WALKING AROUND CHAPEL HILL (WACH): A PILOT EXERCISE PROGRAM FOR INDIVIDUALS WITH SERIOUS MENTAL ILLNESS

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A thesis submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Arts in The Department of Psychology (Clinical Psychology).

Chapel Hill
2016

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ABSTRACT

Julia Browne: Walking Around Chapel Hill (WACH): A Pilot Exercise Program for Individuals with Serious Mental Illness
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The health benefits of exercise are well documented, yet annual health care costs related to physical inactivity within the billions. Previous exercise research in individuals with serious mental illness (SMI) has been encouraging yet limited in accessibility and sustainability of interventions. The current study developed and evaluated the impact of a group, pedometer-based walking program on the health of individuals with SMI. To achieve these goals, we first conducted focus groups to obtain input from clients and clinicians regarding implementation and adoption of a walking program. Upon incorporating findings from focus groups, we developed and pilot tested a group, pedometer-based walking program in 16 individuals with SMI, Walking Around Chapel Hill (WACH). Results indicated feasibility and acceptability as well as improvements in physical health, activity level, social support, and mental health. Future research should examine group, pedometer-based walking programs in larger samples and with the inclusion of a comparison condition.

ACKNOWLEDGEMENTS

We would like to thank all of the individuals who participated in this study as well as staff at the Schizophrenia Treatment and Evaluation Program (STEP) and Outreach and Support Intervention Services (OASIS) for their help and support conducting this study. We would also like to thank Kelly Smedley and Thava Mahadevan for assisting with recruitment, Lana Nye and Kelsey Ludwig for helping lead walking groups, and Emily Bass and Kagan Griffin for aiding with data collection and management.

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SMI	Serious Mental Illness

INTRODUCTION

The impact of exercise on physical health and psychological well-being are well established. Exercise reduces the risk of obesity, sedentary lifestyle, and the development of chronic illnesses such as high blood pressure, diabetes, and heart disease (Bassuk & Manson, 2005; Richardson et al., 2005). Moreover, exercise enhances neurocognition and self-efficacy, and reduces symptoms of anxiety and depression (Brosse, Sheets, Lett, & Blumenthal, 2002; Lawlor & Hopker, 2001; McAuley, Mailey, Szabo, & Gothe, 2013; Smith et al., 2010; Utschig, Otto, Powers, & Smits, 2013). Despite these known benefits, over 60 million U.S. adults are overweight and approximately 30% of the U.S. adult population does not engage in regular physical activity (Brosse et al., 2002). Comparable to the $47 billion in indirect annual health care costs attributed to cigarette smoking, physical inactivity and obesity comprise $24.3 billion of annual indirect health care costs (Colditz, 1999). Thus, there is a critical discrepancy between the known value of exercise and the current levels of physical activity in the population. Although this discrepancy has been extensively examined in the general population, there has been far less attention given to populations that would benefit most from increasing physical activity, like those with serious mental illnesses (SMI).

Individuals with SMI often die prematurely from preventable causes such as poor diet, lack of exercise, and high rates of substance use and smoking (Connolly & Kelly, 2005). They are also more likely to be sedentary than the general population. Sedentary lifestyle combined with weight gain from antipsychotic medication may contribute to higher rates of obesity and subsequent development of type II diabetes in this population (Connolly & Kelly, 2005). Based

on imminent health issues observed in individuals with SMI, the potential benefits of increased physical activity are substantial.

The few studies examining the effects of exercise on physical and mental health in individuals with SMI have yielded encouraging results (Gorczynski & Faulkner, 2010). But, given that several of the exercise interventions required supervision from a professional trainer and access to a gym, it is unlikely that individuals would be able to continue the program upon study completion due to cost and availability of services (Beebe et al., 2005; Gorczynski & Faulkner, 2010; Pelham, Campagna, Ritvo, & Birnie, 1993). Exercise interventions aimed at this population should not only emphasize efficacious, valid protocols, but also ease of access and delivery to promote continued physical activity. Given that many of these individuals suffer from social isolation, group based interventions may hold particular promise in providing a unique opportunity for social interaction, social support, and obtaining a sense of responsibility in tandem with physical health improvements (Gorczynski & Faulkner, 2010; Mason & Holt, 2012). Thus, there is a significant need for a valid exercise program that is not only effective, but also accessible, feasible, and sustainable for individuals with SMI.

Health improvements can be observed through participation in various types of exercise. Walking is one of the most accessible forms of exercise because it can take place without the need for equipment or a gym membership. Additionally, walking is one of the most popular forms of exercise among those with SMI (Daumit et al., 2005) as well as those with chronic medical illnesses (Richardson et al., 2005). Results from studies investigating pedometer-based walking programs, treadmill walking protocols, and walking groups demonstrate that walking leads to improved physical health, well-being, and weight loss (Bravata et al., 2007; Gorczynski & Faulkner, 2010; Ogilvie et al., 2007; Tudor-Locke & Bassett Jr., 2004). Group walking has the

potential to serve as a means for promoting and maintaining routine exercise as well as provide an opportunity for social interaction (Mason & Holt, 2012). Moreover, research that examined walking as the primary form of exercise has demonstrated good adherence and attendance rates (Rhodes, Warburton, & Murray, 2009). Groups can be led by a trained layperson, providing further support for feasibility, sustainability, and accessibility. Similarly, pedometers are inexpensive and accurate devices that can be comfortably worn on the hip or wrist to track the number of steps and total distance walked (Bravata et al., 2007; Tudor-Locke, & Bassett Jr., 2004). In fact, pedometers have been recommended for use with individuals with SMI to increase reliability of physical activity tracking (Lindamer et al., 2008). In addition to serving as reliable tracking devices, pedometers function as tangible motivators by providing constant feedback regarding progress toward step count goals. Moreover, programs that utilized pedometers to establish step count goals have been shown to increase physical exercise and improve well-being and physical health in the general population as well as in individuals with SMI (Beebe & Faust Harris, 2012; Beebe et al., 2013; Bravata et al., 2007; Croteau, 2004; Kane et al., 2012; Methapatara & Srisurapanont, 2011; Tudor-Locke & Bassett Jr., 2004).

The use of a group-based walking program to target physical inactivity in this population addresses potential barriers to exercise participation with regard to accessibility, sustainability, and feasibility. Yet, providing individuals with access and a walking group schedule does not effectively guarantee involvement. Barriers to physical activity in this population range from medication sedation, mental illness symptoms, and weight gain from medication, to lack of motivation, lack of confidence, low comfort level, and lack of an exercise companion (Archie, Wilson, Osborne, Hobbs, & McNiven, 2003; Marzolini, Jensen, & Melville, 2009; McDevitt, Snyder, Miller, & Wilbur, 2006). As a result, low attendance rates and high dropout rates are

commonplace. Although medication side effects and symptoms pose a serious barrier to participation, lack of motivation is often cited as the main reason for poor attendance and high attrition (Archie et al., 2003; Beebe et al., 2011). In order to target the physical inactivity and lack of motivation in this population, it is necessary to employ strategies to promote participation. Furthermore, the long-term benefits of sustained exercise participation as well as the effectiveness of specific exercise programs will largely remain unknown in this population if attendance and attrition rates continue to impede research.

Financial incentives have been successful in enhancing patient compliance with healthcare treatments, increasing exercise, promoting weight-loss, and encouraging smoking cessation (Burton, Marougka, & Priebe, 2010; Charness & Gneezy, 2009; Giuffrida & Torgerson, 1997; Jeffery, Wing, Thorson, & Burton, 1998; Sutherland, Christianson, & Leatherman, 2008; Volpp et al., 2008; Volpp et al., 2009). In addition, monetary incentives have been shown to increase treatment adherence in individuals with severe mental illness (Burton et al., 2010). Therefore, the current study utilized monetary incentives to increase engagement and participation in the walking program.

