

RUNNING HEAD: Predicting Exercise

PREDICTING EXERCISE IN PERSONS WITH PSYCHIATRIC DISABILITIES: A
CROSS-SECTIONAL STUDY OF SOCIAL COGNITIVE THEORY CORRELATES

BY

Michelle Robinson Zechner

Dissertation Committee:

Richard Goldberg
Amy Spagnolo
Ellen Anderson, reader
Margaret Swarbrick, reader
Kenneth J. Gill, chair

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ABSTRACT

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Michelle Robinson Zechner, M.S.W.

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Chair: Professor Kenneth Gill

People with psychiatric disabilities such as schizophrenia, bipolar disorder and major depression are at risk for premature mortality and morbidity related to chronic health conditions. Physical activity improves health and quality of life, and shows promise for supporting mental health recovery. Physical activity is a complex behavior with many correlates. To date, no unifying theoretical model has fully explored the motivational constructs of physical activity in persons with psychiatric disabilities. Social Cognitive Theory (SCT) includes multiple correlates and predicts physical activity in many populations, including those with chronic health conditions. A proposed SCT model was tested to predict self-report exercise in persons with psychiatric disabilities. Recruitment of 120 persons from community mental health centers and supported housing programs in New Jersey completed nine self-report measures related to SCT variables, health, psychiatric distress and demographics in a cross-sectional design. Hierarchical multiple regression was used to test the hypothesis that the model would predict physical activity. Correlation and linear regression was used to test the secondary hypotheses regarding the relationships within the model. The proposed social cognitive model variables of social support, self-efficacy, outcome expectations, barriers and goal-setting practices in conjunction with the correlates of gender, age, number of health conditions and distress from psychiatric symptoms predicted 25% of the variance in self-report exercise. The model was significant overall, however SCT correlates did not show a significant prediction of exercise after controlling for gender, age, number of health conditions and distress from psychiatric symptoms. As predicted, amount of physical activity is related to the SCT correlates, except number of barriers. Depressive symptoms and female gender were both significant predictors of reduced physical activity, and less motivation for exercise. Self-efficacy for exercise was confirmed to have strong relationships with outcome expectations and goal-setting practices, with moderate relationships to barriers and social support. Exercise interventions based upon SCT should address gender and psychiatric symptom differences for best outcomes. Focused interventions providing goal-setting and goal-tracking skills may improve self-efficacy, and in turn increase the amount of weekly exercise. Additionally, mental health providers must consider type of social support necessary to encourage increased physical activity.

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Chapter I

INTRODUCTION AND BACKGROUND

Context and Background of the Problem

People with psychiatric disabilities are dying prematurely. It is estimated that people living with schizophrenia, bipolar disorder, major depression and other psychiatric disabilities are at risk for a reduced lifespan of at least twenty-five years due to poor physical health (Parks, Svendsen, Singer et al., 2006). Many persons diagnosed with psychiatric disabilities are also diagnosed with chronic health conditions including: diabetes, heart disease, hypertension or pulmonary disease (Jerome et al., 2009). This increase in morbidity and mortality has been well-documented and is the largest health disparity of any sub-population in the United States (DeHert et al., 2011; Parks, Svendsen, Singer et al., 2006; Bartels & Desilets, 2012). Causes of this disparity are related to a variety of factors including: reduced access to appropriate medical care, weight-gain associated with psychotropic medication usage and lifestyle choices (DeHert et al., 2011; Roberts & Bailey, 2011).

Antipsychotic medications often prescribed to persons with psychiatric disabilities have been linked to obesity, diabetes and cardiovascular disease (Roberts & Bailey, 2011; Bartels & Desilet, 2012). The chronic health conditions of people with psychiatric disabilities, particularly cardiovascular disorders, can also be influenced by lifestyle habits and choices (Daumit, Goldberg, Anthony & Dixon, 2004). One lifestyle behavior that may promote individual health is physical activity or exercise. Physical activity has been demonstrated to reduce risk of mortality, improve or prevent many chronic health

problems including quality of life and symptoms of anxiety and depression in the general population (USDHHS, 1996).

Despite the demonstrated benefits of physical activity, most Americans are not physically active at the recommended level of 30 minutes on most days (Ayotte, Margrett & Hicks-Patrick, 2010). People diagnosed with psychiatric disabilities are even less likely to exercise as compared to the general population (Janney, 2012; Jerome et al., 2009; Daumit, Goldberg, Anthony, & Dixon, 2004). While there has been extensive research on the identification of health concerns of persons with psychiatric disabilities and some literature detailing the need for, and impact of, health promotion interventions, much less study has been made of physical activity of persons with psychiatric disabilities (Parks, Svendsen, Singer et al., 2006; Colton & Manderscheid, 2006; Cabassa, Ezell & Lewis-Fernandez, 2010; Bartels & Desilets, 2012; Bradshaw, Lovell & Campbell, 2010; Beebe et al., 2010). The quality of existing literature on physical activity of persons with psychiatric disabilities is poor with limited sample sizes, non-experimental design, use of different variables and measures, and few replications of interventions (Tosh, Clifton, & Bachner, 2011; Vancampfort et al., 2012). There are very few studies examining the theoretical processes and determinants of initiating and maintaining physical activity.

Starting and maintaining regular physical activity requires motivation. A small body of research has explored motivational processes for exercise in persons with psychiatric disabilities (Beebe, et al., 2010; McDevitt, Snyder, Miller & Wilbur, 2006), however, to date no research has fully explored the predictive determinants of physical activity for persons with psychiatric disabilities.

Recovery from mental illness is understood to be “a reformulation of one’s life aspirations and an eventual adaptation to the disease” (Pratt, Gill, Barrett & Roberts, 2007, p.111). For recovery to occur, a person living with psychiatric disabilities must successfully manage both mental and physical symptoms. Psychiatric rehabilitation practitioners must offer support and strategies to support a person’s whole health and encompass comprehensive mental and physical wellness (Swarbrick, 1997). Psychiatric rehabilitation (PsyR) as a field has focused upon supporting persons with psychiatric disabilities to identify meaningful choices, achieve personal recovery and improve quality of life. Specific challenges of supporting persons living with psychiatric disabilities to increase their physical activity include: poor motivation, lack of personal agency and efficacy to begin and maintain activity. Strategies to encourage health-promoting activities must combine PsyR goals, values and principles with health interventions for the best possible overall outcomes (Ussher, Stanbury, Cheeseman & Faulkner, 2007; McDevitt, Snyder, Miller & Wilbur, 2006; Gretchen-Doorly, Subotnik, Kite, Alarcon & Neuchterlein, 2009).

There is strong evidence that physical activity supports recovery from mental illness. For example, physical activity improves quality of life (Martin-Sierra et al., 2011), alters brain structure by increasing brain volume; which may support the reduction of negative symptoms (Scheewe et al., 2012), and offers overall benefits in psychological wellness such as self-esteem, competence, coping and a reduction in symptoms of depression and anxiety (Richardson et al., 2005; Holley, Crone, Tyson & Lovell, 2011).

Significance or Need for Study

There have been two complete tests of a Social Cognitive Theory (SCT) model in the

general population (Ayotte, et al., 2010; Rovniak, Anderson, Winett & Stephens, 2002). Rovniak, Anderson, Winett & Stephens (2002) used a prospective design to study the primary SCT determinants of social support, self-efficacy, outcome expectations and self-regulation to predict exercise in 277 university students. Using structural equation modeling, the authors determined these SCT constructs accounted for 55% of the explained variance in physical activity, with self-efficacy and self-regulation accounting for the greatest total effects (Anderson, Winett & Stephens, 2002). Ayotte, et al. (2010) expanded upon previous work by measuring more constructs of the SCT model, including social support, self-efficacy, perceived barriers, outcome expectancies and self-regulatory behaviors, while considering gender, age and number of health conditions in 116 middle-aged and young-old adults recruited with referrals from undergraduate students. This model accounted for 66% of the explained variance in physical activity (Ayotte, Margrett & Hicks-Patrick, 2010). At this point in time there has not been a full examination of the relationship between SCT and exercise in persons with psychiatric disabilities. A complete study of the SCT model to explain variance in physical activity of persons with psychiatric disabilities would 1) build upon and extend the current limited knowledge of SCT and physical activity in persons with psychiatric disabilities, 2) establish the applicability of a well-researched and complete theoretical model of health-behavior change in persons with psychiatric disabilities, and 3) identify the particular determinants most needed to influence physical activity behaviors in persons with psychiatric disabilities.

Problem Statement and Goals

Physical activity is a complex behavior with multiple factors and determinants

contributing to it, including overall physical health status. The understanding of physical activity in persons with psychiatric disabilities is further complicated by the possible interaction of psychiatric symptoms and chronic health conditions. A unifying theoretical model has not yet been identified to assess and understand the motivational constructs of physical activity in persons with psychiatric disabilities. It is critical to identify a theoretical model that explains physical activity, and accounts for symptomology and health conditions, in persons with mental illness in order to better structure relevant and effective exercise interventions, and ultimately help people to achieve better health and recovery. One model, which attempts to explain the determinants of physical activity, is Social Cognitive Theory (SCT). While there is a strong research base suggesting SCT is effective in explaining the amount of physical activity in the general population (McAuley, Mailey, Szabo & Gothe, 2013), there has not been a thorough testing of the SCT model on a population with psychiatric disabilities. SCT is of particular use in the field of psychiatric rehabilitation because it is a theoretical model predicated on the construct of agency, or a person's ability to make changes in their life (Bandura, 2001), while taking into account the complex challenges introduced by social supports, or lack thereof, action and the reciprocal interactions of thought on behavior.

The primary goal of this research is to assess the amount of variance in physical activity of persons with psychiatric disabilities is explained by the SCT determinants of self-efficacy, social support, outcome expectations, barriers and goal setting practices.

Research Aims and Questions

The study will utilize a correlational approach to determine if five determinants of SCT and four specific personal characteristics are related to physical activity. Participants

will be recruited from Community Mental Health Centers in New Jersey and complete self-report paper and pen validated measures for social support for exercise, self-efficacy for exercise, outcome expectations for exercise, barriers to exercise, goal-setting practices for exercise, the amount of physical exercise completed in the past 7 days, psychiatric symptoms, and number of health conditions. Participants will also be asked to complete an eight question demographic survey.

The use of a non-experimental method does have limitations in the interpretation of data and understanding causality, however, given the fact that the full model of SCT has not yet been tested in persons with psychiatric disabilities the approach will provide a baseline understanding of the inter-relationship of variables and provide groundwork for future experimental and longitudinal designs. Additionally, a correlational methodology is the first step in establishing the validity of the model in predicting physical activity in persons with psychiatric disabilities.

The present study will explore the question: Does the Social Cognitive Theory predict physical activity in persons with psychiatric disabilities? Specifically, the author wishes to determine if there is a relationship between the SCT model determinants (Bandura, 1977) of social support for exercise, self-efficacy for exercise, barriers to exercise, outcome expectations, goal-setting practices, and the amount of self-report physical activity while controlling for gender, age, number of health conditions and psychiatric symptoms.

The research hypotheses assume that the proposed SCT model (see Figure 1) will predict, with moderate power, the amount of self-reported physical activity in persons with psychiatric disabilities. In order to account for variance related to personal

characteristics of physical health impairments related to chronic health conditions, psychiatric symptoms, age and gender, these variables will be studied separately from SCT predictors. Gender will be included as a factor as several studies have noted gender differences in exercise in persons with psychiatric disabilities (Ussher, Stanbury, Cheeseman, & Faulkner, 2007; Carless & Douglas, 2008). This has also been found in the general population (Ayotte, et al., 2010). Women may have less self-efficacy for physical activity and the SCT model explains less of the variance for physical activity (Sylvia-Bobiak, 2006). The literature is inconclusive about psychiatric symptom impact on physical activity in persons with psychiatric disabilities, with some studies indicating a relationship between depressive symptoms and reduced physical activity (Roberts & Bailey, 2011), while others find no difference (Jerome et al., 2009). However, as this research is attempting to understand the relationship of the SCT model and physical activity and not the relationship between symptomology and physical activity, psychiatric symptoms will be used as a covariate in the model. Older age and more health conditions have been negatively associated with amount of physical activity (Ayotte, et al., 2010).

For the purposes of this study persons with psychiatric disabilities or mental illness are defined as people who have been diagnosed with schizophrenia, schizoaffective disorder, bipolar disorder, or major depression. Additionally, persons receiving services from a community mental health center or housing services in the community will also be described as persons with psychiatric disabilities or mental illness. Physical activity or exercise, will be used interchangeably, and should be interpreted as any purposeful movement meant to improve health (USDHHS, 1996). Examples of physical activity include walking, biking, lifting weights, aerobic classes or

tai chi. Three different types of physical activity will be measured; vigorous, moderate and walking. Vigorous exercise requires “hard physical effort” such as heavy lifting, aerobics or fast bicycling (Craig et al., 2003). Moderate physical activity makes a person breathe somewhat harder than usual and may include carrying light loads, biking or tennis (Craig, et al., 2003). Walking is defined as activity that lasts for a minimum of ten minutes. The Social Cognitive Theory (SCT) as described by Bandura (2004) will be used to identify models of behavior change, and specifically health-behavior change, which utilize social, personal and environmental determinants of self-efficacy, outcome expectations, barriers, goals and social support to predict a behavior. This research will use the SCT model proposed by Ayotte, et al. (2010) and minimally adapted for persons with psychiatric disabilities by including psychiatric symptoms as a contributor to self-efficacy. Social support is considered to be the assistance and encouragement by one’s family and friends to engage in physical activity. Self-efficacy is the belief that a person can achieve what she or he intends to achieve (Bandura, 2004). Number of health conditions is defined as a sum of the number of chronic health conditions an individual identifies from a list generated by federal guidelines for the National Survey of Residential Care Facilities (National Center for Health Statistics, 2010). Outcome expectations for physical activity are the beliefs that certain outcomes, both positive and negative, will occur as a result of exercise (Bandura, 1986). Barriers to physical activity are the reasons a person feels unable to or challenged by exercise (Bandura, 2004). Goal setting practices are considered those activities, which assist persons to regulate their behavior (Bandura, 1991). Physical activity or exercise goals are considered the specific plans or intentions a person may have to exercise. In the current model goals will refer to

the goal setting process, self-monitoring of achieving intentions and problem-solving (Rovniak, Anderson, Winett & Stephens, 2002).

Study Hypotheses

The following hypotheses will be tested in the study:

1. Social support, self-efficacy for physical activity, positive outcome expectations, barriers to exercise, and goal-setting practices will predict self-reported physical activity.
2. Social support is positively correlated with amount of self-efficacy for exercise and goal setting practices.
3. Self-efficacy is related to outcome expectations, barriers, goal setting practices and physical activity.
4. Number of health conditions is inversely correlated to self-efficacy, outcome expectations and goal setting practices.
5. Age, psychiatric symptoms and gender will be associated with self-efficacy for physical activity, with higher age, greater symptoms and female gender associated with lower self-efficacy for physical activity values.
6. Goal setting practices will be related to physical activity and predicted by social support with greater social support correlated to more goals.
7. More goal setting practices predict more physical activity

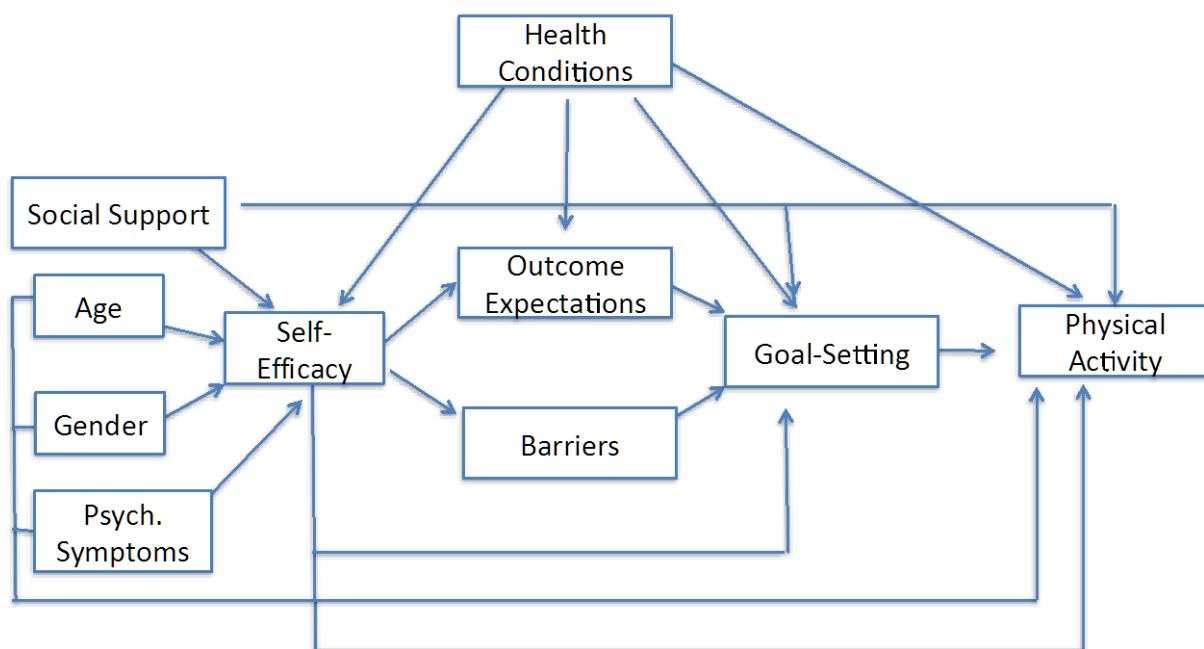


Figure 1. A Proposed Social Cognitive Theory Model of Physical Activity in Persons with Psychiatric Disabilities

Chapter II

LITERATURE REVIEW

This literature review will provide a broad overview of the Social Cognitive Theory, the theoretical application of SCT to health promotion activities, the evidence available that SCT is predictive of health behavior change through specific examples of health promotion research with general populations, and the application of SCT to health promotion, particularly physical activity, in persons diagnosed with severe mental illness. Psychiatric Rehabilitation (PsyR) is a field dedicated to the support of persons diagnosed with severe mental illness. Through situational assessments, skills training and targeted interventions, PsyR practitioners assist people diagnosed with mental illness in setting, achieving and maintaining personal goals. Further, by targeting what the person wants to work on, practitioners attempt to build motivation to help the person desire change. One of the significant challenges experienced by persons with mental illness in achieving goals are negative symptoms, which are often associated with severe mental illness particularly avolition or lack of motivation (Pratt, Gill, Barrett & Roberts, 2007). Avolition presents a challenge for people who would like to make a change in their life, but do not have the energy or drive to engage in the activities necessary to make that change. In order to better support people with mental illness to achieve their personal goals, PsyR practitioners must understand motivation and more specifically the manner in which interventions may serve to improve or enhance motivation.

