have learned a great deal from each of you and will miss you all very much! It's been great!

To my colleagues from the Rehabilitation Psychology program, particularly Dr. John Blake, Kevin Bengtson, Susan Flowers-Benton, and Ashley Kaseroff, thanks for your friendship and support over the past 4 years! Ashley, I have to give special thanks to you for your assistance with this project. I cannot tell you enough how much your help meant to me. I look forward to repaying that debt!

Finally, I would like to thank all of my wonderful friends who have supported me through this journey. There are too many to list, but you all know who you are. Our misadventures these past many years have provided what I needed to deal with the day to rigors of the real world, especially the past two years while I was working on this project. I love you all!

This project was completed with support from the *Rehabilitation Research and Training Center on Evidence-Based Practice in Vocational Rehabilitation* (RRTC-EBP VR) at the University of Wisconsin-Madison and the University of Wisconsin-Stout and with funding provided by the U.S. Department of Health and Human Services, National Institute on Disability, Independent Living, and Rehabilitation Research (Grant H133B100034). The ideas, opinions, and conclusions expressed, however, are those of the researcher and do not represent recommendations, endorsements, or policies of the U.S. Department of Education.

ABSTRACT

Incidence rates of secondary physical health problems amongst individuals living with a severe and persistent mental illness are highly prevalent. This population is 50% more likely to develop a secondary physical health problem, and they typically die 25 years younger than the general population. A number of health behavior interventions have been tried with this population in order to decrease the rates of physical health problems this group experiences. One popular approach has been interventions encouraging higher levels of physical activity. While physical activity interventions have proven to be effective for this group, numerous studies have reported difficulties with recruitment, as well as attrition and drop-out rates. As a result, the existing literature has called for high quality research that will examine the personal and environmental factors that are likely to predict physical activity uptake and maintenance for this population. The purpose of the current study was to evaluate the predictive ability of social-cognitive theory, self-determination theory, and the theory of planned behavior for predicting physical activity participation and physical activity/exercise-related stages of change for this group. Individuals (n=60) living with a severe and persistent mental illness were recruited from an assertive community treatment program in Madison, Wisconsin. Each participant completed a survey in which they provided information about their background, current health, physical activity level and stages of change, and perceptions of various motivational factors. Simultaneous regression analyses were conducted in order to evaluate the predictive ability of each theory, as well as individual demographic characteristics. Results indicate that aspects of each theory may be useful for describing the physical activity behaviors of this group, particularly individual outcome expectations and internal motivation. Information about the

clinical and research implications of the current study are included, as well as recognized limitations.

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CHAPTER ONE

Introduction

The United States of America is challenged to meet the increasing health care demands of a population that is not only growing, but one that is living longer as well. The World Health Organization (WHO, 2015) reported that in 2012, the per capita total expenditure on healthcare was approximately $8,895.10, with the U.S. government incurring nearly half of those expenses due to the population's heavy reliance on Medicare, Medicaid, and the Veteran's Administration health care systems. However, despite spending up to 16% of its gross domestic product (GDP) in providing health care, and consistently ranking in the top 5 in terms of health care GDP percentage globally, the U.S. is thought to lag behind in most benchmarks of health and well being when compared with other industrialized nations (Banthin & Bernard, 2006 as cited in Karpur & Bruyere, 2012; The World Bank, 2015).

In 2012, the United States Census Bureau estimated that 56.7 million individuals, or about 19% of the U.S. population, are living with a disability (United States Census Bureau, 2012). Despite only making up approximately 19% of the U.S. population, it has been estimated that individuals with disabilities may account for up to 47% of total medical expenditures (Max, Rice, & Trupin, 1996). A number of factors contribute to the significant health care costs incurred by individuals with disabilities, particularly the high rates of secondary health care conditions amongst this population. Secondary health conditions are those health conditions occurring concurrently with a primary health diagnosis. Secondary conditions may be directly or indirectly related to the primary health condition and tend to increase one's functional disability, limiting an individual's ability to reach personal goals while increasing medical costs (Karpur & Bruyere, 2012; Lynch & Chiu, 2009; Ravesloot, Seekins, & Walsh, 1997).

The population of individuals living with a severe and persistent mental illness (SPMI) is at a significant risk for the development of comorbid health conditions, and is at a greater risk for hospitalization due to factors that may have been preventable with timely medical care (Khaykin, Cahoon, McGinty, Ford, & Daumit, 2013; Parks, Svendesen, Singer, Foti, & Mauer, 2006). Bezyak, Chan, Lee, Catalano, and Chiu (2012) cited studies by Felker, Yazel, and Short (1996), and Lawrence, Velakoulis, and Pantelis (2003), stating that "an estimated 50% of individuals with severe mental illness have at least one coexisting medical problem, and 35% have medical problems that are undiagnosed or untreated" (p. 62). Consequently, individuals living with a SPMI are at a far greater likelihood than the general population to experience premature mortality. A 2006 report by Parks et al. stated that individuals with SPMI are dying 25 years earlier than the general population, and that these increased mortality rates are largely due to preventable comorbid health conditions. Some conditions that people with SPMI are at a higher risk of acquiring include HIV (Gray, Brewin, Noak, Wyke-Joseph, & Sonik, 2002), metabolic syndrome (McEvoy et al., 2005), diabetes mellitus (El-Mallakh, 2007), cardiovascular issues (Ratliff, Palmese, Reutenauer, Srihari, & Tek, 2013), and oral health problems (Janardhanan, Cohen, Kim, & Rizvi, 2011). A number of factors contribute to these rates, including high rates of unhealthy lifestyles (e.g., substance and tobacco use, unhealthy diets, low rates of exercise and physical activity), illness-related factors (e.g., cognitive dysfunction, negative symptomology), environmental factors (e.g., poverty), and factors related to health care treatment itself (e.g., medication side effects, fragmented or inadequate health care provision). Clearly, the impact of secondary health conditions has a significant impact on the lives of individuals with SPMI. However, the economic burden on society related to the health care needs of this population is equally substantial. Wu et al. (2005) estimated that during 2002, 22.7 billion dollars were spent

in the U.S. on services related to the direct health care needs for individuals living with one of the most severe of the SPMIs, schizophrenia. Adjusted for inflation, this figure would increase to 30.07 billion dollars in 2014. To further accentuate the impact of the health care costs of schizophrenia, estimates suggest that between 2002 and 2006, approximately 87% of individuals with schizophrenia had Medicaid or Medicare, 8% received care through the Veterans Health Administration, 6% had TRICARE or other public insurance, and 7% had no health insurance at all (Khaykin, Eaton, Ford, Anthony, & Daumit, 2010). Clearly, the health care costs incurred by those individuals living with a SPMI are astronomical, and contribute significantly to the stress experienced by the U.S. health care system due to this populations heavy reliance on publicly supported health insurance. Notably, the direct health care costs related to schizophrenia accounted for only 37% of the entire financial burden associated with this illness, and do not account for other public spending related to schizophrenia (e.g., homeless shelters, unemployment, etc.).

Statement of the Problem

As the nation moves forward through the 21st century, one of the great challenges facing the United States will be the increasing demand for health care resources. In order to maintain a minimum quality of care and service provision, the health care system must consider innovative approaches for reducing the potential burden that it faces in the coming years. In the *Healthy People 2020 Report* (U.S. Department of Health and Human Services [U.S. DHHS], 2010) the Committee on Leading Health Indicators for Healthy People 2020 identified a number of objectives that will better equip the health care system to manage the increasing need it faces. Among the 24 objectives described in the report is a call for an "increase in the proportion of persons who receive appropriate evidence-based clinical preventive services (p.4)." Preventive

health care practices are generally thought of as those behaviors that reduce or eliminate individual susceptibility to disease and disability. Preventive health care may be primary (e.g., lifestyle counseling and immunizations), secondary (e.g., early detection of subclinical disease by screening or case finding to prevent disability), or tertiary (e.g., minimizing disability and handicap from established disease) (Patterson & Chambers, 1995). One example of primary preventive health care that is thought to have special relevance for individuals with disabilities is greater participation in physical activity. The Healthy People 2020 report has recognized the importance of physical activity in the lives of all Americans, and has called for an increase in "the proportion of adults who meet current federal physical activity guidelines for aerobic physical activity and for muscle-strengthening activity (p.4)."

The Centers for Disease Control and Prevention ([CDC]; n.d.) defines physical activity as "any bodily movement produced by the contraction of skeletal muscle that increase energy expenditure above a basal level." Physical activities may include those activities considered "*lifestyle activities*", or those activities that are often part of regular daily life that increase the energy that is exerted such as walking, doing gardening, or household work. Another type of physical activity may include regular *exercise*. Exercise is defined as a "subcategory of physical activity that is planned, structured, repetitive, and purposive in the sense that the improvement or maintenance of one or more components of physical fitness is the objective (CDC, n.d.)." Exercise may include strength training or activities that are performed at an intensity that significantly increases one's heart rate such as running. As the American public has become more aware of the risks associated with inactive lifestyles, many have chosen physical activity participation as a means of minimizing their susceptibility to health problems. Physical activity participation is often cost-effective, and requires minimal training or equipment.

If the incidence rates of physical health problems within the population of individuals living with a SPMI can be reduced, there is strong potential for positive outcomes at both an individual and societal level. Higher levels of physical activity participation within this group could certainly cultivate these outcomes. At an individual level, participation in physical activity has been proven to lead to positive physical (e.g., reduced rates of obesity) and psychological (e.g., decreases in psychiatric symptoms) health outcomes (e.g., Bradshaw, Lovell, & Harris, 2005; Faulkner & Biddle, 1999; Knöchel et al., 2012; Roberts & Bailey, 2011) for people living with a SPMI. Furthermore, increasing the health and wellness of individuals with disabilities has been associated with an improved likelihood of successful functional outcomes (e.g., employment) (Ipsen, Ravesloot, Arnold, & Seekins, 2012). At a societal level, improvements in the physical health of this group has the potential to lessen the burden placed on health care resources, individual dependence on publicly sponsored benefit and entitlement programs, and lower rates of unemployment, amongst other benefits. Clearly, there is much to gain for many stakeholders.

In the past decade, a great deal of rehabilitation research has explored the benefits of health promotion and preventive health practices for individuals with disabilities. The existing research is clear in that people with disabilities have a great deal to gain from living healthier lifestyles. What has been a greater challenge for the rehabilitation research community is determining what types of interventions are the most effective, and particularly, how to motivate individuals with disabilities to participate in such interventions. Fortunately, rehabilitation researchers have accepted the challenge and have began to dedicate greater resources in order to increase the amount of knowledge that exists about factors that influence people with disabilities to live healthier lifestyles. However, despite the improvements in the presence of health-related

research in rehabilitation, the field's knowledge base is still lacking in some areas. Interestingly, little rehabilitation health research has focused on one of the rehabilitation populations that presents the greatest health needs: Individuals living with a SPMI. Following a review of the literature published between the years 2000 and 2015 in five major journals related to rehabilitation counseling (i.e., *Journal of Applied Rehabilitation Counseling*, *Psychiatric Rehabilitation Journal*, *Rehabilitation Counseling Bulletin*, *Rehabilitation Psychology*, & *Rehabilitation Research, Policy, and Education*), only 21 articles were identified that discussed factors related to physical activity for individuals living with an SPMI, and several of these articles were only loosely related at that. Of those articles, few investigated the ability of various health promotion theoretical constructs to predict this population's engagement in physical activity. The existing research has primarily focused on (a) the prevalence of secondary health conditions and the need for higher levels of physical activity in the lives of people with SPMI, and (b) the effectiveness of various interventions. However, little research has considered *how* individuals with SPMI might become motivated to engage in physical activity. Schroeder (2007) suggests that the largest source of variance in health-related outcomes may be human behavior itself. Roberts and Bailey (2011) stated that in the existing health promotion research, little attention has been paid to what types of factors that may facilitate or prevent engagement in health promotion interventions for this population, and call for "high quality research to be undertaken to identify incentives and barriers from service users' own perspective (p.705)." This seems to be a significant gap in the existing research, as one of the problems frequently cited as a challenge in health promotion interventions was a lack of motivation to engage (e.g., Archie, Hamilton Wilson, Osborne, Hobbs, & McNiven, 2003; Beebe et al., 2011).

Purposes of Study

The purpose of this study is to establish a foundation of knowledge describing what types of personal and environmental factors are predictive of higher levels of physical activity and stages of change for physical activity/exercise (SOC PA/exercise) within the population of individuals living with an SPMI. Specifically, this study proposes to examine how popular health promotion theories might contribute to the prediction of levels of physical activity and SOC PA/exercise within this group. For example, if research can show that individuals with SPMI who engage in regular physical activity generally have high levels of self-efficacy related to these behaviors, clinical interventions can be developed that are aimed at enhancing an individual's confidence in their ability to engage in physical activities. In many cases, individuals living with a SPMI are living a very unique existence, and a fuller understanding of how different health promotion theories are specifically applicable to them will be useful for clinical, research, and educational purposes.

The primary goal of this research is to determine what types of factors described in popular health promotion theories are consistently present when individuals with SPMI are actively engaging or contemplating participation in higher levels of physical activity. Specifically, this study will examine the relevance of: Albert Bandura's Social Cognitive Theory (SCT; Bandura, 2004, Edward Deci and Richard Ryan's Self-Determination Theory (SDT; Ryan, Patrick, Deci, & Williams, 2008), and Icek Ajzen's Theory of Planned Behavior (TpB; Ajzen, 1991). These theories were selected due to the wealth of existing evidence supporting their applicability both in the general population, but also for their evident utility for people with disabilities. Furthermore, these theories were selected based on observations made during the researcher's own clinical experience, and subsequent hypotheses about this group's physical

activity-related decision making that were formed as a result. Ultimately, it is hoped that gaining a better understanding of how individual health behavior theories apply to this group will direct the development of a more inclusive, evidence-based model that specifically describes the health decision-making processes of this group.

Research Questions and Hypotheses

This study intends to examine:

1. What is the relationship between demographic covariates and physical activity participation? It is hypothesized that various demographic variables will influence the likelihood that an individual engages in higher levels of physical activity.
2. What is the relationship between demographic covariates and stages of change for physical activity and exercise? It is hypothesized that various demographic variables will influence the likelihood that an individual is considering beginning or maintaining participation in physical activity and exercise.
3. What is the relationship between SCT variables and physical activity participation? It is hypothesized that the presence of higher levels of the variables described in SCT will have a positive correlation with physical activity participation.
4. What is the relationship between SCT variables and stages of change for physical activity and exercise? It is hypothesized that the presence of higher levels of the variables described in SCT will have a positive correlation with those individuals who are considering beginning or maintaining physical activity and exercise participation.
5. What is the relationship between SDT variables and physical activity participation? It is hypothesized that the presence of higher levels of the variables described in SDT will have a positive correlation with physical activity participation.

6. What is the relationship between SDT variables and stages of change for physical activity and exercise? It is hypothesized that the presence of higher levels of the variables described in SDT will have a positive correlation with those individuals who are considering beginning or maintaining physical activity and exercise participation.
7. What is the relationship between TPB variables and physical activity participation? It is hypothesized that presence of higher levels of the variables described in the TPB will have a positive correlation with physical activity participation.
8. What is the relationship between TPB variables and stages of change for physical activity and exercise? It is hypothesized that the presence of higher levels of the variables described in TPB will have a positive correlation with those individuals who are considering beginning or maintaining physical activity and exercise participation.

Implications of Study

There are some implications that the current study is likely to have. These include: (a) learning how individual health behavior theories may be applied to understanding the physical activity-related decision making for individuals with SPMI, (b) gaining insight into factors that may be useful for encouraging individuals with SPMI to participate in physical activity interventions, (3) and directing future research in health promotion for this population.

Definitions

Severe and Persistent Mental Illness: While definitions of SPMI vary, Parabiaghi, Bonetto, Ruggeri, Lasalvia, and Leese (2006) found evidence to support a definition suggesting that a severe mental illness is when an individual has a mental disorder which causes their Global Assessment of Functioning (GAF) score to be <= 50, and the duration of service contact has been greater >= 2 years. Typically, mental health diagnoses that would be considered “severe

and persistent mental illnesses" would be any schizophrenia-spectrum disorder, severe bipolar disorder, or a major mood disorder. For the purposes of this study, the term SPMI will be utilized to describe individuals who meet the above described criteria.

CHAPTER TWO

Literature Review

Health promotion interventions have gained acceptance as a valuable piece of the rehabilitation counseling service paradigm. The World Health Organization (WHO; 2015) defines *health promotion* as the "process of enabling people to increase control over, and to improve, their health." In turn, health promotion interventions are those acts by rehabilitation counselors aimed at assisting rehabilitation clientele with improving their overall health. Health promotion interventions are thought to be a promising strategy, not only for improving individual health status, functioning, and quality of life, but also for lowering the direct and indirect costs associated with health care (Lynch & Chiu, 2009; Ravesloot, Seekins, & White, 2005). The infusion of health promotion into the rehabilitation counseling service paradigm is described a "bright opportunity for improved educational and vocational participation; increased life satisfaction and community/family participation; increased personal financial stability; and lower costs to individuals, their families, and society (Lynch & Chiu, 2009, p.278)." Clearly, many individuals with disabilities from a variety of backgrounds may have much to gain from achieving improved physical and mental health. This statement holds particularly true for this individuals living with a severe and persistent mental illness (SPMI)

This chapter will begin by describing the high prevalence rates of physical health problems within the population of individuals living with an SPMI, as well as the numerous factors contributing to this epidemic. Moving forward, the second section of this chapter will discuss the existing research on physical activity participation for people with SPMI, with a special focus on research discussing motivational factors that have been found to be relevant in predicting physical activity in the lives of people with SPMI. Finally, the third section of this

chapter will provide an overview of the health promotion theories that have been selected for the current study, with a thorough description of how each of these theories is applied to health behavior, as well as a description of when the theory has been applied to health behavior in previous empirical studies.

The Physical Health of Individuals Living with SPMI

A substantial body of literature has described the astronomical incidence rates of physical health problems that individuals living with a SPMI experience. Gill, Swarbrick, Murphy, Spagnolo, & Zechner (2009) cited evidence (Berren, Hill, Merkile, Gonzalez, & Santiago, 1994; Parks, Svendesen, Singer, Foti, & Mauer, 2006,) providing estimates suggesting that 60% of individuals with a SPMI develop serious comorbid medical problems that result in a loss of life anywhere from 15 to 25 years earlier than the general population. Gill et al. (2009) also cited research by Green, Canuso, Brenner, & Wojcik, 2003, Jeste, Gladsjo, Linamer, & Lacro, 1996, and Lambert, Velakoulis, & Panelis, 2003 suggesting that rates of circulatory disease, diabetes, obesity, hyperlipidemia, osteoporosis, chronic pulmonary disease, HIV-related illnesses, polydipsia, and epilepsy are consistently found to be more prevalent within the population of individuals living with a psychiatric illness. Among the most common of the comorbid medical conditions that people with SPMI experience is known as the *metabolic syndrome*. Metabolic syndrome is described as a "constellation of different conditions (Papanastasiou, 2012)" which tend to increase an individual's risk for diabetes mellitus and coronary heart disease. Individuals diagnosed with the metabolic syndrome often display some combination of abdominal obesity, heightened levels of triglycerides, elevated high-density lipoprotein cholesterol, hypertension issues, and elevated fasting glucose (Grundy et al. 2005, as cited in Kelly et al., 2007). In the general population, about 22% of Americans have metabolic syndrome. In the population of

individuals living with a SMPI, about 30-60% of individuals are thought to be living with this condition (Gill et al., 2009).

Despite increased attention from medical professionals and rehabilitation counselors, reducing the incidence rates of comorbid health conditions within this population has proven to be quite challenging. This is due to the numerous obstacles to health that this population faces, which together create a complex, multi-layered system of barriers and impediments. A review of the existing literature has identified a broad range of factors that are thought to contribute to the high rates of secondary health conditions within this population. The following section will provide a description of several of the primary contributing factors, including (a) unhealthy life behaviors (b) illness-related factors, (c) insight-related factors, (d) environmental factors, and (e) factors related to treatment modalities.

Contributors to Prevalence Rates

Unhealthy life behaviors. Individuals with SPMI are more likely than the general population to engage in a number of behaviors that may have negative consequences on their health. Research has shown that this population consumes more food than the general population (Strassnig, Brar, & Ganguli, 2003), and also consumes food that is less healthy (McCreadie, 2003). Daumit et al. (2005) found that people with SPMI engage in levels of physical activity that are significantly less than the general population, and this group also appears to be at a higher risk to engage in risky sexual practices (Gray et al., 2002). Roick et al. (2007) found that individuals with SPMI are more likely to be tobacco users than the general population, and also use tobacco more frequently. In addition, people with SPMI are thought to be as much as 4.6 times more likely to have a co-occurring substance abuse problem (Regier et al., 1990). Of note, research has suggested that the higher rates of tobacco and substance use

within this group may be due to high numbers of individuals who are using substances for psychiatric symptom alleviation (Goswami, Mattoo, Basu, & Singh, 2004), possibly reducing their likelihood of their choosing to abstain from using these substances.

Illness-related factors. Incidence rates of physical health problems within this population may also be exacerbated due to deficits associated with this group's primary impairments such as cognitive dysfunction and negative symptomology.

Cognitive dysfunction. Research has shown that cognitive dysfunction in people with schizophrenia is highly prevalent, if not universal, and may significantly impact a range of cognition functions such as episodic memory, processing speed, verbal fluency, attention, executive functioning, and working memory (Tandon et al., 2009). Cognitive dysfunction is thought to exist throughout the lifespan of people with schizophrenia, and may improve only moderately in response to different illness-related treatments (Tandon et al., 2009). In fact, the high prevalence rates and pervasive nature of the cognitive deficits present in SPMIs such as schizophrenia have led many to propose that such symptoms should be included in the diagnostic criteria for these illnesses, however the variability in the presentation of such symptoms for person to person has limited the utility of doing so (Tandon, 2009).

Cognitive dysfunction may influence the decision-making of individuals with schizophrenia and other SPMIs in a number of ways. For example, impaired cognitive functioning may limit the ability of people with schizophrenia to navigate the world around them, and in turn, impair their ability to plan and follow through with making healthy lifestyle changes. In turn, without effective assistance and support from others, the opportunities for many individuals to find and utilize the resources that they need may be quite limited.