This study sought to develop and evaluate the impact of Walking Around Chapel Hill (WACH), a group, pedometer-based walking program, on health of individuals with SMI. Because this type of intervention has not yet been tested in individuals with SMI, we conducted this study in two stages. In stage 1, we conducted focus groups with clinicians and clients, which served as a needs assessment (Beebe et al., 2009). End-user input is critical to adoption and sustainability of an intervention. Feedback provided by clients and clinicians informed necessary modifications to the protocol including, but not limited to, frequency of weekly groups, obstacles for attendance, financial incentives, and comfort regarding pedometer usage. The second stage of

this study served as a pilot trial of the group, pedometer-based walking program. As a result, the primary aim of stage 2 was to examine the acceptability and feasibility of WACH. The secondary aim was to examine the impact of WACH on physical health and activity level. The tertiary aim was to examine the impact of WACH on social support and mental health. A final, exploratory aim was to assess the relationship between changes in activity level and physical health indices in order to establish whether changes in physical activity were associated with physical health improvements (Bravata et al., 2007; Croteau, 2004; Dallas et al., 2009).

STAGE 1

Method

Participants

Participants in client focus groups (n=12), were eligible if they (a) had a diagnosis of a serious mental illness (e.g. schizophrenia spectrum, bipolar disorder, major depression) as evidenced by chart review; (b) were above the age of 18; and (c) willing and able to provide informed consent. Primary diagnoses of clients included: schizoaffective disorder (n=7), schizophrenia (n=1), bipolar disorder (n=1), major depressive disorder (n=1), and other (n=2). Secondary diagnoses included depression (n=3), posttraumatic stress disorder (n=1), anxiety/OCD (n=2), and substance abuse (n=1) (Table 1).

Participants in clinician focus groups (n=14), were eligible if they (a) currently provided treatment to individuals with SMI; (b) were above the age of 18; and (c) willing and able to provide informed consent. Clinicians were primarily master's level social workers who had an average of 8.6 years of clinical experience (Table 1).

Participants (n=26) were recruited from local clinics through referrals, flyers, and email/listserv announcements. All client participants were outpatients at the Schizophrenia Treatment and Evaluation Program (STEP) clinics in Carrboro and Raleigh, NC. Clinician participants were employed at STEP, the Outreach and Support Intervention Services (OASIS) program (for individuals with first episode psychosis), or on a local Assertive Community Treatment (ACT) team. All study subjects signed a written informed consent document approved by the University of North Carolina at Chapel Hill (UNC-CH) Institutional Review Board.

Measures

Discussion questions and walking group questionnaires. We designed discussion questions and feedback questionnaires to obtain information regarding a potential walking group intervention for this population (e.g., recommendations for frequency/duration of groups, location, barriers). The focus group format and discussion questions were created in consultation with a qualitative analysis consultant at the Odum Institute at UNC-Chapel Hill. Similar discussion questions were asked across client and clinician groups to maintain consistency and allow for between- and within-group analyses (See Table 2).

Questionnaires were created to obtain information regarding general interest in a walking group as well as recommendations for length and duration. Questions were modified to reflect the appropriate group (client vs. clinician). Clients were asked to rate their current level of physical activity, likelihood of participating in a walking group, and comfort wearing a heart rate monitor and/or pedometer. Clinicians were asked to rate their perception of how physically active their clients were, how high of a need there is for a feasible exercise intervention in this population, and the likelihood that they would refer clients to a walking group. All ratings were made using a Likert scale from 1(Not at all) to 5 (Very). Both groups were also asked to choose the ideal length (20 minutes, 30 minutes, 40 minutes, 50 minutes) and frequency (1day/week, 2days/week, 3days/week, 4+days/week) of walking groups in a multiple-choice format. Finally, open-ended questions were included in the survey to elicit potential barriers to successful implementation as well as suggestions for incentives to exercise. Information from these questionnaires provided valuable information regarding the potential for a subsequent walking group in this population.

Procedure

The study coordinator led each 60-75 minute focus group. The discussion followed a semi-structured format that covered topics regarding experience with exercise, barriers to health and exercise, as well as specific input regarding a potential future walking group intervention. Participants completed questionnaires at the end of the discussion. All focus groups were audio recorded: Sessions were transcribed by trained research assistants and qualitatively analyzed to detect themes from the discussions. In addition, participants completed a feedback questionnaire containing items rated on a Likert scale, multiple choice questions, and free response. Participants were compensated $15.00 for their time.

Study location. The study was conducted at the Schizophrenia Treatment and Evaluation Program (STEP) outpatient clinic. The STEP clinic has two locations (Carrboro, NC and Raleigh, NC) that serve hundreds of individuals with SMI. The focus groups were conducted in secure rooms at the clinics to optimize safety and convenience for both clients and clinicians.

Data Analysis. Trained research assistants transcribed all four focus groups. Transcripts were entered and coded using Atlas.ti qualitative analysis software. JB and the Odum consultant (Paul Mihas, PM) analyzed the transcripts collaboratively. Analyses were completed using constant comparison with both a start-list of deductive codes and emerging, inductive codes identified across data (Boeije, 2002; Onwuegbuzie, Dickinson, Leech, & Zoran, 2009). These deductive and inductive codes became part of a codebook of codes and definitions. Through constant comparison, we compared data with data, data with codes, and codes with codes while coding in order to understand more clearly the nuanced meaning of each code (Boeije, 2002; Putter & Nolen, 2010).

In both client and clinician focus groups, topics related to health, exercise, and input

regarding the potential for a subsequent walking group were considered. Analyses were primarily descriptive and allowed for examination into the co-occurrence of codes and emerging themes within client and clinician groups as well as across groups. In line with published methodology, two raters read the transcripts, coded data, and adjudicated any substantive differences (Armstrong, Gosling, Weinman, & Marteau, 1997; McDevitt et al., 2006).

Results

Four focus groups were completed over a four-month period. Client focus groups consisted of six participants in each of two groups and clinician focus groups consisted of six and eight participants in each of two groups. Deductive and inductive coding of all transcribed focus groups elicited four primary themes: *reasons to exercise, barriers to exercise, incentives to exercise*, and *attitudes on walking groups*. Results from focus groups and questionnaires will be presented separately below to highlight both client and clinician perspectives.

Focus Group Results

Reasons to exercise

Client perspectives. Focus group transcripts revealed that the majority of clients had experience with exercise, especially with walking due to its accessibility (Figure 1). Clients described walking primarily for its positive impact on their mood, physical health benefits, and for enjoyment. Additionally, many clients reported having depression and described walking during their "witching hour" as a coping skill.

Clinician perspectives. Clinicians described their clients as generally inactive except for some that used walking as a form of transportation. One clinician described the use of walking as a mode of transport:

> *Some [exercise]. Mostly walking, and then most of our clients don't have transportation, so that is one of the main means of getting around, so they do walk.*

Focus group transcripts also revealed that the majority of clinicians believed their clients were aware of the physical health benefits of exercise but rarely engaged in it due to various barriers. One clinician explained:

> *There are those that are sort of aware that they're overweight and would like to exercise, […] but say they're living in a group home, the access to a gym is not really available because they don't have the transportation.*

Overall, clients and clinicians described physical health benefits and accessibility of walking as the primary reasons to engage in exercise. Yet, clinicians recognized walking as a mode of transport whereas clients endorsed walking for exercise as a positive coping skill for depression.

Barriers to exercise.