Social Cognitive Theory (SCT) is a widely applied theoretical model developed by Albert Bandura to understand human behavior. It is a useful construct to understand and explain the mechanisms by which a person makes changes and incorporates both

internal factors, such as motivation and expectations, and external factors such as environmental concerns and social influences (Bandura, 2005). Social cognitive theory is a model of behavioral causation involving social supports for making changes (Bandura, 2005). SCT identifies three primary sources of influence over behavior, which may interact to further encourage or discourage behavioral change. These three factors are personal, behavioral and environmental (Bandura, 1986), and will be further discussed below. Other models of human motivation and activity use a unidirectional rationale for behavior change, assuming that only environment or only internal factors influence change (Bandura, 1997).

In this model, behavior is seen as being related to both internal and external factors in concert or “reciprocal causation” (Bandura, 1989). SCT identifies three areas of influence to understand human action: behavior or specific actions a person takes, personal or all factors connected with an individual and environmental factors or those completely outside of a person including reactions of other people. The behavioral domain in the model identifies the actions that a person takes which influence the environment and concurrently are also influenced by the environment (Bandura, 1989). The personal or cognitive domain encompasses attributes connected to the individual including cognition, social status and roles, personal attributes, and physical characteristics (Bandura, 1986). In a sense this domain includes what the person brings to a situation including their thoughts about their behavior and reaction to a situation. Additionally, this domain would encompass the symptoms, stigma and experience of living with a mental illness. Finally, environmental factors are those external to the individual and can include both situational factors and other people. The influence of the

environment on cognitions is important. The external and environmental domains in a person's life shape the development of thoughts and in the activation of thought into action (Bandura, 1986). If a person perceives the environment as hostile then they will be less likely to initiate a new action. Likewise, an individual can shape his or her environment by eliciting negative responses from other people by their behavior or by changing the components in their environment.

SCT assumes a triadic reciprocal relationship between behavioral, environmental and personal factors, which interact to determine a person's behavior (Bandura, 1989). See Figure 2. This 'reciprocal determinism' is bidirectional and suggests that each of the three components of behavior, environment and personal factors are influenced by and influence all of the other factors. People are both products and producers of their environment (Bandura, 1989). The resulting action is a product of the three factors. SCT highlights the role of the individual as an activating factor in his or her own lives, which will be described later as 'agency'. In order for people to become causal contributors to their own life course they must develop competencies, self-beliefs of efficacy and the ability to self-regulate motivation and action (Bandura, 1989).

Self-Efficacy

A primary assumption of the SCT model is determinism or the role of the individual in their own life. Self-efficacy is interconnected to the construct of self-determination. The SCT model identifies the person as "reciprocally contributing influence to their own motivation and behavior within a system of reciprocal causation involving personal determinants, action and environmental factors" (Bandura, 1986, p.12). As humans, we have the capability of influencing our thoughts, behaviors and

actions. Through regulation of "one's own motivation, thought processes, affective states and actions" (Bandura, 2000, p.18), humans take an active role in their experiences. Self-efficacy is important to consider in all activities because it influences motivation and regulation of behavior. Research suggests it is necessary for achieving goals and overall positive well-being (Bandura, 1994). Self-efficacy is domain specific or connected to a given activity, and reliant on a specific situation and set of skills. SCT "treats the efficacy belief system not as an omnibus trait, but as a differentiated set of self-beliefs linked to distinct realms of functioning" (Bandura, 2000, p.18). People's beliefs' about their self-efficacy influences their cognitions and subsequently "self-beliefs of efficacy influence how people feel, think, and act (Bandura, 1992, p.3). A strong sense of personal self-efficacy affects initiation and persistence of behavior (Bandura, 1977).

Perceived self-efficacy

Perceived self-efficacy is the understanding of what a person can do with their existing skills (Bandura, 1986). It is a way of conceptualizing "individuals' beliefs in their capability to exercise control over challenging demands and their own functioning" (Schwarzer, Luszczynska & Wiedemann, nd, p.1).

When someone has a limited sense of self-efficacy for a certain task, these "self-referent misgivings create stress and undermine effective use of the competencies people possess by diverting attention from how best to proceed to concern over personal failings and possible mishaps" (Bandura, 1986, p.394). By focusing on the inability to complete a task, one can lose perspective of the personal strengths that may support the accomplishment of a new task. Likewise, when someone has a strong sense of personal self-efficacy this sense of confidence allows a person to "deploy their attention and effort

to the demands of the situation” and become activated by the obstacles to increase their efforts toward a specific goal (Bandura, 1986, p.394). Strong self-efficacy is helpful to mobilize existing abilities and apply them to new tasks, and also to work on challenging tasks. Simply having the knowledge about a specific action or task is not enough to ensure that a person will perform that action or task. Many examples of this phenomenon abound in health promotion. A person may know that exercising five times a week will help to maintain a normal weight, but this knowledge alone does not ensure that the person will exercise. Perceptions of ability to exercise or self-efficacy are strong predictors of taking the action. And consequently, personal mastery is the strongest influence on self-efficacy (Schwarzer, Luszczynska & Wiedemann, nd). Additional influences upon self-efficacy include vicarious experiences or social learning, social persuasion and coping strategies to reduce stress reactions or negative thinking (Bandura, 1998).

There is a relationship between how a person may judge their capability in taking action and how those conceptions of self-efficacy affect motivation and behavior (Bandura, 1986). As Bandura points out (1986), efficacy about an activity requires more than knowing the steps involved to complete the task. Self-efficacy impacts perseverance in striving towards a goal despite barriers and setbacks, which may challenge motivation (Schwarzer, Luszczynska & Wiedemann, nd). Therefore improving a person’s thoughts about the challenge of a particular skill or goal can support optimistic self-beliefs and ultimately influence the cognitive, motivational, and affective processes necessary to initiate action (Schwarzer, Luszczynska & Wiedemann, nd).

Efficacy shapes our behavior in four ways. In the first, cognitive processes, efficacy

impacts thoughts that either improve or decrease performance (Bandura, 2000).

Motivational processes, comprised of causal attributions, outcome expectancies and identified goals, rely heavily on efficacy beliefs for self-regulation (Bandura, 2000). In order for a person to begin a behavior or even to consider a new behavior they must have some level of motivation.

Efficacy further shapes behavior through affective or emotional processes. This is through the mechanisms of predicting how people will perceive threats, how well a person may cope with difficulty, and alleviating aversive situations. Finally, efficacy shapes a person's behavior through selection processes or by choosing particular environments, which either support or detract from goals. People shape "their life paths by the environments they select and the environments they create" (Bandura, 1992, p. 30).

In the realm of physical activity,

"Perceived self-efficacy has been found to be important at all stages in the health behavioral change process, but it does not always constitute exactly the same construct. The meaning depends on the particular situation of individuals who may be more or less advanced in the change process." (Schwarzer, Luszczynska & Wiedemann, nd, p.5).

An example of situation specific nature of perceived self-efficacy can be found in exercise: a person may feel very confident in their abilities to perform moderate physical activity, however not confident at all in their ability to perform vigorous exercise. Perceived self-efficacy is important to any type of behavioral change and to health behavior changes because higher self-efficacy is correlated with higher future goal attainment (Bandura, 1992).

Agency

Bandura identifies that the foundation of self-efficacy is a concept called agency. Agency is the general notion that “people are neither driven by inner forces nor automatically shaped and controlled by the environment...they function as contributors to their own motivation, behavior, and development within a network of reciprocally interacting influences (Bandura, 1989, p.8).” The energy and force with which people contribute to their own lives defines agency. “Agency embodies the endowments, belief systems, self-regulatory capabilities and distributed structures and functions through which personal influence is exercised” (Bandura, 2001, p.2). There are three types of agency. The first, direct personal agency, is the belief that one has the power to make things happen (Bandura, 2000). The second, called proxy agency, is using other entities with influence and power to support one’s needs (Bandura, 2000). Finally, collective agency is when people “work together to produce the results they desire but cannot accomplish on their own” (Bandura, 2000, p.25).

Agency is a powerful construct as it identifies the energy within a person that allows them to take action, self-direct their lives and make changes. It can be particularly empowering when working with persons with mental illness who may have experienced stigma, loss and challenges in attaining personal goals as it allows the person to focus on their abilities and perhaps to encourage personal recovery. People can use their cognitions or thoughts and translate them into personal action or detailed plans for change through the use of personal agency (Bandura, 1989). Helping a person to understand their personal agency may also serve as a motivational tool that could support them to meet their goals.

Outcome-Expectations

Outcome expectations are “a person’s estimate that a given behavior will lead to certain outcomes” (Bandura, 1977, p.193). Anticipating that a specific set of behaviors will lead to certain outcomes may serve as part of the motivational process. It is important to note that learning occurs within a social context and outcome expectations may be linked to the observation of successful peers. As people watch others like themselves succeed this “provides incentives for individuals to undertake difficult tasks” (Bandura, 1986, p.302). Indeed, as a person attempts further challenging tasks, direct observations of other people’s success can encourage perseverance and effort despite setbacks (Bandura, 1986).

There is a proposed relationship between self-efficacy and outcome expectations, and targeted behaviors. For example, with individuals who have higher self-efficacy for exercise and greater outcome expectations, they may be more likely to utilize those self-regulatory strategies necessary to making a change in exercise and maintaining it. (Anderson, Wojcik, Winett, & Williams, 2006).

Self-Regulation

Another construct related to SCT that must be explored is that of self-regulation. Self-regulation includes “setting of goals, cognitive preparations, and the ongoing monitoring and evaluating of goal-directed activities” (Connor & Norman, 2005, p.5). Using physical activity as an example, studies have shown that in order for people with low activity levels to increase their activity, they must focus more on their ability to self-monitor including planning and tracking, goal-setting and evaluation of existing exercise behavior (Anderson, Wojcik, Winett, & Williams, 2006). Motivation for physical

activity is complex. While self-regulation is one component of motivation, self-efficacy actually moderates the effect of self-regulation when making changes in physical activity (Luszczynska, Schwarzer, Lippke & Mazurkiewicz, 2011). People who make successful changes in their behavior must be confident in their abilities to make that change (self-efficacy) and practice the self-regulating tools necessary to begin and maintain the change. Self-efficacy is an important precursor to self-regulatory behaviors (Anderson, Wojcik, Winett, & Williams, 2006). Without strong self-efficacy a person will be less likely to utilize the self-regulatory behaviors necessary to initiate new behaviors. SCT suggests self-regulatory behaviors will increase as self-efficacy and outcome expectations improve (Anderson, Wojcik, Winett, & Williams, 2006). When addressing physical activity or any health behavior change self-regulation “is likely to be fundamental to the success of any health promotion intervention” (Yates, Davies, Gorely, Bull & Khunti, 2008, p. 265).

Social Cognitive Theory and Health Promotion

SCT has been extensively discussed in relation to health promotion interventions. Health behavior change is complex and difficult to accomplish for any person, and perhaps more so when the person has one or more chronic health or mental health diagnosis. Changing one’s behavior requires more than a single factor: “behavior is determined by a multi-authored influence” (Bandura, 1986, p.39). The SCT model of health promotion identifies factors that shape behavior, the motivation and change process and how the factors interact to influence behavior change. Specific determinants of health behavior change within the SCT model include knowledge of health risks and benefits, perceived self-efficacy, outcome expectations, health goals, perceived

facilitators and social and structural impediments to changes in behavior (Bandura, 2004).

A foundational component of SCT is the belief that a person has the capacity or agency to make changes in his or her life. This is particularly important to health promotion and the concurrent lifestyle changes necessary to improve health. This ability to shape one's life and take action is sometimes referred to as *agency*, as was described previously.

The first step in most health promotion efforts is providing information. Interventions to improve health must include general information to build knowledge: "Knowledge creates the precondition for change. But additional self-influences are needed to overcome the impediments to adopting new lifestyle habits and maintaining them" (Bandura, 1998, p. 20). In order to address lifestyle issues people need "knowledge about how to regulate their behavior and a firm belief in their personal efficacy to turn concerns into effective preventive actions" (Bandura, 1997, p. 280). Without a strong sense of self-efficacy a person may feel that the needed actions for health improvement are beyond their ability (Bandura, 1997).

Personal Self-Efficacy in Health

Efficacy beliefs are the foundation of action towards change (Bandura, 1997). Beliefs about personal efficacy impact decisions throughout the process of health behavior change: whether to change lifestyle habits, searching for motivation, maintaining a new habit, being vulnerable to relapse and persevering after relapse (Bandura, 1998). Self-efficacy impacts general health in several ways. When people believe that they can cope with stressors they are activating specific "biological systems"

which can mediate between health and disease (Bandura, 1998). This refers to the link between stress and physical health. Additionally, a low sense of self-efficacy can contribute to depression, which can also impact the immune system (Bandura, 1997). These pathways represent the connection between the physical body and mental health.

A second path in which self-efficacy impacts health is a person's direct control over specific lifestyle choices, which impact health (Bandura, 1998). For example, a person with higher self-efficacy will be able to take more challenging actions towards improving their health.

SCT in health promotion assumes that self-efficacy drives all other processes toward health behavior change (see Figure 3). In this model, self-efficacy impacts all of the other health change determinants directly: "Perceived self-efficacy occupies a pivotal role in social cognitive theory because it acts upon the other classes of determinants" (Bandura, 1997, p.35). It may also serve as a mediator or moderator of additional variables such as social support or perceived barriers to a health-promoting behavior.

Self-efficacy influences goals as people with greater self-efficacy establish more challenging goals for themselves; outcome expectations as people with higher self-efficacy anticipate that they will be able to achieve more; and the ease with which challenges can be overcome (Bandura, 2004). In addition, self-efficacy impacts commitment to the goals that a person identifies (Bandura, 1998). Outcome expectations can impact behavior directly, because if a person believes they can accomplish something than they are more likely to do it. In turn, outcome expectations influence goal setting as higher self-efficacy leads to a person creating more challenging goals.

Socio-structural factors, the social reactions to specific behaviors, serve as either facilitators or impediments to behavior (Bandura, 2004). They can be either positive responses from the social environment which can act as facilitators to a new behavior such as exercise, or negative responses which act as impediments to making a change. The sociocultural factors in turn influence the setting of goals. If a person's peer group embraces smoking, then quitting smoking may be less likely to be an urgent goal due to the influence of the social environment, however if a person's social supports criticize smoking the social environment is a facilitator to the goal of quitting. Finally, goals influences behavior, particularly goals that are more proximal in nature: "Short-term attainable goals help people to succeed by enlisting effort and guiding action in the here and [n]ow" (Bandura, 2004, p. 145).

Health Outcome Expectations

The types of health behaviors that a person will start, change or continue are "affected by the outcomes people expect their actions to produce" (Bandura, 2004, p.144), whether positive or negative. Outcome expectations of changing health behavior can include: physical effects of the behavior, the social implications of a specific behavior, and self-evaluation of a specific behavior (Bandura, 1998). An example of the physical effects of a behavior includes a person's anticipation of positive feelings after starting to exercise and expecting that the exercise could lead to weight loss. The social implications of a health behavior may include social recognition whether positive or negative reaction to a new behavior (Bandura, 2004) and the ongoing reciprocal relationship of person to their environment. Self-evaluative reactions are in response to

analyzing whether a potential new health behavior, for example walking several times a week, is perceived as beneficial or negative.

Goals

Once a person has the knowledge about a specific health behavior and has built the necessary self-efficacy to improve motivation to change, goal-setting can be helpful for self-motivation as people start to monitor their actions and then respond positively or negatively to the situation (Bandura, 1998). In regards to physical health, personal goals can provide self-incentives and direction for lifestyle habits (Bandura, 2004). Goals serve to motivate a person, but must be conceptualized as long-term or distal goals, such as the desire to lose 50 pounds, and proximal goals or the shorter-term goals, such as exercising five times in one week.