Negative symptoms. The term *negative symptom* generally refers to a "voidance type" symptom, in which there is an "absence of normal functioning (Reynolds, 1861)", or when a particular emotional state or behavior that is common within the general population is decreased or diminished. About one in three individuals with schizophrenia suffer from significant negative symptoms (Makinen, Miettunen, Isohanni, & Kopponen, 2008), and similar symptoms are likely to present in other SPMIs as well. Foussias and Remington (2010) proposed that the negative symptoms of schizophrenia "represent the illnesses core" and may be "the most significant factor in the impaired functional recovery associated with schizophrenia (p.359)." The *Diagnostic and Statistical Manual of Mental Disorders* (DSM-V) states that for many individuals with schizophrenia, negative symptomology is related to a "substantial portion of the morbidity associated with schizophrenia (APA, 2013)", and is thought to be a major barrier to this population's opportunities for living a normal life (Makinen et al., 2008). In many cases, people with schizophrenia may have a poor awareness of the adverse effects of negative symptoms, and may not notice or care about these symptoms (Makinen et al., 2008). While individuals with schizophrenia may experience a number of different negative-type symptoms (e.g. affective flattening, alogia, anhedonia, attentional impairment), one common negative symptom with particular relevance to the health concerns of this population is *avolition*, which refers to a "decrease in motivated self-initiated purposeful activities (APA, 2013)." The degree to which an individual experiences avolition is thought to be a major determinant of the degree to which an individual achieves functional outcomes (Foussias & Remington, 2010). Individuals experiencing avolition may be less likely to show interest in participating in a number of life activities, including work or socialization. Archie, Hamilton-Wilson, Osborne, Hobbs, & McNiven (2003) describe a study in which they offered individuals with schizophrenia a free six

month membership to a local YMCA fitness facility. A high number of participants did not use their membership for the full six months, and some individuals did not utilize their membership at all. The main reason that participants provided for their poor attendance was a lack of motivation. Vancampfort et al. (2015) provided further evidence highlighting the impact of negative symptomology, finding that the negative symptoms of schizophrenia were significantly associated with lower autonomous motivation towards physical activity in inpatients with schizophrenia.

Limited insight. Research has suggested that the limited insight that people with schizophrenia have into their health needs may be at least partially attributable to a lack of knowledge or understanding. Loh, Meyer, and Leckband (2008) found that individuals with schizophrenia are more likely to underestimate their body size. Bezyak et al.'s 2012 study provided evidence suggesting that people with SPMI may also have limited insight into their physical activity levels. As individuals with SPMI may not have an accurate understanding of their health habits and needs, they may be less likely to feel that change is necessary or desirable. Further accentuating the problem, Goldman wrote an interesting article in 1999 suggesting that in some cases, individuals with schizophrenia may limit their opportunities for health care due to psychosis, denial, or an increased tolerance for pain.

Environmental factors. A number of environmental factors contribute to the high rates of secondary health conditions within this population. As individuals with SPMI are more likely to be unemployed or to be living in poverty, this group may not have access to the resources essential for achieving a healthier lifestyle such as some types of medical treatments, entrance to health facilities (e.g. YMCAs), or healthier food choices (El-Mallakh, 2007; Goldman, 1999).

Additionally, this population might have limited service options due to limited transportation or a lack of health care providers who are willing to accept government-sponsored health insurance.

Treatment-related factors. Interestingly, a number of factors related to the nature of medical and psychiatric treatments for people with schizophrenia are further contributing to the barriers to healthy lifestyles that this population faces.

***Medication side effects*.** The medications commonly used to treat many SPMIs are well known to have a wide range of unintended side effects. In many cases, the cost of treating an individual's psychiatric symptoms may be severe consequences for an individual's physical health. While the development and use of antipsychotic medications has succeeded in reducing the degree of positive symptomology that individuals with schizophrenia experience, research has suggested that antipsychotic medication treatments have not "translated into substantial gains in functional recovery (Foussias & Remington, 2010)", and may be responsible for the development of a number of secondary health conditions, including a compromised metabolism (McEvoy et al., 2005), glucose abnormalities and constipation (Falkai et al., 2005,) white blood cell count deficiencies (Drew, 2013), sexual dysfunction (Lieberman et al., 2005), and significant weight gain (Simpson et al., 2001). Interestingly, Padmavati, McCredie, and Tirupati (2010) found that schizophrenia in the absence of anti-psychotic medication treatment is not a risk factor for metabolic abnormalities.

In addition to increasing an individual's susceptibility to various physical health conditions, the use of antipsychotic medications may lead to the worsening of negative-type symptomology. Roberts and Bailey (2011) reported that psychiatric medications often cause increased sedation. Interestingly, Ussher, Stanbury, Cheeseman, and Faulkner (2007) reported

that a primary reason that people with severe mental illness don't exercise is because of feeling too tired.

Fragmented and inadequate treatment. High rates of comorbidity and early mortality amongst individuals with SPMI are at least partially due to issues related to the health care system itself. Traditionally, this group has had difficulty both accessing and engaging with health care services. Goldman (1999) reports that individuals with schizophrenia are "less likely than those in the general population to receive adequate health care for reasons that can be attributed to both the health care system and to the patients themselves (p.13)." People with comorbid mental illness and physical health problems may easily "fall through the cracks", for reasons such as a lack of insurance coverage, fragmented health care, stigma, the complexities of management, the challenges of navigating health care systems, or a lack of awareness on the part of the patient (Goldman 1999; Muir-Cochrane, 2006). Issues related to traditional mental health treatment systems for people with schizophrenia may contribute to the high degrees of secondary health conditions amongst this population as well. Hutchinson et al. (2006) describe the traditional treatment paradigm of the mental health system as one that focuses on managing the impairment, dysfunction, and disability associated with SPMI in contrast to a fuller, functional recovery. Specifically, care providers generally focused on the alleviation of psychiatric symptoms rather than a more comprehensive, holistic treatment that focuses on physical health issues as well. In turn, health care for with individuals with SPMI is often fragmented, meaning that physical health care often occurs separately from mental health care (Goldman, 1999). Research has suggested that the most effective approach may be an integration of mental health and physical health care, leading to more timely, seamless, and effective services. However, these types of service practices are not consistently utilized amongst different treatment

providers. Hutchinson et al (2006) stated that mental health treatment providers are challenged by "differences in staff training and philosophy, funding and reimbursement barriers, scarce resources, and time constraints (p. 244)." Phongsavan, Merom, Bauman, & Wagner (2007) stated while mental health clinicians recognize the psychological and physical benefits of helping people with psychiatric disabilities to become more physically active, many do not feel confident in traducing lifestyle advice into routine clinical care. Furthermore, some mental health professionals report a lack of awareness, beliefs, and attitudes about disability, a knowledge of disability and disability-related issues, and the skills and behaviors necessary for working with clients with disabilities (Strike, Skovholt, & Hummel, 2004). As many individuals with SPMI are presenting with a secondary disability, this is additional evidence that in some instances, a focus on mental health counseling with this population is certainly not a sufficient avenue for a holistic recovery.

In summary, comorbid physical health problems are highly prevalent amongst individuals living with a SPMI. A number of personal and environmental factors contribute to the high rates of physical health conditions within this group, creating a complicated, multi-faceted system of factors that make it very challenging for mental health consumers and clinicians

Physical Activity in the Lives of People with SPMI

The issue of physical health problems amongst individuals living with SPMI has received a great deal of attention. However, the multi-faceted system of factors contributing to the health problems this population experiences will not easily be overcome. Regardless, researchers and health professionals are motivated to seek solutions to this epidemic. Based on the presence of a vast amount of research focusing on the physical health needs of individuals with SPMI across many different health professions, the fields of medicine and rehabilitation counseling are

aligned in proposing that an effective approach for assisting individuals with SPMI in reducing their risk for comorbid physical health conditions would be encouraging this group to more actively participate in physical activity (PA). The barriers to healthy living that people with SPMI experience come in many shapes and sizes, and approach from numerous directions. For these reasons, it is implausible that any single intervention can eliminate each of the barriers this group experiences. However, it does seem possible that a point of intervention with strong potential to impact a number of the barriers that this group faces might be greater participation in physical activity. Training and participation in PA interventions not only offers this group an opportunity to directly reduce or eliminate a number of the contributors to unhealthy lifestyles that they might experience (e.g., a lack of opportunity, and lack of ability), but participation in PA may indirectly reduce or eliminate some of the existing problems as well (e.g., an individual might be inspired to reduce their tobacco use if they are exercising regularly). Furthermore, PA interventions are cost effective, can occur in almost any setting, and individuals can partake in them with little to no equipment and minimal training.

The following sections will describe the existing literature related to physical activity in the lives of people with SPMI including (1) what is currently known about physical activity participation for this group, and a description of (2) research describing factors influence individual participation in PA and PA interventions.

The Physical Activity Habits of Individuals with SPMI

A wealth of literature describes the physical activity-related tendencies of individuals living with SPMI. For several decades, the existing research on physical activity has suggested that individuals living with SPMI engage in lower levels of physical activity than individuals who have not been diagnosed with a SPMI. Chamove (1986) identified a number of studies

occurring between 1934 and 1981 stating that individuals with schizophrenia scored well below the general population on numerous measures related to physical activity and physical fitness. A number of more recent studies have reported similar findings.

Daumit et al. (2005) reported that the degree to which people with SPMI participated in walking was about equal to the general population (although a 2013 study by Beebe and Harris contradicts this), and that walking is the most common physical activity that individuals with SPMI reported participating in. However, while Daumit et al. found that individuals with SPMI walk as much as the general population, for 29% of the individuals in this study, walking was their only form of physical activity, and it was suspected that this group's participation in walking was directly related to a reliance on public transportation. When the degree to which people with SPMI participate in more vigorous physical activities was compared to the general population, people with SPMI were far less likely to participate. Daumit et al. also reported that 26% of people with SPMI reported no leisure time physical activity in the past month, and another 36% had physical activity levels that were lower than recommended. Beebe and Harris (2013) and Jerome et al. (2009) reported similar findings. Jerome et al. also suspected that people with SPMI are more likely to engage in short bouts of PA, rather than sustained PA. Lindamer (2008) also found that people with schizophrenia engaged in significantly less physical activity than non-psychiatric control groups. However, while 35% of the sample population did meet the recommended amount of weekly minutes spent engaged in physical activity, only 4% were doing it in bouts greater than 10 minutes at a time. Interestingly, Vancampfort et al. (2013) found that when matched with a control group of individuals from the general population who had a similar average body mass index (BMI), people with SPMI performed poorer on a PA test, and also reported less amounts of PA as well. Roick et al (2007) found similar findings,

including specific statistics about sleeping more, less time spent in moderate and strenuous levels of PA, and also lower participation in sports than the general population.

While the majority of the existing research suggests that individuals with SPMI are less likely to engage in physical activity, there is some conflicting research. In a study conducted by Lundgren, Rempfer, Lent, and Foster (2014), a group of individuals diagnosed with schizophrenia or schizoaffective disorder reported that they were engaging in levels of physical activity that were equal to a control group (n=27) of individuals without a history of severe mental illness. Interestingly, the group of individuals with SPMI also reported significantly higher levels of satisfaction with physical activity participation. McLeod, Jaques, & Deane (2009) found that Australians with schizophrenia reported levels of physical activity similar to those reported for the general population, however, the group of people with schizophrenia had markedly higher rates of obesity. Fewer than half of those surveyed reported achieving the minimum amount of weekly physical activity required to attain some health benefits. Participants also reported more sessions of walking and moderate activity per week than the general population, similar numbers of sessions of vigorous intensity activity, but substantially less time in vigorous activity (65 vs. 142 minutes per week). The authors also found that people with schizophrenia who had experienced fewer hospitalizations in the previous 3 years tended to engage in higher levels of physical activity, and that this could suggest that higher functioning individuals with schizophrenia may be more likely to choose to engage in higher levels of physical activity. Despite the existence of a few studies suggesting that individuals with SPMI do in fact engage in levels of PA comparable to the general population, it should be noted that previous research has suggested that individuals with SPMI may have difficulty with accurately

reporting their levels of PA (Bezyak et al., 2012), and in most cases the aforementioned studies did utilize self-report PA level measures.

Empirical Evidence on Interventions

Numerous physical activity interventions have been implemented for individuals with SPMI. In most cases, interventions offered structured physical activity/exercise programs, psychoeducational programs (e.g., discussing the importance of physical activity), or the provision of resources (e.g., a free gym). Consistent with Vancampfort et al.'s (2012) suggestions, interventions usually addressed (1) barriers to physical activity and (2) factors that will facilitate physical activity. While the results of past interventions have reported some improvements in overall physical and mental health (Gorczynski & Faulkner, 2009), and in some cases, neurobiological growth (Vancampfort et al., 2014), it has been challenging to encourage people with SPMI to begin and maintain participation for numerous reasons, particularly, self-motivation. While interventions have focused on "what is effective (e.g., yoga)", little attention has been given to the types of factors that might motivate individuals to participate in these effective programs. The research on what types of factors motivate individuals with SPMI to be physical active has not been entirely conclusive, and has highlighted the need for theoretically based research on the motivational processes linked to the commencement and continuation of health behaviors in individuals with SPMI (e.g., Beebe et al., 2012; Green et al., 2012; Medalia & Brekke, 2010; Vancampfort et al. 2015; Vancampfort et al., 2013).

While the majority of past research has focused on the efficacy of various physical activity interventions, there is some research that has specifically looked at what types of factors might motivate individuals with SPMI to be more physically active. Beebe et al. (2011) conducted an interesting study in which they investigated the impact of a motivational

intervention on exercise behavior for individuals with a schizophrenia spectrum disorder (SSD). Participants (n=97) were randomly assigned to either a motivational intervention designed to increase exercise behavior through enhancing motivational factors (n=48), or a control group (n=49). The motivational intervention consisted of 4 weekly, hour-long groups incorporating content based upon the tenets of social-cognitive theory (SCT), specifically, self-efficacy. The initial groups did not involve walking, they instead involved a discussion focusing on the basics of walking for exercise, in addition to information on walking safely, warm up and cool down exercises, and assistance with setting individualized exercise and/or attendance goals. Written materials were also provided to supplement the content provided in the group. In contrast, the control group involved 4 weekly, one-hour meetings that consisted of discussion on health behaviors such as medication adherence and smoking cessation. These groups did not include information on exercise or motivational content. Following the motivational intervention, both the treatment group and the control group began a sixteen-week walking program. The intention was to determine if those individuals who had received the motivational intervention would have reporter greater perceived self-efficacy for PA post-intervention. Interestingly, no significant differences in overall participation rates between the treatment and control groups were found. However, the authors did find moderate correlations with pre-group attendance (both the intervention and nonintervention group) and walking group attendance (r =.38, p <.001), persistence (r =.39, p <.01), and overall minutes walked (r =.30-.39, p <.001). They suggested that these correlations might mean that factors such as social support and group dynamics could facilitate ongoing motivation for physical activity. In regard to the author's hypothesis that PA related self-efficacy would improve post intervention, their hypothesis was not rejected, as the treatment group reported significantly higher degrees of self-efficacy (M=6.6, SD=2.3, p<.0168)

than the control group (*M*=4.8, *SD*=2.3). Interestingly, the control group reported slightly higher scores (*M*=4.6) on an outcome expectations measure following the intervention than the treatment group (*M*=4.2), however, although this difference was not statistically significant.

Vancampfort et al. (2013) conducted a study involving individuals with schizophrenia (n=129) in order to identify the motivational processes linked to the commencement of PA within this population. Participants were asked to complete 2 questionnaires, (1) a questionnaire for their current level of PA, and (2) an additional questionnaire identifying the participant's perception of behavioral regulation for exercise behavior. Vancampfort et al. found that participants with higher levels of autonomous regulation showed higher levels of PA (r=.57, p<.001), while amotivation, external regulation, and introjected regulation were negatively correlated with PA participation. In an additional study (n=55) Vancampfort et al. (2015) found that lower autonomous motivation for PA was correlated with higher degrees of negative symptomology in people with schizophrenia (r=-.34, p<.05).

Sorenson (2006) conducted a study with 109 psychiatric patients in order to evaluate the relationship between constructs related to SDT and physical activity, and to determine if individuals who had participated in PA in the past had a strong self-schema for PA. The results of this study reported a significant inverse relationship between extrinsic motivation and PA level (r= -.276, p<.01), and significant positive correlations between PA level and intrinsic motivation (r=.211, p<.05) and exercise schema (r=.345, p<.01).

Further research has addressed motivation for exercise in individuals with SPMI, although the primary conclusions taken from these studies were that (1) attrition rates in PA interventions for individuals with SPMI are significant, and (2) interventions can increase PA participation in individuals with SPMI, if individuals are willing to fully participate. Archie et

al. (2003) provided free access to a fitness facility for 20 individuals for 6 months. Their goal was to monitor the amount that the participants would exercise. After 4 months, the dropout rate was 40%, 70% after 5 months, and 90% after 6 months. The primary reason given for dropping out was a lack of motivation. In an additional study by Menza et al. (2004) tested a 1-year weight control program that involved counseling and exercise. 51 individuals with a SSD participated. Attrition rates were 34%, however, those who did participate decreased their weight and BMI significantly.

Health Behavior Theory

Past research supports the effectiveness of PA interventions for individuals with SPMI, however little information has been provided that is useful for understanding *how* to encourage this group to participate in such interventions. Regardless, evidence does support the applicability of a number of different theories that have been shown to describe factors known to lead to motivation and positively influence the health-related decision-making of the general population, as well as other groups of individuals with disabilities. Some research has even gone as far as to examine the interrelationships between different theories and propose a model of how different aspects of health-related decision making might influence and interact with one another (e.g., Pender, 1996). The following sections will describe the three social-cognitive health-behavior theories that were selected to provide a framework for investigating the motivation processes associated with PA for individuals with SPMI: (a) the *Social-cognitive Theory*, (b) the *Self-Determination Theory*, and (c) the *Theory of Planned Behavior*. Each section will provide an overview of the central ideas behind each theory, including a description of the key constructs related to health-behavior change, and selected evidence describing each theory's utility for understanding the health behavior of the general population and individuals with disabilities.

Social-Cognitive Theory

Research suggests that in order for an individual to consider behavior change, an individual must have confidence in their ability to engage in a behavior, as well as confidence in their ability to achieve their desired goals and preferred outcomes as a result of that behavior. If an individual is not confident in their ability to engage in a behavior or achieve their desired goals by engaging in a particular behavior, there is little reason to attempt behavior change. These beliefs are the centrals ideas behind the concept of *self-efficacy*. Self-efficacy is a fundamental construct within many popular theories describing human behavior change, and has been applied in numerous empirical studies involving a variety of health behaviors (Chou, Ditchman, Pruett, Chan, & Hunter, 2009). In turn, a discussion on theories of health behavior change naturally begins with a description of Albert Bandura's SCT (Bandura, 2004), which describes the various processes involved with the potential influence of self-efficacy. SCT is a theory of behavior change that proposes that health behaviors should be understood within the context of triadic reciprocality (Chou et al., 2009). The theory of triadic reciprocality suggests that personal factors, environmental factors, and individual behavior interact in order to determine whether an individual choses to engage in a health behavior (Bandura, 2004). Bandura suggests that health behaviors are influenced by a dynamic interaction of contextual factors, rather than just personal factors alone.

SCT specifies a core set of five behavior determinants, the mechanisms through which they work, and the optimal approaches for translating this knowledge into effective clinical practice (Bandura, 2004). SCT's core behavioral determinants include one's (1) *knowledge of health risks and the benefits of health practices*, (2) *perceived self-efficacy*, (3) *outcome expectations*, (4) the health *goals* that people set for themselves and the concrete plans and

strategies for realizing them, and (5) the *perceived facilitators* and social and structural *impediments* to engaging in a particular beahvior (Bandura, 2004). For a graphical illustration of SCT, please refer to Figure 1.

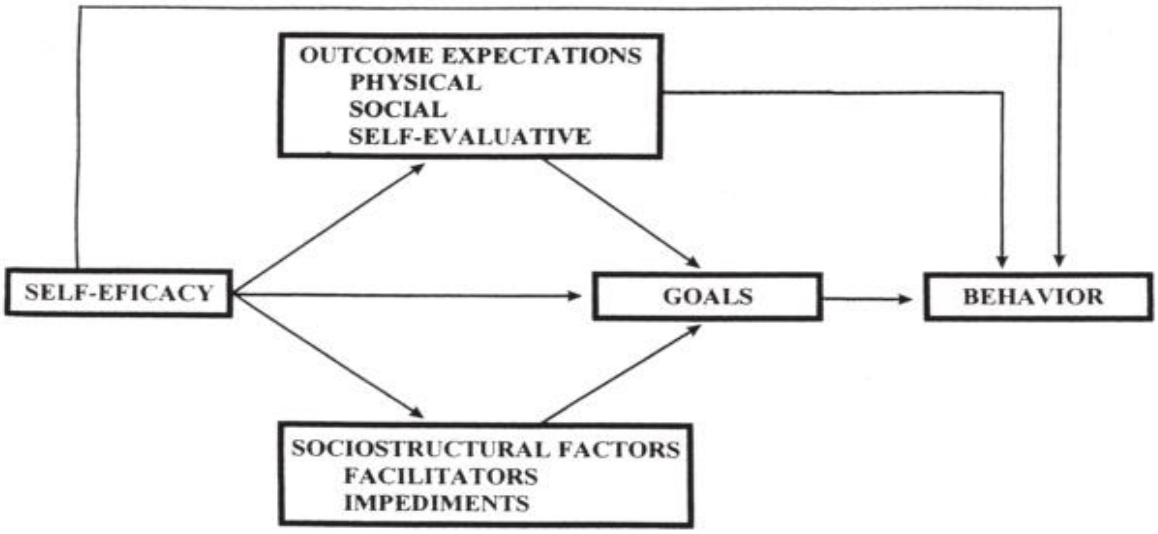

Figure 1. ***Social-cognitive Theory (Bandura, 2004)***

Knowledge. Bandura (2004) states that an individual's knowledge of their health risks and the benefits of health behavior change create the "precondition for change (p. 144)." If an individual lacks knowledge about how their lifestyle habits might impact their health, they have little reason to consider putting themselves through the challenges and potential frustrations of behavior change. However, when an individual has knowledge about possible health risks and the possible benefits of healthier living, these factors might inspire an individual to consider implementing lifestyle changes. For example, if an individual begins to realize that they are at risk for developing diabetes due to obesity, and that this risk might be alleviated through participation in healthier eating, that individual might consider a lifestyle change. Bandura (2004) states that additional self-influences are necessary, however. Knowledge alone is not

enough. With knowledge of one's need to change comes the consideration of one's ability to change. Does that individual have the *ability* to make the necessary changes?

Perceived self-efficacy. Once an individual is aware of their health risks and the potential benefits of behavior change, one might naturally ask themselves: "*Do I have the ability to engage in this behavior?*" In regards to health behavior change, perceived self-efficacy refers to one's beliefs about their ability to exercise control over their health habits (Bandura, 2004). For example, in order to successfully carry out a plan to begin exercising or engaging in regular physical activity, an individual must first believe that they have the ability to engage in those behaviors, as well as the necessary personal and environmental resources to do so. Perceived self-efficacy lies at the core of SCT, and is a primary determinant of behavior in numerous other health behavior theories (e.g., SDT, TpB). Beliefs about personal efficacy are thought to play a central role in any type of personal change, and this construct is considered the "foundation of human motivation (Bandura, 2004, p. 144)." If an individual does not believe that they can successfully engage in a behavior, they have little incentive to try doing so. "Whatever other factors may serve as guides and motivators, they are rooted in the core belief that one has the power to produce desired changes by one's actions (Bandura, 2004, p. 144)." Self-efficacy is thought to be a focal determinant of behavior change as it influences health behavior both directly, and through its influence on the other determinants (Bandura, 2004). Self-efficacy shapes the goals one sets out to achieve, as well as one's confidence in their ability to achieve their desired outcomes (e.g., outcome expectations). Additionally, one's self-efficacy impacts one's beliefs about the strength of factors (e.g., facilitators) that will help them reach their goals, as well as possible barriers. Among the behavioral determinants, SCT proposes that the essential

component of health behavior change is self-efficacy due to its direct effect on motivation, behavior, and other impediments (Bandura, 1997, 2004).