Client perspectives. Clients mentioned several barriers to exercise such as physical health complications, motivation, safety, symptoms, and transportation; however, motivation was the most salient obstacle (Figure 2). Three clients described their struggle with motivation:

> *I have a lot of trouble especially lately motivating myself to exercise, I struggle with depression. Its one of the hardest things is to get yourself going.*

> *Motivation! I have that problem with exercise.*

> *I just need motivation, so you know groups like this help me talk […] and seeing other people making […] efforts to do better with [their] health and stuff.*

Clients described physical health conditions such as arthritis, diabetes, and bodily pain as preventing them from engaging in exercise. Additionally, safety was an obstacle that many clients had encountered. One client explained:

> *That's the really hard part about walking, You have to go somewhere safe to walk [and then] you have the extra barrier between you and doing the exercise.*

Clinician perspectives. Clinicians identified physical health complications, motivation, socioeconomic status, stigma, symptomatology, lack of enjoyment in exercise, and transportation as barriers (Figure 2). Clinicians believed that physical health complications, symptoms, and transportation were most salient for their clients. One clinician described:

> *They have some other health complications but obesity I think is probably their biggest health complication. Pre-diabetes, that kind of thing. And exercise wise: I mean, none. They sit at home, watch TV. I think probably the most exercise, the most activity they get is when they come into appointments.*

Clinicians explained that symptoms related to SMI (e.g. negative symptoms in schizophrenia spectrum disorders) are a major barrier for clients to exercise. One clinician described:

> *I think they see exercise as important. I think they know that it's a component of not just weight management but it is a component of their mental health and health and I think they understand it. But there's this negative symptomatology, sort of the avolitional part [that gets in the way].*

Overall, clients and clinicians recognized physical health complications as a primary barrier to exercise in this population. Yet, clients perceived motivation and safety as additional barriers whereas clinicians perceived mental health symptoms and transportation concerns as most significant.

Incentives to exercise.

Client perspectives. Clients offered several strategies to increase motivation to exercise, especially with regards to participation in a walking group (Figure 3). Clients described that walking with a group of individuals would give them "a sense of shared purpose," which would serve as a strong motivator. Additionally, several clients offered the suggestion for using pedometers to track steps, provide rewards for participating, and have time after the walks to

share experiences. One client described positive past experience with using a pedometer as "a sneaky way to get exercise" because of the constant feedback on one's progress.

Clinician perspectives. Clinicians recommended pedometers and rewards as the most effective strategies to incentivize clients to exercise, especially in a walking group (Figure 3). A few clinicians described the potential for motivating clients through both pedometers and rewards:

> *You could even split the walking into two groups, have teams, use pedometers or something to compete with some sort of a reward.*
>
> *You could tie the number of steps to some [prize like] movie tickets to build and to add some enticing elements to it.*
>
> *I think [pedometers] would be a great thing, have it be a little bit more fun and competitive.*

Clinicians also mentioned that the sense of responsibility that would develop from group participation may also play a role in motivating clients to exercise; but tangible rewards were identified as more effective.

Attitudes on walking groups.

Client perspectives. Clients were most interested in a walking group because of the social interaction component. Two clients explained the impact of their struggle with isolation on exercise:

> *Another thing is, it's nice to go with other people, to meet people, sometimes when you're dealing with depression and things you get isolated, so to combine exercise with socialization is really good.*
>
> *I think exercising with people I know and stuff would help me too. Because when I exercise at the Y and at the mall I was by myself so exercising with people probably might help me a little bit.*

Clients were excited about the idea of participating in a walking group; but acknowledged concerns regarding effective implementation. The majority of concerns were related to logistical issues such as group scheduling, location, and length.

Clinician perspectives. Clinicians thought a walking group would be effective for their clients because it would provide them with the opportunity for social interaction and then they would experience the secondary gain of improved health. Two clinicians explained:

> *I know our clients crave contact with someone else going through something like them.*
>
> *It's kind of a great idea if you can promote the expectation that the reward is the social connection, the reward is the health benefit.*

Overall, clinicians provided positive feedback regarding the potential for a walking group intervention in this population specifically because of the social interaction component above and beyond the health benefit.

Walking Group Questionnaire Results

Perceptions of client physical activity. Survey questionnaires indicated that clients perceived themselves as relatively physically active (M=3.58, SD=1.08) yet clinicians perceived their clients as mostly physically inactive (M=1.93, SD=.829).

Walking group input. Client participants expressed interest in attending a walking group (M=3.92, SD=1.24). Additionally, they had preferences for two or three days per week with each walk lasting approximately 30 minutes. Clinician participants expressed awareness of a very high need for feasible exercise interventions for this population (M=4.79, SD=.579), and indicated interest in referring clients to a walking group (M=4.5, SD=.650). Finally, they recommended one or two days per week with each walk lasting approximately 30 minutes.

Discussion

The purpose of stage 1 was to explore client and clinician perspectives on physical activity, physical activity intervention, and associated barriers for individuals with SMI. Moreover, stage 1 sought to elicit input from both clients and clinicians on the potential for a walking group intervention for this population. Results from the present study are consistent with

previous research indicating that individuals with SMI recognize the physical health benefits associated with exercise but experience barriers that impede participation (Gorczynski & Faulkner, 2010; McDevitt et al., 2006). Both clients and clinicians described walking as the most accessible and favorable form of exercise. Moreover, both groups identified the potential benefits of exercising in a group due to the prominent social isolation experienced by individuals with SMI. Examination of client and clinician perspectives elicited several similarities as well as notable differences regarding reasons to exercise, barriers, incentives, and attitudes on walking groups.

Clients perceived themselves as relatively physically active and identified enjoyment, positive impact on mood (especially alleviating depressive symptoms), and the associated health benefit as primary reasons for engaging in exercise. Additionally, clients explained that they used exercise as a coping skill, especially for managing symptoms of depression. Clients' recognition of the mood-improving-effects of exercise is consistent with evidence demonstrating that exercise can significantly reduce depressive symptoms (Lawlor & Hopker, 2001). Unfortunately, several barriers such as motivation, safety, and physical health complications impeded consistent participation in exercise for these individuals.

Clinicians reported that their clients are relatively inactive due to barriers to exercise such as physical health complications, motivation, socioeconomic status, stigma, symptomatology, lack of enjoyment in exercise, and transportation (to and from a gym). They described that the majority of their clients that do engage in exercise utilize walking as the primary form. They explained that the primary reasons for exercise are the health benefit and mode of transportation.

Although both groups identified similar reasons to exercise and barriers to exercise, notable differences emerged between the client and clinician perspective. Firstly, clients and

clinicians differed in their perception of client physical activity such that clinicians viewed SMI clients as far more physically inactive than clients viewed themselves. Yet, since previous research has not examined differences in client and clinician perspectives on exercise in this population, little is known regarding the origins of these perceptions. Secondly, clients identified positive effects of exercise on mood and physical health whereas clinicians believed clients used exercise for transportation and physical health. This difference in perspective may suggest that clients experience far more positive effects of exercise than is commonly understood by clinicians. Thirdly, clients recognized motivation and safety as primary barriers to exercise whereas clinicians recognized transportation and symptoms. The barriers identified by clients' parallel typical exercise barriers in the general population (Schutzer & Graves, 2004) whereas clinicians felt symptoms related to mental illness were most salient. Clinicians' focus on symptoms as primary barriers could be a product of the typical context in which they interact with clients (e.g. therapy, medical care).