Goals established for the immediate future are helpful in guiding specific health behaviors (Bandura, 2004). Having both a long-range goal and short-range goal is beneficial in health behavior change because health-promoting actions often take time to see changes in health. Setting short-range proximal goals that work toward larger distal goals can support a person's self-motivation and act as a guide to how to proceed (Bandura, 1998). Further, successfully achieving proximal goals can "generate self-satisfaction from personal accomplishments that operates as its own reward during the pursuit of higher level goals" (Bandura, 1991, p.263).

Self-Regulation in Health

To successfully begin health-promoting behaviors, a person needs motivation to master and implement specific skills, and the ability to self-regulate those skills. Changing lifestyle habits requires more than the desire to do so. It also requires the

development of self-regulation skills (Bandura, 1998), or those skills that help a person make changes in behavior. Self-regulation is a process in which a person is aware of specific behaviors, reacts to those behaviors and the impact of how such awareness impacts behavior (Bandura, 1998). Without the ability to self-regulate a person would not be able to be self-reflective or self-reactive, or have the ability to exercise control over thoughts, feelings, motivations or actions (Bandura, 1991).

Self-regulation has several components including “self-monitoring, proximal goal setting, strategy development, and self-motivating incentives” (Bandura, 1997, p.296). At the beginning awareness of a desire to make a lifestyle change, a person must become aware of their current actions through self-monitoring. Once a person has made the decision to initiate changes, they must then identify the short-term steps that they wish to achieve to make a change. Often these proximal goals lead to identifying specific strategies to make a change. These proximal goals “are instrumental in achieving larger future goals” (Bandura, 1997, p.303) and as these short-term goals are achieved they serve to bolster motivation. Strategy development is the way in which a person guides their own efforts toward a goal, or the steps they will take along the way to help them achieve the shorter term goals. People are able to use self-incentives to encourage behavior that they may prefer not to do to reward themselves for sub-goal accomplishments (Bandura, 1997). The self-regulation system is particularly useful when considering how a person may manage chronic health conditions such as diabetes.

Social Support

The importance of social structures on behavioral change can not be underestimated: “human adaptation and change are rooted in social systems” (Bandura,

1997, p.6). Social support, or the impact that friends, family, coworkers or other social connections have upon a person's effort at behavior change, is related to adopting and maintaining health behaviors. Research has shown that social supports are statistically relevant in a person's ability to improve efforts at weight loss and increasing physical activity (Norman & Connor, 2005). Social support can support health behavior change when the support raises self-efficacy to change behaviors, but if social support encourages dependence or lack of change it can actually decrease coping self-efficacy (Bandura, 2004). Therefore the quality of the social support is relevant to the process. Social supports reinforcement of positive or negative self-efficacy cognitions influence sense of personal agency. When individuals are encouraged to think independently and seek answers for themselves they are more likely to do so.

Evidence for SCT in health management

Health promotion interventions based upon social cognitive theory assume: a person's thoughts influence their behavior; personal qualities such as their background or diagnosis or experiences influence behavior; the behavior of a person shapes what they do and the environment they are in; and the environment, including social factors, may support or impede health behaviors (Bandura, 2004).

A health behavior can be described as "any activity undertaken for the purpose of preventing or detecting disease or for improving health and well-being" (Connor & Norman, 2007, p.2). SCT has been applied to a variety of health promotion efforts as detailed below. One of the broad appeals of the model is the focus upon a person's role in improving their health, including practices to improve self-management of chronic health issues. The model makes the distinction between intending to make a lifestyle

change and taking action (Luszczyska et al. 2011). The relationship between intention and action is complex and may include additional variables such as motivation to take action and social support for the action, as well as, other mediating variables.

SCT has been a model for interventions addressing chronic health conditions such as type 2 diabetes (Yates, Davies, Goerly et al., 2008; Plotnikoff et al., 2008; Nouwen, et al., 2011), peripheral artery disease (Rejeski, Tian, Liao, & McDermott, 2008), osteoarthritis (Gyurcsik, Brawley, Spink & Sessford, 2013), post-operative bariatric health management (Hunka, 2011) and cancer (Graves, 2003). The SCT model has also been applied to studies examining methods to enhance health promoting behaviors such as weight loss (Byrne, Barry, & Petry, 2012; Annesi & Whitaker, 2008), improved nutrition (Anderson, Winett & Wojcik, 2007) and increased physical activity (Williams, Anderson & Winett, 2005; White, Wojcicki & McAuley, 2012; McAuley et al., 2011; Luszczyska, Schwarzer, Lippke & Mazurkiewicz, 2011; Anderson, Wojcik, Winett & Williams, 2006; Keller, Fleury, Gregor-Holt, & Thompson, 1999).

Most of the studies reviewed tested the primary pathway between self-efficacy, either self-regulatory or task specific, and the specific health behavior being studied. There is strong evidence that there is a relationship between self-efficacy and health behaviors within a variety of populations. Significant positive relationships have been published between health behaviors and increased behavior specific self-efficacy (Annesi & Whitaker, 2008; Annesi, Unruh, Marti, Gorjala & Tennant, 2011; Byrne, Barry & Petry, 2012; Gyurcsik, et al., 2013; Leutzinger & Newman, 1995; Luszczyska, et al., 2011; Nouwen et al., 2011; Plotnikoff et al., 2008; White, et al., 2012; Yates, Davies, Gorely, Bull & Khunti, 2008).

Some of the previous work to validate the SCT model and health promotion has been prospective in nature to study the relationship of self-efficacy for a specific health behavior such as self-management of a chronic condition, physical activity or nutrition (Gyurcsik, et al., 2013; White, Wojcicki & McAuley, 2012; Rejeski, Tian, Liao, McDermott, 2008; Plotnikoff et al., 2008; Nouwen et al., 2011; Anderson, et al., 2006).

Several authors examined the internal pathways between self-efficacy and behavior to support the SCT model in health. Yates et al. (2008), Plotnikoff et al. (2008) and White et al. (2012) examined the relationship between self-efficacy and outcome expectations. There were significant relationships found in the path between self-efficacy and outcome expectations, which supported the SCT model.

Also, Plotnikoff et al. (2008) studied additional relationships within the model of self-efficacy and the impact upon health behaviors (Bandura, 2004), to determine if the model would predict physical activity within a sample of persons diagnosed with Type 1 and Type 2 Diabetes. Findings supported the relationship between self-efficacy and social supports, the positive relationship between higher outcome expectations and more challenging goals, however no significant finding was noted between outcome expectations and behavior (Plotnikoff et al., 2008). In contrast, Anderson et al. (2006) and Anderson et al. (2007) did find a significant relationship between outcome expectations and behavior. Both studies also examined the pathway between social supports and behavior and found it significant.

Physical Activity and Self-Efficacy

Efficacy beliefs, along with other determinants, can “regulate motivation, affect, and behavior” (Bandura, 1998, p.6). Self-efficacy beliefs influence motivation to start

exercising and the amount of effort and perseverance a person will invest into changing behaviors (Pajares, 1997). Self-efficacy is one of the most often researched factors correlating with and determining physical activity (McAuley, et al., 2013). The reciprocal relationship of self-efficacy and physical activity has been well established (White, Wojcicki & McAuley, 2012). An increase in self-efficacy reports is related to increased levels of physical activity; conversely an increase in physical activity is linked to an increase in self-efficacy (McAuley, et al., 2013).

Self-efficacy can predict long-term maintenance of physical activity behavior both at baseline and following an intervention designed to improve self-efficacy (McAuley, et al., 2013). Levels of self-efficacy are linked to ongoing success or failure of exercise behavior: people who exercise regularly may experience fluctuating success in the maintenance of the behavior. If a person was successful in physical activity at one point and is currently not exercising, their sense of self-efficacy may decrease as the person may become disappointed in themselves and their ability to continue a specific behavior (Bandura, 2003). The strength of relationship between self-efficacy and physical activity is predicated upon such factors as type of efficacy assessed, specific behavior, population-specific characteristics, and when efficacy and physical activity are measured (McAuley, et al., 2013).

Beginning to exercise requires different knowledge and efficacy abilities than exercising in different conditions and continuing the behavior over time (Bandura, 2003). For example, adopting a new physical activity behavior requires a person to learn new information about how to start an activity and break that into manageable steps, all the while believing in one's ability to begin something new. Whereas maintaining physical

activity requires that a person has the skills to continually self-regulate their schedule and overcome barriers, in addition to self-motivate to keep the behavior going: “success in regular exercise is heavily dependent on self-regulatory efficacy” (Bandura, 2003, p.411). There is a time element in the variability of self-efficacy for physical activity. McAuley et al. (2011) describe the significance of time point at which self-efficacy for physical activity is measured: exercise self-efficacy scores decreased after three weeks of a twelve month intervention, rose significantly at 6 month measurement and then decreased significantly at the end of the intervention (McAuley et al., 2011), suggesting an initial overestimation of ability at baseline along with a concern about maintaining a research-driven exercise after completion.

Self-Efficacy and Other SCT Determinants in Physical Activity

Self-efficacy has a relationship to the behavior of physical activity both by influencing a person’s drive and perception of ability, but also by influencing the other determinants within the model. To begin, self-efficacy for physical activity influences goal-setting, which then influences behavior (Hunka, 2011). Goal setting is helpful as a self-regulation practice in the process of beginning and continuing physical activity because it focuses one’s effort on exercise and guides behavior (White, Wojcicki & McAuley, 2012). Self-regulatory skills are considered essential to overcome challenges in initiating and maintaining regular physical activity:

“The aspect of perceived efficacy that is most relevant is not whether one can execute the physical skills, which are readily mastered, but the self-regulatory efficacy to mobilize oneself to exercise regularly in the face of a variety of personal, social, and situational impediments (Sallis et al., 1988 as cited by Bandura, 2003, p.410)”

Outcome expectations of starting and maintaining physical activity are also impacted by self-efficacy beliefs. Outcome expectations for physical activity are those, which “reflect beliefs about physical experiences resulting from engagement in physical activity” (White, Wojcicki & McAuley, 2012, p.19). Examples of outcome expectations for physical activity could include outcomes of the exercise process such as weight loss, improved mood, or improved cardiovascular health. People who have a low self-efficacy and high outcome expectations about exercise may be unwilling to continue to exercise if they do not quickly gain the results they expected (Bandura, 2003). This is a common issue: a person makes a resolution to begin an exercise program and after a short time when no significant physical change is noted, other than discomfort from the physical activity will stop exercising. While outcome expectations may not directly impact physical activity behaviors (Anderson, et al., 2006; Beebe et al., 2010), there is evidence that they are significantly linked to the establishment of more challenging goals and other self-regulatory behaviors necessary for initiating and maintaining physical activity, and that self-efficacy directly influences outcome expectations (Plotnikoff et al., 2008; Ayotte, et al., 2010).

Predictive ability of SCT for Physical Activity

In order to successfully examine the predictive ability of the SCT model on physical activity it is important to measure multiple determinants, as self-efficacy is only one of several components of the total model (Bandura, 1998). Many of the studies using SCT as a theoretical base for exercise interventions have only examined one or two model pathways (White, Wojcicki & McAuley, 2012). It is especially important to test the complete SCT model as sub-populations with specific health issues may respond

differently to interventions (McAuley, et al., 2013) and have unique socio-cultural opportunities and barriers. This limited study of the entire model challenges the generalizability and validation of the theory as it applies to physical activity.

Physical activity self-efficacy has both a direct and indirect effect on the behavior of physical activity. One large study (n=999) utilizing the SCT model as a predictor of high levels of physical activity (Anderson, et al., 2006) found self-regulation strategies to have the strongest effect ($\beta_{\text{total}} = .36$), specifically the self-regulation tasks of identifying time and making arrangements for exercise. Other significant and more modest predictors of high levels of exercise were identified as social support from family members ($\beta_{\text{total}} = .16$) and self-efficacy for exercise ($\beta_{\text{total}} = .12$), as measured by author developed questions focusing on overcoming barriers to increasing exercise and self-efficacy for integrating physical activity in the daily routine, while outcome expectations measured, managing time for exercise and physical health outcome expectations, were not significant (Anderson, et al., 2006).

Another study (Petosa, Suminski, & Hertz, 2003) found that SCT constructs, including self-efficacy, exercise role identity, self-regulation, outcome expectancy value, social support, and positive exercise experience, comprehensively accounted for 27% of the variance in physical activity over a 4 week period of self-report in college students. Hellman (1997 as cited by Keller, Fleury, Gregor-Holt & Thompson, 1999) found that self-efficacy, perceived benefits, barriers and support accounted for 50% of the variance in exercise in a cross-sectional study of cardiac rehabilitation participants. Finally, Sallis et al., (1992 as cited by Keller, Fleury, Gregor-Holt & Thompson, 1999) observed self-efficacy, barriers, friend support and family support accounted for 12% of variance in

exercise in a cross-sectional study of 1,739 adults in the community. It should be noted that the examination of SCT correlates varies widely in each study; the specific variables used in the models and the experimental interventions utilized are often very different, which leads to an extreme range in the predictive ability of the model.

Only two studies have explored the complete social cognitive model in relationship to physical activity (McAuley, et al., 2013), and both studies modified Bandura's health promotion model by removing benefits from the socio-structural center of the design, and adding social support as a contributor to self-efficacy and self-regulation (see Figure 4). The first study tested the determinants of the SCT model in college students (Rovniak, Anderson, Winett & Stephens, 2002) across three observational time points by measuring path analysis of social support, self-efficacy for physical activity, outcome expectations, self-regulation and physical activity. The authors found that self-efficacy had the greatest overall effect on physical activity ($\beta_{total} = .71$), however the effect was mediated in part by self-regulation and when this was accounted for, the total impact of self-efficacy dropped ($\beta_{total} = .57$) (Rovniak, Anderson, Winett & Stephens, 2002). This finding suggests an overlap between self-efficacy and self-regulation as predictive variables, and suggests that self-efficacy for exercise is improved by self-regulation. Self-regulation had a strong effect on physical activity ($\beta_{total} = .48$), social support had a moderate effect ($\beta_{total} = .28$), however this effect was entirely mediated by self-efficacy, and outcome expectations were not significant (Rovniak, Anderson, Winett & Stephens, 2002). The total variance explained by the tested model was 55%.

Ayotte, et al. (2010) also studied the entire SCT model in a cross-sectional convenience sample of married couples 50-75 years old (n=472) via postal mail. In this model, the authors utilized covariates of gender, age and numbers of health conditions to best understand the relationship of SCT determinants to physical activity using structural equation modeling. The model explained 66% of the variance. Higher social support was directly related to improved self-efficacy ($\beta_{\text{direct}}=.40$) and self-regulatory behaviors ($\beta_{\text{direct}}=.17$), however the relationship between social support and physical activity was mostly indirect ($\beta_{\text{indirect}}=.34$; $\beta_{\text{direct}}=.05$) and explained by self-efficacy and self-regulatory behaviors (Ayotte, et al., 2010). The authors also found a strong relationship between high self-efficacy and positive outcome expectancies ($\beta_{\text{direct}}=.45$), and fewer perceived barriers ($\beta_{\text{direct}}= -.41$). In addition self-efficacy was directly related to self-regulatory behaviors ($\beta_{\text{direct}}=.34$), and indirectly via both outcome expectations ($\beta_{\text{indirect}}=.18$) and perceived barriers ($\beta_{\text{indirect}}=.16$) (Ayotte, et al., 2010). This study noted an important distinction in the relationships between both barriers and outcome expectations with physical activity. The authors suggest that these two determinants have an *indirect* relationship with physical activity that is moderated by self-regulatory behaviors (Ayotte, et al., 2010). Self-efficacy was directly associated with physical activity ($\beta_{\text{direct}}=.48$). Finally, several relationships were observed between the covariates and SCT determinants. The number of health conditions was related to self-efficacy ($\beta_{\text{direct}}= -.28$) and perceived barriers ($\beta_{\text{direct}}=.16$) (Ayotte, et al., 2010). Age was related to less positive outcome expectations ($\beta_{\text{direct}}= -.30$).

Self-efficacy for physical activity is also an indirect determinant of physical activity. Self-efficacy is a moderator of self-regulatory behaviors such as planning for

physical activity, such that persons who have higher self-efficacy will increase exercise following interventions for planning, while persons who have low self-efficacy will not increase their exercise with interventions designed to improve self-regulatory skills and efficacy (Luszczynska, Schwarzer, Lippke & Mazurkiewicz, 2011; Annesi & Vaughn, 2011). People who identify “many barriers and do not expect positive outcomes from ...physical activity are not likely to have physical activity plans and goals” (Ayotte, et al., 2010, p.182). Consequently, the increased use of self-regulatory strategies is a strong predictor of increased exercise (Umstattd, et al., 2008).

Self-efficacy appears to act as a mediator between physical activity and quality of life and functional ability, particularly in older adults (McAuley, et al., 2013). In this situation, an intervention has no effect on exercise when changes in self-efficacy are taken into account (Lewis, Marcus, Pate & Dunn, 2002). A mediator is an intervening causal variable (Baumann, Sallis, Dzewaltowski, & Owen, 2002), or something that, when added to a variable improves a specific measured outcome. Self-efficacy also mediates the relationship between physical activity and functional impairments in physical health in persons with chronic health issues (McAuley, et al., 2013).