Outcome expectations. Bandura (2004) states that one's decision to engage in health behavior will be influenced by the outcomes an individual expects their behavior to result in, and that those perceived outcomes may take several forms (i.e., physical, social, or self-evaluative). The *physical outcomes* might include the "pleasurable and aversive effects of the behavior" in addition to the "accompanying material losses and benefits (p.144)." The *social outcomes* might include the praise or negative responses that behavior change might elicit from others. Finally, the third set of outcomes considers "the positive and negative self-evaluative reactions to one's health behavior and health status. Individuals are thought to do things that improve their self-perception and esteem, and are likely to avoid behaviors that lead to negative thoughts and feelings about themself. Bandura states that people adopt personal standards and regulate their behavior based on their self-evaluative reactions. People are likely to do things that give them self-satisfaction and self-worth, while refraining from behaving in ways that breed self-dissatisfaction (Bandura, 2004). Therefore, if an individual feels that engagement in PA will make them feel good about themselves, they are more likely to engage in that behavior.

Perceived facilitators and impediments. Individuals who are considering behavior change will likely consider potential of various facilitators or impediments as well. As Bandura (2004) states, if there were no impediments for individuals to surmount, behavior change would be easy. When an individual is establishing behavior change goals, they will certainly be influenced by how they perceive the strength of various facilitators and impediments. Furthermore, one's perception of facilitators and impediments will ultimately influence one's sense of perceived self-efficacy. Facilitators to health behavior, or factors that will increase an

individual's confidence in their ability to make change, might take the form of accessibility to exercise facilities, or even having a friend who will walk with them daily and provide social support. Impediments are perceived barriers or challenges that might make it difficult for an individual to accomplish behavior change. Possible impediments might include a lack of transportation to or from a health facility, or the potential for injury due to beginning an unfamiliar exercise or physical activity program.

Empirical evidence. A number of research studies have applied the tenets of SCT to health behavior change (Chou et al., 2009), including safer sexual practices (Wang et al., 2003), dietary behavior (Schnoll & Zimmerman), and adherence to medical recommendations (Williams & Bond, 2002). Furthermore, numerous studies that have considered the role of social-cognitive variables within the context of integrated health promotion models for PA (Chiu, Lynch, Berven, & Chan, 2011). Several studies have examined the role of SCT principles in predicting the health behavior of individuals with disabilities, including studies looking specifically at PA. For example, Ferrier, Dunlop, and Blanchard (2010) conducted a study to examine the role of self-efficacy and outcome expectations in explaining PA tendencies for 76 individuals with multiple sclerosis. Regression analyses showed that self-efficacy (β=.41) and outcome expectations (β=.27) directly influenced PA levels, and that self-efficacy directly influenced outcome expectations (β=.28). In a study with 54 older adults conducted by McAuley, Lox, and Duncan (1993), it was found that self-efficacy was a significant predictor of exercise program attendance (r=.42, p<.01). Vong, Cheing, Chan, Chan, and Leung (2009) reported that individuals with chronic pain that report higher levels of pain self-efficacy are more likely to experience reduce pain intensity, to use adaptive coping strategies, and to improve physical functioning. Suh, Joshi, Olsen, and Motl (2014) found that self-efficacy was significantly

associated with PA (r=.33, p<.01) in individuals with relapsing-remitting multiple sclerosis. Sperber et al. (2014) reported that PA self-efficacy was significantly associated (β=.27) with physical activity frequency in a sample of 337 older adults with arthritis.

Self-Determination Theory

In order to fully understand and facilitate human behavior change, it is critical that the role of an individual's motivation be acknowledged. While an individual may have confidence in their ability to do something, how motivated are they to do it? For example, motivating an individual to participate in an exercise program that he or she is not ready for poses a great challenge for clinicians (Archie et al., 2007). Research has suggested that intrinsic motivation is a key predictor of motivation of behavior, while external motivators may weaken any inherent interest in an activity (e.g., Deci & Ryan, 1985). Over the past 20 years, a great deal of research has attempted to understand the role of motivation for health behavior and the factors that precede its development through the lens of self-determination theory (SDT). Edward Deci and Richard Ryan created self-determination theory (SDT) as a model to understand how human beings might develop the motivation to engage in a particular behavior. Focusing on self-determination attempts to provide a means for understanding the "processes through which a person acquires the motivation for initiating new health-related behaviors and maintaining them over time (Ryan, Patrick, Deci, & Williams, 2008, p.2)." SDT highlights the importance of internalizing the values and skills necessary for change that will foster self-determination. As a general theory of motivation, SDT has spawned a number of interesting experimental and field studies focusing on how factors such as rewards, sanctions, use of authority, provision of choice, and level of challenge impact patients' experiences, and in turn their behavioral persistence and outcomes (Deci & Ryan, 2000). The applicability of SDT in health contexts has been supported

substantially in research (Ng et al., 2012), and is considered a key determinant of the likelihood of health behavior change. For a graphical illustration of SDT, please see Figure 2.

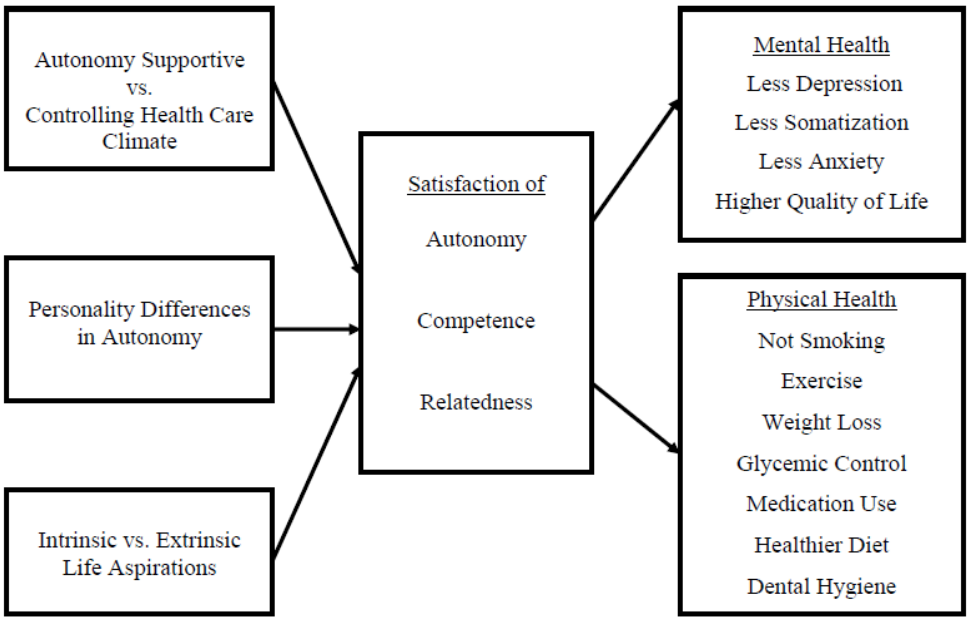

Figure 2. ***Self-determination Theory***
Ryan, Patrick, Deci, & Williams (2008)

SDT states that in order to maximize an individual's likelihood of internalizing and integrating the capacities to "self-regulate and sustain behaviors conducive to health and well-being (Ryan et al., 2008, p. 2)," an individual must develop a sense of *autonomy support* within the social contexts they might exist in. Ng et al. (2012) describe autonomy support as "a treatment atmosphere that encourages individuals to engage in health-conducive behaviors for their own reasons, facilitates success in dealing with barriers to change, and conveys feelings of acceptance and respect (p.327)." In regards to health promotion, key players contributing to an individual's sense of autonomy support may include an individual's mental health treatment providers and medical doctors. Satisfaction of one's sense of autonomy support is thought to be the key determinant of (a) *autonomy*, (b) *competence*, and (c) *relatedness* in health care settings. Under these circumstances, the regulation of health behaviors is thought to be more likely to be

internalized, and in turn, behavior change will be better maintained (Williams, Deci, & Ryan, 1998).

Autonomy. Autonomy is defined as the self-government of one's own decision and actions (Deci and Ryan, 2002), or "the perception of being the origin of one's own behavior and experiencing volition in action (Ng et al., 2012, p.327)." Ryan et al. (2008) describe how an individual must develop "autonomous motivation" if they are likely to make successful behavior change. Many health-related behaviors (e.g., increasing physical activity and dieting) are not "intrinsically motivated or inherently enjoyable activities (p.3)". Therefore, "if such behaviors are to be successfully enacted and maintained outside of treatment settings or controlled environments, individuals must come to value the behaviors and personally endorse their importance (p.3)." SDT states that many individuals engage in behavior changes in response to *controlled motivation,* which is motivation to behave based on pressure from external sources. Two common forms of controlled motivation are (1) *external regulation*, "in which a person acts only to get an external reward, avoid a punishment, or to comply with social pressures," and (2) *introjection*, "in which a patient might behave in a manner in order to receive approval or praise, or to avoid disapproval or feelings of guilt (p.3)." SDT states that both forms of controlled regulation are generally ineffective and unrelated to long-term behavior change. In contrast, change is more likely to occur when it is a function of *autonomous motivation*. Two forms of autonomous motivation are *identified regulation* (i.e., personal endorsement or identification with the value or importance of a particular behavior), and *integrated regulation (*i.e., when one not only values a behavior, but also has aligned it with their core values). Research has suggested that both identified and integrated regulation are well known to be associated with increased likelihood of long-term behavior change (Ryan et al., 2008).

Competency. In addition to a sense of autonomy, internalization and integration requires that an individual perceives a feeling of being effective in producing desired outcomes and exercising one's capacities (Ng et al., 2012). Consistent with Bandura's (2004) description of the importance of perceived self-efficacy, SDT posits that individuals must experience a sense of confidence and competency that they possess the skills and tools necessary for change. However, in contrast to SCT, SDT states that perceived competence alone is not sufficient to ensure adherence. SDT builds on SCT, stating that perceived competence must first be preceded by volition and autonomy. "Once individuals are volitionally engaged and have a high degree of willingness to act, they are then most apt to learn and apply new strategies and competencies (Ryan et al., 2008, p.3)." Simply stated, individuals might perceive that they possess the ability to change, but for whatever reasons, they are unmotivated. Additionally, individuals may need to be supported when competence or control-related barriers emerge. Deci and Ryan (2002) do emphasize that competence can only be achieved when an individual's health goals represent sufficient challenges. When an individual feels that they are developing and mastering capacities, they are more likely to continue to strive to fulfill the need for competence.

Relatedness. Relatedness has been described as feeling supported and connected to important others in one's life (Deci & Ryan, 2002), or a "feeling of being respected, understood, and cared for by others (Ng et al., p. 237)." In the context of health behavior change, relatedness refers to the importance of the patient/practitioner relationship climate. In order to maximize the likelihood of behavior change, the patient must perceive a sense of respect and understanding from the practitioner, in addition to a sense that the practitioner genuinely cares about the patient (Ryan et al., 2008). Relatedness is thought to have a significant impact on a patient's openness to information and the likelihood of complying with physician recommendations. Ryan et al. state:

> "In health care this is especially so, as vulnerable individuals, often lacking in technical expertise, look for the inputs and guidance of professionals. In this process a sense of being respected, understood, and cared for is essential to forming the experiences of connection and trust that allow for internalization to occur (p.3)."

Empirical evidence. A substantial body of research on health behavior has provided support for the validity of the central tenets of SDT as a meaningful model for understanding the relationship between motivation and health behavior (e.g., Ng et al., 2012; Teixeria, Carraca, Markland, Sliva, & Ryan, 2012). According to Brooks (2014), SDT has been tested on individuals in longitudinal studies on smoking cessation (Williams, Gagne, Ryan, & Deci, 2002), alcohol treatment (Ryan, Plant, & O'Malley, 1995), medication adherence (Williams, Rodin, Ryan, Grolnick, & Deci, 1998), and weight loss (Williams, Grow, Freedman, Ryan, & Deci, 1996). In these studies, the results consistently demonstrated that feelings of relatedness, autonomy, and competence significantly predicted whether individuals were likely to initiate and maintain health behavior change. SDT has also been shown to predict exercise and physical activity participation (e.g., Edmunds, Ntoumanis, & Duda, 2006; Rouse, Ntoumanis, Duda, Jolly, and Williams), although unfortunately only a few studies have applied SDT to the physical activity participation of individuals with disabilities (e.g., McBride et al., 2010; Russell & Bray, 2010; Williams, McGregor, Zeldman, Freedman, & Deci, 2004), and even fewer have applied SDT to understand PA participation for individuals living with SPMI (e.g., Beebe et al., 2011; Sorensen, 2006; Vancampfort et al., 2013). SDT research seems particularly important for this group as motivation for PA is often cited as one of the main reasons that this group abstains from these activities (Archie et al., 2003; Centorrino et al., 2006; Chen et al., 2009; Kwon et al. 2006; Menza et al., 2004; Pelham et al., 1993; Pendlebury et al., 2005; Vreeland et al., 2003). Beebe et

al. (2011) did report that individuals with a SSD who participated in a motivational intervention attended more walking groups, for more weeks, and walked more minutes than the control groups. Vancampfort (2014) also found that internal motivation predicted higher levels of PA amongst individuals with SPMI. Beebe et al. (2011) also described previous research (Hardeman et al., 2010; Kikkert et al., 2006) highlighting the importance of relationship factors with treatment providers (relatedness), and how this influences engagement and appointment attendance in individuals with SPMI.

Ng. et al (2012) conducted a meta-analysis of 184 studies related to SDT and health care or health promotion contexts. In this study, Ng et al. found that autonomy supportive environments were associated with the basic needs of autonomy, relatedness, and competence, and that the presence of these basic needs was related to positive mental health (ρ = .22 to .62) and physical health (ρ = .07 to .67) outcomes. Ng. et al. also combined the techniques of meta-analysis and path analysis in order to test the overall SDT model for health behavior. In this analysis, they also found support for the fit of the model $\chi 2(3) = 76.25$, $p < .01$, CFI = .98, RMSEA = .07, SRMR = .03. An additional systematic review by Teixeira, et al. (2012) had consistent results, providing evidence for a positive association between more autonomous forms of motivation and physical activity and exercise. Furthermore, perceived competence and more internalized motives were found to predict exercise participation across a variety of different sample populations and settings.

Theory of Planned Behavior

The Theory of Planned Behavior (TpB; Ajzen, 1985) has proven to be a valuable framework for understanding human health behavior. The TpB and SDT are thought to complement one another, providing a fuller picture of factors influencing motivation and

ultimately, the prediction of behavior performance (Hagger & Chatzisarantis, 2009). The TpB gives consideration to the influence of *intention* on instances when an individual is choosing to engage in a behavior. Intention is thought to be the "immediate antecedent of behavior (Ajzen, 2006, p. 1)." The TpB suggests that an individual's intention to engage in a behavior is the most proximal predictor of that behavior occurring (Mausbach et al., 2013). Ajzen (1991) states that intentions are thought to capture the motivational factors that influence a behavior, and are indications of how hard people are willing to try, and how much effort they will exert in order to perform a particular behavior. Ultimately, the likelihood of forming the intention to engage in a behavior is thought to be mediated by three sets of "memory-accessible beliefs" (i.e., behavioral beliefs, normative beliefs, and control beliefs), structured according to an "expectancy-value" framework (Latimer & Martin Ginis, 2005; Albery & Munafo, 2008; Taylor et al., 2006). *Behavioral beliefs* are thought to influence (a) an individual's *attitudes* about performing a behavior; *normative beliefs* are thought to influence (b) an individual's *subjective normative beliefs*; and *control beliefs* are thought to influence (c) an individual's *perceived behavioral control* (Mausbach et al., 2013; Taylor et al., 2006). Ajzen (2006) states that as a general rule, favorable attitudes, encouraging subjective norms, and a strong sense of behavioral control are likely to increase the strength of an individual's intention to perform a behavior when an opportunity to perform that behavior presents itself. For a graphical illustration of the TPB, please see Figure 3.

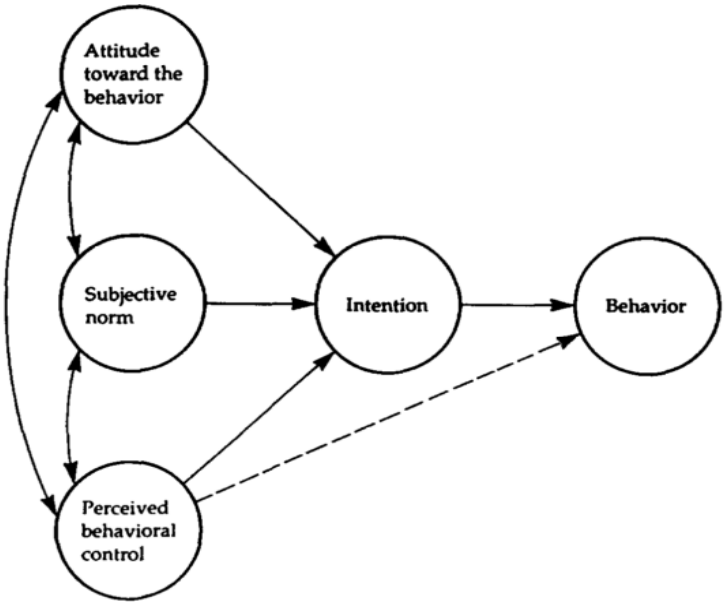

Figure 3. ***The Theory of Planned Behavior (Ajzen, 1991)***

Attitudes. According to the TpB, an individual's attitudes towards a particular behavior are based on their positive or negative beliefs about the likely outcomes of a behavior, and the evaluation of these outcomes (Ajzen, 2006). Attitudes are thought to play a major role in determining whether or not an individual carries out a behavior. Taylor et al. (2006) states that according to SDT, an individual's attitudes towards a behavior are the sum of two types of behavioral beliefs: (1) the likelihood that an action might lead to a desired outcome or negate an undesirable outcome and (2) the desirable or negative consequences associated with potential outcomes. Bandura (2004) states that the construct of attitudes is very similar to the SCT construct of outcome expectations, the difference being the lack of consideration for one's self-evaluative outcomes in the TpB.

Subjective norms. Ajzen (2006) states that one's "normative beliefs", or beliefs about the normative expectations of significant others (e.g. family, friends, health care providers, etc.), also have a significant influence on one's motivation to engage in a particular behavior. Taylor et

al. (2006) describe two types of normative beliefs: (1) beliefs about the normative expectations of others, and (2) the degree to which an individual wants to behave in a way that meets the expectations of significant others. The sum of these normative beliefs influences an intention to engage in a particular behavior.

Perceived behavioral control. Perceived behavioral control is thought to be the sum of one's control beliefs, which include (1) the external factors inhibiting or facilitating an action or behavior (e.g., not enough time, bad weather, life responsibilities), and (2) an individual's confidence in their ability to execute a particular behavior (Taylor et al., 2006). Ajzen (1991) states that the concept of perceived behavioral control is compatible with Bandura's concept of perceived self-efficacy, in that it relates to whether an individual has confidence not only in their ability to engage in a particular behavior, but also in their ability to overcome potential challenges to that behavior. Research has recognized the multidimensionality of perceived behavioral control, and has suggested that it is actually made up of three related constructs: perceived control, perceived difficulty, and perceived confidence/self-efficacy for performing a behavior, with perceived confidence/self-efficacy being the proximal predictor of health behaviors and intentions (Rodgers, Conner, & Murray, 2008).

Empirical evidence. A number of meta-analyses have been conducted in order to investigate the utility of the TpB for predicting various behaviors for both the general population and people with disabilities, although no research was found that considers how the TpB applies to the PA behaviors of individuals with SPMI. Rich, Brandes, Mullan, and Hagger (2015) cited previous research (Ajzen, 1991, Armitage & Conner, 2001; Godin & Kok, 1996; Hagger, Chatzisarantis, & Biddle, 2002; McEachan, Conner, Taylor, & Lawton (2011), Schulze & Wittman, 2003; Sniehotta, Presseau, & Arujo-Soares, 2015; Trafimow, Sheerhan, Conner, &

Finlay, 2002) providing evidence for the utility of the TpB, stating that across a number of health behaviors, the TpB has been found to account for between 19-36% of the variance in behavior, and 40-49% of the variance in intention. Reviews have also supported the utility of intention as a mediator of the effect of attitudes and subjective norms on behavior, and perceived behavioral control as a predictor of both intention and behavior, supporting the hypotheses proposed by the model.

In a meta-analysis of 111 studies involving the TpB as applied to exercise behavior, Downs and Hausenblas (2005) found large associations between intention and exercise behavior, intention and perceived behavioral control, and intention and attitudes. Moderate associations were found between perceived behavioral control and intentions, and intentions and subjective norms. In following regression analyses, intention and perceived behavioral control accounted for 21% of the variance in exercise behavior, but only intention was a significant predictor. In a second regression analysis, attitudes, perceived behavioral control, and subjective norms accounted for 30.4% of the variance in intention, but only attitudes and perceived behavioral control contributed significantly, while subjective norms did not.

In a 2005 study on individuals with spinal cord injuries (SCI), Latimer and Ginis (2005) conducted a hierarchical regression analysis in order to evaluate the utility of the TpB for predicting leisure time physical activities (LTPA) among individuals with spinal cord injury (SCI). Attitudes ($r = .58$, $p < .01$), subjective norms ($r = .48$, $p < .01$), and perceived behavioral control ($r = .66$, $p < .01$), were found to be unique predictors of intention, and in turn, intentions mediated the effects of the TpB constructs on behavior. However, intentions did not serve as strong predictors of physical activity as intentions only accounted for 16% of the variance in behavior. The authors suggested that while intention may initially be intact, it might be possible

that individuals with SCI experienced unforeseen barriers to physical activity that inhibited their ability to follow through with their intended behavior.

Eng and Ginis (2007) evaluated the utility of the TpB for explaining and predicting LTPA in individuals with chronic kidney disease. This study also incorporated a hierarchical regression analysis. Attitudes (r = .62, p <.001), subjective norms (r = .33, p <.01), and perceived behavioral control (r = .78, p <.001) were each found to be significantly correlated with intention. However, once entered into the regression model, perceived behavioral control was the only construct found to be significantly associated with predicting intentions. The authors suspected some redundancy in the measurement instruments, perhaps explaining the lack of variance accounted for attitudes and subjective norms. Regardless, the TpB variables were able to account for 61% of the variance in intentions, and 28% of the variance in actual time spent engaged in LTPA for this group.