With regard to a walking group for SMI individuals, both clients and clinicians were highly interested and optimistic about its success. Clients and clinicians both indicated that a primary motivator to participate in a walking group would be the opportunity for social interaction. Both groups recommended organizing a time for "after walk sharing" so that connection and cohesion within the group could be fostered. This finding is in line with previous research suggesting that successful exercise programs for individuals with mental illness provide an atmosphere for social interaction (Mason & Holt, 2012). Furthermore, both clients and clinicians expressed interest in using pedometers as part of the walking group to track steps for a source of tangible motivation. Pedometers have been successfully used in SMI populations as the primary intervention but have not yet been examined in combination with a walking group (Kane

et al., 2012; Lindamer et al., 2008). Clients and clinicians differed in their opinions regarding the use of external rewards such as money and prizes such that clinicians felt their use was necessary to initially engage participants in an intervention.

Limitations of this stage include the relatively small sample size and potential for sampling bias, especially among client participants. It is possible that clients who volunteer to participate in a focus group about exercise would be more physically active, view exercise in a positive light, and be motivated to participate in a potential exercise intervention.

This study (stage 1) is one of the first to explore both client and clinician perspectives on exercise in the SMI population prior to the implementation of an intervention. Different emergent themes from client and clinician focus groups demonstrate the need to recognize barriers, incentives, and implementation strategies from both the consumer and facilitator lens. Considering the varying perspectives of clients and clinicians, and addressing all salient barriers during the development phase has the potential to significantly impact the efficacy, feasibility, and sustainability of the exercise intervention. Both clients and clinicians were highly interested in the development of a walking group that also incorporated the use of pedometers for tangible motivation.

As a result of the foregoing, stage 2 incorporated findings from stage 1 when designing and testing an exercise intervention for individuals with SMI. Specifically, stage 2 tested a combination group, pedometer-based walking program for individuals with SMI. The intervention protocol consisted of 30-minute walking groups, held 2x/week, for 10-weeks. Moreover, given that clinicians identified transportation as a concern for feasibility, all walking groups were held in the area surrounding the outpatient clinic to eliminate any additional travel.

Finally, at the end of each walk, there was time set aside for “after walk sharing” for participants to reflect on their experience in the walking group.

STAGE 2

Method

Participants

A total of 16 individuals participated in stage two. Participants were included if they (a) had a diagnosis of a schizophrenia spectrum disorder as evidenced by chart review; (b) were above age 30; (c) were deemed safe to participate in exercise according to Physical Activity Readiness-Questionnaire (PAR-Q) as indicated by responding "no" to all of the 7 items; (d) had no history of cardiovascular disease; (e) did not have diabetes or hypertension or had diabetes or hypertension and provided written documentation of verbal consent from a doctor; (f) did not have orthopedic limitations such as broken or fractured bones, torn or pulled muscles, or problems with joints that significantly interfered with walking; (g) had not been hospitalized in the last 3 months; (h) were clinically stable (i.e., no medication changes in the previous month) and report from clinician; (i) had a BMI $\geq$ 25; and (j) were willing and able to provide informed consent. Participants were not excluded based on gender or race. Criteria i was added for the second cohort of individuals to solely capture individuals who are overweight or obese. Complete demographic and clinical information can be found in Table 3.

Participant recruitment for individuals with SMI in stage 2 paralleled efforts from stage one. Once a person was referred to the study (or self refers), the study coordinator conducted a phone screen with the individual and described the study protocol, expectations for participation, and potential risks and benefits. The study coordinator evaluated the subject's understanding and

only proceeded if the individual comprehended these elements. All study subjects signed a written informed consent approved by UNC-CH's Institutional Review Board.

Measures

At baseline, eligible participants completed demographic self-report measures. Participants also completed measures of physical health, activity level, social support, and mental health at baseline, post-test, and 1-month follow-up. Information regarding patient satisfaction and program acceptability was collected at post-test. With regard to self-report measures, if a participant indicated two answer choices for a given item (on a Likert scale), the average of the two answers was recorded and used in analyses. Participants were paid $20.00 for completing each assessment.

The Physical Activity Readiness Questionnaire (PAR-Q; American College of Sports Medicine & Pescatello, 2014) is a 7-item yes/no screening tool used to determine an individual's potential risk of exercising based on their heath history. PAR-Q guidelines recommend that individuals who answer "yes" to any of the seven questions consult a doctor before beginning physical activity. As noted above, individuals were excluded from the proposed study if they indicate any prior health concerns as evidenced by answering "yes" to any item on this measure.

Participants completed self-report measures of date of birth, gender, race, education level, and employment status. Clinical information, such as diagnosis, number of hospitalizations, and current medications, were confirmed via chart review.

Acceptability and feasibility was assessed through examination of attendance rates, ability to recruit the desired sample size, and client feedback relevant to intervention delivery. Participants completed the Client Satisfaction Questionnaire (CSQ-8; Larsen, Attkisson, Hargreaves, & Nguyen, 1979), to assess WACH acceptability. The CSQ-8 is an 8-item measure

of client satisfaction. Items are rated on a Likert scale from 1 to 4 with varying anchors for each question, and scored to produce a value of general satisfaction with services, ranging from 8-32 with higher values indicating greater satisfaction. For the purposes of the current study, the CSQ-8 questions were modified slightly to prompt feedback for the exercise program. For example, questions were changed from "How would you rate the quality of the service you received" to "How would you rate the quality of the exercise program you received? "Additionally, clients completed a feedback questionnaire developed by the research team that included both multiple choice questions and free response questions.

The Short Form-36 (SF-36; Leese et al., 2008) is a 36-item measure that produces two summary scores: physical health and mental health. These two summary scores contain subscales of eight categories: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. Due to the small sample size and utility of the SF-36 for assessing changes in self-reported physical health, primary analyses were conducted on the Physical Component Summary (PCS) score.

Weight was assessed at baseline, post-test, and 1-month follow-up using a digital scale located in the outpatient STEP clinic. One participant exceeded the maximum weight of the STEP scale (>400 lbs) and as a result, weighed herself at her doctor's office and reported the weight to the research team. Body Mass Index (BMI) was used to assess change in body mass during the pilot trial by inputting height and weight into the National Institutes of Health online BMI calculator (http://www.nhlbi.nih.gov/health/educational/lose_wt/BMI/bmicalc.htm). Additionally, one participant in the first cohort did not have a BMI of 25 or greater and thus was excluded from analyses of weight and BMI. Blood pressure and resting heart rate were assessed at baseline, post-test, and 1-month follow-up using the equipment at the STEP outpatient clinic.

We did not measure blood pressure and resting heart rate of participants in the first cohort of WACH (n=9). Therefore, results of blood pressure and resting heart rate only reflect readings from the second cohort of participants (n=7).

The Six Minute Walk Test (6MWT; Vancampfort et al., 2011) was used to assess changes in physical health resulting from increased physical activity. The 6MWT measures the total distance an individual can walk in six minutes. Consistent with test guidelines, participants will complete this test individually, on a level course, and under supervision (American Thoracic Society, 2002). The 6MWT was completed at baseline, post-test, and at one-month follow-up in the hallway at the STEP outpatient clinic. The 6MWT has been validated as a simple and noninvasive measure of health change associated with increased exercise. Additionally, the 6MWT has been shown to correlate with BMI, negative and depressive symptoms, and resting heart rate (Vancampfort et al., 2011). One participant did not complete the 6MWT at post-test or follow-up and was excluded from analyses of this measure.

The Short Form International Physical Activity Questionnaire (IPAQ; Faulkner, Cohn, & Remington, 2006), a valid self-report measure, was used to assess changes in physical activity. The IPAQ Short Form is a four-item scale that assesses the frequency and duration of walking, moderate-intensity exercise, vigorous-activity exercise, and sitting. Due to the nature of this study, changes in frequency and duration of walking as well as sitting were used in analyses to determine changes in activity level.