Physical Activity and Persons with Mental Illness

Persons diagnosed with mental illness are at risk for physical health issues, and have increased rates of mortality and morbidity as compared to persons who do not have mental illness (Tosh, Clifton & Bachner, 2011). Some prevalence estimates of chronic illnesses including diabetes, hypertension, respiratory issues and heart disease, are as high as 60% (Richardson, Faulkner, McDevitt, Skrinar, Hutchinson & Piette, 2005). High rates of physical health comorbidity contribute to a lifespan that is at least 25 years

younger on average among persons with mental illness (Parks et al., 2006). Physical activity is one of the most influential health behaviors for any person to address health conditions including: heart disease, insulin resistance, obesity and overall mortality (Jerome et al., 2012). For example, regular physical activity is effective for persons with schizophrenia to improve their blood lipid levels, decrease blood pressure, improve glucose metabolism and improve overall aerobic fitness (Vancampfort, et al., 2012). Despite the well-documented physical benefits of regular exercise, persons living with mental illness are more likely to be sedentary than people who do not have mental illness (McDevitt, Snyder, Miller & Wilbur, 2006; Jerome et al., 2009) and are unlikely to exercise at the recommended minimum 150 minutes of activity per week (Jerome et al., 2009).

The literature regarding physical activity interventions designed for persons living with mental illness is evolving. This is a relatively new area for research, and few studies have explored constructs from Social Cognitive Theory. Much of the research, regardless of theoretical model, involves single case studies of groups exploring the impact of health promotion activities on physical or mental health outcomes (Acil, Dogan & Dogan, 2008; Doorly, Subotnik, Kite, Alarcon & Neuchterlein, 2009; Fogarty, Happeli & Pinikahana, 2004; Beebe et al., 2011; Beebe et al., 2010; Jerome et al., 2012; Daumit et al., 2013). There is not yet one recommended theoretical approach to design and study interventions to promote physical activity for people diagnosed with mental illness. Many conceptual models of health behavior overlap (Bandura, 2003), and several models have been utilized in researching motivation for physical activity of persons living with mental illness including Social Cognitive Theory (Beebe et al., 2010; McDevitt, Snyder, Miller

& Wilbur, 2006), Social Determination Theory (Raepsaet, Knapen, Vancampfort & Probst, 2010; Roman, Beebe & Burk, 2012), Social Ecological Theory (Vancampfort et al., 2012) and Transtheoretical Model for Change (Bassilios, 2005). Self-efficacy for physical activity, particularly self-regulatory efficacy or the process of setting goals and problem-solving, is influenced by barriers and incentives to initiating the action (Bandura, 2003). The barriers and facilitators to exercise for persons with mental illness have been explored. Specific barriers to exercise for persons with mental illness are: negative symptoms of mental illness, particularly avolition; the impact of sedating medications; being overweight; relying on staff for motivation; limited social contacts and unsafe neighborhoods (McDevitt, Snyder, Miller & Wilbur, 2006; Ussher, Stanbury, Cheeseman & Faulkner, 2007). Correlates predicting lower physical activity levels are a diagnosis of cardio-metabolic disorders and negative symptoms of psychiatric disorders (Holley, Crone, Tyson & Lovell, 2011). Despite low levels of physical activity, people living with mental illness report that an increase of exercise would improve their overall quality of life (McDevitt, Snyder, Miller & Wilbur, 2006). Incentives for physical activity for persons with mental illness include: an improvement in mental health symptoms, having a distracting hobby, a belief that exercise improves recovery (McDevitt, Snyder, Miller & Wilbur, 2006), increased time or attention from staff, and weight loss (Roberts & Bailey, 2011). A recent review (Holley, Crone, Tyson & Lovell, 2011) of 15 studies examined the impact of physical activity on the mental health of persons with schizophrenia. The authors found that persons with mental illness who engage in greater amounts of physical activity appear to have improved mental health outcomes, in addition to improved physical health statuses. Physical activity provided some level of

improvement of mental health variables, including symptom reduction, stress management and improved quality of life in the reviewed articles (Holley, Crone, Tyson & Lovell, 2011), however, the broad range of design and mixed quality of the research makes it difficult to understand the relationship between variables. Additionally, most of the research regarding physical activity in persons with mental illness is cross-sectional, further limiting the understanding of causality.

Social support is another variable that has been explored in the examination of physical activity for persons with mental illness. Social support is helpful in making behavioral changes in lifestyle. There is some evidence that the use of peers supports lifestyle changes in persons with mental illness (Jerome et al., 2012; Druss et al., 2010). Social support or connections to others such as friends or family may encourage or discourage active participation in physical activity. For example, social isolation is correlated with lower levels of physical activity (Jerome et al., 2012). People with mental illness are at risk for fewer social supports (McDevitt, Snyder, Miller & Wilbur, 2006), and identify themselves as having limited social support for exercising (Ussher, Stanbury, Cheesman, & Faulkner, 2007). The quality of social support may make a difference for persons to begin or maintain physical activity. This may include peer support for exercise (Carless & Douglas, 2008; Jerome et al., 2012; Ussher, Stanbury, Cheesman, & Faulkner, 2007; Druss et al., 2010) in a health promotion intervention, or the inclusion of motivational staff (McDevitt, Snyder, Miller & Wilbur, 2006; Roberts & Bailey, 2011). Some social contacts may discourage exercise by criticizing the amount of time spent exercising (Aschbrenner, Muser, Bartels & Pratt, 2013). While social support can encourage physical activity, the specific types of support offered must be tailored to the

individual (Carless & Douglas, 2008) and to the person's evolving sense of ability and efficacy to the task.

SCT and Physical Activity for Persons with Mental Illness

There are several examples of Social Cognitive Theory utilized as a theoretical construct to understand motivation and behavior change of physical activity in persons with mental illness. In the earliest example, McDevitt, Snyder, Miller & Wilbur (2006) completed a qualitative focus group series at a community mental health center with 34 individuals to examine which factors affect physical activity in persons with mental illness receiving outpatient mental health services. The authors developed a semi-structured focus group using SCT as the theoretical structure, with questions relating to "personal, psychosocial, and environmental barriers to physical activity" (McDevitt, Snyder, Miller & Wilbur, 2006, p. 51) and methods to improve self-efficacy of participants of the program to exercise. All of the barriers to physical activity were suggestive of lowered physical activity self-efficacy (McDevitt, Snyder, Miller & Wilbur, 2006) and included: mental health symptoms, lack of knowledge about safe exercising, weight gain from medications, fear of discrimination, and personal safety while exercising in neighborhoods. Interestingly, the authors note that the specific barriers to physical activity were different for persons with mental illness than for the general population. Participants felt that physical activity was helpful for mental and physical health. Additional themes suggested that participants wanted staff to initiate physical activity, but be aware of potential conflicts of interest of pushing someone to exercise as part of 'program compliance' (McDevitt, Snyder, Miller & Wilbur, 2006). Finally, evidence of non-supportive environmental influences further acted as a barrier to physical

activity such as poverty, experiencing stigma, the experience of mental health symptoms and receiving services. While this design was not experimental, it provided a foundation for use of SCT while examining physical activity in persons with mental illness.

Beebe et al. (2010) explored SCT by using an intervention based upon self-efficacy theory and validated for older adults with a population of persons diagnosed with Schizophrenia Spectrum Disorders. They predicted that persons receiving an experimental four week physical activity knowledge-based activity would improve Self-Efficacy for Exercise and Outcome Expectation for Exercise measure scores as compared to Time and Attention Controls. The 97 participants were randomly assigned to one of the two conditions, and a pre-test posttest design was used to determine differences in scores. Mean scores for Self-Efficacy for Exercise were significantly higher in experimental participants at post-test, however, mean Outcome Expectation for Exercise scores were significantly higher in control after the intervention; the control group were engaged in greater physical activity at the baseline. The authors suggest that outcome expectation may not be a valid measure for persons with mental illness, however, another explanation may be differences between subjects: control participants were exercising more than persons in the experimental condition at the pre-test (Beebe et al., 2010), or lack of statistical power. This study had some problematic limitations, which threaten its external validity, such as high refusal rate, excessive exclusionary criteria, and not utilizing or including covariates such as amount of time exercising.

As a follow-up to the previous study, Beebe, et al. (2011) examined the impact of the experimental educational intervention on participation in a 16 week walking group. They predicted that participants who had previously participated in the experimental

group would have higher attendance, persistence and compliance to a community walking group compared to participants who had participated in a time and attention based control. In fact, the experimental group did attend more walking groups, persisted in walking for longer time periods and walked more minutes than persons who had received only the control experience (Beebe, et al., 2011). This second arm of the study was more promising in validating the importance of addressing self-efficacy for physical activity and the relationship to performing physical activity.

In the third study using the same participants, Beebe et al., (2013) looked at a convenience sample of previous participants (n=24) who had participated in the original experimental or time and attention control groups months before, to determine if participants who had received the experimental condition would be walking more steps in one week. This follow-up study was a cross-sectional examination of total steps walked during a seven-day period. Results indicated that participants from the experimental group walked more steps (4425) than persons in the control (2810), and more distance daily (1.4 miles) compared to control (.9 miles) (Beebe et al., 2013). The study was limited by using only a portion of participants and recruiting through convenience and by mixing cohorts of participants, which meant that participants had received the intervention in a range of timeframes from 12 to 22 months previously. Despite these limitations, it is promising that an intervention designed to improve self-efficacy for physical activity appeared to have long-term impact on participants.

The final pilot study presented in this review utilized elements of SCT within a physical activity intervention, which included peer support (Jerome et al., 2012). The authors proposed peer support improves adherence and subsequent changes in

cardiovascular fitness associated with moderate intensity exercise program among persons with mental illness receiving community care. Participants (n=93) were randomized to either receive trained peer mentors or no peer mentors, then both groups were offered progressive exercise groups three times a week for four months. Jerome et al. (2012) studied the relationship between mental health symptoms, physical activity self-efficacy and fitness levels, and found a significant correlation between physical activity self-efficacy and time on treadmill ($r=.28, p<.05$), cardiovascular strength as measured by the METs test ($r=.29, p<.05$), and physical strength as measured by the 6 Min Walk Test ($r=-.32, p<.05$). What is noteworthy, however, is generalized self-efficacy had no such relationship (Jerome et al., 2012). Further, they discovered a modest correlation between social support and fitness level. No meaningful correlation between physical fitness level and mental health symptoms or status was found. There were several limitations to this study, which could prevent generalizability. The authors included many exclusion criterion including weight, ability to walk, substance use, and abnormal treadmill test results. By restricting participants in this way, it is unclear if the intervention would be effective in less healthy participants. Additionally, the study utilized external motivators such as rewards for personal goal attainment, which makes it hard to tease out the development of personal self-efficacy for exercise from motivation to receive rewards.

Use of Self-Report Measures

One common method of studying physical activity and SCT determinants is through self-report. While self-report of such constructs as physical activity, social support for exercise, self-efficacy for exercise, outcome expectations for exercise, goal-

setting practices, and barriers to exercise is dependent upon participant ability to recall events and provide honest answers, it is an economical and feasible approach to gather information for the purposes of this study. Further, self-report of all of the constructs have been utilized in previous studies both in persons with psychiatric disabilities (Faulkner, Cohn & Remington, 2006; Beebe et al., 2010) and in persons without psychiatric disabilities (Sallis, Grossman, Pinski, Patterson & Nader, 1987; Salmon, Owen, Crawford, Bauman & Sallis, 2003; Rovniak, Anderson, Winnett, & Stephens, 2002).

Summary

There is a small sub-set of literature that has examined physical activity in persons with psychiatric disabilities through the lens of SCT. Specific features that have been studied include barriers and incentives to physical activity, outcome expectations and social support. While an extensive understanding of the barriers or impediments, also called socio-structural factors, to begin activity and to maintain physical activity is necessary to design interventions (Bandura, 2003), a broader focus is necessary to understand if the theoretical model is effective in explaining initiation of physical activity for persons living with mental illness.

However, none of the reviewed literature has examined the larger construct of SCT as it applies to persons with mental illness and the pathways to physical activity.

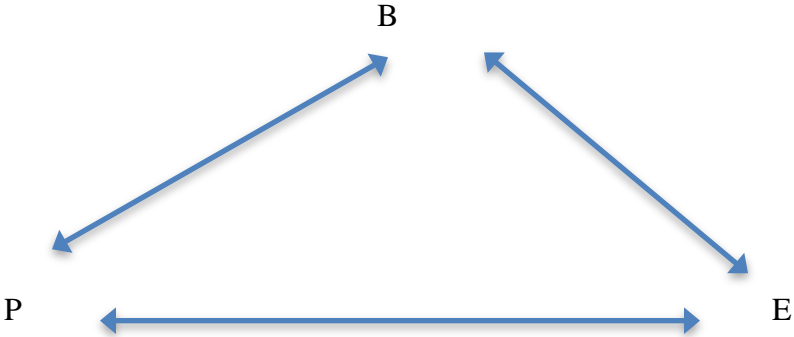


Figure 2
Bandura's Determinants of Social Cognitive Theory
P= Personal and Cognitive Factors
B = Behavioral Factors
E= Environmental Factors

Note:
From Bandura, 1986
The three determinants of Social Cognitive Theory

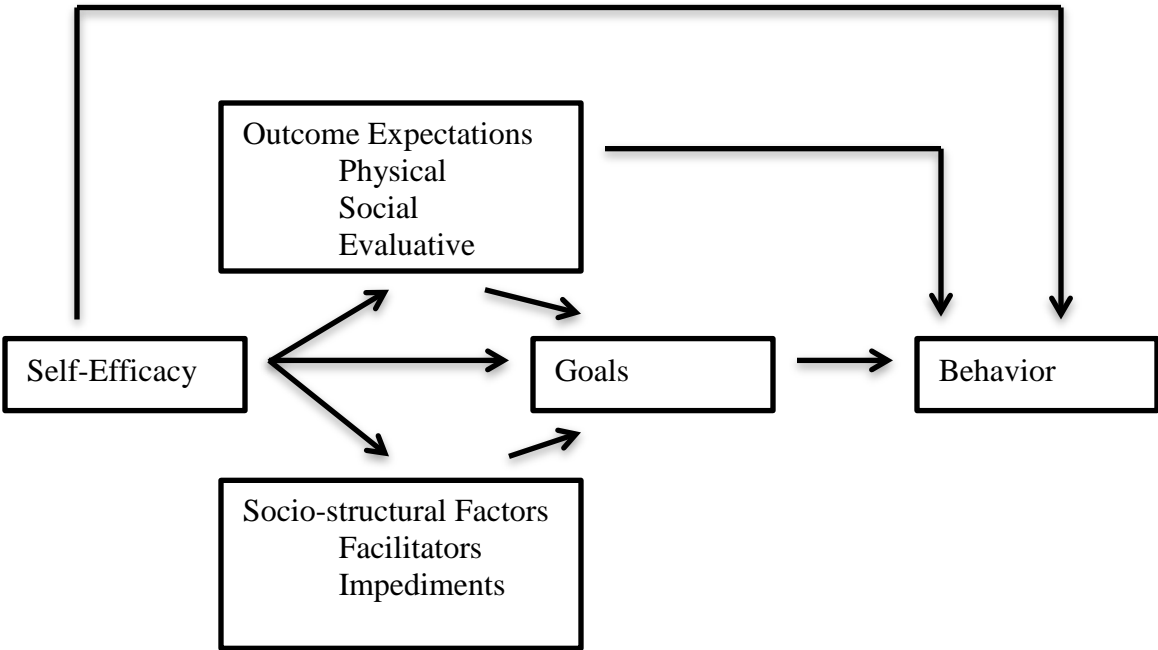


Figure 3
Perceived self efficacy impact upon health behaviors
From: Bandura, 2004, p. 146

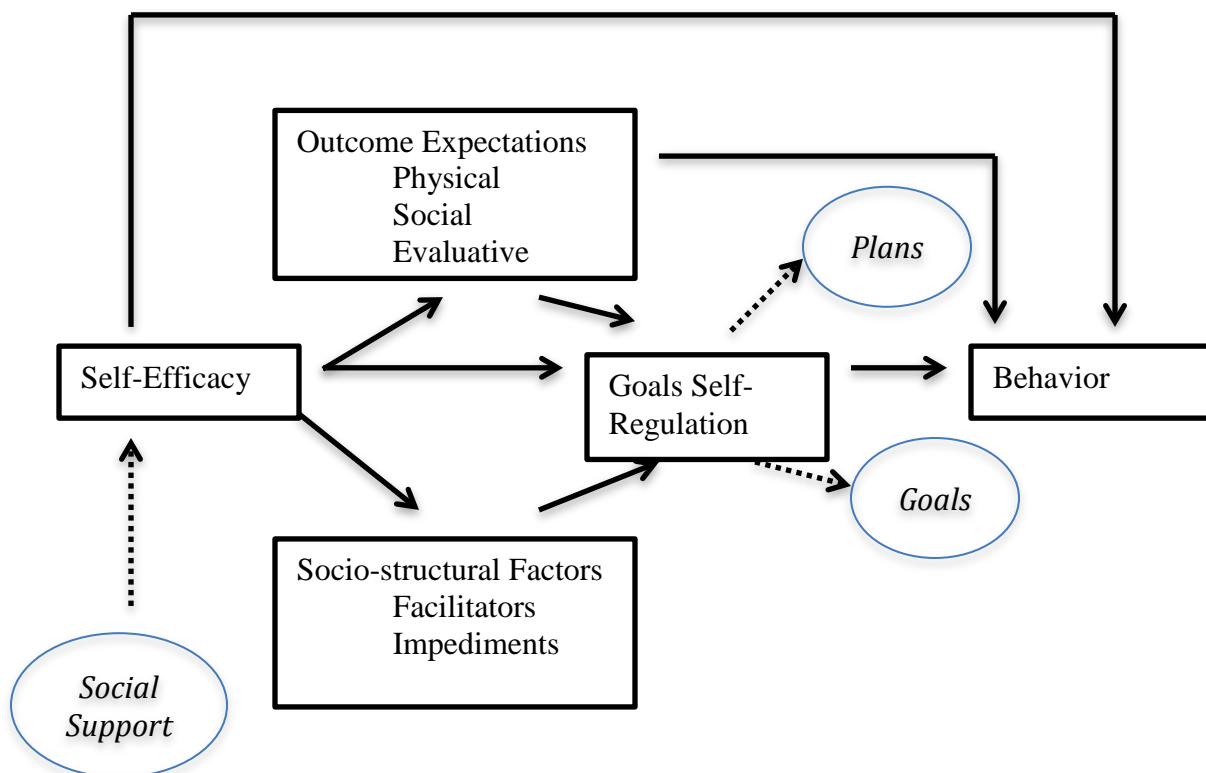


Figure 4 Updated SCT Model for Physical Activity
 Modifications of Bandura's Model SCT for Health Promotion model by Ayotte et al., 2010 & Rovniak et al., 2002. Additions indicated by circles and italicized text, deletions indicated by strikethrough text.