Rich, Brandes, Mullan, and Hagger evaluated the utility of the TpB in predicting treatment adherence in chronic illness. 27 studies were included that considered individuals with numerous types of chronic illnesses including diabetes, heart disease, breast cancer, and their adherence for behaviors such as medication, exercise, and diet. Zero order correlations between the TpB variables were statistically significant (p<.05), ranging from .22 to .51. The TpB variables accounted for 33% of the variance in intention, however, only 9% of the variance in actual behavior adherence was accounted for by intention.

While PA was not included, Mausbach et al. (2013) did evaluate the utility of the TpB for predicting functional behaviors (e.g., taking medications, doing laundry, etc.) in a sample of 64 individuals diagnosed with schizophrenia. In this study, zero order relationships were found between behavioral intention and attitudes (r=.58, p<.0001), subjective norms (r=.62, p<.001),

and perceived behavioral control (r=.69, p<.001). Intentions (r=.041, p=.001, subjective norms (r=.27, p=.029), and perceived behavioral control (r=.35, p=.36, p=.004) were found to be related to the performance of functional behaviors, although attitudes (r=.23, p=.063) were not. In six subsequent regression analyses using the TpB constructs as predictors and various functional behaviors as outcome variables, the TpB constructs were found to be useful for predicting action, although the utility of the TpB's predictability was influenced by the type of behavior. An additional path analysis, subjective norms and perceived behavioral control were found to be significantly related to intentions, which in turn predicted greater engagement in functional behavior.

Conclusion

A review of the literature related to the health needs of individuals with SPMI has highlighted a number of factors. First and foremost, the physical health concerns of individuals with SPMI are significant, and a number of factors are contributing to the astronomical rates of comorbidity and early mortality that this group experiences. Secondly, both the field of medicine and the field of rehabilitation have acknowledged the issue of secondary health problems within this population, and clinicians from each have made a number of attempts to introduce interventions promoting higher levels of PA for this population. It is well known that many individuals with SPMI are likely to engage in very low levels of PA. Despite the presence of interventions that have been proven to be effective, clinicians have had difficulties encouraging individuals with SPMI to begin participation, and to maintain participation in these interventions. Motivation has been cited as a key problem, and is often the reason cited by individuals with SPMI for their lack of participation. Medical and rehabilitation researchers have made a call for

theory-based research that will investigate what types of motivational factors and process may better encourage individuals with SPMI to participate in PA.

A number of health behavior theories exist that have been proven to account for the variance in PA related decision making and participation amongst both the general population, but also amongst many groups of individuals with disabilities. SCT, SDT, and the TpB have been well trialed, and certainly explain factors that are related to health decision-making. Unfortunately, little research has investigated how health behavior theory applies to individuals with SPMI. The time has come to investigate how to better encourage individuals with SPMI to engage in PA. There is a great deal for this population to gain, both physically, and psychologically, in addition to the numerous potential benefits for society. SCT, SDT, and the TpB each explain interesting and unique factors influencing health behavior, and are excellent starting points for understanding how health behavior applies to individuals with SPMI. Understanding the utility of this population may not only facilitate the development of effective interventions, but may inspire the development of health behavior models specifically tailored to the needs of this population.

CHAPTER THREE

Methodology

A quantitative correlational research design consisting of a correlational analysis and multiple regression analysis was used to investigate the ability of the variables described in the social-cognitive Theory (SCT), the self-determination theory (SDT), and the theory of planned behavior (TpB) to predict participation in physical activity (PA) and PA/exercise stages of change (SOC PA/exercise) for individuals living with a severe and persistent mental illness (SPMI). The following sections include a discussion of the sample and procedures, the measurement instruments and psychometric properties, and statistical analyses.

Procedure

In the fall of 2014, the Program of Assertive Community Treatment (PACT) in Madison, Wisconsin was contacted in order to discuss this study. PACT is a comprehensive community treatment service provider for individuals living with a SPMI such as schizophrenia-spectrum disorders, major mood disorders, and severe bi-polar disorder. PACT is affiliated with the Mendota Mental Health Institute (MMHI) which is a state agency serving under the Wisconsin Department of Health Services. PACT serves approximately 150 individuals with SPMI in Dane County, Wisconsin. PACT administration expressed interest in the study, and a meeting was held to discuss sample recruitment. After the meeting, the PACT administrator, Dr. Jana. Frey provided a written letter of support (see Appendix A) to be included in the study's application to the Institutional Review Board (IRB) at the University of Wisconsin-Madison. Upon receiving approval (Appendix B) from the UW-Madison IRB, PACT administration requested that approval be sought from the MMHI IRB as well. In March of 2015, a meeting was held with the MMHI IRB to discuss this study. After the meeting, MMHI clinical and researcher director

David Lee, Ph.D., JD provided written IRB approval via email to allow for data collection to begin.

An additional researcher was recruited in order to enhance the participant recruitment and data collection processes. PACT administration approved the participation of a UW-Madison rehabilitation psychology student and PACT pre-doctoral intern Ashley Kaseroff. Ms. Kaseroff's role and participation was approved by the UW-Madison IRB as well as the MMHI IRB. Study advertisement flyers (Appendices C & D) were posted in the waiting room at the PACT offices. Interested participants had two options for participation. They could either contact the research team in order to arrange for delivery of a consent form (Appendix E) and a study questionnaire (Appendix F), or they could attend an advertised drop-in session during which they could provide consent and complete a questionnaire. Several interested participants reached out to the research team through their case manager or via telephone. In some instances, interested participants also approached the research team while in the PACT office in order to request a questionnaire.

Study participants were each provided with a packet that contained a description of the study, an informed consent form, and the questionnaire. Once participants were given a questionnaire, they were immediately asked to participate in the consent process. Approximately 11% of PACT's consumer population has a legal guardian. As this was a significant percentage of the PACT client pool, it was determined that interested individuals who had a legal guardian should be offered the opportunity to participate. When participants expressed interest in participation, they were asked if they had a legal guardian. In those instances in which they did have a guardian, the research team worked with the interested participant in order contact their

guardian in order to receive guardian approval via signature on the consent form. In these cases, the participant was also required to provide their own assent as well.

The questionnaire itself took approximately 30-45 minutes to complete. Typically, participants completed the questionnaire immediately while they were at the PACT office or took the questionnaire home with them. In a few instances, participants asked members of the research team to assist with reading the questions and potential responses. Financial support for this study was provided through the *Rehabilitation Research and Training Center on Evidence-based Practice in Vocational Rehabilitation* (RRTC-EBP), and each participant was compensated for his or her participation with a $20.00 gift certificate for use at a local department store.

Sampling and Participants

Sixty PACT consumers completed the research packet. An additional five packets were handed out, but were not returned. Follow-up calls to these participants was met typically met with a reluctance to follow through due to the length of the survey, or due to a lack of ongoing interest in a $20.00 gift card. These potential participants were ensured that their ongoing participation was not required, but if they decided that they did in fact want to complete the survey, they could contact the members of the research team in the near future.

Participant Characteristics

Participants in this study were not asked to provide information about their diagnosis due to PACT's own consumer eligibility criteria (the presence of a SPMI), which ensured that participants had diagnoses consistent with the aims of this study. Dr. Frey was able to provide information about the statistical breakdown of consumer diagnoses, as well as additional demographic statistics. As of August 2014, PACT was serving 142 consumers. Of this group, at

least 50% had a dual diagnosis of major mental illness as well as a substance abuse disorder. Over 90% had a primary diagnosis of schizophrenia or a related diagnosis (e.g., schizoaffective disorder). Of the remaining 10%, those consumers had diagnoses of bi-polar disorder, major affective disorder, obsessive-compulsive disorder, or autism spectrum disorder. 9% were under court ordered treatment, 11% had legal guardians, and 40% required daily or twice daily mediation monitoring by PACT staff.

Descriptive data that was collected in the questionnaires is presented in Table 3.1. In the current study, participant ages ranged from 21 to 67 (M= 42.05, SD= 14.51). Over half of the participants were male (71.7%), and 63.3% identified themselves as Caucasian, followed by African American (11.7%), Asian (8.3%), Hispanic (5%), and other (11.7). In terms of educational attainment, 23.3% did not complete high school, 43.3% had a high school diploma or equivalent, 31.7% had completed some college, and one participant graduated from college (1.7%). In terms of employment, 48.3% of the participants were current working, whether it was full-time employment, part-time employment, or a volunteer position. 83.3% of the sample stated that they were not currently in a relationship, and 96.7% of the participants stated that they were currently taking psychiatric medications. It is important to note that 75% stated that they had participated in a PACT physical education group in the past, and 38.3% reported that they were currently participating in one. A number of participants also reported that they had worked with PACT staff individually to be physically active in the past (61.7%) and 33.3% were currently receiving PA assistance from PACT. In order to get a sense of the participant's current level of physical health, several questions were asked about the presence of secondary health problems that are common for this population. Thirteen participants reported that they were at-risk for diabetes (21.7%), and 10 stated that they currently had diabetes (16.7%). Eleven participants

Table 3.1
Participant Demographic Characteristics (N = 60)

Variable	*n*	(%)	*Minimum T-Score*	*Maximum T-Score*	*M*	*(SD)*
Age	59				42.05	(14.5)
Gender						
Female	16	(26.7)				
Male	43	(71.7)				
Unspecified	1	(1.7)				
Race/ethnicity						
African American	7	(11.7)				
Caucasian	38	(63.3)				
Hispanic	3	(5.0)				
Asian	5	(8.3)				
Other	7	(11.7)				
Education level						
Less than high school	14	(23.3)				
HSD, HSED, or GED	26	(43.3)				
Some college	19	(31.7)				
College graduate	1	(1.7)				
Employment status						
Employed full-time	6	(10.0)				
Employed part-time	18	(30.0)				
Unemployed/Seeking	15	(25.0)				
Unemployed	13	(21.7)				
Retired	3	(5.0)				
Volunteer	5	(8.3)				
Relationship status						
Single	50	(83.3)				
Significant other	10	(16.7)				
Currently Taking Psychiatric Medications						
Yes	58	(96.7)				
No	1	(1.7)				
Unspecified	1	(1.7)				

Physical Activity Group Participation				
Past	45 (75.0)			
Current	23 (38.3)			
Physical Activity Assistance from Staff				
Past	37 (61.7)			
Current	20 (33.3)			
Current Health Status				
SF-12 physical health	60	24.35	55.30	40.99 (5.52)
SF-12 mental health	60	31.82	64.09	45.65 (6.76)
Diabetes				
At risk	13 (21.7)			
Current problem	10 (16.7)			
High/Low Blood Pressure				
At risk	11 (18.3)			
Current problem	9 (15.0)			
Metabolic Syndrome				
At risk	10 (16.7)			
Current problem	5 (8.3)			
High Cholesterol				
At risk	8 (13.3)			
Current problem	6 (10.0)			
Pulmonary Disease				
At risk	9 (15.0)			
Current problem	17 (28.3)			
Obesity				
At risk	14 (23.3)			
Current problem	18 (30.0)			
Cardiovascular Problems				
At risk	5 (8.3)			
Current problem	4 (6.7)			

(18.3%) reported that they were at-risk for high/low blood pressure, and nine (15%) reported that high/low blood pressure was a current problem. Ten (16.7%) participants reported that they were at risk for developing metabolic syndrome, and five (8.3%) stated that it was a current problem. Nine participants (15%) reported that they were at risk for pulmonary disease, and 17 (28.3%) reported that this was a current problem. Fourteen (23.3%) participants reported that they were at risk for obesity, and 30% (18 participants) stated that they were currently obese. Five participants (8.3%) reported that they were at risk for cardiovascular problems, and four (6.7%) reported that they currently had this type of health problem.

Measurement Instruments

The following sections provide a description of each instrument that was utilized for this study, including information about the instrument's development, the construct(s) of focus, the researcher's justification for its selection, and information describing its psychometric characteristics. Furthermore, each section will provide a description of any instance in which a scale was modified. It has been well documented in the literature that individuals with SPMI, particularly those individuals with a schizophrenia-spectrum disorder, may experience cognitive limitations (Tandon, Nasrallah, & Keshavan, 2009) or a disrupted process of formal education due to premorbid symptomology or the onset of a SPMI during the later adolescent years (Strauss et al., 2012). In order to ensure that the scale items were easily understandable, and that the overall instructions for each measure were clear, in some cases the presentation and language was modified on a few of the scales. Additionally, it was necessary to modify the language on several of the scales in order to ensure that they contain referents that are relevant to the current study, and the participant's treatment provider (PACT). The potential impact of any test item

modifications on the results of this study will be fully recognized and considered in the discussion and limitations sections of the final report.

Demographic Information

Demographic information was collected in order to categorize participants by a number of factors, and also to evaluate the ability of various demographic variables to predict participation in PA or stages of change SOC PA/exercise. A section of the questionnaire was developed in which participants were asked to describe individual characteristics that are common in rehabilitation research such as age, gender, race/ethnicity, educational attainment, relationship status, and employment status. Additional information was sought about other relevant factors including current use of psychiatric medications, past or current assistance with PA/exercise from PACT staff, and the presence of current health problems. Additional information was obtained for descriptive purposes using a health-related quality of life measurement (the Short Form-12).

As stated above, participants were asked several unique questions that were thought to be relevant to the specific to the purposes of this study. First, participants were asked to indicate whether or not they were currently taking psychiatric medications. A prescription to psychiatric medications may have a significant influence on the degree to which they participate in PA. However, almost every participant was currently taking psychiatric medications and therefore, little information was obtained from this question aside from its descriptive ability. Secondly, participants were asked 2 questions about their past and current participation in PACT PA groups, as well as 2 questions asking whether or not participants had ever worked with PACT staff individually in order to be more physically active. PACT offers a number of regular exercise groups. Additionally, PACT staff often work with clients individually in order to assist

those individuals with learning about PA and to become making PA a regular practice. Past or current assistance from PACT was thought to be a variable that might have an influence on an individual's thoughts about PA, as well as their likelihood of PA participation. Trost, Owen, Bauman, Sallis, & Brown (2002) stated that past participation in exercise is predictive of current participation. These questions were used to create two categorical variables representing past or current participation in any sort of PACT PA category, regardless of whether it was in a group setting or individually A sum of the total number of these activities participated in was not utilized.

Participants were also asked to identify whether they felt they were at risk for particular secondary health conditions or whether they were currently dealing with specific conditions. Seven questions were designed that focused on secondary conditions that have been shown in previous research (e.g., Gill et al., 2009) to be quite common within this population. Specifically, participants were asked about diabetes mellitus, high blood pressure, metabolic syndrome, high cholesterol, breathing or lung problems, obesity, and heart, vein, or artery problems. Obtaining this information provided insight into the current health status of the sample population, and to understand how the presence of secondary conditions might be predictive of PA levels or contemplation of participation in PA.

Health-Related Quality of Life

Finally, in order to obtain descriptive information about how participants perceived their current health, this study utilized the second version of the self-report instrument the *Short Form 12 Health Survey* (SF-12v2; Ware, Kosinski, Turner-Bowker, & Gandek, 2002). The SF-12v2 is a modified version of the *Short Form 36 Health Survey* (SF-36; Hays, Sherbourne, & Mazel, 1993*).* As the names of the instruments imply, the SF-12v2 is a 12-item survey while the SF-36

contains 36 questions. The developers of the original version of the *Short Form 12 Health Survey* (SF-12) believed that an instrument with fewer questions would be more useful for larger scale health measurement and monitoring efforts (Ware, Kosinski, & Keller, 1996). Consistent with the SF-36, the SF-12v2 contains questioning related to the respondent's physical and mental health. The SF-12v2 utilizes eight scales to provide both a physical component summary (PCS) and a mental component summary (MCS). For each question, respondents are asked to check an answer box that most accurately represents how they feel about the question or statement that is given. For example, one question asks: "During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?" The respondent is than provided with a Likert-type response system that provides users with 5 options (e.g. "All of the time", "None of the time" in order to reflect how they feel the statement's content reflects their thoughts on their own life. According to the SF-12v2 users manual provided by QualityMetric, Inc. (Ware, et al., 2002), SF-12v2 items are scored so that a higher score indicates better health. For example, the authors stated "functioning items are scored so that a high score indicates better functioning, and the pain item is scored so that a high score indicates freedom from pain (Ware et al., 2002, p. 30)." A set value is assigned to each item on the SF-12v2, and those values are calculated within a scoring algorithm provided by QualityMetric. Individual physical and mental health scores are then compared against a normative sample taken from the general U.S. population in 1998. Cheak-Zamora, Wyrwich, and McBride (2009) evaluated the psychometric properties of the SF-12v2 and reported that the reliability and validity of the instrument are fairly strong, as well as consistent with the findings of previous evaluations (Llewellyn, McGurk, & Weinman, 2006; Ware et al., 2002; Zelman, Gore, Dukes, Tai, & Brandenburg, 2005).

Physical Activity Measures

Physical activity level. The *Physical Activity Scale for Individuals with Physical Disabilities* (PASIPD) was utilized in order to operationalize individual PA level. The PASIPD is a well-validated instrument that provides information about PA participation in a number of different areas. The PASIPD was developed by Washburn, Zhu, Frogley, and Figoni (2002). According to Bezyak et al. (2011), the PASIPD is a modification of the *Physical Activity Scale for the Elderly* developed by Rockhill et al. (1999). The PASIPD is useful as it considers a number of areas of PA including lifestyle PA (e.g., walking, cleaning, or gardening), and exercising (e.g., playing sports, jogging, and strength training).

The PASIPD is a 13 item self-report questionnaire that assesses an individual's frequency of PA in five different life-activity domains including house repair and gardening, housework, vigorous and moderate sport, and occupation (Washburn et al., 2002). Questions contain statements such as "During the past 7 days, how often did you do any exercise specifically to increase muscle strength and endurance such as lifting weights, push-ups, pull-ups, or wheel-chair push-ups, etc.?" Participants utilize a Likert-type scale ranging from 1 (never) to 4 (often) in order to provide responses. If a participant provides a "never" response, they are referred to the next question. However, if an individual provides a response between 2 and 4, they are asked to complete a follow up question that describes how many hours they engage in an activity. Bezyak et al. (2011) describes the procedure for scoring the PASIPD. PASIPD scores are computed by multiplying the average hours per day that an individual spends in an activity by a *MET value*, which refers to a metabolic equivalent. The MET value is representative of the intensity and energy expenditure of different physical activities, which are thought to be comparable for different ages and weights. The maximum possible score for the PASIPD is

199.5 MET hours per day. Washburn et al. (2002) provides a report of the MET equivalents for each of the items contained in the PASIPD, as well as instructions for estimating the number of hours per day that an individual spends in specific types of activities.

The developers of the PASIPD suggest that the results of their initial factor analysis does support instrument validity based on the internal consistency of item scores and overall participant scores (Washburn et al., 2002). Bezyak et al. (2011) cited research by van der Ploeg et al. (2007) that reported a test-retest estimate of .77 after a 1-week interval. Bezyak et al. (2011) reported a test-retest reliability estimate of .65. Recently, Bezyak, Chan, Chiu, Kaya, and Huck (2014) recently validated the five-factor structure of the PASIPD for individuals with SPMI and found satisfactory results. In the current study, a Cronbach's alpha of .65 was calculated.

Stages of change PA/exercise. SOC PA/exercise was measured using the Physical Activity Stages of Change (PASC). This measure was developed by Nigg et al. (2005) to operationalize the concept of readiness to engage in PA. It is composed of four items (e.g., Do you currently engage in regular physical activity?"). Items are rated using a dichotomous "yes" or "no" format. Responses on the four items are converted to a five-point rating scale representing the degree to which is an individual is contemplating or regularly engaging in PA. Individuals with a score of 1 are classified as in the precontemplation stage; those with a score of 2 are considered to be in the contemplation stage; individuals who score a 3 are classified as in the preparation stage; a score of 4 identifies an individual in the action stage; and a score of 5 suggests that an individual is in the maintenance stage (Chiu, Fitzgerald, Strand, Muller, Brooks, & Chan, 2012). The higher the stage, the more actively involved in PA an individual is likely to be.

For the current study, four questions related to exercise participation were utilized as well. In order to be inclusive of all of types of physical activities (and to maintain consistency with the PASIPD), the referents from the four original questions of the PASC were modified in order to refer to "exercise" rather than "physical activity", creating four additional questions that were added to the measure. The original PASC contains a statement referring to specific types of physical activities; however it does not refer to exercise activities that increase exertion to a greater degree. For this reason, the original PASC alone was not consistent with the broader scope of this study. In order to score this combined measure, the same approach that is used for scoring the original PASC was utilized, however, an average score was calculated based on participant responses to the eight items. In the current study, a Cronbach's alpha of .76 was calculated.

Physical Activity and Exercise Predictor Measures

A number of different instruments were utilized to measure the constructs described in the various health behavior theories as independent variables. However, in several cases, there was considerable overlap between similar constructs from different theories. In these cases, similar constructs from different theories were measured utilizing a single instrument. Bandura (2004) describes the similarities between the components of many of the popular health behavior theories, suggesting that many of the differences are trivial in nature and are often referring to factors that are more similar than different, just with varying names. The following sections provide a description of each instrument that was used for this study. Additionally, each section will identify which health-behavior theoretical constructs each instrument was utilized to measure.

Knowledge. This study utilized the *Risk Behavior Diagnosis Scale* (RBD) in order to operationalize an individual's degree of awareness and concern about dangerous health conditions. The RBD was developed by Witte, Cameron, McKeon, and Berkowitz (1996) to determine which types of health risk messages would be most effective for a given individual. The instrument contains two scales related to *efficacy*, and two scales related to *threat*. For the current study, only the scales focusing on "threat" (i.e., perceived susceptibility and severity) were included, as a scale operationalizing individual efficacy was already in place. The RBD was designed so that researchers would be able to tailor each item to the specific focus of their study. For example, item one on the *Severity of Threat* subscale reads: "I believe that [health problem] is severe." For the current study, the phrase "many health problems" was utilized in order to get a general sense of each participant's perceptions about the severity of potential health conditions and their own susceptibility for acquiring one. The perceived susceptibility and severity scales each contain three items. Items on the RBD are rated on a 5-point Likert-type scale (1=strongly disagree; 5=strongly agree). The numeric value of each item is tallied and divided by the number of items in order to create a composite "threat" score. Witte et al (1996) reported a relatively low Cronbach's alpha for the two scales as a unified threat measure (α=.54); however the individual scales had strong internal consistency (α=.85 and .90). Witte et al. suggested that the lower internal consistency of the unified threat scale was likely due to the independent nature of the two dimensions. Regardless, in the current study, a Cronbach's alpha of .83 for the unified threat scale was calculated.