Yamax Corporation DW model pedometers are the most accurate at detecting steps taken (within 1%) as compared to other available brands and thus, were used to track steps (Basset et al., 1996). Step count readings obtained from pedometers were continuously tracked throughout the 10-week program and at follow-up to detect changes in activity level. Pedometer readings

were recorded daily for the entire duration of the study including the 1-month follow-up.

The Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Powell, Farley, Werkman, & Berkoff, 1990) is a 12-item self-report questionnaire assessing the perceived adequacy of support from family, friends, and significant others. Items are rated on 5-point Likert scales, and a total score is obtained by summing items. The total score was used for analyses.

Mental health was assessed through symptom severity, positive mood rating, and a quality of life index. Symptoms were assessed with the Positive and Negative Syndrome Scale (PANSS; Kay, Opler, & Fiszbein, 1992). Four scaled scores are produced: Positive Symptoms, Negative Symptoms, General Psychopathology, and Total Score. Raters were trained to conduct the PANSS to a gold standard of reliability (i.e., intraclass correlation > .80). Due to the small sample size, we focused on the PANSS Total Score.

The Positive and Negative Affect Schedule Short Form (PANAS-SF; Thompson, 2007) is a 10-item scale used to assess changes in mood. Participants in the current study completed only the 5-item positive scale before and after each group walk to assess for mood changes during the walking groups. The positive scale consists of five adjectives (Alert, Inspired, Determined, Attentive, Active) that are rated from 1 (Not at all) to 5 (Extremely). Participants completed the PANAS-SF-P before and after each group walk (possible total of 40 times).

The World Health Organization Quality of Life Scale (WHOQOL-BREF; Skevington, Lotfy, & O'Connell, 2004) is a 26-item self-report questionnaire that assesses quality of life in four domains including physical health, psychological health, social relationships, and environment. Four domain scores are produced indicating quality of life for each particular domain. Additionally, questions 1 and 2 are examined separately as they address overall

perception of quality of life and individuals overall perception of their health, respectively (Skevington et al., 2004). The environment domain score was not calculated, as it is not relevant to the aims of this study. The overall quality of life score as well as domain scores of physical health, psychological health, and social relationships were calculated and used in analyses.

Procedure

We conducted two 10-week walking groups for two cohorts of individuals (n=16). Cohort 1 (n=9) completed the program in the fall (September to November) and cohort 2 (n=7) completed the program in the spring (March to May). Based on prior research and the results obtained from stage 1, the walking groups were conducted twice per week, 30-minutes per day, at a moderate pace. The groups took place in the area surrounding the STEP Outpatient clinic in Carrboro, NC. Participants wore a pedometer during all waking hours for the entire duration of the 10-week program including the one-month follow-up period. Participants were instructed not to reset their pedometer for the entire duration of the study to simplify the procedure and promote accurate step count readings.

To establish a baseline reading of step count, all participants wore a pedometer during the first week of the study without any specific instructions related to goal-setting. Formal training for pedometer use is not necessary; but brief information regarding proper use and care was addressed. Consistent with updated step count norms for older adults and special populations, participants were encouraged to achieve at least 3,000 steps/day on unsupervised walks (Tudor-Locke et al., 2011) beginning during the second week of the study. If participants are able to exceed this 3000 steps/day, appropriate modifications to goals were set. This protocol, including supervised walking groups (2x/wk.) and unsupervised pedometer-based walks (step count goals), meets the minimum exercise recommendations for health promotion (Haskell et al., 2007).

To increase accountability and adherence to pedometer usage, the study coordinator spoke with each participant daily by phone, text, or email based upon participant preference for the entire duration of the study including the 1-month follow up (98 days). The study coordinator would remind the participant to put on their pedometer and then request the step count reading each morning between 6-10am; however, response times from participants varied throughout the day. Specifically, the study coordinator would send or speak the following message: "Hi, this is your reminder to put on your pedometer. How many steps has your pedometer recorded so far?" Upon receiving the message from the participant with the step count, the study coordinator replied with "Thanks" and did not initiate continued conversation until the subsequent day. If a participant reported that they did not wear the pedometer on the preceding day or if the step count reported was too low to be considered an accurate reading (<50 steps), the step count for that day was recorded as missing data. Pedometer readings were recorded based on participant self-report; however, the research team confirmed readings at both group walks each week.

The study coordinator and a graduate student research assistant met the group at the STEP clinic for each session, reviewed safety precautions, administered the PANAS-SF, and led individuals on a walk for 30 minutes. Participants were encouraged to walk at a moderate pace, defined as being able to speak without feeling out of breath, which is consistent with rating level of physical exertion at about a "3" (scaled 1-5) using the "Talk Test" (Persinger, Foster, Gibson, Fater, & Porcari, 2004). After 30 minutes, the group returned to the STEP clinic, discussed how they felt, completed the PANAS-SF a second time, reviewed the previous week's step progress, and set a step goal for the upcoming week.

The study coordinator led goal-setting groups once per week for individuals to reflect on their progress from the previous week and set a goal for the upcoming week. The study

coordinator created weekly updates for all participants each week that included graphs of their daily steps for the previous week, their PANAS mood ratings, and their average steps in relation to their goal (e.g. exceeded step goal vs. keep working towards step goal). Participants would review their weekly updates and then choose a step goal for the upcoming week. Participants reported their upcoming step goal in front of the entire group to foster cohesion, group support, and accountability.

The study coordinator assisted individuals with goal setting based upon whether or not they achieved their goal the previous week. Additionally, if participants achieved their goal the week before, they were encouraged to increase their daily step goal by 500-1000 steps; however, goal setting was individualized to the participant (Bravata et al., 2009).

To motivate individuals to sustain participation in the program, we provided monetary incentives for participation in the walking groups. Participants earned $10.00 for each attended group and were paid weekly.

The area surrounding the STEP clinic contains several miles of bike and walking paths as well as side walked streets. The location was chosen to facilitate accessibility and sustainability of WACH since it could be completed without the need for additional transportation. Participants and group leaders chose specific walking routes together to foster cohesion.

Data Analytic Plan

Primary Aim Analysis

To assess feasibility and acceptability, total session attendance was calculated for each participant. We tracked the number of referrals, the source of the referral (self versus clinician), number of participants screened, and number accepted into the study. In addition, numerical scores from the CSQ-8 were used to assess clients' acceptability of the walking program. To

assess pedometer adherence, we calculated the percentage of days that participants reported step count to the research coordinator out of a possible 98 days. Finally, participants completed a feedback questionnaire at post-test about the acceptability of the walking program.

Secondary and Tertiary Aim Analyses

Given the small sample size and nature of the pilot study, formal inferential statistics are not appropriate (Lancaster, Dodd, & Williamson, 2004). Instead, we computed within-group effect sizes for continuous outcome variables in order to evaluate the magnitude of pre-post and follow-up changes in key domains including physical health, activity level, social support, and mental health. Effect sizes were calculated by dividing the mean difference (baseline to post-test and baseline to 1-month follow-up) by the baseline standard deviation (Lakens, 2013). Effect sizes were evaluated according to Cohen's (1988) recommended ranges: small (d=.20*),* medium (d=.50*),* and large (d=.80). Due to the small sample size, summary and composite scores were used for analyses when appropriate.

Exploratory Aim Analysis

To assess the relationship between step count changes and physical health changes, we first computed change scores for each participant by subtracting baseline from post-test and baseline from follow-up for step count, BMI, and 6MWT. We then computed Pearson correlations between baseline-post-test and baseline-follow-up changes on step count and baseline-post-test and baseline-follow-up changes on BMI and 6MWT.