Chapter III

METHOD

Participants

Persons with psychiatric disabilities in this study are people who have been diagnosed with schizophrenia, schizoaffective disorder, bipolar disorder, or major depression, and who receive outpatient mental health services or supportive housing services in the state of New Jersey and surrounding areas. One hundred forty-two persons agreed to participate. Participants in the study were from community mental centers (63%), male (60%), had a high school education (60%), an average age of 47 years and were primarily Black (51%) or White (38%). They reported predominantly diagnoses of bipolar disorder (35%) or depression (36%). Participants indicated good (36%) or fair (29%) perception of overall health. The number of health conditions ranged from zero to eight, with the average being 2.23. Finally, most of the support for physical activity came from exercise groups at the mental health service location (43%).

The amount of physical activity reported by participants was measured by the International Physical Activity Questionnaire – Short Form, which provided an estimate of metabolic equivalents (MET) minutes per week. This value is a weighted estimate of the amount of energy expended in one week in MET units and is calculated by multiplying MET level with minutes of activity and events per week (Craig et al., 2003). The IPAQ scores vigorous activity as being 8.0 MET expenditure, moderate activity as 4.0 MET expenditure and walking as 3.3 MET expenditure. A participant indicated the number of days they engaged in a particular type of activity of at least ten minutes duration, and the average amount of time spent in that activity, then this product is

multiplied by the MET expenditure for that activity. All of the activities are then added together to create a MET minutes per week value. Participants in the study had a mean value of 3205.19 MET minutes per week (Sd = 4600.81), and median value of 1417.75 MET minutes per week. Authors of the IPAQ suggest that the median is more useful descriptive of MET minutes due to the skewed nature of exercise with more persons exercising less (Craig, et al., 2003). Participants had an average of 53.96 minutes spent per week in vigorous exercise, however one participant reported 690 minutes per week and two reported roughly 300 minutes per week. Most participants reported little or no vigorous exercise time per week. The average amount of time per week spent in moderate exercise was 85 minutes. Three participants did report moderate exercise minutes at 390 minutes or above. More participants spent time in walking than in any other physical activity with an average of 122 minutes per week. Four participants indicated walking 360 minutes or more per week. In general, participants walked more than any other type of exercise and very few reported performing 10 minutes or more of vigorous exercise in a week.

See Tables 1 and 2 for further information.

Sampling procedures.

Recruitment of participants for the study took place at community mental health centers (CMHCs) and specialized transitional housing services for persons with psychiatric disabilities also known as housing services. The researcher or research assistant recruited participants during community meetings, health fairs, at other group meetings and via informational sessions held onsite. All participants were provided with an informational page outlining the benefits of physical activity. In addition, participants

were paid \$20.00 for the completion of the measures packet. Each participant was asked to sign a receipt stating that they have received \$20.00 for completion of the packet.

Ethics approval was granted from Rutgers, The State University of New Jersey, Institutional Review Board prior to commencing the study.

Power analysis.

The necessary power to find a moderate effect size ($f^2=.15$) at a reasonable power level (.8), using $\alpha=.05$ with 9 total predictors, was computed at $N=114$ using G*Power (Buchner, Erdfelder, Faul, & Lang, 2009). Further review of relevant literature offers a more conservative perspective: one estimation is to utilize 15 participants per predictor for multiple regression (9 variables X 15= 135 participants) (Stevens, 2002), while another suggests the use of the equation $N \geq 50+8IV$ (Tabachnick & Fidell, 2001) for a medium-sized relationship and $\beta=.20$, which suggests 122 participants would adequately power the study. In order to take into account potentially missing data and dropout rates, 140 participants were targeted for recruitment.

Procedure

Study information was distributed to several large outpatient CMHCs and supported housing providers in central and northern New Jersey. Follow-up telephone calls were made to Directors of Partial Hospitalization, Outpatient Services and Chief Executive Officers of housing programs to solicit participation by the organization, and to schedule an informational meetings with key stakeholders in the system. Following organizational agreement to participate, they provided written information for staff and participants to review the aims and background of the study, inclusion criteria, measures and procedure.

The study was publicized at community meetings of the programs, and through signs at the organizations. The researcher and research assistant(s) scheduled weekly visits to organizations to meet with and interview participants, with a goal of recruiting 20 participants per week. Informed consent and data collection was planned for groups of five. The informed consent procedure was completed as a group process: the researcher or research assistant read the consent form aloud. Participants were advised that they could withdraw from the study at any time, without compromising their care at the CMHC or housing services. Participants were given a short quiz to assess for capacity to give consent, and given three opportunities to complete the quiz. Following the informed consent process, participants were given a packet with response cards and three measures. The administration order of the measures was randomized by session in order to minimize order bias. The eight measures were each assigned a number and, using a random number generator software package, fifty randomized sequence lists were generated. The packets were completed in an interview room at the CMHC or housing location.

Upon successful completion of the informed consent capacity quiz, surveys were administered in groups between 2 and 11 persons for approximately 60 to 90 minutes on a single occasion by the researcher or research assistant(s) using a structured questionnaire format with response cards for the International Physical Activity Questionnaire, Self-Efficacy for Exercise Scale, Outcome Expectations for Exercise Scale, Exercise Goal-Setting Scale, Barriers to Exercise and Social Support for Exercise Scale. Questions were read aloud by the researcher or research assistant(s) from the specified measures and participants used response cards provided. Participants self-

administered the BSI-18, Health Conditions checklist and demographic questions. One item of BSI-18 (item 17) was scored on-site immediately as it asked participants to rate distress related to thoughts of ending one's life. If the participant scored the item as "quite a bit" or "extremely" bothered by this statement, then it indicates acute distress (Pearsons, nd) and the researcher or research assistant(s) would implement a crisis plan following discussion with the person. The researcher or research assistant(s) spoke privately to the participant to assess if the participant was in imminent danger of self-harm. The participants were encouraged to identify support persons with whom they can speak, given 24-hour local and national hotlines to discuss thoughts and feelings. If the person was in immediate or acute distress they were encouraged to call 911 or go to the nearest hospital emergency department. None of the persons scoring question 17 in the acute distress range indicated imminent danger of self-harm. All were encouraged to discuss these thoughts and feelings with their onsite mental health provider.

The researcher recruited participants, administered and collected measures, entered data and analyzed the data of the study. Research assistants assisted in recruiting participants, administering and collecting measures and entering data into statistical software package.

Measures-Instruments

International Physical Activity Questionnaires (IPAQ).

The International Physical Activity Questionnaires (IPAQ) are a set of 4 publicly available questionnaires that include a long version with 27 questions or short version with 7 questions. Both the long and short versions have administration variations, which permits telephone or researcher administered questions or self-administered paper and

pencil versions. The instrument was developed to measure three types of physical activity in multiple countries (Booth, 2000) and is publicly available at www.ipaq.ki.se in multiple languages, free of charge. The tool measures vigorous physical activity, moderate physical activity, walking and total minutes of physical activity through self-report, as well as, the metabolic equivalent value or MET (Faulkner, Cohn & Remington, 2006). Reliability was explored using test-retest methods no more than 8 days apart with a Spearman's reliability coefficient of .88 for the United States (Craig et al., 2003). Criterion validity was investigated by correlating self-report information to objective accelerometer data with fair to moderate outcomes: Spearman correlation coefficient of .30 (95% CI .23-.36) (Craig et al., 2003).

Faulkner, Cohn & Remington (2006) established reliability and validity of the IPAQ-SF for use in persons with mental illness. Thirty-five persons living with schizophrenia completed the survey twice over a 7 day period in combination with RT3 accelerometers usage. Results of the test-retest of the measure for type of activity indicated Spearman's rank correlation coefficient of .69 ($p < .01$ [CI: 0.46-0.83]) for vigorous physical activity, .50 ($p < .01$ [CI: 0.2-0.71]) for moderate physical activity and .68 ($p < .01$ [CI: 0.45-0.83]) for walking. In addition, to determine further test-retest reliability in other areas, the authors calculated Spearman's rank correlation coefficient = .70 for MET minutes per week, a measure of metabolic exercise rate, and Spearman's rank correlation coefficient = .68 for total minutes of physical activity per week (Faulkner, Cohn & Remington, 2006, p.229). Convergent criterion validity was explored through the agreement between total minutes of physical activity derived from the IPAQ and RT3 accelerometer during a 7 day period, with results indicating fair agreement at

Spearman's rank correlation coefficient= 0.37 ($p < 0.05$ [95% CI: 0.04–0.63]) (Faulkner, Cohn & Remington, 2006). By comparison, Craig et al. (2003) reported Spearman's rank correlation coefficient= 0.76 for reliability and 0.30 for criterion validity of IPAQ-SF in the general population.

Social Support for Diet and Exercise Scales.

The Social Support for Diet and Exercise Scales were developed to measure the perceived social support related to healthy eating and physical activity (Sallis, Grossman, Pinski, Patterson & Nader, 1987). The scale is comprised of two subscales, the first relating to social support for dietary behaviors and the second relating to exercise. The exercise subscale has 13 items measuring the self-report amount of time family and friends provide both positive and negative social support for exercise in the past three months. Responses are assigned a value on an eight point Likert scale ranging from “none” to “does not apply”. Psychometric properties were established via a study utilizing undergraduate students and faculty (Sallis, Grossman, Pinski, Patterson & Nader, 1987). Factor analysis was computed for both friend support and family support; Friend Support for Exercise Scale included four factors and accounted for 57% of the total variance, while Family Support for Exercise Scale also included four factors and accounted for 59% of the total variance (Sallis, Grossman, Pinski, Patterson & Nader, 1987). Reliability for the scale was assessed via test-retest method 1-2 weeks later and reliabilities ranged from 0.55 to .86, while internal consistency was explored examining Cronbach's alpha coefficients ranged from .61 to .91 (Sallis, Grossman, Pinski, Patterson & Nader, 1987). Concurrent criterion validity was tested by correlating the social support factor scores with additional measures, with significant correlations being

reported for factors within the scale to other measures of diet and exercise (Sallis, Grossman, Pinski, Patterson & Nader, 1987). Finally, discriminant construct validity was established by examining correlations between the factors of the scale and the Social Support Questionnaire: none of the factors correlated with the indices of the Social Support Questionnaire and the Social Support Questionnaire was not significantly correlated with diet or exercise habits (Sallis, Grossman, Pinski, Patterson & Nader, 1987).

A slightly modified version of the measure was administered and validated in a study of social support for healthy behaviors for persons with mental illness (Ashenbrenner, Mueser, Bartels & Pratt, 2013). In the modification of the exercise subscale, the three-item Rewards/Punishment scale was altered by removing one item: “gave me rewards for exercising”, then the subscale was renamed criticism for exercise habits. This was done to separate the sub-scale into one construct of disapproval of exercise (Ashenbrenner, Mueser, Bartels & Pratt, 2013). Reliability for the entire scale with modifications was reported using Cronbach’s $\alpha=.73$ for the friend rating and $.80$ for family member rating. Validity for the scale was not reported. The current study will use the original validated scale, with the two subscales of social support from family and social support from friends as predictor variables.

Self-Efficacy for Exercise Scale.

Self-Efficacy for Exercise Scale (SEE) has nine items measured on a five point Likert scale and was created to measure self-efficacy to overcome barriers to exercise in older adults (Resnick & Jenkins, 2000). Reliability for the measure was explored by testing internal consistency ($\alpha=.92$) (Resnick & Jenkins, 2000). Convergent construct

validity was tested by using health status to predict SEE scores after controlling for age and gender ($F=38.0$, $p<.05$), and SEE scores significantly predicted physical activity ($F=78.8$, $p<.05$) (Resnick & Jenkins, 2000). Finally, predictive criterion validity was examined: the SEE accounted for 30% of the variance in physical activity (Resnick & Jenkins, 2000).

One published study has explored reliability of the SEE scale with persons with schizophrenia. In an intervention designed to improve walking, acceptable reliability was estimated by calculating alpha coefficients ($\alpha=.82$), and significant test-retest scores after the four week group ($r=.48$, $p=.001$) (Beebe et al., 2010).

Outcome Expectations for Exercise Scale.

The Outcome Expectations for Exercise Scale (OEES) is a nine item scale designed to assess the outcome expectations older adults identify related to physical activity (Resnick, Zimmerman, Orwig, Furstenberg & Magaziner, 2000). It is scored on a Likert 5 point scale by summing the numerical responses and dividing by the number of items (Resnick, Zimmerman, Orwig, Furstenberg & Magaziner, 2000). Scores range from 1 to 5, with a higher total indicating greater outcome expectations for exercise. Reliability was assessed using Cronbach's alpha coefficients and found acceptable ($\alpha=.89$) (Resnick, Zimmerman, Orwig, Furstenberg & Magaziner, 2001). Using six variables as predictors of exercise behavior in a multiple regression model, OEES scores were predictive of amount of exercise ($r^2=.31$, $\beta=.31$, $p<.05$); physical health ($r^2=.18$, $\beta=.27$, $p=.001$); and self-efficacy expectation ($r^2=.23$, $\beta=.17$, $p<.025$) (Resnick, Zimmerman, Orwig, Furstenberg & Magaziner, 2000). It should be noted that OEES scores had the highest beta weight in the multiple regression model indicating its relative

importance in predicting exercise. Concurrent criterion validity was tested in 58 nursing home residents by comparing the mean OEES scores for exercising older adults (Mean=2.7, SD=.48) with non-exercising older adults (Mean= 2.5, SD=.78), a significant difference in means suggesting that persons who did exercise had a higher score on the OEES (Resnick, Zimmerman, Orwig, Furstenberg & Magaziner, 2000). One study used the measure in persons with schizophrenia. Evidence of internal consistency was reported using test-retest scores ($r=.33$, $p=.03$) after the 4 week intervention, and post-test Cronbach's alpha coefficients with acceptable values ($\alpha=.907$ baseline, $\alpha=.909$ post-test) (Beebe et al., 2010).

Barriers to Physical Activity Scale.

The Barriers to Physical Activity Scale is a subscale found in the larger Physical Activity and Health Questionnaire, nationally developed measure broadly used in population studies in Australia (Salmon, Owen, Crawford, Bauman & Sallis, 2003). The questions ask respondents to rate the impact of 13 different barriers on ability to exercise, e.g. work or cost, using a 5 point Likert scale ranging from "not a barrier" to "very much a barrier". Internal consistency was estimated using Cronbach's alpha coefficient ($\alpha=.7$). A one-week test-retest assessment of reliability using intra-class correlation coefficients indicated item values ranged from .36 (no sidewalk) to .74 (disability or injury). Construct validity was explored by using barriers as predictors of sedentary behavior. The barriers of cost (Odds Ratio =1.5, CI 1.1-2.1, $p=.009$), being tired (Odds Ratio =.5, CI .4-.8, $p<.001$), and work interference (Odds Ratio= .6, CI=.4-.9, $p=.009$) were found to significantly predict sedentary behavior or exercise of less than 2.5 hours per week (Salmon, Owen, Crawford, Bauman & Sallis, 2003).

Exercise Goal-Setting Scale.