Self-Efficacy. The *SCI Exercise Self-Efficacy Scale* (ESES) was utilized to measure the constructs directly related to an individual's perceived efficacy for PA, including perceived self-efficacy as described in the SCT (Bandura, 2004), competence as described in the SDT (Ryan et

al., 2008), and the self-efficacy related aspects of perceived behavioral control as described in the TPB (Ajzen, 1991). The ESES was originally developed by Kroll, Kehn, Ho, & Groah (2007) to measure exercise self-efficacy for people with spinal cord injury (SCI). Despite its development for individuals with SCI, the items on the scale were developed in a manner that is easily applicable to most other populations with few referent modifications. The ESES is composed of 10 items that measure one's confidence in their ability to engage in exercise or PA (e.g., "I am confident that I can overcome barriers and challenges with regard to physical activity and exercise if I try hard enough"). Each item is rated on a 4-point Likert-type rating scale (1= not at all true, 2= rarely true, 3= moderately true, 4= always true). Item scores are tallied and then divided by 10 in order to provide a mean PA and exercise self-efficacy score (1=low self-efficacy, 4=strong self-efficacy). Kroll et al. reported a Cronbach's alpha of .93, indicating a high degree of internal consistency reliability, and finding that each of the items seemed to load onto one factor. Construct validity was established as a statistically significant correlation (Spearman RHO = .32; $p < .05$) with the Generalized Self Efficacy Scale (Jerusalem & Schwarzer, 1992) was found. In the current study, a Cronbach's alpha coefficient of .87 was obtained.

The language used on several of the items on the ESES was modified slightly for use in the current study. First, each of the items on the ESES mentioned both "physical activity" and "exercise". As the current study is considering exercise as a subcategory of PA, references to exercise were taken out of each question in order to minimize the wording and also to avoid participant confusion. Secondly, the wording was modified slightly in some cases in order to improve the readability for this study's participants. For example, item 2 of the ESES states "I

can find means and ways to be physically active and exercise." In the current study, item 2 was modified to: "I can find ways to be physically active."

Outcome expectations. The *Outcome Expectations for Exercise Scale* (OEE; Resnick, Zimmerman, Orwig, Furstenberg, & Magaziner, 2000) was utilized to operationalize outcome expectations as described in SCT (Bandura, 2004), and attitudes as described in the TpB (Ajzen, 2006). The OEE was originally developed as a tool that could be used to identify elderly individuals who had low expectations for the effects of exercise. The OEE consists of nine items that are statements about the positive benefits of exercising (e.g. Exercise makes my mood better in general). Subjects respond using a Likert-type response system, ranging from 1 (strongly disagree) to 5 (strongly agree). The scale is scored by totaling the numerical ratings for each response and then dividing by the number of items. In a 2001 study by Resnick, Orwig, Zimerman, and Magaziner, the internal consistency of the instrument was calculated to be .78. Furthermore, a confirmatory factor analysis testing a single factor model showed a good fit of the data to the measurement model and all factors loadings were greater than .50. In the current study, the Cronbach's alpha coefficient was .90. The items on the OEE were modified slightly in order to refer more broadly to PA instead of a focus specifically on exercise. For example, item 9 was modified from "Exercise helps to strengthen my bones" to "Physical activity helps to strengthen my bones."

Barriers. The *Barriers to Health Promoting Activities for Disabled Persons Scale* (BHADP) developed by Becker, Stuifbergen, and Sands (1991) to operationalize individual perceptions of barriers and impediments to PA as described by Bandura (2004). The BHADP is composed of 18 items making up three subscales: (a) intrapersonal barriers (e.g., too tired), (b) interpersonal barriers (e.g., "other responsibilities") and (c) environmental barriers (e.g., lack of

transportation) which ask subjects about different types of factors that might make participation in health behavior challenging (Chiu, Lynch, Chan, & Rose, 2012). Responses are scored from 1 (never) to 4 (routinely), however, in the current study, the instrument was slightly modified in order to use the phrase "very often" instead of "routinely". The instrument is scored by summing the numeric values of each item and then dividing that total value by the number of items. A higher mean score suggests more perceived barriers, and a lower score suggests a perception of fewer barriers. In selected studies including people with and without disabilities (Becker et al., 1991; Chiu et al., 2012), the BHADP was found to have good internal consistency reliability coefficients (.82-.85). In the current study, the measure was found to have a Cronbach's alpha of .89.

Autonomy support. The *Health Care Climate Questionnaire* (HCCQ) was utilized to operationalize participant perceptions of how autonomy supportive their health care providers are. The HCCQ was introduced by Williams, Grow, Freedman, Deci, and Ryan in 1996. It contains 15 items, which subjects rate using a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). It includes items such as "I feel my health care practitioner understands how I see things with respect to my health." The HCCQ is scored by totaling the numerical values assigned to each item and then dividing that number by the of items. Means are obtained, and that figure serves as a representation of the degree of autonomy support which an individual perceives (1=little autonomy support, 5=strong autonomy support) Williams et al. (1996) reported that the HCCQ has an excellent internal consistency reliability estimate of .95 based on an earlier sample of 276 individuals, and also reported that a factor analysis of their responses revealed a one-factor solution measuring perceived autonomy support. In the current study, a Cronbach's alpha coefficient of .72 was calculated. Fitzgerald et al. (2014) recently introduced a

modified version of the HCCQ entitled the *Clubhouse Climate Questionnaire* that was successfully tested on a sample population of individuals with SPMI.

The referents for the items on the HCCQ were modified in order to include the name of the sample population's mental health care provider, PACT, and also to improve the readability of each item (e.g., "My PACT team understands my opinion about physical activity"). This was done in order to clarify which health care provider this measure was referring to, as many individuals with SPMI receive physical health care and mental health care from a number of different providers. Furthermore, the terminology was also modified in order to refer to autonomy support for PA, rather than a general health focus. Finally, the Likert-type scale was reduced to offer 5 possible responses in order maintain closer consistency with other measures in the questionnaire. This is consistent with the recent modification of the HCCQ Likert scale described by Fitzgerald et al. (2014), which was shown to have strong reliability (.86).

Internal motivation. *The Behavioural Regulation in Exercise Questionnaire 2* (BREQ-2; Markland & Tobin, 2004) was utilized to evaluate individual perceptions of internal and external motivation for PA. The BREQ is based on the SDT conceptualizations (Deci & Ryan 1985; 1991) of internal and external motivation. It includes 19 items making up five subscales: (a) intrinsic motivation (e.g., "I exercise because its fun"), (b) identified regulation (e.g., " I value the benefits of exercise"), (c) introjected regulation (e.g., " I feel guilty when I don't exercise"), (d) external regulation (e.g., "I exercise because other people say I should"), and (e) amotivation (e.g., "I don't see the point in exercising"). Respondents utilize a 5-point Likert-type scale (0=Not true for me; 4=Always true for me) in order to provide a response. Subscales may be interpreted individually, or a *Relative Autonomy Index* (RAI) may be calculated which provides an estimate of the degree to which a respondent feels self-determined motivation. Initial research

by Markland and Tobin (2004) has supported the factorial validity of the BREQ-2, and shown item reliability estimates as acceptable to good (α=.73 -.86). In the current study**,** the Cronbach's alpha for each of the BREQ's 5 scales ranged from .63 to .85. For the current study, the item referents were slightly modified in order to refer to PA rather than exercise. Additionally, the language utilized in some items was modified in order to improve readability.

Relatedness. The SDT concept of relatedness was operationalized using a modified version of the *Work-related Basic Needs Satisfaction Scale* (W-BNS) developed by van den Broeck, Vansteenkiste, De Witte, Soenens, and Lens (2010). The W-BNS contains 18 items such as "At work I feel part of a group." Items are rated on a 5-point Likert-type scale ranging from one (totally disagree) to five (completely agree). The W-BNS is scored by adding the numerical values assigned to each item and then dividing that number by the number of scale items to obtain a mean figure representing an individual's sense of relatedness. The W-BNS is comprised of three subscales representing autonomy, relatedness, and competence. The current study utilized the relatedness subscale, which has been shown to have a strong internal consistency estimate of .82. For this study, four additional items were added to the W-BNS in order to fully capture factors relevant to the sample population's treatment provider, and the referents on each item were modified to refer to PACT (e.g. "At Pact I feel part of a group"). Additionally, the language used in several questions was modified in order to avoid questions that would require a reverse-response style. Despite the use of a modified version in the current study, a Cronbach's alpha of .91 was calculated.

Subjective norms. Based on recommendations by Ajzen (2006), Keegan, Chan, Ditchman, and Chiu (2012) developed a questionnaire in order to measure normative beliefs about exercise and PA. The normative belief scale is composed of four items (e.g., "My family

members think that I should be physically active and exercise on a regular basis," "My doctor thinks that I should be physically active and exercise on a regular basis") Participants are asked to rate the items for both scales on a 7-point Likert-type scale, ranging from "extremely unlikely" to "extremely likely." For use in the current study, the scale was modified to include a 5-point Likert scale (1=Extremely Unlikely, 2=Extremely Likely). The numerical values assigned to each item are added together and then divided by the number of items in order to produce in overall score representing an individual's perception of whether they feel that their normative group and their medical professionals believe that they should be physically active. The item referents were also modified slightly to focus specifically on PA in a broader sense. Additionally, a fifth question was added that specifically asked respondents about PACT (i.e., "PACT staff think that I should be physically active on a regular basis"). Keegan et al. (2012) reported that the reliability and validity of items based Ajzen's standardized guidelines have been well established (e.g. Courneya, Friedenreich, Sela, Quinney, & Rhodes, 2002; Courneya, Vallance, Jones, & Reiman, 2005). In Keegan et al.'s (2012) study, the Cronbach's alpha coefficient for the normative beliefs scale was computed to be .92. In the current study, the Cronbach's alpha coefficient was computed to be .90.

Behavioral control. Also based on Ajzen's (2006) recommendations, an additional TpB measure was designed based on the scale that was developed by Keegan et al. (2012) to operationalize the concept of perceived behavioral control as related to the influence of outside forces that might make it challenging for an individual to engage in PA (e.g., unforeseen events, family obligations). The scale contains four items (e.g., "How often do you encounter unanticipated events that prevent you from being physically active on a regular basis?") and a 5-

point Likert-type response system. In the Keegan et al. (2012) study, the Cronbach's alpha was calculated to be .77. In the current study, a Cronbach's alpha of .72 was calculated.

Behavioral intention. Behavioral intention was measured utilizing four items taken from the *Health Behavior Intention Scale* (HBIS), which was developed by Renner and Schwarzer (2005) to measure intention to engage in heath behavior. It is composed of 10 items (e.g., "I intend to live a healthier life"). Items are rated on a 7-point Likert-type scale (1= do not intend at all to 7 = strongly intend). For the current study, the response system was modified and provided respondents with five possible responses. Participant responses are added together and then divided by the number of items in order to obtain a mean intention score. Among the 10 items of the HBIS, four were previously used as the *Intention Scale for Health Eating Habits* by Schwarzer and Renner in a 2000 study. In that study, the authors reported a Cronbach's alpha of .91, with the reliability of the intention measure as .65. In the current study, a modified version of those four items was utilized (e.g., I intend to live an active lifestyle). Following data analysis, a Cronbach's alpha of .88 was calculated for the items selected of this measurement.

Data Analysis

The *Statistical Package for the Social Sciences* (SPSS) for Windows was utilized to perform all data analyses. Initially, SPSS was utilized to describe the statistical characteristics of the demographic information obtained from the questionnaires. Frequencies, percentages, means, and standard deviations were used to summarize the demographic data (see Table 3.1). Descriptive statistics for the study measures are summarized in Table 3.2. Following the acquisition of this data, SPSS was utilized to perform 8 simultaneous multiple regression analyses in order to test each research hypotheses.

Table 3.2

Descriptive Statistics for Study Measures

Predictor Variables	**Measure**	**Response Range**	***M***	***SD***	**α**
Knowledge	Risk Behavior Diagnosis Scale (Perceived Susceptibility and Severity Scales)	1-5	3.3	(1.1)	.83
Self-efficacy	Exercise Self-Efficacy Scale	1-4	3.1	(.58)	.87
Outcome expectations	Outcome Expectations for Exercise Scale	1-5	4.1	(0.67)	.90
Barriers	Barriers to Health Promoting Activities for Disabled Persons Scale	1-4	1.9	(0.65)	.89
Autonomy support	Health Care Climate Questionnaire	1-5	3.9	(2.26)	.72
Internal motivation	Behavioural Regulations for Exercise Questionnaire-2				
Amotivation			1.7	(.32)	.77
External regulation			2.5	(.50)	.63
Introjected regulation			3.0	(.25)	.76
Identified regulation			3.7	(1.11)	.78
Intrinsic motivation			4.0	(.40)	.85
Relatedness	Work-related Basic Needs Satisfaction Scale	1-5	4.1	(.39)	.91
Subjective norms	Normative beliefs scale	1-5	3.8	(.87)	.90
Behavioral control	Perceived Behavioral Control Scale	1-5	2.1	(.95)	.72
Intention	Revised Health Behavior Intention Scale	1-5	4.1	(.38)	.88
Outcome Variables	**Measure**	**Response Range**	***M***	***SD***	**α**
Physical activity level	Physical Activity Scale for Individuals with Physical Disabilities	Varies	21.6	(18.02)	.65
Physical activity and exercise stages of change	Modified Physical Activity Stages of Change Scale	1-4	7.6	(2.76)	.76

Simultaneous Regression Analysis

The primary analyses were conducted using a simultaneous regression analysis (SRA). According to Hoyt, Leierer, and Millington (2006), SRA is a basic application of multiple regression that involves the simultaneous use of a set of predictor variables (i.e., dependent variables) in order to make the most accurate prediction possible of scores on the criterion variable (e.g., the dependent variable). This type of analysis provides researchers with information about the variance in the criterion variable that is accounted for by the predictors as a set, and the unique association of each of the predictors with the criterion variable when all of the other predictors in the regression analysis are statistically controlled for (Hoyt et al., 2006). In the current study, four sets of predictors were utilized to measure the two criterion variables (PA level and SOC PA/exercise). The first analysis evaluated the amount of variance accounted for by the set of demographic covariates selected for this study (age, gender, race, employment status, education level, relationship status, use of psychiatric medications, involvement in physical activities with PACT staff, and current health problems) The second analysis utilized a set of predictor variables related to SCT which was operationalized by the *Risk Behavior Diagnosis Scale* (knowledge), the *Exercise Self-Efficacy Scale* (self-efficacy), the *Outcome Expectations for Exercise Scale* (outcome expectations), and the *Barriers to Health Promoting Activities for Disabled Persons Scale* (barriers). The third analysis involved sets of predictors related to SDT including a modified version of the *Health Care Climate Questionnaire* (autonomy support), the *Exercise Self-Efficacy Scale* (competence), the *Behavioral Regulations for Exercise Questionnaire-2* (internal motivation), and a modified version of the *Work-Related Basic Needs Scale* (relatedness). The fourth analysis utilized a set of predictor variables related

to the TpB. The constructs were operationalized by the *Exercise Self-Efficacy Scale* (perceived behavioral control), the *Outcome Expectations for Exercise Sca*le (attitudes), and a modified version of the *Health Behavior Intention Scale* (intention). For this analysis, additional scales were developed based on those utilized by Keegan et al. (2012) in order to operationalize subjective norms and the second focus of perceived behavioral control related to external factors that limit an individual's ability to be physically active. In order to achieve the desired statistical power in the current study, an a priori power analysis was conducted for the total R^2 value for a multiple regression analysis with seven predictor variables, power equal to.80, and an alpha level of .05. GPOWER (Faul, Erdfelder, Lang, & Buchner, 2007), a software tool for a general power analysis, yielded a sample size of 90 for a medium effect size (f^2 =.15; Cohen, 1988). The recommended sample size was unfortunately not attainable. The results of the study are interpreted within the context of this limitation in the discussion section presented in chapter five.

CHAPTER FOUR

Results

The purpose of the present study was to examine the predictive ability of Social Cognitive Theory, Self Determination Theory, and the Theory of Planned Behavior for physical activity participation and stages of change in relation to physical activity and exercise among individuals living with a SPMI. Eight simultaneous regression analyses were used to determine the amount of variance in physical activity levels and stages of change physical activity/exercise (SOC PA/exercise) that could be accounted for by sets of predictors representing individual characteristics and experiences, in addition to the variables associated within the aforementioned health behavior theories. This chapter describes the results of the statistical analyses used to evaluate the primary research questions.

Correlation Analyses

The correlations between the two outcome variables (PA and SOC PA/exercise) and the predictor variables ranged from variables ranged from small to large, with Pearson Product-Moment correlation coefficients ranging from .03 to .53. The correlation matrix and descriptive statistics for the predictor and criterion variables in the final regression analysis are provided in Tables 4.1 and 4.2. Physical activity level was found to be significantly associated with employment status (r= .40, p <.001), education level (r = .22, p <.05), stages of change PA/exercise (r = .51, p <.001), self-efficacy (r = .31, p <.05), outcome expectations (r = .53, p <..001), and motivation quality (r =.37, p <.01). SOC PA/exercise was not found to be associated with any of the demographic covariates, but was associated with physical activity level

Table 4.1

Correlations, Means, and Standard Deviations for Demographic Covariates Used in Final Regression Analysis

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Physical activity	--										
2. Stages of change	.51**	--									
3. Male gender	.03	.07	--								
4. Caucasian race	-.13	-.16	.06	--							
5. Employment status	.40***	.12	.09	-.16	--						
6. Relationship status	-.12	-.16	.22*	.03	-.02	--					
7. Past PACT PA participation	.23*	.32**	.28*	-.14	-.01	-.15	--				
8. Current PACT PA participation	.14	.14	.08	-.12	.01	-.05	.34**	--			
9. Education level	.22*	.12	-.05	.03	.07	-.16	.05	.25*	--		
10. Current health problems	-.13	-.12	-.17	.13	-.18	-.30*	.10	.14	.07	--	
11. Age	-.23*	-.33**	-.21	.45**	-.05	-.15	.40**	-.09	-.04	.16	--
Mean	21.60	3.80	.72	.63	.48	.83	.90	.65	2.12	1.50	42.05
Standard Deviation	18.03	1.38	.45	.49	.50	.38	..30	48	.78	.48	14.52

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

Table 4.2

Correlations, Means, and Standard Deviations for Theoretical Variables Used in Final Regression Analysis

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Physical activity	--											
2. Stages of change	.51**	--										
3. Knowledge	-.17	-.12	--									
4. Self-efficacy	.31*	.37**	-.21	--								
5. Outcome expectations	.53**	.45**	-.07	.64**	--							
6. Barriers	-.24	-.25	.29*	-.25	-.09	--						
7. Subjective norms	-.09	.05	.38**	.24	.21	.37**	--					
8. Behavioral control	.09	-.09	.15	.07	.14	.39**	.22	--				
9. Behavioral intention	.17	.35**	-.11	.63**	.57**	-.08	.17	.07	--			
10. Health care climate	.06	.19	-.03	.58**	.56**	-.06	.31*	.08	.49**	--		
11. Internal motivation	.37**	.41**	-.07	.66**	.64**	-.50**	.15	.30	.54**	.45***	--	
12. Relatedness	.09	.05	.15	.28*	.48**	.05	.21	.03	.32*	.70**	.19	--
Mean	21.60	3.8	3.3	3.1	4.13	1.91	3.76	2.14	4.12	3.86	6.06	4.06
Standard Deviation	18.03	1.38	1.03	.62	.74	.57	1.12	.85	.92	.80	6.66	.78

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

(r = .51, p < .001), self-efficacy (r =.37, p <.01), outcome expectations (r = .45, p <.001), intention (r =.35, p <.01), and motivation quality (r =.40, p <.001).

Regression Analyses

With PA and SOC PA/exercise as the criterion variables, eight simultaneous regression analyses examined the effects of the following sets of predictor variables: (a) demographic covariates (i.e., current age, male gender, race (white vs. non-white), employment status, level of education, relationship status, group or individual assistance with PA from PACT staff, and current health problems; (b) SCT variables (i.e., knowledge, self-efficacy, outcome expectations, and barriers); (c) TpB variables (i.e., self-efficacy, outcome expectations [attitudes], subjective norms, perceived behavioral control, and intention); (d) SDT variables (i.e., autonomy support, self-efficacy, relatedness, and internal motivation). The results of the analyses, including standardized coefficients (β) for the predictor variables and the R^2 in each analysis, are presented in the tables provided in each of the following sections.

Demographic covariates. In this set of variables, physical activity level was significantly associated with employment status (r =.40, p <.001),education level (r =.22, p <.05), past PACT PA participation(r =.23, p <.05), and age (r =-.23, p <.05). The SOC PA/exercise outcome variable was not found to be significantly associated with any of the demographic covariates. A simultaneous regression analysis was conducted with the demographic covariates (i.e., current age, male gender, Caucasian race, employment status, level of education, relationship status, past PACT PA participation, current PACT PA participation, and current health problems) and each of the outcome variables. When using physical activity level as the outcome variable, this set of demographic covariates accounted for 29% of the variance in

physical activity level, $R = .54$, $R^2 = .289$, F (9, 50) = 2.26, p = ..05. Please see Table 4.3 for a full description of this simultaneous regression analysis. Upon examining the standardized partial regression coefficients, only employment status was found to significantly contribute to the variance in physical activity level scores after controlling for the effect of other variables in the model, with $\beta = .38$, t (59) = 3.05, $p < .01$. Education level, age, and past participation in PACT PA were not significant in the regression model as their effects were likely mediated by employment status. As employment status did remain a significant predictor of physical activity, it seems likely that those individuals who are employed are likely engaging in greater levels of physical activity that is directly related to their time spent at work.

When the primary outcome variable was SOC PA/exercise, the demographic covariates accounted for 22% of the variance in SOC PA/exercise, $R = .46$, $R^2 = .22$, F (9, 50) = 1.53, p = .xxx, n.s.. Please see Table 4.4 for a full description of this simultaneous regression analysis. No individual demographic covariate was found to account for a significant amount of the variance in SOC PA/exercise. This could imply that the demographic covariates utilized in this study are unrelated to whether or not an individual is contemplating participation in physical activity or exercise.

Social cognitive predictors. In this set of variables, physical activity level was significantly associated with self-efficacy ($r = .31$, $p < .01$), outcome expectations ($r = .53$, $p < .001$), and perceived barriers ($r = -.24$, $p < .05$). The SOC PA/exercise variable was found to be significantly associated with self-efficacy ($r = .37$, $p < .01$), outcome expectations ($r = .45$, $p < .001$), and barriers ($r = .25$, $p < .05$) as well. A simultaneous regression analysis was conducted with the set of variables related to SCT (i.e., knowledge, self-efficacy, outcome expectations, and perceived barriers) and each of the outcome variables. When physical activity level was the

Table 4.3

Demographic Covariate Predictors of Physical Activity (*N*=60)

Variable	R^2	*B*	*SE B*	β
Demographic Covariates	.29*			
Male gender		-3.64	5.28	-.09
Caucasian race		-2.36	5.25	-.064
Employment Status		13.55	4.44	.38**
Relationship Status		-5.12	6.46	-.12
Past PACT PA Participation		10.10	8.84	.17
Current PACT PA participation		1.96	5.01	.05
Education level		3.38	2.91	.15
Current Health Problems		-4.31	4.89	-.12
Age		-.23	.19	-.18

*$p < .05$; **$p < .01$; ***$p < .001$

Table 4.4

Demographic Covariate Predictors of SOC Physical Activity/Exercise (*N*=60)

Variable	R^2	*B*	*SE B*	β
Demographic Covariates	.22			
Male gender		-.10	.43	-.03
Caucasian race		.10	.42	.03
Employment status		.21	.36	.08
Relationship status		-.75	.52	-.21
Past PACT PA participation		.86	.71	.19
Current PACT PA participation		.15	.40	.05
Education level		.11	.23	.06
Current health problems		-.46	.39	-.16
Age		-.03	.02	-.27

*$p < .05$; **$p < .01$; ***$p < .001$

primary outcome variable, the set of SCT variables accounted for 34% of the variance in physical activity level scores, $R = .58$, $R^2 = .34$, F (4, 55) = 7.14, $p < .001$). Please see Table 4.5 for a full description of this simultaneous regression analysis. Outcome expectations were found to account for a significant amount of the variance in physical activity level scores after controlling for the effect of the other variables in the model, with $\beta = .61$, t (59) = 4.23, $p = .000$. Self-efficacy and barriers were not found to be significant in the regression model and may be mediated by outcome expectations.