Results

In order to determine whether results from cohorts 1 and 2 could be combined for analyses, we compared groups on basic demographic, clinical, and physical activity variables at baseline. Independent samples t-tests were conducted to compare cohorts 1 and 2 on age,

baseline symptoms (PANSS scores), and self-reported minutes spent walking (IPAQ). A chi-squared test was conducted to compare the cohorts on gender. Results from all analyses (t-tests and chi-squared) were not statistically significant, indicating that cohorts 1 and 2 were not significantly different from each other on these basic demographic, clinical, and physical activity variables. As a result, results from both cohorts were combined for all analyses. All participants (n=16) completed baseline, post-test, and 1-month follow-up assessments.

We received an adequate number of referrals for stage 2 from clinicians and clients as well as self-referrals (See Figure 6). The attendance rate for walking groups was 84% for the entire sample (n=16). Participants reported their pedometer step count reading to the study coordinator on 86% of days by responding to the phone call, email, or text prompt they received. There were no dropouts in this study.

Scores on the client satisfaction questionnaire-8 (CSQ-8) indicated a high level of acceptability for WACH (M=30.6, SD=1.45; maximum score is 32). Additionally, participant responses on the post-test feedback questionnaire indicated that the health benefit, social interaction, walking different routes, and money were all motivating factors to attendance. Specifically, the health benefit and social interaction were rated as most motivating (See Figure 7). Feedback about pedometers and goal setting revealed moderate to high levels of acceptability. Finally, participants reported high levels of satisfaction with reporting steps to the study coordinator each day and are moderately likely to attend walking groups without compensation (See Table 4).

Participants provided qualitative responses to three questions on the feedback questionnaire including: “What did you like about the exercise program?”, “What didn’t you like about the exercise program?”, and “What do you think would make this exercise program

better?". Inductive coding was used when analyzing these responses to identify emerging themes in these data. Social interaction (56%), health changes (e.g. improved endurance) (25%), and spending time outdoors (12.5%) were the most commonly cited parts about the exercise program that participants liked. In terms of components that participants did not like and that could be improved, participants recommended more days (31%), longer walks (12.5%), and more people in the walking groups (18.8%). The majority of participants reported that there was nothing they would like to change about the current program (62.5%). Overall, qualitative feedback indicated that participants enjoyed the walking groups and recommended longer and more frequent walking groups.

Table 5 provides means and standard deviations for key domains of physical health, activity level, social support, and mental health as well as within-group effect sizes for differences between baseline-post-test and baseline-1-month follow-up assessments.

In terms of physical health, analyses revealed small to medium effect size (ES) improvement in resting heart rate (baseline to post-test) and six minute walking test (both time points). A small (ES) improvement was observed in self-reported physical health as evidenced by scores on the PCS from the SF-36 from baseline to post-test. Small to medium (ES) deterioration was observed in systolic blood pressure (both time points) and diastolic blood pressure (baseline to post-test). Little to no changes were observed in PCS (baseline to follow-up), weight (both time points), BMI (both time points), diastolic blood pressure (baseline to follow-up), and resting heart rate (baseline to follow-up).

Activity level results included large ES improvements in minutes spent walking each week (IPAQ walking) at both time points and daily steps (baseline to post-test). Medium to large ES improvements were observed in daily steps from baseline to follow-up. Small to medium

improvements were observed in IPAQ sitting from baseline to post-test. Little to no changes were observed in hours spend sitting from baseline to follow-up.

A small ES improvement was observed in perceived social support as evidenced by changes on the MSPSS from baseline to post-test and baseline to follow-up.

For mental health variables, medium to large ES improvements were observed in PANSS symptom scores from baseline to post-test. Small to medium ES improvement was observed in the PANSS (baseline to follow-up), overall quality of life rating (both time points), quality of life related to physical health (both time points), and psychological domain of quality of life (baseline to post-test). Small ES improvement was observed in the psychological domain of quality of life and social relationships domain of quality of life from baseline to follow-up. Little to no changes were observed in the social relationships domain of quality of life from baseline to post-test. Finally, scores on the PANAS from pre-walk (M=17.80, SD=4.64) to post-walk (M=20.93, SD=3.19) reflected medium to large improvements in positive mood (d=0.68).

Table 6 provides bivariate correlations among changes in step count, 6MWT, and BMI from baseline to post-test and baseline to follow-up. A significant moderate negative correlation was found between changes in step count and changes in BMI from baseline to post-test indicating that larger increases in step count were related to larger reductions in BMI. Correlations between changes in 6MWT and changes in step count at both time points were in the expected direction but were not statistically significant. Similarly, the correlation between step count changes and changes in BMI from baseline to follow-up was in the expected direction but was not statistically significant.

Discussion

The purpose of stage 2 was to evaluate the feasibility and acceptability of a group,

pedometer-based walking program, WACH, for individuals with SMI. Secondary and tertiary aims were to examine the impact of WACH on physical health, activity level, social support, and mental health. A final exploratory aim was to examine the relationship between step count changes and physical health changes, specifically BMI and 6MWT, from baseline to post-test and baseline to follow-up. Results from stage 2 suggest feasibility and acceptability of WACH as evidenced by high attendance rates and participant satisfaction ratings. Though pedometers have been successfully used in this population as the primary intervention (Kane et al., 2012; Lindamer et al., 2008), high pedometer adherence rates and participant acceptability ratings observed during WACH suggest that pedometers can be effectively used in combination with a walking group program.

Given the salience of motivation as a barrier to physical activity participation (Archie et al., 2003; Beebe et al., 2011), especially in this clinical population, results from the present study are encouraging in that they demonstrate the importance of health benefits and social interaction components of WACH in encouraging attendance. Moreover, although monetary incentives were utilized in the present study, participants rated them lowest of all four motivators for attendance (health benefit, social interaction, and walking different routes). Therefore, it may most effective and sustainable to use incentives and rewards for initial engagement but progressively focus more on the health and social components to promote continued participation.

Participants experienced improvements in all of the key domains: physical health, activity level, social support, and mental health over the course of this 10-week intervention. Participants experienced minor weight loss (~1.3 lbs.), on average, over the course of 10 weeks; however, weight-loss and BMI varied drastically among participants. Improvements in 6MWT distance and resting HR suggest that participants' experienced physical health and fitness changed over

the course of the program. Blood pressure did not improve over the course of WACH; however, it is likely that this 10-week moderate intensity intervention was not of sufficient duration and intensity to significantly impact blood pressure (Murphy, Nevill, Murtagh, & Holder, 2007). Finally, small improvements in self-reported physical health suggest that participants recognized noticeable health benefits by participating in WACH.

Step count improvements were substantial with an approximate 2,000-step increase, on average, over the course of 10 weeks. By the end of the intervention, eight participants (50%) (compared to just one participant at baseline) were accumulating daily steps within the 6,500-8,500 range recommended for adults with chronic illnesses (Tudor-Locke et al., 2011). Moreover, by the end of the 10-week intervention, four participants were walking above 10,000 steps/day, which is considered the upper end recommendation for healthy older adults (Tudor-Locke et al., 2011). Participants self-reported minutes spent walking and hours spent sitting improved as well, suggesting that participation in WACH promoted lifestyle changes outside of supervised walking groups. Weight loss and step count increases observed in the present study are consistent with previous research on walking programs in the general population (Bravata et al., 2007; Richardson et al., 2008). Furthermore, the moderate to large significant correlation between change in step count and change in weight from baseline to post-test suggests that those who increased their daily steps most experienced the greatest weight loss.