The Exercise Goal-Setting Scale (EGS) was developed to identify goal-setting, self-monitoring and problem solving practices (Rovniak, Anderson, Winnett, & Stephens, 2002) and has been used in college students and middle-aged and older adults (Ayotte et al., 2010). The scale has 10 questions related to exercise goals and plans, with responses on a five point Likert scale ranging from “does not describe me” to “describes completely”. The scale internal consistency was estimated using Crohnbach’s alpha coefficient ($\alpha=.89$), and reliability established by examining seven day test-retest alpha coefficient values ($\alpha=.87$) (Rovniak, Anderson, Winnett, & Stephens, 2002). A significant correlation ($r=.38$) between scores on the EGS and self-report physical activity was suggestive of criterion validity (Sepers, C., Bartee, R., Abbey, B., & Heelan, K., n.d.). Further studies of criterion validity correlated EGS scores with self-efficacy (.47), outcome expectations (.29) and social support for exercise (.25)(Elavsky, Doerksen, & Conroy, 2012).

Brief Symptom Inventory – 18.

The Brief Symptom Inventory 18 (BSI-18) is an 18 item self-report instrument designed to measure psychological distress from psychiatric symptoms in adults. The tool is a reduced version of the 53 item Brief Symptom Inventory (Boothroyd, 2012). There are three symptom sub-scales including; somatization, depression and anxiety, in addition to, a Global Severity Index (GSI) (Pearson's Clinical Assessment Group, n.d.). For the purposes of this study, the sub-scales of the BSI-18 were utilized to represent distress from symptoms. Internal consistency of the measure has been tested via Cronbach’s coefficient alpha in adults without psychiatric disabilities with values ranging

from .74 to .89 (Carlsen et al., 2004). In psychiatric outpatient settings Cronbach's alpha values ranged from .71 to .84 for the subscales and .89 to .91 for the GSI score (Andreu, et al., 2008; Franke et al., 2011). Test-retest reliability in psychiatric outpatient clinics was assessed over a 15 day timeframe, with a GSI coefficient alpha value of .76 (Andreu, et al., 2008). Concurrent criterion validity was explored by correlating anxiety-related items on the BSI-18 to similar items on the Becks Anxiety Index: correlation scores ranged from .52 for a physical sub-score of anxiety construct to a high of .82 for the subjective anxiety sub-score (Andreu, et al., 2008). Additional concurrent criterion validity was explored correlating the BSI-18 depression questions with the Becks Depression Index total depression scores ($r=.83, p<.001$), and the MMPI-2 Depression subscale ($r=.78, p<.001$) (Andreu, et al., 2008).

Number of chronic health conditions.

The number of chronic health conditions experienced by participants was identified using a technique described by Ayotte et al. (2010). A list of 31 common chronic health conditions was presented to the participant, and the person circled the health diagnosis they currently have or have had in the past. The list of health conditions is from the National Center for Health Statistics (2010) utilized in national surveys of Residential Health Care Facilities. The only change to the list was the wording change of "SERIOUS MENTAL PROBLEMS SUCH AS SCHIZOPHRENIA OR PSYCHOSIS" to "MENTAL ILLNESS DIAGNOSIS: Please Circle One: Schizophrenia, Schizoaffective Disorder, Depression, Bipolar Disorder, Other". This change was made in order to identify the mental illness the person has been diagnosed with. The variable number of

health conditions was a summed numeric value representing the total number of health conditions the person has circled.

Demographic Variables.

Participants were asked to complete a brief demographic and health 9 item questionnaire, which will identify: age, gender, highest education level attained, housing type, smoking status and number of cigarettes smoked per day, number of psychotropic medications taken per day, and if they receive services that help them to exercise.

Design

A correlational cross-sectional non-experimental design was used. Identified variables were measured in a single session or cross-sectional method. Participants volunteered to participate.

Variables and Operational Definitions

The dependent variable or criterion variable for the study is physical activity. The predictor variables or independent variables for the study are: social support from family for exercise, social support from friends for exercise, self-efficacy for exercise, outcome expectations for exercise, barriers to exercise, goal-setting practices for exercise, gender, number of health conditions, psychiatric symptoms and age.

Physical activity or exercise was defined as any purposeful movement meant to improve health (USDHHS, 1996), which lasted at least ten minutes. The IPAQ provides a weighted number of MET units expended per week. One MET unit is defined as "the resting metabolic rate, that is, the amount of oxygen consumed at rest, sitting quietly in a chair (Jette, Sidney & Blümchen, 1990, p. 555)." An activity which doubles that amount of energy burned is considered an MET value of 2, and an activity, which triples the

amount of energy consumed has an MET value of 3 etcetera (Jette, Sidney & Blümchen, 1990). Social support for physical activity is the assistance and encouragement of family and friends to engage in physical activity (Sallis et al., 1987). Self-efficacy for exercise is the belief that a person can successfully exercise despite barriers presented (Resnick & Jenkins, 2000).

Outcome expectations for physical activity were the beliefs that certain positive outcomes, such as weight loss or improved endurance, will occur as a result of exercise (Bandura, 1986). Barriers to physical activity are the reasons a person feels unable to or challenged by performing physical activity (Bandura, 2004). In the current model goals referred to the goal setting process, or the activities, which help a person regulate their behavior (Bandura, 1991) including self-monitoring of achieving intentions and problem-solving (Rovniak, Anderson, Winett & Stephens, 2002).

The personal characteristics included in the model included gender, number of health conditions, psychiatric symptoms and age. Gender was reported as male, female or transgender. Number of health conditions was defined as a sum of the number of chronic health conditions circled from a list generated by the National Survey of Residential Care Facilities, which are linked to physical disability (National Center for Health Statistics, 2010). Psychiatric symptoms were the experienced mental health distress related to severe mental illness and were operationalized by the score from the General Severity Index from the Brief Symptom Inventory, which is “the single best indicator of current distress levels, and should be utilized in most instances where a single summary measure is required” (Derogatis & Melisaratos, 1983, p.597). Finally, age was understood as the chronological age as of the date of measure.

Data Analysis Plan

In order to assess internal consistency of all instruments administered, Cronbach's alpha coefficient scores was computed. In order to ensure the integrity of the data, raw numeric values from all questions were entered into the database by the doctoral candidate, then 100% of the data was entered into a second database by a research assistant. Descriptive statistics were studied via IBM SPSS version 20 (2012). The data was screened for outliers. Given the limited range of response values, outliers may be limited. Missing data values were replaced with the mean group scores as described by Tabachnick & Fidell (2001). Survey score values were computed using raw scores within the SPSS compute variable function after all of the raw data was entered. Correlations between each predictor variable and criterion variable were studied to identify which variables were most highly correlated with physical activity. Additionally, correlations between each of the predictor variables were examined to determine possible significant relationships and collinearity.

Hierarchical multiple regression, simple linear regression and correlation were used to assess the proposed model of physical activity in persons with psychiatric disabilities. A hierarchical multiple regression model was used, as described further below, to study the relationship between SCT correlates and physical activity, while controlling for personal characteristics. As little supporting literature exists on the topic of SCT and exercise in persons with psychiatric disabilities, the data analysis included a plan to attend to potential covariate effects, while still looking at multiple relationships between variables.

Hierarchical or sequential regression analysis was used to examine the relationship between self-report physical activity (the dependent variable) and the SCT determinants (the independent variables) while controlling for personal characteristics, to address the first hypothesis. The first block included the personal characteristics of: gender, age, number of health conditions, and distress from psychiatric symptoms of anxiety, depression and anxiety. The second block in the model included SCT determinants of: social support from family; social support from friends; self-efficacy; outcome expectations; barriers; and goal setting practices. Standardized regression coefficients (beta weights) for each predictor variable were computed to assess the individual contribution of each predictor to the overall variance. The amount of variance was computed for the first block, the second block and the combination of both blocks.

Analysis was performed to evaluate assumptions of hierarchical regression, namely normality, linearity, and homoscedasticity of residuals, the presence of outliers, an absence of multicollinearity and singularity (Tabachnick & Fidell, 2001), following the running of the statistical tests in order to reduce the risk of bias in transforming the data if necessary.

To determine if social support is positively correlated with the amount of self-efficacy for exercise and goal setting practices, the second hypothesis, Pearson's correlation coefficient was used to assess the relationship between social support and self-efficacy, and social support and goal setting practices. Correlation was utilized to test these relationships. Social support has a small effect on physical activity, which is mediated "almost entirely by self-efficacy" (Rovniak, Anderson, Winett & Stephens, 2002, p.153), therefore testing the relationship between self-efficacy and social support is

important. The specific placement of social support as a correlate of self-efficacy, and outside of the center of the model, was supported by the models of physical activity and SCT determinants studied by Ayotte, et al. (2010) and Rovniak, Anderson, Winett & Stephens (2002).

For the third hypothesis, Pearson's correlation coefficient was used to determine the strength and direction of the relationship between SE and each of the other SCT determinant variables of outcome expectations, barriers, goal-setting practices, and the criterion variable of physical activity. This analysis is consistent with the proposed model of SCT, which places self-efficacy at the center of the model, and suggested by previous literature on the significant positive correlations between SE and the other SCT correlates and SE and physical activity (Bandura, 2004; Ayotte, et al., 2010; White, Wojcicki & McAuley, 2012; Anderson, et al., 2006). The relationship between these variables has not yet been tested in persons with psychiatric disabilities.

The number of health conditions was hypothesized to be inversely correlated to self-efficacy, outcome expectations and goal setting practices in the fourth hypothesis. Pearson's correlation coefficient was computed and is hypothesized to indicate that more chronic health conditions will correlate with lower SE, fewer OE and fewer goal setting practices. This analysis was consistent with the proposed SCT model of exercise in persons with psychiatric disabilities. Chronic health conditions have been shown to negatively influence self-efficacy, outcome expectations and goals in persons without psychiatric disabilities (Ayotte, et al., 2010; Plotnikoff et al., 2008), however, this has not been tested in persons with psychiatric disabilities.

The fifth hypothesis asserts that age, psychiatric symptoms and gender was associated with self-efficacy for physical activity, with higher age, greater symptoms and female gender associated with lower self-efficacy for physical activity values. To test this hypothesis, Pearson's correlation coefficient was used to study possible relationships between: self-efficacy and age; and self-efficacy and perceived severity of psychiatric symptoms. As for gender, a one-tailed t-test was used to compare the mean scores of SE between males and females. The personal characteristics in this hypothesis are based upon previous research. The statistical tests utilized were generated by the proposed model. Age and female gender impacts self-efficacy to exercise in persons without psychiatric disabilities (Ayotte, et al., 2010; Anderson, et al., 2006). Persons with psychiatric disabilities report that symptoms are a barrier to exercise in focus groups (McDevitt, Snyder, Miller & Wilbur, 2006; Roberts & Bailey, 2011; Vancampfort et al., 2012), and persons with depressive symptoms have reported lower self-efficacy for exercise (Ussher, Stanbury, Cheeseman & Faulkner, 2007).

In order to test the sixth hypothesis, goal setting practices is related to physical activity and predicted by social support with greater social support correlated to more goals, Pearson's correlation coefficient was used to test the relationship between goal setting practices and amount of physical activity. Simple linear regression was used, with social support as the predictors and goal setting practices as the criterion variable, to test the predictive ability of social support from family and social support from friends on the number of goal setting practices. Again, the use of the statistical tools of correlation and simple regression is consistent with the proposed model. Social support is correlated to goal-setting practices in previous studies (Ayotte, et al., 2010).

For the final hypothesis, more goal setting practices predict more physical activity; simple linear regression was used with goal-setting practices score as the predictor variable and amount of self-reported physical activity as the criterion variable. Self-regulation, in the form of goal-setting practices has been demonstrated to have a strong effect on amount of exercise in populations without psychiatric disabilities (Rovniak, Anderson, Winett & Stephens, 2002; Ayotte, et al., 2010). Testing this relationship with simple regression permits an understanding of the predictive ability of goals on exercise and supports the proposed model.

Table 1

Descriptive Statistics

Variable	n	%	Mean	SD	Range
Type of Service					
<i>CMHC</i>	75	62.5			
<i>Housing</i>	45	37.5			
Age	120	100	47.47	12.17	
21-70					
Gender					
<i>Male</i>	72	60			
<i>Female</i>	41	39.2			
<i>Transgender</i>	1	.8			
Reported Psychiatric Disorders*					
<i>Bipolar Disorder</i>	42	35			
<i>Schizophrenia</i>	35	29.2			
<i>Schizoaffective</i>	10	8.3			
<i>Depression</i>	43	35.8			
Number of Psychiatric Diagnoses					
<i>Zero</i>	11	9.2			
<i>One</i>	90	75			
<i>Two</i>	17	14.2			
<i>Three</i>	2	1.7			
Number of Psychiatric Medications	116		3.66	2.86	
0-15					
Education					
<i>High School</i>	71	59.2			
<i>Some College</i>	30	25			
<i>Bachelors Degree</i>	11	9.2			
<i>More than Bachelors</i>	6	5			
<i>Missing</i>	2	1.7			
Race					
<i>American Indian</i>	2	1.7			
<i>Asian</i>	2	1.7			
<i>Black</i>	61	50.8			
<i>Hispanic</i>	6	5.0			
<i>White</i>	45	37.5			
<i>Other</i>	4	3.3			
Housing					
<i>Live Alone Apt/House</i>	27	22.5			
<i>Shared Apt/House</i>	63	52.5			
<i>Boarding Home</i>	14	11.7			
Variable	n	%	Mean	SD	Range
<i>Motel/Shelter</i>	2	1.7			
<i>Rooming House</i>	4	3.3			

Housing (cont'd)					
<i>Homeless</i>	6	5.0			
<i>Group or Foster Home</i>	4	3.3			
Smoking Status					
<i>Yes</i>	72	60.0	11.54	8.31	
<i>2-40</i>					
<i>No</i>	48	40.0			
Type of Exercise Support Received					
<i>Wellness Coach</i>	2	1.7			
<i>Support Group</i>	17	14.2			
<i>Gym Pass</i>	4	3.3			
<i>Exercise Group</i>	52	43.3			
<i>Other</i>	18	15.0			
Self-Rated Perception of Health					
<i>Excellent</i>	11	9.2			
<i>Very Good</i>	26	21.7			
<i>Good</i>	43	35.8			
<i>Fair</i>	35	29.2			
<i>Poor</i>	3	2.5			
<i>Missing</i>	2	1.7			
Number of Health Conditions					
<i>0-8</i>			2.23	1.70	
<i>Zero</i>	18	15			
<i>One</i>	29	24.2			
<i>Two</i>	27	22.5			
<i>Three</i>	20	16.7			
<i>Four</i>	14	11.7			
<i>Five</i>	7	5.8			
<i>Six</i>	3	2.5			
<i>Seven</i>	1	.8			
<i>Eight</i>	1	.8			
Exercise**	120	100	3205.19	4600.81	0 -29,199
Time Sitting in Minutes***	120	100	523.92	266.99	60 - 990

Note: n=120. * Participants recorded more than 1 psychiatric diagnosis so the totals for psychiatric disorder do not equal 120.

**Computed value of Metabolic Equivalent Value (MET) minutes per week or the number of active weighted minutes per week. This value is computed by multiplying the MET score of a type of activity by the number of minutes performed (Source: www.ipaq.ki.se/scoring.pdf, nd)

***Average minutes spent sitting in one day

Table 2

Amount of Physical Activity Reported by Participants

	Percentiles				
	M	Median	25 th	50 th	75 th
MET minutes/week*	3205.19	1417.75	585	1417.75	4118.25
Vigorous minutes**	54	94	0	0	98
Moderate minutes**	86	60	0	60	120
Walking**	122	75	60	75	180

*Computed value of Metabolic Equivalent Value (MET) minutes per week or the number of active weighted minutes per week. This value is computed by multiplying the MET unit difficulty of a type of activity by the number of total minutes performed in the past week (Source: *www.ipaq.ki.se/scoring.pdf*, nd)

**The raw number of minutes a person reported in this type of physical activity in the past week, rounded to the nearest minute.

Chapter IV

RESULTS

Data Handling

Data was double-entered into SPSS version 20 (IBM SPSS, 2012) into two separate files, one by the doctoral student and the other by a research assistant. Datasets were then compared for missing or conflicting data and outliers, which was then compared and corrected using original surveys. Multicollinearity among variables was checked by examining tolerance values, and the level of relationships among the predictors was tolerable. An SPSS Missing Value Analysis of the combined corrected dataset revealed a missing rate of 293 values out of 21,456 or 1.44% total. Twenty-two percent of participants did not respond to the question asking which services they received to support their physical activity. Finally, three IPAQ questions related to vigorous exercise had missing data ranges from 10-12%. Cases with blank values or “don’t know” for the amount of vigorous or moderate exercise were dropped (n=22) as recommended by IPAQ scoring protocol. The remainder missing data values were spread across all questionnaires with no identifiable pattern.

Missing data values for the Barriers to Physical Activity Survey, EGS, OEES, SEE and Social Support were computed and entered using the group mean value for the item. BSI-18 missing data were estimated by summing the existing responses of the participant, then this sum was divided by the number of completed questions. The estimated value was then rounded up or down and substituted for the missing item scores for the individual.