When the primary outcome variable was SOC PA/exercise stages of change, the set of SCT variables accounted for accounted for 25% of the variance in PA/exercise stages of change, $R = .50$, $R^2 = .25$, F (4, 55) = 4.67, p = .xxx, n.s.. Please see Table 4.6 for a full description of this simultaneous regression analysis. In this analysis, an individual's outcome expectations was found to account for a significant amount of the variance in PA/exercise stages of change after controlling for the effect of the other variables in the model, with $\beta = .40$, t (59) = 2.61, $p = .05$. Self-efficacy and barriers were not found to be significant in the regression model and may be mediated by an individual's outcome expectations.

Self-determination predictors. In this set of variables, physical activity level was significantly associated with self-efficacy ($r = .31$, $p < .01$) and internal motivation ($r = .37$, $p < .01$). The PA/exercise stages of change variable was also found to be significantly associated with self-efficacy ($r = .37$, $p < .01$) and motivation quality ($r = .41$, $p < .001$). A simultaneous regression analysis was conducted with the set of variables related to SDT (i.e., health care climate, internal motivation, self-efficacy, and relatedness) and each of the outcome variables. When physical activity level was the primary outcome variable, the set of SDT variables

Table 4.5

Social Cognitive Predictors of Physical Activity (*N*=60)

Variable	R^2	*B*	*SE B*	β
SCT	.342***			
Knowledge		-1.773	2.02	-.10
Self-efficacy		-4.412	4.33	-.15
Outcome expectations		14.781	3.5	.61***
Barriers		-6.305	3.71	-.20

*$p < .05$; **$p < .01$; ***$p < .001$

Table 4.6

Social Cognitive Predictors of SOC Physical Activity/Exercise (*N*=60)

Variable	R^2	*B*	*SE B*	β
SCT	.254*			
Knowledge		-.04	.17	-.03
Self-efficacy		.14	.35	-.06
Outcome expectations		.74	.29	.40*
Barriers		-.47	.30	-.19

*$p < .05$; **$p < .01$; ***$p < .001$

accounted for 20% of the variance in physical activity level scores, $R = .45$, $R^2 = .320$, F (4, 55) = 3.48, $p < .05$). Please see Table 4.7 for a full description of this simultaneous regression analysis. Internal motivation was found to account for a significant amount of the variance in physical activity level scores after controlling for the effect of the other variables in the model, with $\beta = .34$, t (59) = 2.13, $p < .05$. Self-efficacy was not found to be significant in the regression model and may be mediated by internal motivation.

When the primary outcome variable was SOC PA/exercise, the set of SDT variables accounted for accounted for 19% of the variance in PA/exercise stages of change, $R = .43$, $R^2 = .19$, F (4, 55) = 3.17, $p < .05$). In this analysis, no individual variables were found to account for a significant amount of the variance in SOC PA/exercise after controlling for the effect of the other variables in the model. It is possible that internal motivation and self-efficacy both mediated each other's effect on SOC PA/exercise. Please see Table 4.8 for a full description of this simultaneous regression analysis.

Theory of planned behavior predictors. In this set of variables, physical activity level was significantly associated with self-efficacy ($r = .31$, $p < .01$) and outcome expectations ($r = .53$, $p < .001$). The SOC PA/exercise variable was found to be significantly associated with self-efficacy ($r = .37$, $p < .01$), outcome expectations ($r = .45$, $p < .001$), and intention ($r = .35$, $p < .01$) as well. A simultaneous regression analysis was conducted with the set of variables related to TpB (i.e., self-efficacy, outcome expectations [attitudes], subjective norms, perceived behavioral control, and intention) and each of the outcome variables. When physical activity level was the primary outcome variable, the set of TpB variables accounted for 36% of the variance in physical activity level scores, $R = .60$, $R^2 = .36$, F (5, 54) = 5.94, $p < .001$). Please see

Table 4.7

Self-Determination Predictors of Physical Activity (*N*=60)

Variable	R^2	*B*	*SE B*	β
SDT	.202*			
Health care climate		-9.32	4.70	-.41
Internal motivation		.93	.44	.34*
Self-efficacy		7.45	5.21	.26
Relatedness		5.61	4.03	. 24

*$p < .05$; **$p < .01$; ***$p < .001$

Table 4.8

Self Determination Predictors of SOC Physical Activity/Exercise (*N*=60)

Variable	R^2	*B*	*SE B*	β
SDT	.187*			
Health care climate		-.06	.40	-.03
Internal motivation		.06	.03	.30
Self-efficacy		.50	.40	.20
Relatedness		-.07	.31	-.04

*$p < .05$; **$p < .01$; ***$p < .001$

Table 4.9 for a full description of this simultaneous regression analysis. Outcome expectations (attitudes) were found to account for a significant amount of the variance in physical activity level scores after controlling for the effect of the other variables in the model, with $\beta = .64$, t (59) = 4.29, $p < .001$. Self-efficacy and intention were not found to be significant in the regression model and may be mediated by outcome expectations.

When the primary outcome variable was SOC PA/exercise, the set of TpB variables accounted for accounted for 25% of the variance in PA/exercise stages of change, $R = .50$, $R^2 = .18$, F (5, 54) = 3.54. Please see Table 4.10 for a full description of this simultaneous regression analysis. In this analysis, an individual's outcome expectations was found to account for a significant amount of the variance in SOC PA/exercise after controlling for the effect of the other variables in the model, with $\beta = .37$, t (59) = 2.27, $p < .05$. Self-efficacy and intention were not found to be significant in the regression model and may be mediated by outcome expectations.

Model Comparison

Each of the health behavior models utilized in this study accounted for a significant amount of the variance in regard to whether individuals with SPMI are currently participating in physical activity, and also where they are in regard to making PA and exercise –related behavior change. The results of each of the preceding simultaneous regression analyses are provided in Tables 4.11 and 4.12 to allow for an easy comparison of the predictive ability of each of the health behavior models.

Secondary Analysis

Based on the strength of the association between outcome expectations and physical activity in the set of SCT and TpB variables, a secondary analysis was conducted in order to gain an understanding regarding what types of malleable factors that might predict outcome

Table 4.9

Theory of Planned Behavior Predictors of Physical Activity (*N*=60)

Variable	R^2	*B*	*SE B*	β
TpB	.355***			
Self-efficacy		2.21	4.59	.08
Outcome expectations		15.6	3.64	.64**
Subjective norms		-3.61	1.85	-.23
Behavioral control		1.28	2.38	-.06
Behavioral intention		-4.02	2.85	-.21

*$p < .05$; **$p < .01$; ***$p < .001$

Table 4.10

Theory of Planned Behavior Predictors of SOC Physical Activity/Exercise (*N*=60)

Variable	R^2	*B*	*SE B*	β
TpB	.247**			
Self-efficacy		.19	.38	.09
Outcome expectations		.69	.30	.37*
Subjective norms		-.05	.15	-.04
Behavioral control		-.23	.20	-.14
Behavioral intention		.16	.24	.11

*$p < .05$; **$p < .01$; ***$p < .001$.

Table 4.11

Beta and R^2 Comparison Table (Physical Activity Level)

β/ R^2	SCT	SDT	TpB
1. Knowledge	-.10		
2. Self-efficacy	-.15	.26	.08
3. Outcome expectations	.61**		.64**
4. Barriers	-.20		
5. Health care climate		-.41	
6. Internal motivation		.34*	
7. Relatedness		.24	
8. Subjective norms			-.23
9. Behavioral control			-.06
10. Behavioral intention			-.21
R^2	.34***	.20*	.36***

*p < .05; **p < .01; ***p < .001

Table 4.12

Beta and R^2 Comparison Table (Stages of Change)

β/ R^2	SCT	SDT	TpB
1. Knowledge	-.03		
2. Self-efficacy	-.06	.20	.09
3. Outcome expectations	.40*		.37*
4. Barriers	-.19		
5. Health care climate		-.03	
6. Internal motivation		.30	
7. Relatedness		-.04	
8. Subjective norms			-.04
9. Behavioral control			-.14
10. Behavioral intention			.11
R^2	.254**	.187*	.247**

*$p < .05$; **$p < .01$; ***$p < .001$

expectations in order to conceptualize interventions for individuals with SPMI. The variables associated with SDT were selected based on their strong foundational association with motivation and their existing relationship with outcome expectations, as well as the SDT variable's potential for being modifiable. For this secondary analysis, a hierarchical regression analysis (HRA) containing two sets of SDT variables was utilized, with the first set containing one environmental variable (health care climate), and the second set containing personal variables related to internal motivation, self-efficacy, and relatedness. The correlation matrix for all variables is presented in Table 4.13.The correlations among the dependent variable and predictor variables ranged from medium to strong. Pearson product-moment correlation coefficients in the .40s to the .60s were found between outcome expectations and health care climate (r =.56, p <.001), internal motivation (r =.64, p <.001), self-efficacy (r =.64, p <.001), and relatedness (r =.48, p <.001).

In the first step of the regression analysis, health care climate was entered. This variable accounted for a significant amount of variance in outcome expectation score, When the first block of the HRA was entered, R = .56, R^2 = .31, F (1, 58) = 25.76, p < .001. Examining the standardized partial regression coefficients, health care climate was found to significantly contribute to variance in outcome expectancy scores, with β = .56, t (59) = 5.08, p < 0.001. Following the initial set, a second block containing internal motivation, self-efficacy, and relatedness was entered. These variables accounted for a significant amount of variance in outcome expectancy scores beyond that explained by the healthcare climate variable entered in the first step: R = .77, R^2 = .59, ΔR^2 = .28, F (4, 55) = 19.58, p < .001). An examination of the standardized partial regression coefficients revealed that healthcare climate was no longer significant after controlling for the effect of internal motivation, competency, and relatedness,

Table 4.13

Correlations, Means, and Standard Deviations for Variables Used in Secondary Regression Analysis

Variable	1	2	3	4	5
1. Outcome expectations	--				
2. Health care climate	.56***	--			
3. Internal motivation	.64***	.45***	--		
4. Self-efficacy	.64***	.59***	.66***	--	
5. Relatedness	.48***	.70***	.19	.28*	--
Mean	4.13	3.86	6.06	3.1	4.06
Standard Deviation	.74	.80	6.66	.62	.78

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

β = -.05, t (59) = -.33, p = .74, *n.s*. Internal motivation contributed significantly to explaining variance in outcome expectancy, β = .39, t (59) = 3.36, $p < .001$, indicating that increased internal motivation for physical activity/exercise was associated with greater outcome expectancy for physical activity/exercise. Similarly, competency (β = .31, t (59) = 2.43, $p < .05$) and relatedness (β = .35, t (59) = 2.80, $p < .01$) also contribute significantly to explaining variance in outcome expectancy. Please see Table 4.14 for a full description of this analysis including values of change in R^2 (ΔR^2), along with unstandardized regression coefficients (B), standard errors (*SE B*), and standardized coefficients (β) for the predictor variables at each step and in the final model.

Mediator Analysis

Following the regression analyses, the variable representing outcome expectations (attitudes) appeared to be a mediator of the relationship between self-efficacy (competency and behavioral control) and physical activity. A mediator analysis was conducted to test this hypothesis. Guidelines provided by Frazier, Tix, and Baron (2004), Baron and Kenny (1986), and Preacher and Hayes (2004) were followed for conducting the mediator analysis. The process involves a three-step approach:

1. Regressing the mediator onto the independent variable (IV) in order to show that it is possible that the two variables may be causally linked.
2. Regressing the dependent variable (DV) onto the IV to show that this causal relationship may also possible.
3. Regressing the DV simultaneously onto the IV and the mediator in order to show that the mediator is significantly related to the DV, even when the IV is statistically controlled.

Table 4.14

Hierarchical Regression Analysis for Evaluating Relationship Between Outcome Expectations and SDT Variables

Variable	R^2	ΔR^2	At Entry Into Model			Final Model		
			B	*SE B*	β	*B*	*SE B*	β
Step 1	.31***							
Health care climate			.51	.10	.56***	-.05	.14	-.05
Step 2	.59*	.28*						
Internal motivation			.04	.01	.39***	.04	.01	.39***
Self-efficacy			.37	.15	.31	.37	.15	.31
Relatedness			.33	.12	.35**	.33	.12	.35**

Note: $F(4,55)=19.58$, $p < .001$ for the full model; $F(1,58)=25.76$, $p<.001$ for step 1; $F(3,55)=12.43$, $p < .001$ for step 2.
*$p < .05$; **$p < .01$; ***$p < .001$

As Figure 4 illustrates, the standardized regression coefficient between PA self-efficacy and PA outcome expectancy was statistically significant, as was the standardized regression coefficient between PA outcome expectancy and PA. The standardized indirect effect (ab) was (.64)(.57) = .36. We tested the significance of this indirect effect using bootstrapping procedures. Unstandardized indirect effects were computed for each of 10,000 bootstrapped samples, and the 95% confidence interval was computed by determining the indirect effects at the 2.5th and 97.5th percentiles. The bootstrapped unstandardized indirect effect was .36, and the 95% confidence interval ranged from .14 to .65. Thus, the indirect effect was statistically significant, supporting the observation that PA outcome expectancy is a mediator for the relationship between PA self-efficacy and PA.

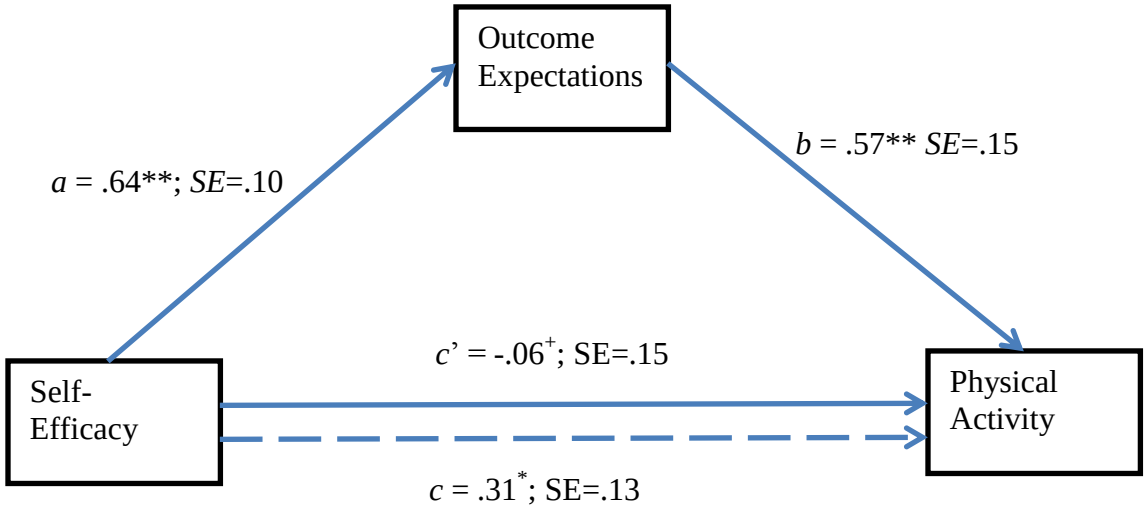

Figure 4. *Path coefficients for simple mediation analysis on physical activity (N = 60). Note: Dotted line denotes the effect of self-efficacy on PA when outcome expectancy is not included as a mediator. a, b, c and c' are standardized ordinary least squares (OLS) regression coefficient. *p < .05,**p < .01, + p = .69.*

CHAPTER FIVE

Summary, Discussion, And Implications

The primary goal of this study was to evaluate the ability of popular health-behavior theories to predict PA participation and PA and exercise-related stages of change (SOC PA/exercise) for individuals living with a SPMI. The following sections will provide a brief overview of the purposes and procedures of the current study, a summary and discussion of the study's findings, the limitations of this study, clinical implications, and implications for future research.

The physical health problems experienced by those individuals living with a severe and persistent mental illness (SPMI) have limited the opportunities available to this population (Lynch & Chiu, 2009), while also placing a heavy burden on society (Wu et al., 2005). Rates of secondary health conditions are highly prevalent within this group (Gill et al., 2009), and intervening is quite complicated due a number of lifestyle and contextual factors (e.g., Soundy, Stubbs, Probst, & Hemmings, 2014). In order to reduce the high incidence rates of physical health problems within this group, many clinicians have chosen to implement interventions that encourage higher levels of physical activity (PA) within this population. Past research has shown that interventions focused on increasing this group's participation in PA can be effective, offering opportunities for improved physical health and psychological functioning (Gorczynski & Faulkner, 2009). However, one of the great barriers to the overall successes of these interventions is the lack of motivation by individuals with SPMI to participate (e.g., Archie et al., 2003). The existing literature has called for further research aimed at exploring the types of factors that could increase the motivation of people with SPMI to engage in PA interventions in

order to enhance the outcomes that such interventions may facilitate (e.g., Beebe et al., 2012; Green et al., 2012; Medalia & Brekke, 2010; Vancampfort et al. 2015; Vancampfort et al., 2013).

Social-cognitive theory (SCT), self-determination theory (SDT), and the theory of planned behavior (TpB) were selected based on the substantial research supporting their applicability to the health-related decision making of other groups of individuals with disabilities, as well as the general population. Individuals living with SPMI completed questionnaires related to their personal background, their feelings about physical activity, and their current physical activity level, providing insight into factors related to how members of this group become motivated to be physically active. Eight simultaneous regression analyses were conducted in order to evaluate the relationships between various demographic covariates, theoretical variables, and PA level and SOC PA/exercise. Based on this study's initial findings, a secondary analysis was also conducted in order to identify the ability of SDT variables to predict strong individual outcome expectations.

Summary of Study Findings

The preliminary analyses provided support for the reliability of each of the measures used in operationalizing the constructs of interest in this study. The internal consistency estimates obtained for each measure yielded good or excellent coefficients in nearly every instance, with a range of .72 to .91. Internal consistency estimate was not computed for the Relative Autonomy Index (RAI) of the *Behavioural Regulations for Exercise Questionnaire 2* (BREQ-2) due to the nature of the scoring procedures. . However, the Cronbach's alpha for the five individual subscales of the BREQ-2 showed acceptable internal consistency reliability, ranging from .65 to .85. Internal consistency estimates were also unable to be computed for the outcome measure of PA level, the *Physical Activity Scale for Individuals with Physical Disabilities* (PASIPD),

because it is not a rating instrument and test-retest reliability is thought to be more appropriate for such an instrument. Previous research utilizing the PASIPD has reported test-retest reliability estimates between .65 and .77, however (Bezyak et al., 2011; van der Ploeg, 2007).

The first and second research questions hypothesized that the demographic variables selected for this study would likely have a predictive relationship with individual PA level and SOC PA/exercise. In the correlational analysis, employment status, educational attainment, past PACT pa participation, and age were found to be significantly associated with PA level, however, none of the demographic variables were found to have a significant association with SOC PA/exercise. Once the demographic variables were entered into the regression model predicting PA level, the set of demographic variables was found to be a significant predictor of PA, although only employment status accounted for a significant amount of the variance. The set of demographic variables was not found to be a significant predictor of SOC PA/exercise.

The third and fourth research questions hypothesized that associations would be found between the SCT variables and the two criterion variables. In these analyses, the variables associated with SCT were found to account for a significant amount of the variance associated with PA levels and SOC PA/exercise. Following the correlational analysis, it was shown that both self-efficacy and outcome expectations were significantly associated with each criterion variable. As would be expected, perceived barriers had a negative relationship with both criterion variables, although these associations were not significant. Interestingly, knowledge had a negative relationship with both PA level and SOC PA/exercise. Following the regression analyses, the results indicated that individual outcome expectations had mediated the predictive ability of the other variables in each analysis. While the set of SCT variables had accounted for a

significant amount of the variance in PA level and SOC PA/exercise, the only significant predictor of the criterion variables following the regression analyses was outcome expectations.

The fifth and sixth research questions hypothesized that the variables related to the SDT constructs would also account for a significant amount of the variance in PA and SOC PA/exercise. The hypotheses were supported by the results in both cases. However, the correlation analysis identified only internal motivation and self-efficacy [competence] as significant predictors of the criterion variables. In the subsequent regression analyses, the effects of self-efficacy were mediated by internal motivation in the first analysis (PA level), and in the second analysis, each variable appeared to mediate the effects of the other predictors on SOC PA/exercise.

The seventh and eighth research questions hypothesized that the variables related to the TpB constructs would be predictive of each of the criterion variables. Each regression analysis did provide support for the research hypotheses. In the correlational analysis, the only variable unique to the TpB set of variables that was found to have some predictive ability was intention, which had a significant association with SOC PA/exercise. However, following the regression analyses, the results indicated that outcome expectations [attitudes] was mediating the relationship between intention and SOC PA/exercise, and again (as in the 3rd and 4th research questions), outcome expectations had mediated the relationship between self-efficacy [perceived behavioral control] and the criterion variables as well.

The results of the eight primary analyses suggested that outcome expectations might be the most prominent predictor of PA and SOC PA/exercise for individuals living with SPMI. However, while understanding that outcome expectations are associated with PA and SOC is useful information, as an individual construct it is limited in its ability to help conceptualize

interventions for individuals living with SPMI. In order to identify factors that might predict positive outcome expectations, a secondary analysis consisting of a hierarchical regression analysis (HRA) was conducted. SDT constructs were selected as predictor variables in the secondary analysis as SDT has the strongest foundational base on motivation, it incorporates modifiable variables, and a substantial amount of research has shown that SDT constructs are related to PA participation. A HRA was appropriate for this analysis, as it would allow for a multi-step procedure that could control for the impact of autonomy support, which is a precursor to the SDT concepts of autonomy, competence, and relatedness. When the first block was entered into the analysis, autonomy support was found to account for a significant amount of the variance in outcome expectations (31%). However, once internal motivation, self-efficacy, and relatedness were entered as the second block of variables, the model accounted for approximately 59% of the variance in outcome expectations, with internal motivation and relatedness accounting for a significant amount of the variance.