Improved quality of life, social support, and symptoms suggest that participation in WACH also impacted psychological outcomes. Though this sample (n=16) consisted of clinically stable (no medication changes in the past month or hospitalizations in the past 3 months) participants currently receiving outpatient pharmacological and psychological treatment, large ES improvements in symptoms were present from baseline to post-test. Consistent with

previous research on exercise in SMI (Gorczynski & Faulkner, 2010), results from this trial demonstrate the impact of physical activity not only on physical health but also on symptoms, especially negative symptoms in individuals with SMI. Given the difficulty in treating negative symptoms, mental health care providers may consider a group-based exercise intervention as an adjunct to current treatment for individuals with SMI. In addition, improvements in self-reported social support and quality of life further highlight the impact of physical activity participation on psychological outcomes.

Limitations of stage 2 include a small sample size and lack of a comparison condition. Given that the primary aims of the current study were to examine the feasibility and acceptability of WACH, a control condition was not necessary at this stage of the design. However, because of the lack of a control condition, it is important to interpret the results with caution. Additionally, since participants were compensated for attendance in the walking groups, reported attendance rates may not reflect those obtained in the absence of monetary awards. Finally, given that this study was not fully funded, the study coordinator led all walking groups, conducted all assessments, and initiated all daily contact calls, texts, and emails. As a result, participants' responses during assessments may have been influenced by the presence and perceived goals of the study coordinator.

Despite these limitations, changes in the key domains in stage 2 are comparable to those reported in the few published randomized controlled trials of exercise interventions for individuals with SMI (Beebe et al., 2005; Gorczynski & Faulkner, 2010; Pelham, Campagna, Ritvo, & Birnie, 1993). Yet, unlike the majority of previous research, WACH was integrated into the local outpatient clinic and did not require access to a gym, supervision by a professional trainer, or advanced equipment, thus promoting sustainability of the intervention. Moreover,

WACH includes strategies to promote accountability and motivation including self-monitoring, mood ratings, daily reminders and step count reporting (to a research assistant), goal-setting, and weekly progress updates. Social interaction was also a primary focus of WACH as participants were encouraged to talk with each other and with the group leaders during group walks as well as during the "after walk sharing" session. Overall, this pilot trial has demonstrated the value of a comprehensive yet accessible, feasible, and sustainable exercise intervention for individuals with SMI.

GENERAL DISCUSSION

This two-stage study identified and explored physical activity and its associated barriers in individuals with SMI and subsequently developed and examined a group, pedometer-based walking program. Results from stage 1 indicated that there is a significant need for improved and sustainable exercise interventions for this population. Furthermore, clients and clinicians recommended walking as the most accessible and enjoyable form of exercise for this population. Stage 2 utilized information obtained from stage 1 in tandem with previous research to develop and test WACH, a group, pedometer-based walking program. Stage 2 results indicated acceptability and feasibility of WACH as well as improvements in physical health, activity level, social support, and mental health indices. Overall, this initial trial produced promising results and warrants further examination in the context of a larger randomized controlled trial.

Based on results of the initial trial conducted in stage 2, we plan to modify and improve upon WACH in several important ways. Informed by participant recommendations for more groups/week, longer, walks, and a longer overall program, we plan to extend the duration of WACH as well as include a dosing component to allow for a progression of increased frequency and length of walking groups. Additionally, given the large variations in physical activity/fitness indicators including daily steps, resting HR, and 6MWT, we plan to tailor the program to the fitness level of participants by stratifying them into groups based on an initial fitness test. Through these modifications, we plan to improve upon WACH and test this modified intervention in the context of a larger trial to continue our dedication to improving the lives of

those with SMI.

Table 1

Demographic Characteristics of Stage 1 Participants

	Clients (n=12)	**Clinicians (n=14)**
Gender, % (n)		
% Female	41.7 (5)	64.2 (9)
Age		
M (SD)	39.7 (7.7)	37.3 (10.1)
Range	25-50	24-55
Race, % (n)		
Caucasian	41.7 (5)	90.9 (10)
African-American	58.3 (7)	9.1 (1)
Education, % (n)		
Some high school	8.3 (1)	-
High school diploma	16.7 (2)	-
Some college	25 (3)	-
College degree	33.3 (4)	7.1 (1)
Higher than college	8.3 (1)	92.9 (13)

Note. Three clinician participants did not provide their ages. Age listed in table represents average of 11 clinician participants.

Table 2

Focus Group Discussion Questions

Client Version:
1. What do you do to try to keep healthy?
2. When I mention exercise what goes through your mind?
3. What, if anything, gets in the way of exercising?
4. If you were in charge of an exercise program what would it look like?
5. What are your thoughts about a walking group?
6. If you were in charge of the walking group, how would you get people involved?
Clinician Version:
1. Can you comment on the physical health of your clients?
2. How often would you say your clients exercise?
3. What times of exercise programs do you think would be more feasible for your clients?
4. What are your thoughts about a walking group for clients?
5. What obstacles do you anticipate being most prevalent?
6. How could clients be best motivated to participate in a walking group?

Table 3

Demographic and Clinical Characteristics of Stage 2 Participants

Gender, % (n)	
% Female	31.25 (5)
Age	
M (SD)	43.3 (7.8)
Range	33-61
Race, % (n)	
Caucasian	75.0 (12)
African-American	25.0 (4)
Education, % (n)	
High school diploma	31.25 (5)
Some college	6.25 (1)
College degree	50.0 (8)
Higher than college	12.5 (2)
Employment Status, % (n)	
Unemployed	81.25 (13)
Employed part-time	18.75 (3)
Diagnosis, % (n)	
Schizophrenia	31.25 (5)
Schizoaffective disorder	62.5 (10)
Psychotic disorder NOS	6.25 (1)

Table 4

WACH Feedback and Acceptability

Feedback Category	**M (SD)**
Pedometer Acceptability	
How much did you like using a pedometer?	4.0 (1.2)
How likely are you to continue using the pedometer after the study ends?	3.5 (1.4)
Goal Setting Acceptability	
How much did you like setting weekly step goals?	3.6 (0.9)
How much did you like receiving weekly goal sheets?	4.0 (1.0)
WACH Specific Feedback	
How much did you like reporting your steps each day?	3.9 (1.1)
How likely is it that you would attend groups without pay?	3.6 (1.3)

Note. Participants rated all feedback questions on a scale from 1 (Not at all) to 5 (Extremely).

Table 5

Means (M), Standard Deviation (SD), and Within-group Effect Sizes (Cohen's d) for Outcomes (n=16)

Outcomes and Measures	Baseline M (SD)	Post-test M (SD)	1-mo. FU M (SD)	BL-PT *d*	BL-FU *d*
Physical Health					
SF-36 PCS	49.93 (9.46)	51.55 (8.95)	50.30 (9.79)	0.17	0.04
Weight (pounds)[a]	244.15 (68.53)	242.85 (67.53)	244.21 (68.05)	0.02	-0.00
BMI[a]	36.65 (9.86)	36.51 (9.92)	36.66 (9.92)	0.01	-0.00
Systolic BP[b]	123.29 (21.09)	134.71 (15.03)	129.29 (11.41)	-0.54	-0.28
Diastolic BP[b]	80.00 (17.41)	86.71 (10.45)	79.29 (10.27)	-0.39	-0.04
Resting HR[b]	90.43 (13.70)	86.57 (7.39)	90.00 (6.00)	0.28	0.03
6MWT[a] (feet)	1499.57(404.10)	1631.78(312.87)	1622.76(301.61)	0.33	0.30
Activity Level					
IPAQ Walking (min./week)	64.69 (78.83)	316.25 (418.42)	171.72 (234.30)	3.19	1.36
IPAQ Sitting (hours/day)	5.41 (3.29)	4.31 (2.82)	5.34 (2.64)	0.33	0.02
Daily steps	4464.60(2240.09)	6766.10(3425.20)	5940.04(3791.13)	1.03	0.66
Social Support					
MSPSS	64.97 (15.20)	66.81 (15.58)	68.94 (14.80)	0.12	0.26
Mental Health					
PANSS	76.19 (12.71)	67.06 (12.17)	72.31 (16.59)	0.72	0.30
WHOQOL-Overall	7.16 (1.86)	7.88 (1.78)	7.69 (1.82)	0.39	0.29
WHOQOL-Physical Health	24.59 (4.64)	26.13 (5.89)	25.75 (5.50)	0.33	0.25
WHOQOL-Psychological	20.69 (4.94)	21.94 (5.81)	21.50 (5.57)	0.25	0.16
WHOQOL-Social Rel.	10.81 (2.95)	10.63 (3.07)	11.19 (3.15)	-0.06	0.13