Additional data handling for the IPAQ was completed as per the IPAQ scoring protocol; values in the hours, or questions 2a, 4a or 6a, section reading 10, 15, 30, 60 or 90 hours were deleted and those same values were placed into the minutes response for that level of exercise. For example, if a person wrote 10 hours and zero minutes for the amount of time exercised on one day, then the value 10 was deleted from hours and placed into the minutes cell. Additionally, if a person indicated 20 hours of sitting per day that value was changed to 16 hours to assume 8 hours of sleeping.

One deviation to the proposed method was made: the subscales of the BSI (Somatic, Depressive, Anxiety) were used in place of the BSI-Global Severity Index score. By using the subscales there was increased precision in understanding the relationships between type of symptom distress and all of the variables in the model.

Statistics and data analysis

Cronbach's alpha was computed to test for internal consistency for: Barriers to Exercise Survey, BSI-18, Exercise Goal Setting Survey, Outcome Expectations for Exercise Survey, Self-Efficacy for Exercise Survey, and Social Support for Exercise. Ratings of internal consistency ranged from .85 to .94 suggesting strong internal consistency values (See Table 3).

Data was analyzed using SPSS FREQUENCIES to evaluate for assumptions. IPAQ scores were significantly positively skewed and violated assumptions of normality. A square root transformation was performed on the IPAQ data to reduce positive skew, reduce the number of outliers, and improve the normality, linearity, and homoscedasticity of residuals. Further analysis on the transformation indicated improved normality of the distribution.

Correlations between the criterion variable of exercise and each predictor variable were examined. Significant correlations were identified between exercise and goal-setting ($r(120) = .32, p < .000$), exercise and gender ($r(120) = -.31, p < .000$), exercise and self-efficacy ($r(120) = .29, p < .001$), exercise and outcome expectations ($r(120) = .20, p < .013$), and exercise and social support from friends ($r(120) = .15, p < .049$). Additional significant correlations between variables were noted (see Table 4 and Figure 5).

Study Hypotheses

1. Social support, self-efficacy for physical activity, positive outcome expectations, barriers to exercise, and goal-setting practices will predict self-reported physical activity. A hierarchical multiple regression analysis was performed to predict self-report physical activity based on social support, self-efficacy for physical activity, positive outcome expectations, barriers to exercise, and goal-setting practices, after controlling for age gender, distress from somatic psychiatric symptoms, distress from depressive psychiatric symptoms, distress from anxiety psychiatric symptoms and number of self-report chronic health conditions. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity, homoscedasticity and nor presence of multicollinearity. On the first step age, gender, distress from somatic psychiatric symptoms, distress from depressive psychiatric symptoms, distress from anxiety psychiatric symptoms and number of self-report chronic health conditions were entered into the model. Step one explained roughly 18% of the variance in physical activity ($F(6,113) = 4.06, p = .001, r^2 = .178$), and was statistically significant. Two variables were statistically significant in the model: gender ($\beta = -.358, p = .000$) and BSI-Depression subscale ($\beta = -2.558, p < .012$). On the second step, social support, self-efficacy, outcome

expectations, barriers, goal-setting strategies were entered simultaneously, and added an r^2 change value of .068, however the second step was not statistically significant. After entry of the second step of the SCT predictors, the total variance explained by the model as a whole was 24.5% ($F(12,107) = 2.90, p = .002$). In the final model, only two predictors gender ($\beta = -.316, p = .001$) and BSI-Depression subscale ($\beta = -2.077, p < .040$) contributed significantly to the prediction of exercise.

All variables in the model had a zero order correlation with physical activity. Gender, self-efficacy, outcome expectations, social support from friends, and goal setting practices were significantly correlated with exercise. Age, number of health conditions, psychiatric distress subscales, social support from family and number of barriers to exercise were not statistically significantly correlated with exercise. Table 5 displays the standardized regression coefficients (β), r^2 , and adjusted r^2 after entry of all 12 of the predictor variables are entered into the model. The SCT predictors, as a group, did improve the model from 18% to 25%.

2. *Social support is positively correlated with amount of self-efficacy for exercise and goal setting practices.* Social support from friends was positively correlated with SEE score ($r(120) = .20, p < .014$) and goal setting practices ($r(120) = .31, p < .000$). Social support from family was not significantly correlated with SEE score, however it was correlated with goal setting practices ($r(120) = .25, p < .003$).

3. *Self-efficacy is related to outcome expectations, barriers, goal setting practices and physical activity.* Self-efficacy was significantly correlated with outcome expectations ($r(120) = .46, p < .000$), barriers to exercise ($r(120) = -.27, p < .001$), goal setting practices ($r(120) = .64, p < .000$), and physical activity ($r(120) = .29, p < .001$). It should be noted

that all of the relationships were positive, except for barriers to exercise, which was a negative relationship and in the predicted direction of SCT model.

Self-efficacy does appear to be central to the proposed model as is demonstrated by the number of significant correlations with other SCT variables and exercise. Confirmation of this hypothesis supports the importance of self-efficacy for exercise in this population.

4. *Number of health conditions is inversely correlated to self-efficacy, outcome expectations and goal setting practices.* Outcome expectations were inversely correlated with number of health conditions ($r(120) = -.26, p < .002$), however self-efficacy and goal-setting practices were not correlated with number of health conditions.

5. *Age, psychiatric symptoms and gender will be associated with self-efficacy for physical activity, with higher age, greater symptoms and female gender associated with lower self-efficacy for physical activity values.* Age was not correlated with SEE scores. Significant inverse relationships between BSI Somatic symptom distress and SEE scores ($r(120) = -.20, p < .015$), and BSI Depression symptom distress and SEE scores were identified ($r(120) = -.26, p < .002$), however, there was not a significant relationship between BSI Anxiety symptom distress and SEE score. An independent-samples t-test comparing SEE scores for females ($M=4.78, SD=2.38$) and males ($M= 5.83, SD= 2.23$) demonstrated a significant difference, with female gender being associated with lower self-efficacy scores ($t(117) = 2.44, p < .008$, one-tailed). The magnitude of difference was a small effect size ($\eta^2 = .048$).

6. *Goal setting practices will be related to physical activity and predicted by social support with greater social support correlated to more goals.* Goal setting practices are significantly correlated to physical activity ($r(120) = .321, p < .000$). An analysis using

linear regression to predict goal-setting practices from social support from family and social support from friends indicated a significant change related to the model ($F(2, 117) = 7.06, p = .001, r^2 = .107$). While social support from friends provided significant contribution to the model ($\beta = .246, p < .019$), social support from family did not significantly contribute to the model.

7. *More goal setting practices predict more physical activity.* Linear regression analysis indicated that goal-setting practices predicted self-report physical activity ($F(1, 118) = 13.59, p < .000, r^2 = .103$).

Supplemental Results

Sobel tests were used to study the possible indirect relationships between SCT variables (Preacher & Hayes, 2004). A Sobel test explored the mediating relationship of goal-setting practices on the relationship between self-efficacy and physical activity. Results of the Sobel test suggest that the relationship between self-efficacy and physical activity is significantly mediated by goal setting practices ($z = 2.01, p < .04$). This suggests self-efficacy predicts exercise through the use of goal-setting practices. Confidence alone will not predict exercise as the person must also be strategizing and planning for more exercise. Additionally, a Sobel test suggests that the relationship between self-efficacy and goal-setting practices is mediated by outcome expectations ($z = 2.52, p < .01$), which implies that self-efficacy is related to goal-setting practices through outcome expectations. Outcome expectations help to explain the relationship between self-efficacy and goal-setting practices.

Table 3

Internal Consistency of Measures

Measure	Mean	SD	Cronbach's Alpha	Items
Barriers to Physical Activity	6.03	3.69	.864	13
BSI-Somatic Subscale	5.43	5.62	.853	6
BSI-Depression Subscale	6.98	6.15	.864	6
BSI Anxiety Subscale	6.54	5.95	.848	6
Exercise Goal Setting Survey	2.79	1.15	.922	10
Outcome Expectations for Exercise Scale	3.76	.92	.919	9
Self-Efficacy for Exercise Scale	5.41	2.33	.906	9
Social Support for Physical Activity Family	18.62	8.06	.880	10
Social Support for Physical Activity Friends	19.88	9.20	.922	10

Note: Internal consistency computed from all surveys (n=142). Social Support for Physical Activity Family and Friend sub-scales of social support were tested for internal consistency. The Rewards/Punishment sub-scale items were not included in the testing.

Table 4

Significant Correlations between Predictor Variables and Exercise

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Exercise (DV)	1												
2. Age		1											
3. Gender	-.31+		1										
4. Num.Health		.31+	.34+	1									
5. BSI-Somatic				.23+	1								
6. BSI Dep.				.16*	.78+	1							
7. BSI Anxiety					.79+	.78+	1						
8. Barriers					.22+	.29+	.25+	1					
9. Goal Practices	.32+		-.22+			-.25+	-.21*		1				
10. Outcomes	.20*		-.34+	-.26+		-.232+	-.34+		.46+	1			
11. Self-Efficacy	.29*		-.21*		-.20*	-.26+		-.27+	.64+	.46+	1		
12. Soc.Sup.Fam								.30+	.25+	.27+		1	
13. Soc.Sup.Frnd	.15*					-.25+		.17*	.31+	.22+	.20*	.54+	1

Note: +Correlation is significant at the 0.01 level (1-tailed). * Correlation is significant at the 0.05 level (1-tailed). n=120

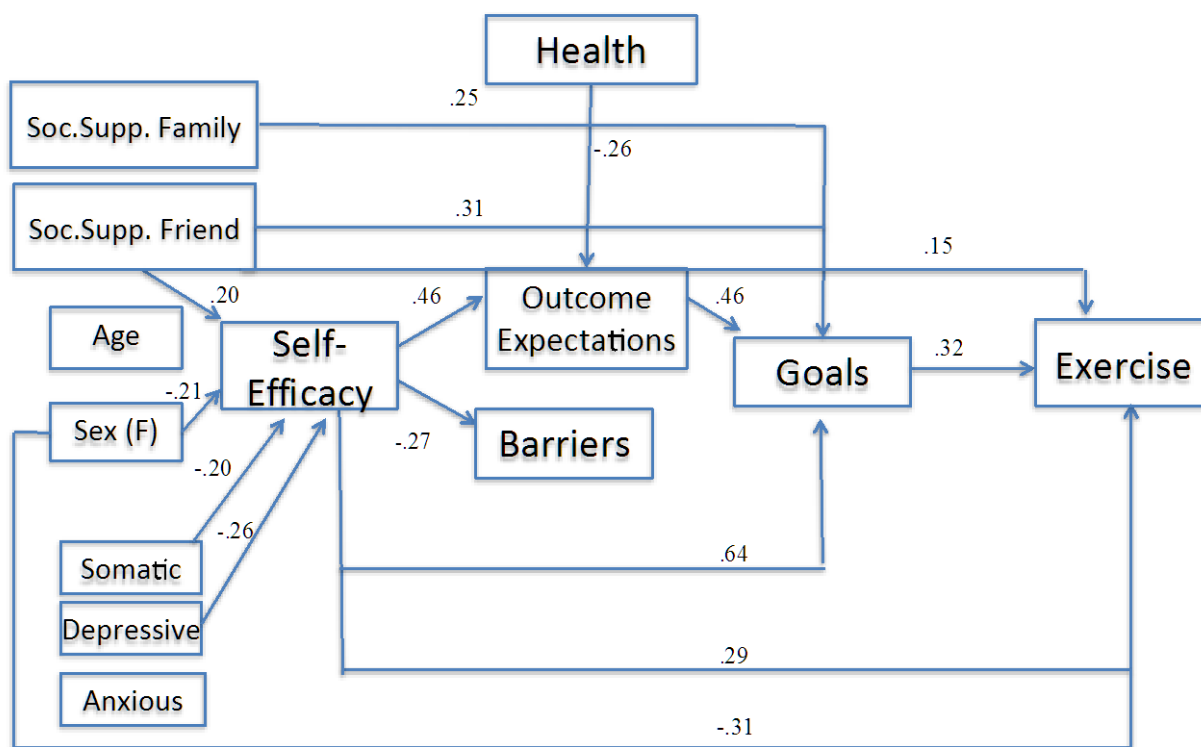
Table 5

Hierarchical Multiple Regression Analyses Predicting Self-Report Exercise From Social Support from Family, Social Support from Friends, Self-Efficacy, Outcome Expectations, Barriers to Exercise and Goal-Setting Practices While Controlling for Age, Gender, Distress from Somatic Psychiatric Symptoms, Distress from Depressive Psychiatric Symptoms, Distress from Anxiety Symptoms, and Number of Chronic Health Conditions

Amount of Self-Report Exercise		
Predictor	ΔR^2	β
Step 1	.177*	
Age		-.174
Gender		-.316*
Distress from Somatic		.082
Distress from Depressive		-.388**
Distress from Anxiety		.203
# Chronic Health Conditions		.151
Step 2	.068	
Social Support from Family		-.099
Social Support from Friends		.087
Self-Efficacy		.170
Outcome Expectations		-.035
Barriers to Exercise		.169
Goal-Setting Practices		.105
Total R^2	.245*	

Note: Hierarchical multiple regression, criterion variable self-report physical activity. First block: age gender, distress from somatic psychiatric symptoms, distress from depressive psychiatric symptoms, distress from anxiety psychiatric symptoms and number of self-report chronic health conditions. Second step of model added social support, self-efficacy for physical activity, outcome expectations, barriers to exercise, and goal-setting practices. n=120

* $p < .002$, ** $p < .05$



$r^2 = .245$ (F (12,107) = 2.90, p = .002)

A Proposed Social Cognitive Theory Model of Physical Activity in Persons with Psychiatric Disabilities

Figure 5

A Proposed Social Cognitive Model of Physical Activity in Persons with Psychiatric Disabilities

Chapter V

Discussion

The proposed model of physical activity based on Bandura's Social Cognitive Theory successfully explains 25% of the variance in self-reported physical activity in persons with psychiatric disabilities, which partially confirmed Hypothesis 1. The analysis used a two-step hierarchical multiple regression to predict physical activity from SCT determinants, and control for contributions of personal characteristics. The first step predictors: gender, distress from somatic psychiatric symptoms, distress from depressive psychiatric symptoms, distress from anxiety psychiatric symptoms and number of self-report chronic health conditions, were significant and explained 18% of the variance. The second step SCT predictors of social support, self-efficacy, outcome expectations, barriers, goal-setting strategies were entered simultaneously, were not significant and added 7% to the variance. This suggests that SCT shows promise in predicting exercise, but does not explain variance without the inclusion of other correlates.

Hypothesis 2, indicating that social support is related to self-efficacy and goals, is only partially confirmed. Social support from friends is significantly correlated with self-efficacy and goal-setting practices however social support from family did not significantly correlate with self-efficacy.

Hypothesis 3, positing that self-efficacy is related to outcome expectations, barriers, goals and exercise, was confirmed as self-efficacy is significantly positively correlated to outcome expectations, goal setting practices and physical activity, while being negatively correlated to barriers. Self-efficacy does appear to be central to the

proposed model as is demonstrated by the number of significant correlations with other SCT variables and exercise. Confirmation of this hypothesis supports the importance of self-efficacy for exercise in this population.

The relationships in Hypothesis 4, testing health conditions inverse relationships with self-efficacy, outcome expectations and goals, are partially confirmed. While all three correlations are in the proper direction of inverse relationship, only outcome expectations had a significant relationship to number of health conditions.

The relationships between the non-SCT model predictors of age, psychiatric symptoms and gender, with self-efficacy in hypothesis 5, are partially confirmed. Gender was related to self-efficacy. Distress from psychiatric symptoms, specifically depressive and somatic symptoms were inversely related to self-efficacy. Unlike in other studies (Ayotte, et al., 2010; Anderson, et al., 2006), there was not a relationship between age and self-efficacy.

Hypothesis 6 suggesting that goals are related to exercise with goals predicted by social support was confirmed. There was a moderate correlation between goal-setting practices and exercise in the current study. Social support from friends was predictive of exercise goals.

Hypothesis 7 was confirmed as goal-setting practices predicted physical activity, however the strength of the predictive relationship ($r^2 = .103$) was a small effect size.

There is a clear connection between type of psychiatric symptom distress and exercise. Depressive symptoms are associated with decreased exercise, as well as, all of the Social Cognitive Theory determinants with the exception of social support. Exercise in previous research has shown a protective effect against depression and is helpful

addressing existing depressive symptoms. Yet, the more depressed a person is, the less likely they are to exercise, and with less exercise the person may become more depressed creating a downward spiral of mood and functioning. A bi-directional relationship between depression, self-efficacy and health behaviors has been previously suggested (Kavanaugh, 1992). People experiencing anxiety or somatic symptoms are exercising more than people with depression, and appear to have stronger motivation for exercise.

Gender also played a significant role in the current model, with women being much less likely to exercise. While there are fewer women than men served by community mental health services, women require different and specialized interventions to encourage exercise. This study suggests that women receiving services from the public mental health system exercise less, are less confident in their ability to exercise, identify fewer positive outcome expectations of exercise and report a higher number of physical health conditions than men. This significant difference in exercise between men and women has been previously reported in both populations served by the public mental health system (Jerome et al., 2009; Ussher, et al., 2007; Carless & Douglas, 2008), and those persons not in this system (Sylvia-Bobiak, 2006; Ayotte, et al., 2010).