Discussion

This is the first study to concurrently evaluate the ability of SCT, SDT, and the TpB to predict PA participation and SOC PA/exercise for individuals living with a SPMI. The primary analyses, which used PA and SOC PA/exercise as the criterion variables, and the secondary analysis, which used outcome expectations, did provide some support for the utility of SCT, SDT, and TpB constructs as predictors of PA and SOC PA/exercise for individuals living with a SPMI. However, the degree to which the theoretical constructs served as predictors may not be consistent with the tenets of the original theories and while the health behavior theory regression models did account for a significant amount of variance in each analysis, the study results do indicate that individual constructs were accounting for an unexpected amount of that variance.

It was suspected that various demographic variables would likely be associated with higher levels of PA and SOC PA/exercise within this population. It was not surprising that employment status was associated with higher levels of PA, as in most cases, individuals who are employed are more likely to be active on a day-to-day basis (van Domelen, et al., 2011). The regression analysis with PA level as the outcome variable was significant, although employment status was the only variable accounting for a level did account for a significant amount of the variance in PA participation. No demographic variables were found to be significant predictors of SOC PA/exercise, and as would be expected, the subsequent regression analysis did not show that the set of demographic variables was a significant predictor of SOC PA/exercise either.

The results of this study supported the utility of SCT as a predictor of PA for individuals living with SPMI. However, in evaluating the predictive ability of SCT for PA level and SOC PA/exercise, the results indicated that outcome expectations were the only significant predictor, mediating the effects of self-efficacy in both instances. This implies that for people with SPMI, self-efficacy alone may not predictive of action; an individual may have confidence in their ability to engage in a behavior, but if they don't expect that behavior to result in desirable outcomes, the person has little incentive for engaging in that behavior. This is consistent with Bandura's 2004 description of SCT, and provides good support for the utility of this model for individuals with SPMI. Also consistent with the tenets of the SCT model was the inverse relationship between barriers, and PA level and SOC PA/exercise. As expected, individuals who perceive more barriers to PA are less likely to attempt to engage in the behavior. The presence of barriers and impediments did not serve as significant predictors of PA level or SOC PA/exercise, however, the inverse relationship between these predictors and the outcome variables did provide support for the SCT model. Interestingly, the variable representing the

knowledge construct also had an inverse relationship with both self-efficacy and outcome expectations, and it was not predictive of PA or SOC PA/exercise. According to SCT, knowledge about one's susceptibility to severe health conditions is a precursor to the instance when an individual contemplates their own self-efficacy. The results of this study may indicate that individuals who perceive greater susceptibility to severe health conditions are already experiencing severe health conditions, and in turn, are less likely or able to have confidence in their ability to engage in PA. Regardless, there were no significant associations found between the knowledge variable, and the SCT and outcome variables.

SDT is one of the most empirically supported health behavior motivational theories in existence (e.g., Ng et al., 2012), and also one of the few models that has been applied to the PA-related decision making of individuals living with SPMI. As expected, the results of this study provided support for the predictive ability of the SDT model for PA level and SOC PA/exercise in individuals with SPMI. According to SDT, autonomy support is a key determinant of whether an individual will experience a sense of internal motivation [autonomy], self-efficacy [competence], and relatedness. As would be expected, the correlation analysis showed significant associations between autonomy support and each of the other expected constructs, providing support for the importance of a supportive health care environment. Autonomy support was not directly associated with PA level or SOC PA/exercise, although internal motivation and self-efficacy were found to have a relationship with the outcome variables, perhaps providing support for the idea that self-efficacy and internal motivation are mediating the relationship between autonomy support and behavior. Following the regression analyses, internal motivation was the only predictor variable that accounted for a significant portion of the variance in PA level. It was unexpected that the variable representing autonomy support had a negative correlation with PA

level that was nearing significance. It was suspected that relatedness variable may be having a suppressor effect on autonomy support. Interestingly, the predictive ability of internal motivation in the current study is very consistent with previous research on the influence of self-determined motivation for individuals with SPMI. Vancampfort and colleagues (2013) conducted a study with 129 individuals with schizophrenia and found significant positive correlations between PA level and autonomous regulation (r =.57, <.001), and significant inverse relationships between PA level and amotivation (r= -.44, p<.001), and external regulation (r= -.28, p<.001). Sorensen (2006) also reported on the relationship between motivation quality and the prediction of PA for individuals with SPMI, providing similar findings to the Vancampfort et al. (2013) study. The results of the current study (r=.37, p<.01) corroborate well with the findings from the previous research, and suggest that one's perception of internal motivation may be a primary determinant of whether an individual with SPMI chooses to engage, or to not engage in PA.

A great deal of research has supported the theoretical underpinnings of the TpB, which suggest that the proximal predictor of a behavior is one's intention to engage in that behavior (Downs & Hausenblaus, 2005). Following the correlational analysis, intentions were found to be significantly associated with SOC PA/exercise, self-efficacy [perceived behavioral control], and outcome expectations [attitudes]. Following the regression analyses, intention was not found to be a significant predictor of PA level or SOC PA/exercise, however, and actually had an inverse relationship with PA level. This was unexpected, as behavior is thought to be the immediate antecedent of intention. The correlational analysis did show that intention was significantly associated with each of the SDT constructs, however, which is consistent with previous research that has suggested that SDT variables can be predictive of TpB constructs (Hagger & Chatzisarantis, 2009). However, in these two TpB regression analyses, outcome expectations

served as the only predictor of PA level and SOC PA/exercise. This finding was consistent with the first two analyses involving the SCT set of variables; the analyses utilizing the variables related to TpB found support for the importance of outcome expectations [attitudes], and also found that outcome expectations appeared to mediate the influence of self-efficacy. Despite the unexpected relationship between intention and behavior, the variance accounted for by the TpB variables was consistent with findings from past research, in that the TpB constructs were found to be significantly associated with health behavior, accounting for anywhere from 19-36% of the variance (Rich et al, 2015). In the current study, the TpB constructs were found to account for nearly 36% of the variance in PA, and 25% of the variance in SOC PA/exercise.

Consistent with Hagger and Chatzisarantis (2009), the secondary analysis provided evidence in support of the ability of the SDT constructs to predict outcome expectations [attitudes]. The relationship between internal motivation and outcome expectations is sufficient to warrant their consideration as integral pieces of the motivational processes that may serve as predictors of PA and SOC PA/exercise for individuals living with SPMI. Hagger and Chatzisarantis (2009) conducted a meta-analysis of 36 previous studies that had integrated the TpB and SDT in health contexts. Following a path analysis, their study found evidence suggesting that the SDT variables may serve as predictors of intention, but are mediated by the strength of one's attitudes, subjective norms, and perception of perceived behavioral control (PBC) in terms of predicting intention.

As predictor sets, the SCT variables and the TpB set accounted for more of the variance, regardless of the criterion variable. However, this was primarily due to the outcome expectations [attitudes] variable. Furthermore, the fact that only one variable was accounting for a significant amount of the variance in each predictor set, suggests that the each model individual was limited

in its ability to identify the factors predicting behavior. It seems very likely that if a variable representing outcome expectations/attitudes was added to the set of SDT variables, that set of variables would account for greatest amount of variance between each of the predictor sets utilized in this study.

Limitations

There are a number of limitations in this study that should be considered when interpreting the results. In regard to the population sample, study participants were limited to the Madison, Wisconsin geographical area, and are currently receiving intensive psychiatric services from a community mental health program. Furthermore, this treatment program also provides a number of PA-related interventions on a regular basis, which may not be commonplace amongst the greater community of service providers working with this population. This study is unable to take into account the unique life circumstances that many individuals with SPMI may be experiencing, however, it seems likely that the promotion of self-determined motivation will be useful in a variety of settings, and with a variety of individuals from different backgrounds. Concerns about selection bias should also be noted. Less than half of the PACT client pool agreed to participate in this study. The individuals who did not express interest in participation, and those individuals who picked up questionnaires but did not complete them, may be more susceptible to increased symptomology, amotivation, or lower levels of PA than the population of individuals who did participate in the study. Finally, it may have been beneficial to obtain more information about each individual's specific diagnosis and age of onset, although, Dr. Frey was able to provide current statistics describing the diagnostic breakdown of PACT's clients. As the eligibility criteria for PACT services requires a diagnosis of a SPMI, it seems reasonable to

assume that each of the individuals who participated in this study are living with a severe mental illness that is impacting their ability to fully function in the community.

Secondly, while a number of self-report quantitative measures have been used in studies with people with SPMI in the past, some limitations have been noted. Atkinson, Zibin, and Chuang (1997) suggested that responses to self-report surveys by persons with SPMI may be influenced by affective bias, poor insight, and recent life events; therefore, results can be vulnerable to measurement error or inaccuracy. Bezyak et al.'s 2012 study supports this concern, as the PA levels reported by individuals with SPMI in that study were significantly different when compared with reports of their PA levels provided those individual's psychiatric case managers. There have been conflicting studies, however. Faulkner et al. (2006) conducted a study in which the PA levels provided by individuals with SPMI on self-report measures were significantly correlated with their minutes of activity as measured by accelerometers. Faulkner et al. also found that self-reports of vigorous activity and walking showed good reliability over a re-test period of one week.

Past research has also recognized additional measurement-related issues within studies that have focused on health-related topics such as exercise and PA. Polit, Beck, & Hungler (2012) reported that research on health-related topics may be susceptible to socially desirable participant responses, as well as recall bias. Some individuals may not want to admit that they don't think exercise and physical activity are important, or that they are not overly concerned about their health. Secondly, it may be difficult to accurately measure some constructs in a cross-sectional research design. For example, behavioral intention is a construct that may be better evaluated in a longitudinal study due to the nature of the construct. While an individual may have strong intentions to begin participating in a behavior, they may not have begun doing

so. This may have been a reason for the limited ability of behavioral intention to predict PA that was found in the current study. Additionally, the broad range of tasks defined as PA in the current study may have limited individual participant's perceived efficacy , as opposed to how they may have perceived their efficacy for more specific PA-related tasks.

It should also be noted that the results of this study might have been influenced by the use of some measurement instruments that were modified, shortened, or not well validated. While this is a concern, the Chronbach's alpha that was calculated for the majority of the measurement instruments in this study was sufficient, and does provide some evidence of the validity of the instrumentation. Furthermore, in the majority of the cases, the modifications that were made to the measurement instruments were quite minor. Regardless, the potential for measurement error, particularly with the instruments representing the criterion variables, should be acknowledged. An additional concern is that there was likely some redundancy amongst the measurement instruments. The crossover between health promotion constructs has been well recognized.

Finally, a primary concern was the limited sample size that was drawn for this study. The power analysis recommended 90 participants for a regression analysis with seven predictors. However, recruiting participants proved to be a challenge, and the lower than recommended sample size (n=60) is likely to have had some impact on the results.

Clinical Implications

The implementation of PA opportunities within community mental health settings holds promise as a cost-effective intervention strategy that may facilitate a number of positive physical and psychological health benefits for mental health service consumers. Community mental health (CMH) programs have a unique opportunity to implement meaningful individual and group interventions due to the untraditional counselor/client relationship in these settings, as well as the

opportunities for capitalizing on the "community" aspects of CMH programs in order to provide interventions that will benefit from social engagement and peer support. As one of the few existing studies focusing on factors that motivate individuals with SPMI to be physically active, the current study has a number of implications for how such interventions may be successfully offered in clinical settings.

Based on the findings in the current study, as well as outcomes described in past research, evidence seems to support the importance of self-determined motivation and positive outcome expectations when predicting whether individuals with a SPMI will choose to participate in PA. Clinicians attempting to encourage individuals with SPMI to be more physically active should engage in practices aimed at facilitating a positive sense of these psychological constructs within their consumers. The current study provided support for the prediction of outcome expectations by the SDT variables. The constructs associated with SDT are modifiable, and therefore, factors that may respond to clinical interventions. In order to assist individuals with developing positive outcome expectations, it would be beneficial if clinicians focus on practices which will foster the development of the basic needs of SDT such as: (a) establishing a sense of autonomy support by providing a treatment atmosphere that encourages individuals to engage in health behaviors for their own reasons, conveys feelings of acceptance and respect, and facilitates success in assisting individuals with dealing with barriers to change (Ng et al., 2012); (b) providing individuals with options that allow them to determine both *when* and *how* they would like to engage in health behavior (e.g., providing a variety of PA groups or other PA opportunities) in order to foster the development of internal motivation and autonomous decision-making, as described in How, Whipp, Dimmock, and Jackson (2013); (c) assisting individuals with developing exercise-related self-efficacy through the provision of information, skills training, and experience; and (d)

creating a sense of relatedness through actions (e.g., clinicians facilitating a PA opportunity, peer support in a group setting) that let individuals know they are respected, understood, and cared for by others. Past research has described how peer support may be useful to encourage health behavior (e.g., Simoni, Franks, Lehavot, & Yard, 2011), and approaches for implementing such practices should be considered when attempting to encourage individuals with SPMI to be physically active. Peer support within PA interventions may provide opportunities for modeling (which in turn may improve outcome expectations), and also opportunities for socialization, which in itself may lead to increased PA behavior. In addition, consumer nominated strategies for engaging and maintaining PA behaviors can be initiated from the peers through peer support groups.

While it is important for clinicians to understand the importance of self-determined and internal motivation in order for interventions to be successful and for true behavior change to occur, in some cases, it may be beneficial to encourage initial participation in PA through the use of rewards and incentives. Traditionally, many CMH programs have utilized rewards and incentives in order to encourage individuals with SPMI to engage in treatments (e.g., Highton-Williamson, Barnicot, Kareem, & Priebe, 2015). While some previous research has suggested that rewards and incentives are unlikely to lead to permanent behavior change, they may at the very least be useful in order to foster an initial interest in PA participation. Tidey (2012) reviewed a number of studies evaluating the use of contingency management programs in order to encourage health-behavior participation amongst individuals living with SPMI. Strong evidence was provided, suggesting that incentives may be useful for encouraging individuals to engage in different behaviors (e.g., refraining from substance use). The study called for further research investigating the use of incentives to encourage other behaviors such as PA. While the

results of this study clearly indicated that incentives were shown to lead to temporary behavior change, per the tenets of SDT, research should consider how incentives might influence the longer term adoption and internalization of motivation for health behaviors. According to Ryan et al. (2008), it is imperative that that individuals come to self-regulate and sustain behaviors on their own, through developing a sense of autonomy and competence, which are critical to the processes of internalization and integration.

Based on the findings of the current study and the information from past research, an additional recommendation for clinical settings may be appropriate. For a variety of reasons, structured PA sessions or groups may not be preferable to all individuals living with a SPMI. As stated above, the tenets of STD state that individuals must be able to determine the "when" and "how" of their PA behavior. In some cases, it may be beneficial for clinicians to focus on activities that offer opportunities for greater lifestyle PA participation. For example, while an individual may not be motivated to participate in a biking group, they may be far more interested in part-time employment (which was a significant demographic predictor of PA in the current study). Clinicians can and should be creative in devising interventions that are catered to the individual needs and interests of the individual, even if PA is not that person's primary reason for engaging in that particular behavior.

Implications for Future Research

The current study also has a number of implications for future research. The present findings provide some evidence for the use of SCT, SDT, and the TpB as models of physical activity-related decision making for individuals with SPMI, although the utility of these models as a whole was limited, due to the strength of individual constructs which accounted for a great

deal of the variance in PA and SOC PA/exercise. The secondary analysis suggested stronger relationships may exist with constructs across the models, and a more integrated use of these models may prove to account for a greater amount of the variance in PA level and SOC PA/exercise.

Future health behavior research on individuals with SPMI should focus on the relationships between the existing models in order to get a greater of sense of how individuals with SPMI truly choose to engage in PA. According to Hagger and Chatzisarantis (2009), self-determined motives are hypothesized to be a distal predictor of attitudes and perceived behavioral control (PBC). In turn, attitudes and PBC are thought to be the proximal predictors of intentions to engage in future health-related behavior. These relationships should continue to be explored. Figure 5.1 provides a graphical representation of a possible model that is similar to the integrated model proposed by Hagger & Chatzisarantis (2009).

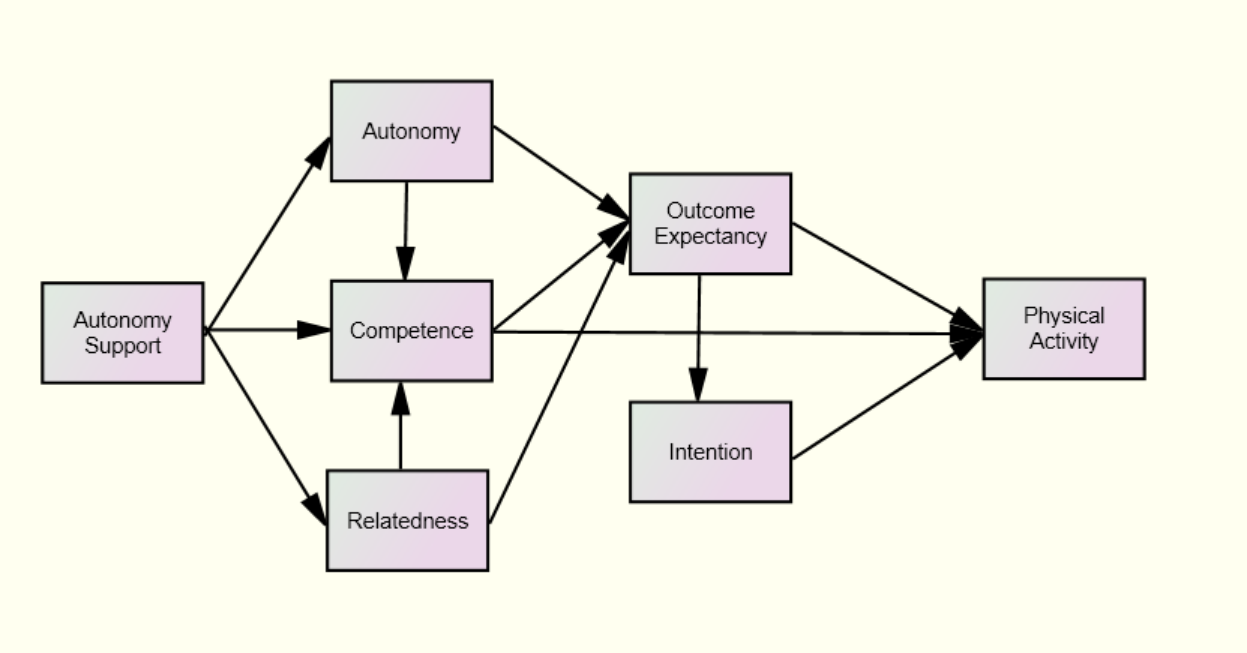

Figure 5. *An expanded and refined SDT model of lifestyle physical activity for people with SPMI*

This model provides a possible representation of the findings of the current study, in which autonomy support influences the quality of the key SDT determinants. Following the satisfaction of these needs, an individual is likely to develop a sense of positive outcome expectations for exercise**,** perhaps leading to PA, or first being mediated by intention. While the findings from the current study provide some support for this model, this model should be tested more rigorously in future research in order to truly understand the relationships between the different constructs.

In future research, the findings of the current study should be applied in the investigation of other health-promoting behaviors for people with SPMI. They can also be explored as predictive models for PA or other health-promoting behaviors for other disabilities group as well. While the associations between the theoretical constructs and PA participation were found to be significant, it would be beneficial if this research was also substantiated by additional research with other populations of individuals with SPMI, particularly groups that have differing demographic backgrounds (e.g., geographic location, treatment providers). The fact that this study was limited not only to the Madison, WI geographic area, but also the fact that PACT regularly provides PA opportunities for its consumers, could certainly limit the generalizability of the current study's findings to the greater population of people living with SPMI. Furthermore, due to the current study's low population sample size, it would be beneficial if the current study's procedures could be duplicated with a greater number of individuals in order to provide stronger support for the present findings.

In the future, qualitative research may also prove to be beneficial for expanding on the current findings. Individuals with SPMI may have an easier time expressing their true thoughts and feelings verbally, as opposed to using a self-report questionnaire that may be somewhat confusing for them. Furthermore, focus groups or one-on-one interviews may provide an

opportunity to gain information about additional factors that influence the PA-related decision making of this population.

It would also be beneficial if future research could explore options for integrating the meaningful findings from the current study into research consisting of randomized controlled trials in clinical settings. In doing so, a greater foundation of information describing exactly how the current study's findings can be successfully implemented, but also how well the clinical implications from the present study may actually lead to greater PA behavior for this population. The findings of the current study are limited in that they can only make suggestions for how individuals will choose to engage in such activities. Until these findings are actually implemented and individuals with SPMI are engaging in greater levels of PA, the true utility of this information will remain unknown.

Finally, it may also be useful to explore how the constructs that were researched in the current study could be predictive of PA level and SOC PA/exercise when other types of outcome measures are used. For example, past research on PA in the lives of individuals with SPMI has utilized technology such as accelerometers, and pedometers to gauge an individual's level of PA participation. Recent research (e.g., Wang, 2015) has utilized more modern technologies such as Fitbits that may provide even more accurate and valuable information due to the broad areas of PA that they are designed to track.

Conclusion

Overall, the findings from the present study provide good support for the utility of some aspects of the SCT, SDT, and TpB for predicting PA level and SOC PA/exercise for individuals living with a SPMI. Outcome expectations [attitudes] were shown to be the proximal predictor of individual PA level and SOC PA/exercise. As evidenced in the secondary analysis, the SDT

theoretical constructs are predictive of outcome expectations, and suggest that autonomy supportive environments may strengthen the likelihood of outcome expectations by satisfying an individual's need for autonomy, competence, and relatedness. Future research should evaluate the applicability of these findings in studies involving greater numbers of individuals with SPMI Furthermore, future research should also evaluate the validity of the current in clinical settings through research involving the use of randomized controlled trials in order to evaluate how this research may truly be applicable to the PA-related decision making of individuals with SPMI.

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Appendix A

Scott Walker
Governor

Kitty Rhoades
Secretary

State of Wisconsin
Department of Health Services

DIVISION OF MENTAL HEALTH & SUBSTANCE ABUSE SERVICES

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September 17, 2014

Garrett Huck
Department of Rehabilitation Psychology
1000 Bascom Mall Room 431b
Madison, WI 53706

Dear Garrett:

I am writing to confirm our agreement following our meeting of August 25, 2014. I have reviewed your request with our clinical staff and administration. They concur with our plan to support your recruitment of participants through PACT.

We feel this investigation will be mutually beneficial. Our program continues to struggle with health maintenance issues, and we truly hope this study can benefit our population as a whole.

Please feel free to contact me for assistance or questions as your research progresses. We anticipate both significant support and participation on behalf of our consumers and staff.