The role of social support in the model appears to be linked to who provides the support: family or friend. If peers provide support or exercise with a person, then he or she is more likely to exercise. The same effect is not evident with family member social support. Bandura (2004) notes that social support for health behaviors may either serve to reinforce change or encourage lack of change. If family members are not physically active, then they may not support the person with psychiatric disabilities to be active. Also, family support for exercise may be perceived as unwanted feedback about

behavior, being judgmental or considered nagging. Future study should further examine the complexities of social support for persons receiving service in the public mental health system, and how it may contribute to or present barriers to exercise, including potential supports from mental health providers and housing support providers.

Goal-setting strategies for exercise has promise to improve the amount of exercise and self-efficacy for exercise in persons with psychiatric disabilities. The field of psychiatric rehabilitation aims to support individuals develop motivation through personal goals and teachable skills to pursue recovery. If PsyR practitioners teach the skills of setting exercise goals, tracking progress toward goals and achieving goals this may serve as much-needed support and reinforcement of exercise in daily life.

The overlap of psychiatric disability and health conditions may compound the difficulty of exercise for persons with psychiatric disabilities. Managing psychiatric symptoms requires repeated interaction with mental health providers over time. This may entail doctor appointments, medication check-ups, blood work and hospitalization, in addition to, counseling appointments and therapeutic groups to address emotional regulation and skills teaching. This prolonged emphasis on ‘illness’ management may impact a person’s sense of identity, and lead a person to consider themselves as “sick” or as a “patient”. Also, many persons with psychiatric disabilities in the public mental health system experience chronic health conditions, which are influenced by weight gain, limited access to quality healthcare and sedentary lifestyle.

Experiencing multiple health conditions may contribute to the over-identification of the role of “patient” in persons with both types of chronic illness, thereby limiting their sense of personal agency, confidence and desire to engage in physical activity. Further,

this may serve to diminish hope and limit sense of personal agency about recovery from mental illness. Enhancing outcome expectations and minimizing perception of barriers to exercise, along with building self-efficacy could together further encourage greater physical activity, and perhaps increase perceptions of control and personal agency.

Compare and Contrast with Other Findings

The amount of variance explained in the current model is lower than in studies of populations without chronic health conditions ($r^2 = 45-64\%$) (Ayotte, et al., 2010; Anderson, et al., 2006; Rovniak, Anderson, Winett & Stephens, 2002), however, the findings are similar to those in a population with diabetes ($r^2=9-14\%$) (Plotnikoff et al., 2008). This suggests that the strength of relationships within SCT determinants of exercise within persons with psychiatric disabilities is similar to other populations with chronic health conditions in their self-efficacy, social support, outcome expectations, barriers and goal-setting practices. It is logical that these two populations would be similar not only due to living with a chronic condition, but also due to the high prevalence of diabetes in persons with psychiatric disabilities, in fact, one-quarter of the current sample indicated a diagnosis of diabetes, which is higher than estimations of 17% diabetes prevalence in persons with psychiatric disabilities (McBain, et al., 2014).

One notable difference between previous studies in persons without psychiatric disabilities and the current study is the relationship between family social support and self-efficacy (Ayotte, et al., 2010; Rovniak, Anderson, Winett & Stephens, 2002). The current study found a small relationship between self-efficacy and social support from friends, while social support from family was not significant. Correlations are indicated

as small when the range from .10-.29, medium when the range is .30-.49, and large with .50-1.0 (Cohen, 1988). Previous studies examining the relationship between family social support and self-efficacy found correlations ranging from small relationships in persons with Type 2 Diabetes ($r=.18$) (Plontikoff et al., 2008) to medium relationships in college students ($r= .29$) (Sylvia-Bobiak & Caldwell, 2006). The largest relationships between family social support and self-efficacy is noted in older adults ($r= .40$) (Ayotte, et al., 2010). These differences as compared to the current sample may be related to several issues. First, college students typically have an age range of 18-22, older than the average age of 47 in this study. Also, the role of student often relies on family for support in many areas, while persons with psychiatric disabilities may or may not rely on family. In the current study the amount of social support from family does not relate to exercise. Additionally, the findings may merely be reflective of the lack of variability in social support from family for persons in the sampled population. In the older adult study, the researchers recruited married couples to test the SCT model so the a-priori assumption was that there was a relationship between family social support and self-efficacy to exercise. A strong link between family social support and exercise may be particularly true for support of spouses. The complex nature of long-term psychiatric symptoms may impact relationships between persons with mental illness and their families, and ultimately lead to less overall family support. Finally, people with diabetes without psychiatric diagnosis may experience more support and less stigma from their families than persons with psychiatric diagnosis.

Similar to previous work, goal-setting practices are the strongest relationships to physical activity of all SCT determinants (Ayotte, et al., 2010; Rovniak, Anderson,

Winett & Stephens, 2002). The current study correlation between goal-setting and exercise was modest when compared to older adults ($r = .68$) (Ayotte, et al., 2010) or to college students ($r = .48$) (Rovniak, et al, 2002), but the relationship was larger than that of persons diagnosed with Type 1 diabetes ($r = .17$) and Type 2 diabetes ($r = .11$) (Plotnikoff et al., 2008). The EGS scores are similar to those reported by Rovniak, et al. (2002) in college students, ($M = 2.84$, $SD = .980$) and larger than in a population of older adults ($M = 1.63$, $SD = .82$) (Ayotte, et al., 2010). Persons in public mental health systems may receive interventions to assist with goal-setting in general, and may be more familiar with and utilizing such strategies more commonly than older adults or persons with Type 1 and Type 2 Diabetes.

Self-efficacy for exercise scores are lower in the current than previously reported in a study of a walking intervention for persons with schizophrenia ($M = 5.8$, $SD = 2.4$) (Beebe, et al., 2010) or for older adults reported by Ayotte, et al. (2010) ($M = 5.95$, $SD = 2.28$). Outcome expectation for exercise scores were lower in the current study as compared to previous reports ($M = 4.3$, $SD = .60$) (Beebe, et al., 2010). One explanation for this could be persons recruited to participate in a walking intervention had greater self-efficacy, which made them more interested in participating in the trial to begin with, and persons with lower self-efficacy self-selected out of the trial.

Unlike other studies (Ayotte, et al., 2010; Anderson, et al., 2006), there was no meaningful relationship between age and self-efficacy. Furthermore, the relationship between age and exercise was not significant as has been reported in other psychiatric rehabilitation literature (Jerome et al., 2009). This may be due to the negatively skewed

distribution of age in the present study, with only twenty percent of participants under the age of 34.

Chronic physical health conditions may have a different impact in persons with psychiatric disabilities than in persons without. Ayotte, et al. (2010) found a modest inverse correlation between health and self-efficacy ($r = -.29$) and a positive relationship between number of health conditions and goal-setting practices ($r = .14$), while the current study found no significant relationships for either. People with psychiatric disabilities may feel less certain about their abilities to exercise in general, despite the number of chronic health conditions they have, so that additional health conditions do not have the same impact upon them as for persons with only physical conditions. Both groups had similar number of average chronic physical health conditions, with the current participants holding slightly more (2.25) physical health conditions as compared to the older adults (2.14) (Ayotte, et al., 2010).

More participants in this study reported some amount of vigorous activity (41.7%) per week as compared to previous work with persons with schizophrenia (25%) (Faulkner, Cohn & Remington, 2006). Additionally, an increased proportion of participants in the current study reported some moderate activity (66.7%) as compared to a previous report (60%) (Faulkner, Cohn & Remington, 2006).

The significant mediating influences of outcome expectations on the relationship between self-efficacy and goal-setting practices in this study confirms previous findings (Ayotte, et al., 2010), indicating the importance of both outcome expectations and self-efficacy on goal-setting practices. Further, the finding that goal-setting practices mediate relationships between self-efficacy and physical activity has also been previously

reported (Ayotte, et al., 2010). These results are important as they suggest that the central components of the SCT model operate in the study population similarly to previous work.

Comparisons between studies should be interpreted with caution as the measurement of social cognitive constructs has differed across studies.

Limitations

The current study relied upon the self-selection of participants who were interested in participating in the study, and therefore may not be generalizable to the population as a whole. Participants were recruited from urban areas of New Jersey, which has a unique set of geographical issues that may be less prevalent in more rural, suburban or affluent areas. Self-reported data is also a source of limitation to the current study. Participants may have over or under-inflated response values due to social desirability. The particular sample selected may not be representative of all persons with psychiatric disabilities.

Instrumentation may be a potential limitation. All of the measures utilized were validated and assessed for reliability in adult populations, however, of the 7 measures used only 3 have previously been validated in a population with severe mental illness. It is possible that relationships between variables are either noted in error or not found. While the instruments displayed acceptable internal reliability, the measure of self-report physical activity (IPAQ), the dependent variable in this study, was challenging for participants to complete. This was particularly true of the questions related to vigorous physical activity. Despite reading the questions aloud, providing the IPAQ instructions, giving examples of relevant vigorous exercise and reviewing incomplete answers one-on-

one at the end of the session, 12% of participants either left the three questions blank or indicated that they did not know the answer. This may have been related to ability for abstract thinking, difficulty with recall, or education level of participants.

While the total hierarchical model was significant and the first block of predictors in the model are significant, the second block of predictors related to Social Cognitive correlates are not. The SCT correlates explained less of the variance than other correlates related to the person in the regression model. While it is promising that some of the variance is explained by the combination of SCT correlates, and the examination of correlational relationships indicated zero-order relationships between SCT and physical activity in the small to moderate range, SCT correlates alone were not predictive of exercise when accounting for variance from personal variables. More work is needed to understand the applicability of the model to persons with psychiatric disabilities. This finding may be related to modest sample size and little variability in the sample in the dependent variable of exercise among the participants. Most participants in this study exercised very little. Other health explanation models should be studied and explored to best understand the motivational constructs of exercise in persons with psychiatric disabilities.

It should also be noted that there may have been overlap between constructs of self-efficacy and exercise goal-setting practices as the correlation between those scores were very high (.64), and also between self-efficacy and outcome expectations (.46). Questions on the SEE and OEES are fairly similar, which further suggests some overlap. Therefore, the measurement of outcome expectations may in actuality be extensions of

self-efficacy. High levels of self-efficacy may be needed to use the goal-setting strategies necessary for increase in exercise.

Another consideration to these results is regarding the number of surveys completed. Participants completed nine surveys in one setting, which may have led to fatigue in the testing process, thereby making scores unreliable.

The cross-sectional approach is a limitation as it collects data at one point in time, which may suggest a relationship but does not establish causality. Additionally, a temporal relationship between self-efficacy and physical activity (McAuley, et al., 2013) has been established, which may further limit the reliability of findings based upon a single observation.

While attempts have been made to assure adequate power and sample size for the current study, the sample size is not large enough to find small effects or use more complex models such as path analysis. An increase in sample size may also improve the distribution of values and normality.

Finally, given the exploratory nature of the question, there are limited examples in the literature to compare findings to, which may make interpretation of the findings more challenging.

Implications

This study is the first to examine a comprehensive SCT model for physical activity in persons with psychiatric disabilities. While, the contribution from the SCT predictors was modest ($r^2=.07$), it suggests that the model may have utility for the population. Like other SCT models it also takes into account the influence of demographic and contextual influences. Psychiatric Rehabilitation Practitioners should

pay special attention to exercise goal-setting practices, self-efficacy, outcome expectations, social support from friends and the impact of depressive symptoms as areas that may support or impede a person's efforts to increase exercise. Gender-specific interventions for women may be warranted in order to increase goal-setting strategies, positive outcome expectations, physical activity and ultimately overall physical health.

The strong relationship between self-efficacy and goal-setting strategies suggests that focused interventions providing goal-setting and goal-tracking skills practice may work to improve self-efficacy and potentially increase the amount of exercise a person completes weekly.

Social support for exercise is more complicated in persons with psychiatric disabilities than in populations not in the public mental health settings or at least those persons without a chronic health condition. The public mental health system must take on the role of additional supports, ideally through peer services or peer wellness coaching. At a minimum, dialogues about physical activity should continue while a person is receiving services in the public mental health system.

Physical activity not only improves physical health, but also offers promise as an intervention to improve mental health symptoms and recovery, and should be encouraged. Depressive symptoms may be improved with increased physical activity as previous study has shown. People with psychiatric disabilities experiencing more depressive symptoms, irrespective of psychiatric diagnosis, report more barriers, lower self-efficacy and have fewer goal-setting strategies for exercise. The difference in relationships between types of psychiatric distress, self-efficacy and exercise suggests that more study is necessary to develop targeted strategies for motivating persons

experiencing depressive symptoms. Individualized interventions for exercise could take into account both gender and types of psychiatric distress, and could perhaps be more motivating to the person receiving them. An individualized approach to services is defined by the goals, values and principles of PsyR.

Future Work

Replication of the study is suggested to confirm the findings. The need for additional theoretical exploration of the SCT model to guide physical activity interventions, and to confirm the utility of the model, is urgent due to the poor overall health of persons in the public mental health system. Due to challenges related to self-report measures, it is recommended that future work utilize objective measures of activity such as pedometers, accelerometers or other technologies. Future work with this population may also benefit from further exploring self-efficacy and goal-setting practices as was done by Rovniak, Anderson, Winett & Stephens (2002) by splitting self-efficacy into task and barrier efficacy, and goal-setting into planning and goals. Additionally, a more comprehensive study of the bi-directional relationship between depressive symptoms and self-efficacy for exercise is recommended.

Further exploration of the mediating and moderating effects of the SCT variables on exercise should be explored to better understand the relationship between SCT correlates and exercise. Future work in this area could benefit from structural equation modeling techniques such as path analysis to further explore the complex correlates of exercise. This technique permits examination of both direct and indirect or mediational relationships, which may further add to the understanding of the influences of the SCT correlates. The technique requires a suggested minimum of 200 participants and at least

ten participants for each pathway studied (Tabachnick & Fidell, 2001). Mediators for exercise may vary across populations and time points, and these relationships should be more closely examined to develop targeted interventions (Lewis, Marcus, Pate, & Dunn, 2002).

Additional consideration should be made for the specific issues present for persons with psychiatric disabilities in terms of barriers, self-efficacy, social support, outcome expectancies, and social support. An example would be to create a social support set of questions that refer to mental health practitioner support for exercise or identify outcome expectancies that relate to improvement in specific types symptoms experienced, e.g. hearing voices, as a result of exercise. These efforts may capture more relevant information and lead to a more meaningful dialogue in promotion of physical activity.

An assessment of instrumental activity of daily living (IADL) and activities of daily living (ADL) would be useful as a covariate in the model of predicting physical activity as many people served by the public mental health system have physical and cognitive challenges that impact daily tasks. Assessing IADL and ADL functioning may capture additional information that could improve the proposed model. Calculation of BMI may offer useful standardized method to compare the impact of obesity on persons with psychiatric disabilities and exercise, and the ability to compare across populations. Finally, due to the fluctuation in distress from psychiatric symptoms, a future model that tracks daily or weekly distress from symptoms and exercise over the course of several months may also improve the understanding of both short-term and long-term implications of symptoms on exercise.

The impact of specific symptomology on motivation and amount of exercise should be further explored. The current study was limited to somatic, depressive and anxiety symptom distress. Given the differing impact of each type of symptom on the model, future work should explore more fully the impact of a broader range of psychiatric symptoms on physical activity. Study could also be made to better understand potential dose effect on symptoms and type of exercise, e.g. stretching or aerobic, on distress from symptoms.

Future work should consider removing social support as a contributor to self-efficacy and place the variable alongside barriers in the center of the model to create a richer “socio-cultural” variable as Bandura originally suggested.

Summary

A proposed model exploring the SCT variables of social support, self-efficacy, outcome expectations, barriers and goal-setting practices, and controlling for age, gender, number of health conditions and psychiatric symptom distress, was partially supported. The hierarchical regression model including SCT variables and personal characteristics explained 25% of the variance in self-report exercise in persons with psychiatric disabilities and was significant.

While the addition of the SCT correlates improved upon the predictive model of exercise, the contributions were not statistically significant.

As predicted, amount of exercise is related to SCT determinants, with the exception of number of barriers. Encouragement of social networking for exercise with friends may be more beneficial to promote exercise than emphasis on exercise with family members. Self-efficacy is confirmed to have strong relationships with goal-setting

and outcome expectations. There is an important role in building confidence in the perception of ability to exercise may lead to more goal-setting practices and ultimately more physical activity. Finally, in the hierarchical regression model gender and distress from depressive symptoms offer the significant weight in predicting self-report exercise.

Exercise is a complex lifestyle behavior that offers a number of physical and psychological benefits to persons regardless of health or mental health status and more work must be undertaken to identify theoretical models, which explain the process of behavior change in physical activity for persons with psychiatric disabilities in order to encourage more movement. Living with psychiatric disabilities and chronic health conditions may pose unique challenges as compared to persons with chronic health conditions alone. An individual's motivation and desire can be impacted by symptoms of the illness and from the sedating effects of medications to manage symptoms. These unique issues may have an impact on cognition, problem-solving, goal-setting, perception of barriers, outcome expectancies, self-efficacy and ultimately on the ability to make behavior change such as increased physical activity. Models to predict physical activity must include additional aspects of the experience of living with psychiatric disabilities to better understand and ultimately how to support and motivate exercise.

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