Sincerely,

Jana Lane Frey, Ph.D.
PACT Program Director

Appendix B

Education and Social/Behavioral Science IRB

3/16/2015

Submission ID number:	2015-0048
Title:	Facilitators of Physical Activity for Individuals with Severe Mental Illness
Principal Investigator:	FONG CHAN
Point-of-contact:	GARRETT EDWARD HUCK, FONG CHAN
IRB Staff Reviewer:	CASEY PELLIEN

The convened ED/SBS IRB conducted a full review of the above-referenced initial application. The study was approved for the period of 12 months with the expiration date of 2/19/2016.

To access the materials approved by the IRB, including any stamped consent forms, recruitment materials and the approved protocol, if applicable, please log in to your ARROW account and view the documents tab in the submission's workspace.

If you requested a HIPAA waiver of authorization, altered authorization and/or partial authorization, please log in to your ARROW account and view the history tab in the submission's workspace for approval details.

Prior to starting research activities, please review the Investigator Responsibilities guidance (http://go.wisc.edu/m0lovn) which includes a description of IRB requirements for submitting continuing review progress reports, changes of protocol and reportable events.

Please contact the appropriate IRB office with general questions: Health Sciences IRBs at 608-263-2362 or Education and Social/Behavioral Science IRB at 608-263-2320. For questions related to this submission, contact the assigned staff reviewer.

Appendix C

Lets Talk about Health and Wellness

Former PACT employee and current UW-Madison student Garrett Huck is hoping to learn more about how men and woman living with severe and persistent mental illness think about their health and wellness.

In order to learn more about how we can encourage people to participate in physical activity, we would like you to fill out a survey. The survey will take about 30-45 minutes to complete, and all of your information will remain anonymous.

All participants will receive a 20.00 Wal-Mart gift card for their participation!

This opportunity is open to any interested individuals with a severe mental illness aged 18 or over regardless of their current level of physical activity. If you have a legal guardian, they must be willing to provide their permission for you to participate. If you have a guardian, please have them contact Garrett if you are interested in participating.

If you are interested in participating, please contact Garrett Huck at the email address provided below. Thank you!

Garrett Huck
ghuck@wisc.edu

Appendix D

Lets Talk about Health and Wellness

Former PACT employee and current UW-Madison student Garrett Huck is hoping to learn more about how men and woman living with severe and persistent mental illness think about their health and wellness.

In order to learn more about how we can encourage people to participate in physical activity, we would like you to fill out a survey. The survey will take about 30-45 minutes to complete, and all of your information will remain confidential.

All participants will receive a 20.00 Wal-Mart gift card for their participation!

This opportunity is open to any interested individuals with a severe mental illness aged 18 or over regardless of their current level of physical activity.

If you are interested in participating, you may visit the PACT office between 8:00 AM and 4:30 PM on xx/xx/2015 in order to complete a questionnaire!

Garrett Huck
ghuck@wisc.edu

Thank you!

Appendix E

Facilitators of Physical Activity for Individuals with Severe Mental Illness

You are invited to be part of a research study being run by Garrett Huck and Professor Fong Chan from the University of Wisconsin-Madison. You must be 18 years or older to participate in the study. You do not have to participate if you don't want to. If you have a legal guardian, you must have their permission, and we must able to obtain their signature. Please take as much time as you need to read the information sheet, and please feel free to discuss it with the research team, or your family and friends. You will be given a copy of this form.

PURPOSE OF THE STUDY

We are asking you to participate in this study so we can learn more about things that might motivate you or make it challenging for you to exercise or be physically active.

WHAT WE WILL ASK YOU TO DO

You will be asked to complete a pen and paper survey with questions about your health and how active you are. The survey will probably take you about 30 to 45 minutes to complete. You will also be asked questions about your background such as your age and education level, how healthy you feel that you are, what types of things help you be physically active, and what types of things might make it hard for you to be physically active. You will also be asked about how physically active you are right now.

POTENTIAL RISKS

The risks to you if you choose to participate are very small. You should know that if you choose to complete your survey at a group session, you might know other people who are completing questionnaires as well. No other people will be able to see your responses on the survey however. You should know that we will ask you questions about your health that may be stressful for some people to talk about. If you decide you don't want to answer a certain question, you can skip that question, or choose to stop filling out the survey at any time.

PAYMENT FOR PARTICPATION

Upon completion of the survey, you will receive a 20.00 Wal-Mart gift card for participating in this research study.

YOUR PRIVATE INFORMATION

The only information we will collect that identifies you will be your signature on this form. Your name won't be connected with the survey that you complete. The study data will be stored in an online database. Only the research team will have access to the study data. The data obtained from this study will be stored for seven years after the study has been completed and will then be destroyed.

There is one time that we won't be able to keep your information confidential that we need to tell you about. It is our responsibility to report any situations observed that could be dangerous such as the abuse or neglect of children, older people, or any other adults. We are also required to report any situations that might be dangerous to you or other people to the appropriate authorities. We are not seeking this type of information in our study though, and we will not ask you questions about these issues

PARTICIPATION AND STOPPING PARTICIPATION

You can choose whether to be part of this study or not. If you volunteer to be in this study, it is ok to stop participating any time that you want. You don't have to answer any questions you don't want to answer and still remain in the study. If you choose to stop completing the survey, you will not be in trouble, and this this will not affect any treatment or services you receive.

YOUR RIGHTS

You may stop participating in the study without a penalty. You are not waiving any of your legal rights because of your participation in this research study. If you have any questions about your rights as a study participant or you would like to speak with someone that is not part of the research team to obtain answers to your questions about the research, please contact:

UW-Madison Education and Social/Behavioral Science IRB
University of Wisconsin - Madison
310 Lathrop Hall
1050 University Avenue
Madison, WI 53706

Lil Larson
IRB Director
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THE PEOPLE IN CHARGE OF THE STUDY

If you have any questions or concerns about this study, please feel free to contact the Professor Fong Chan or Garrett Huck.

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I _____, agree to participate in this research study. I have read the information that the research team provided me with, and I understand that I may stop participating at any time.

_____ _____

(Participant signature) (Date)

_____ _____

(Legal Guardian Signature) (Date)

Appendix F

This survey will ask you many questions about ***Physical Activity***. Physical activity is considered any type of activity that makes you move more than usual. Physical activity can include:

- Cleaning your house or apartment
- Doing gardening
- Walking your dog, or walking to the bus stop.
- Being on your feet at work.
- Running
- Swimming
- Playing sports
- Riding a bike
- Lifting weights
- Dancing

Feel free to ask a friend, family member, or staff if you have don't know what a question means, or if you have a question about what physical activity is. If you make a mistake its ok! Just make sure that your correct answer is clear.

Please answer each question honestly, and only pick one response for each question.

Thank you for agreeing to complete this survey! Your time is valuable, and it is greatly appreciated. This information will be used to help people living with a severe mental illness become more physically active.

1

For each question, please circle the answer that best describes you.

How Old Are You?	_____

What is Your Gender?	Male	Female

What is Your Race?	African-American	White	Hispanic	Asian	Other

Are You Employed?	Employed Full-Time	Employed Part-Time	Unemployed, But Seeking Employment	Unemployed	Retired	Volunteer

Highest Schooling Completed?	Less than High School	High School Diploma, HSED, or GED	Some College	College Graduate

Are You In a Relationship?	Single	Married	Divorced	I Have A Significant Other

Do You Currently Take Psychiatric Medications?	Yes	No

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***In the past*, have you ever participated in any of these PACT groups? (Circle all that apply)**

Basketball Group	Swimming Group
Exercise/Weight Lifting Group	Walking Group

Do you *currently* participate in any of these PACT groups? (Circle all that apply)

Basketball Group	Swimming Group
Exercise/Weight Lifting Group	Walking Group

In the past, have PACT staff helped you be physically active outside of a group?

Yes	No

Currently, do PACT staff help you be physically active outside of a group

Yes	No

In general, would you say your health is:

Excellent	Very Good	Good	Fair	Poor

Does your health now limit you in activities like moving a table, pushing a vacuum cleaner, bowling, or playing golf?

Yes, limited a lot	Yes, limited a little	No, not limited at all

Does your health now limit your ability to climb several flights of stairs?

Yes, limited a lot	Yes, limited a little	No, not limited at all

During the past 4 weeks, how much of the time have you had any problems with your work or other regular daily activities as a result of your physical health?

A. Accomplished less than you would like:

All of the time	Most of the time	Some of the time	A little bit of the time	None of the time

B. Were limited in the kind of work or other activities:

All of the time	Most of the time	Some of the time	A little bit of the time	None of the time

During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

A. Accomplish less than you would like?

All of the time	Most of the time	Some of the time	A little of the time	None of the time

B. Were limited in the kind of work or other activities?

All of the time	Most of the time	Some of the time	A little bit of the time	None of the time

During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely

How much of the time during the past 4 weeks have you felt calm and peaceful?

All of the time	Most of the time	Some of the time	A little of the time	None of the time

How much of the time during the past 4 weeks did you have a lot of energy?

All of the time	Most of the time	Some of the time	A little of the time	None of the time

How much of the time during the past 4 weeks have you felt downhearted and depressed?

All of the time	Most of the time	Some of the time	A little bit of the time	None of the time

During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities like visiting friends or relatives?

All of the time	Most of the time	Some of the time	A little of the time	None of the time

Do you have any of these health problems? Please pick the best answer for each type of health problem.

Diabetes	No Current Problems	At Risk	Current Problem
High/Low Blood Pressure	No Current Problems	At Risk	Current Problem
Metabolic Syndrome	No Current Problems	At Risk	Current Problem
High Cholesterol	No Current Problems	At Risk	Current Problem
Breathing or Lung Problems	No Current Problems	At Risk	Current Problem
Obesity	No Current Problems	At Risk	Current Problem
Heart, Vein, or Artery Problems	No Current Problems	At Risk	Current Problem

Please rate the following questions:

1= Very Rarely **3=In Between** **5= Very Frequently**

How often do unexpected events happen that prevent you from being physically active on a regular basis?	1	2	3	4	5
How often does feeling ill or tired affect your ability to physically active on a regular basis?	1	2	3	4	5
How often do family obligations interrupt your plan to be physically active regularly?	1	2	3	4	5
How often does work or employment make it hard for you to be physically active regularly?	1	2	3	4	5

Please rate the following questions:

1= Do not intend **3=In Between** **5=Strongly intend**

I intend to attain a healthy lifestyle	1	2	3	4	5
I intend to maintain a healthy weight and good health	1	2	3	4	5
I intend to live an active lifestyle	1	2	3	4	5
I intend to engage in regular physical activity and exercise.	1	2	3	4	5

Please choose the answer that best describes your opinion:

1= Extremely Unlikely 3=In Between 5=Extremely Likely

My close friends think that I should be physically active on a regular basis.	1	2	3	4	5
My family members think that I should be physically active on a regular basis.	1	2	3	4	5
My doctor thinks that I should be physically active on a regular basis.	1	2	3	4	5
Most people whose opinions I value think that I should be physically active on a regular basis.	1	2	3	4	5
PACT staff think that I should be physically active on a regular basis.	1	2	3	4	5

Please circle the number that shows how you feel about each statement:

1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree

Physical activity makes me feel better physically.	1	2	3	4	5
Physical activity makes my mood better in general.	1	2	3	4	5
Physical activity helps me feel less tired.	1	2	3	4	5
Physical activity makes my muscles stronger.	1	2	3	4	5
Physical activity is something that I enjoy doing.	1	2	3	4	5
Physical activity gives me a sense of personal accomplishment.	1	2	3	4	5
Physical activity makes me more alert mentally.	1	2	3	4	5
Physical activity improves my endurance in performing my daily activities (personal care, cooking, shopping, light cleaning, taking out the garbage).	1	2	3	4	5
Physical activity helps me strengthen my bones.	1	2	3	4	5

How often do the following things stop you from being physically active?				
1=Never	2=Sometimes	3=Often	4=Very Often	
Lack of a place to be physically active.	1	2	3	4
Too Tired.	1	2	3	4
Lack of transportation.	1	2	3	4
Feeling what I do doesn't help.	1	2	3	4
Lack of money.	1	2	3	4
A disability.	1	2	3	4
No one to help me.	1	2	3	4
Not interested.	1	2	3	4
Lack of information.	1	2	3	4
Embarrassment about my appearance.	1	2	3	4
Concerns about safety.	1	2	3	4
Lack of support from family/friends.	1	2	3	4
Interferes with other responsibilities like work, school, or PACT.	1	2	3	4
Lack of time.	1	2	3	4
Feeling I can't do things correctly.	1	2	3	4
Difficulty with communication.	1	2	3	4
Bad weather.	1	2	3	4
Lack of help from health care professionals.	1	2	3	4

Please answer the questions below about your relationship with PACT. Your responses will be kept confidential, so PACT will not know your responses:

1=Strongly Disagree **2=Slightly Disagree**

3=Neutral

4=Slightly Agree **5=Strongly Agree**

PACT provides me with choices and options about how to participate in physical activity.	**1**	**2**	**3**	**4**	**5**
My PACT team understands my opinion about physical activity.	**1**	**2**	**3**	**4**	**5**
I am able to be open with my PACT team about physical activity.	**1**	**2**	**3**	**4**	**5**
PACT has confidence in my ability to make physical activity changes.	**1**	**2**	**3**	**4**	**5**
PACT accepts me whether or not I take their advice about physical activity.	**1**	**2**	**3**	**4**	**5**
PACT makes sure I really understand health risk behaviors and the benefits of changing without pressuring me.	**1**	**2**	**3**	**4**	**5**
PACT encourages me to ask questions about physical activity.	**1**	**2**	**3**	**4**	**5**
I feel a lot of trust in PACT.	**1**	**2**	**3**	**4**	**5**
PACT answers my questions related to physical activity fully and carefully.	**1**	**2**	**3**	**4**	**5**

PACT listens to how I would like to do things regarding physical activity.	1	2	3	4	5
PACT handles my emotions very well.	1	2	3	4	5
PACT cares about me as a person.	1	2	3	4	5
I don't feel very good about the way PACT talks to me about physical activity.	1	2	3	4	5
PACT tries to understand how I see physical activity before suggesting any changes.	1	2	3	4	5
I can share my feelings about physical activity with PACT.	1	2	3	4	5

Please circle the number that best represents your feelings:

1=Not True for Me **2=Somewhat Not True for Me**

3=Unsure

4=Somewhat True for Me **5=Always True for Me**

I am physically active because other people say I should be.	1	2	3	4	5
I feel guilty when I'm not physically active.	1	2	3	4	5
I value the benefits of physical activity.	1	2	3	4	5
I engage in physical activity because it's fun.	1	2	3	4	5
I don't see why I should have to be physically active.	1	2	3	4	5
I am physically active because my friends/family/partner say I should.	1	2	3	4	5
I feel ashamed when I am not physically active.	1	2	3	4	5
It's important to me to engage in physical activity regularly.	1	2	3	4	5
I don't see why I should bother being physically active.	1	2	3	4	5
I enjoy physical activity.	1	2	3	4	5
I am physically active because others will not be pleased with me if I don't.	1	2	3	4	5

I don't see the point in physical activity.	1	2	3	4	5
I feel like a failure when I haven't been physically active for awhile.	1	2	3	4	5
I think it is important to make the effort to engage in physical activity regularly.	1	2	3	4	5
I find physical activity to be a pleasurable activity.	1	2	3	4	5
I feel under pressure from my friends and family to exercise.	1	2	3	4	5
I get restless if I don't engage in physical activity regularly.	1	2	3	4	5
I get pleasure and satisfaction from participating in physical activity.	1	2	3	4	5
I think exercising is a waste of time.	1	2	3	4	5

Please circle the number that best describes how you feel:

1=Not at all True 2=Rarely True 3=Somewhat True 4=Always True

I can overcome barriers and challenges to physical activity if I try hard enough.	1	2	3	4
I can find ways to be physically active.	1	2	3	4
I can accomplish my physical activity goals that I set.	1	2	3	4
When I face a barrier to physical activity I can find several ways to overcome this barrier.	1	2	3	4
I am confident that I can be physically active even when I am tired.	1	2	3	4
I am confident that I can be physically active even when I am feeling depressed.	1	2	3	4
I can be physically active even without the support of my family or friends.	1	2	3	4
I am confident that I can be physically active without the help of a therapist or trainer.	1	2	3	4
I am confident that I can motivate myself to start being physically active again after I've stopped for awhile.	1	2	3	4
I can be physically active even if I had no access to a gym, exercise, training, or rehabilitation facility.	1	2	3	4

Please circle the number that best describes how you feel:

1= Strongly Disagree 2=Somewhat Disagree

3=Unsure

4-Somewhat Agree 5=Strongly Agree

I believe that many health conditions are very severe.	1	2	3	4	5
I believe that many health conditions can have severe consequences.	1	2	3	4	5
I believe that many health conditions are extremely harmful.	1	2	3	4	5
It is likely that I will develop a severe health condition.	1	2	3	4	5
I am at risk for developing a severe health condition.	1	2	3	4	5
It is possible that I will develop a severe health condition.	1	2	3	4	5

Please circle the number that best describes how you feel:

1=Totally Disagree 2=Somewhat Disagree
3=Unsure 4=Somewhat Agree
5=Strongly Agree

I feel connected with staff at PACT.	1	2	3	4	5
At PACT, I feel part of a group.	1	2	3	4	5
I mix well with other staff at PACT.	1	2	3	4	5
At PACT, I can talk with staff about things that really matter to me.	1	2	3	4	5
I don't feel alone when I am with staff from PACT.	1	2	3	4	5
At PACT, staff involve me in social activities.	1	2	3	4	5
At PACT, there are staff who really understand me.	1	2	3	4	5
Some staff at PACT are close friends of mine.	1	2	3	4	5
People care about me at PACT.	1	2	3	4	5
There are staff at PACT I can share my thoughts with if I want to.	1	2	3	4	5

Please answer the following questions about physical activity such as *walking, gardening, or housework*.

When you do something regularly, it is for 30 minutes at least 4 times per week.

Do you currently regularly engage in regular physical activity?	**Yes**	**No**
Do you intend to engage in regular physical activity in the next 6 months?	**Yes**	**No**
Do you intend to engage in regular physical activity in the next 30 days?	**Yes**	**No**
Have you been regularly physically active for the past 6 months?	**Yes**	**No**

Please answer the following questions about exercise such as *playing sports, weight lifting, yoga, biking, or running*.

When you do something regularly, it is for 30 minutes at least 4 times per week.

Do you currently regularly engage in regular exercise?	**Yes**	**No**
Have you exercised regularly for the past 6 months?	**Yes**	**No**
Do you intend to exercise regularly in the next 30 days?	**Yes**	**No**
Do you intend to exercise regularly in the next 6 months?	**Yes**	**No**

1. During the past 7 days, how often did you engage in stationary activities such as reading, watching TV, computer games, or doing handcrafts?

Never	Seldom (1-2 days)	Sometimes 3-4 days)	Often (5-7 days)

On average, how many hours per day did you spend in these stationary activities?

No Time	Less than 1 hour	More than 1 hour but less than 2 hours	2 to 4 hours	More than 4 hours

2. During the past 7 days, how often did you walk outside your home other than specifically for exercise? For example, getting to work or class, walking the dog, shopping, or other errands?

Never	Seldom (1-2 days)	Sometimes 3-4 days)	Often (5-7 days)

On average, how many hours per day did you spend walking outside your home?

No Time	Less than 1 hour	More than 1 hour but less than 2 hours	2 to 4 hours	More than 4 hours

3. During the past 7 days, how often did you engage in light sport or recreational activities such as bowling, golf with a cart, hunting or fishing, darts, billiards or pool, therapeutic exercise (physical or occupational therapy, stretching) or similar activities?

Never	Seldom (1-2 days)	Sometimes 3-4 days)	Often (5-7 days)

On average, how many hours per day did you spend in these light sport or recreational activities?

No Time	Less than 1 hour	More than 1 hour but less than 2 hours	2 to 4 hours	More than 4 hours

4. During the past 7 days, how often did you engage in moderate sport or recreational activities such as tennis, softball, golf without a cart, or dancing for pleasure or similar activities?

Never	Seldom (1-2 days)	Sometimes 3-4 days)	Often (5-7 days)

On average, how many hours per day did you spend in these moderate sport or recreational activities?

No Time	Less than 1 hour	More than 1 hour but less than 2 hours	2 to 4 hours	More than 4 hours

5. During the past 7 days, how often did you engage in strenuous sport and recreational activities such as jogging, swimming, aerobic dance, cycling (hand or leg), singles tennis, rugby, basketball, or other similar activities.

Never	Seldom (1-2 days)	Sometimes 3-4 days)	Often (5-7 days)

On average, how many hours per day did you spend in these strenuous sport or recreational activities?

No Time	Less than 1 hour	More than 1 hour but less than 2 hours	2 to 4 hours	More than 4 hours

6. During the past 7 days, how often did you do any exercise specifically to increase muscle strength and endurance such as lifting weights, push-ups, pull-ups, or dips.

Never	Seldom (1-2 days)	Sometimes 3-4 days)	Often (5-7 days)

On average, how many hours per day did you spend in these exercises to increase muscle strength and endurance?

No Time	Less than 1 hour	More than 1 hour but less than 2 hours	2 to 4 hours	More than 4 hours

7. During the past 7 days, how often have you done any light housework, such as dusting, sweeping floors or washing dishes?

Never	Seldom (1-2 days)	Sometimes 3-4 days)	Often (5-7 days)

On average, how many hours per day did you spend doing light housework?

No Time	Less than 1 hour	More than 1 hour but less than 2 hours	2 to 4 hours	More than 4 hours

8. During the past 7 days, how often have you done any heavy housework or chores such as vacuuming, scrubbing floors, washing windows, or walls, etc.?

Never	Seldom (1-2 days)	Sometimes 3-4 days)	Often (5-7 days)

On average, how many hours per day did you spend doing heavy house work or chores?

No Time	Less than 1 hour	More than 1 hour but less than 2 hours	2 to 4 hours	More than 4 hours

9. During the past 7 days, how often have you done home repairs like carpentry, painting, furniture refinishing, electrical work, etc.?

Never	Seldom (1-2 days)	Sometimes 3-4 days)	Often (5-7 days)

On average, how many hours per day did you spend doing home repairs?

No Time	Less than 1 hour	More than 1 hour but less than 2 hours	2 to 4 hours	More than 4 hours

10. During the past 7 days how often have you done lawn work or yard care including mowing, leaf or snow removal, tree or bush trimming, or wood chopping, etc.?

Never	Seldom (1-2 days)	Sometimes 3-4 days)	Often (5-7 days)

On average, how many hours per day did you spend doing lawn work?

No Time	Less than 1 hour	More than 1 hour but less than 2 hours	2 to 4 hours	More than 4 hours

13. During the past 7 days, how often did you work for pay or as a volunteer? (This does not include work that mainly involved sitting with slight arm movement such as light office work, computer work, light assembly line work, driving bus or van, etc.)

Never	Seldom (1-2 days)	Sometimes 3-4 days)	Often (5-7 days)

On average, how many hours per day did you spend working for pay or as a volunteer?

No Time	Less than 1 hour	More than 1 hour but less than 2 hours	2 to 4 hours	More than 4 hours

The survey is complete!

Thank you for your participation!!!!!