Note. A positive effect indicates improvement and a negative effect size indicates deterioration.
BL=Baseline; PT=Post-test; FU=Follow-up; PCS = Physical Component Score; BMI=Body Mass Index; BP=Blood Pressure; HR=Heart Rate; 6MWT=Six Minute Walk Test; MSPSS=Multidimensional Scale of Perceived Social Support; PANSS=Positive and Negative Syndrome Scale; WHOQOL=World Health Organization Quality of Life Scale, Brief Version

[a] n=15.

[b] n=7.

Table 6

Bivariate Correlations between Step Count Changes and Physical Health Changes

	6MWT Δ BL-PT	**6MWT Δ BL-FU**	**Daily Steps Δ BL-PT**	**Daily Steps Δ BL-FU**	**BMI Δ BL-PT**	**BMI Δ BL-FU**
6MWT Δ BL-PT	-					
6MWT Δ BL-FU	.790**	-				
Daily Steps Δ BL-PT	.315	.205	-			
Daily Steps Δ BL-FU	.185	.138	.750**	-		
BMI Δ BL-PT	-.432	-.388	-.531*	-.476	-	
BMI Δ BL-FU	-.434	-.456	-.460	-.357	.910	-

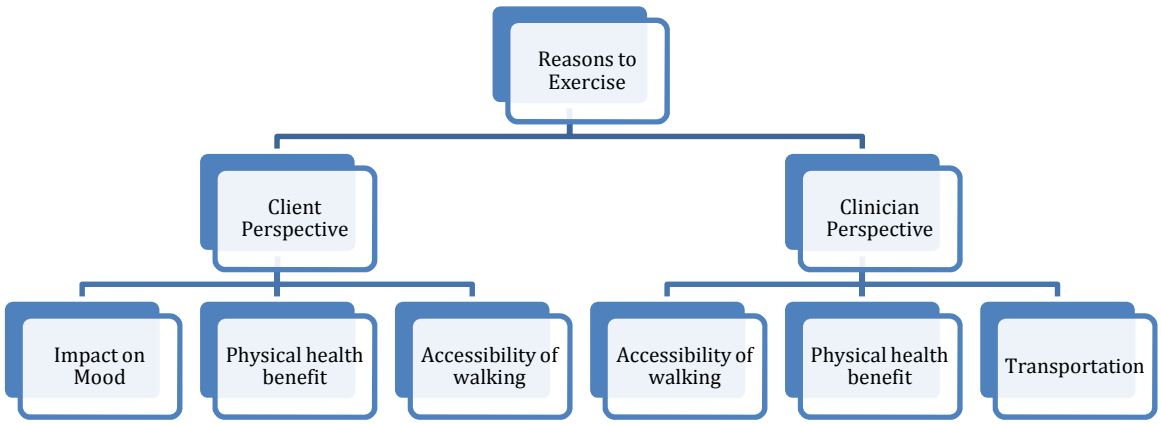
Note. Δ BL-PT = change from baseline to post-test; Δ BL-FU = change from baseline to follow-up; 6MWT= Six Minute Walk Test; BMI = Body Mass Index

*Correlation is significant at the 0.01 level (2-tailed)

**Correlation is significant at the 0.05 level (2-tailed)

Figure 1

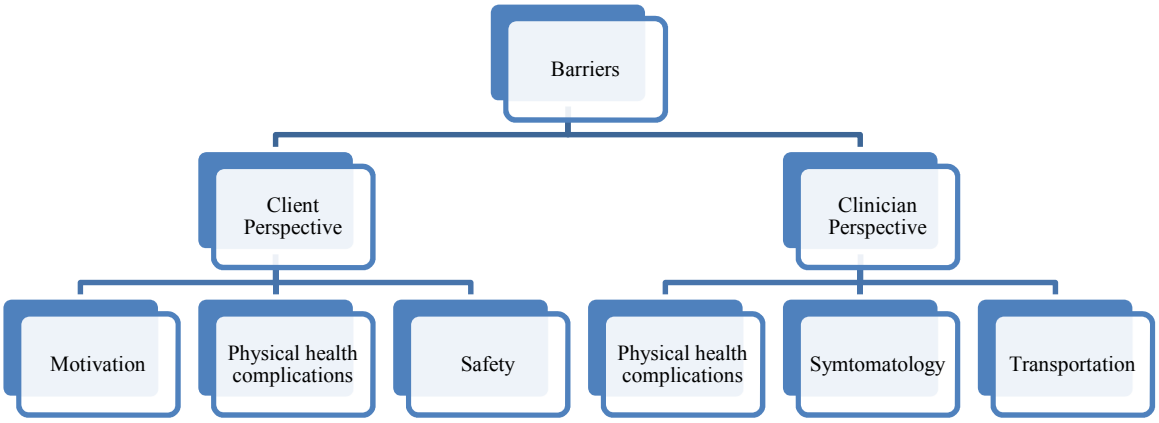
Reasons to Exercise



Note. The three most cited reasons to exercise are represented in the above figure for both clients and clinicians.

Figure 2

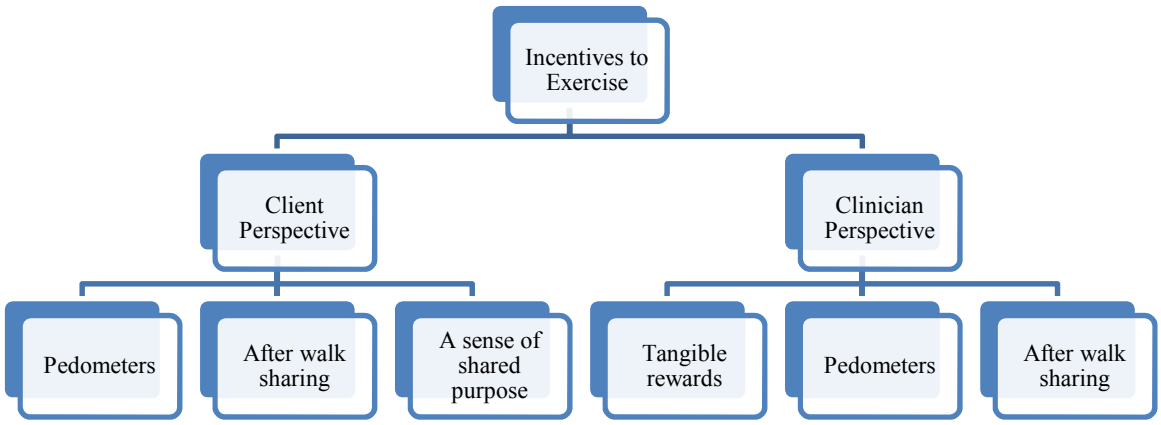
Barriers to Exercise



Note. The three most cited barriers are represented in the above figure for both clients and clinicians.

Figure 3

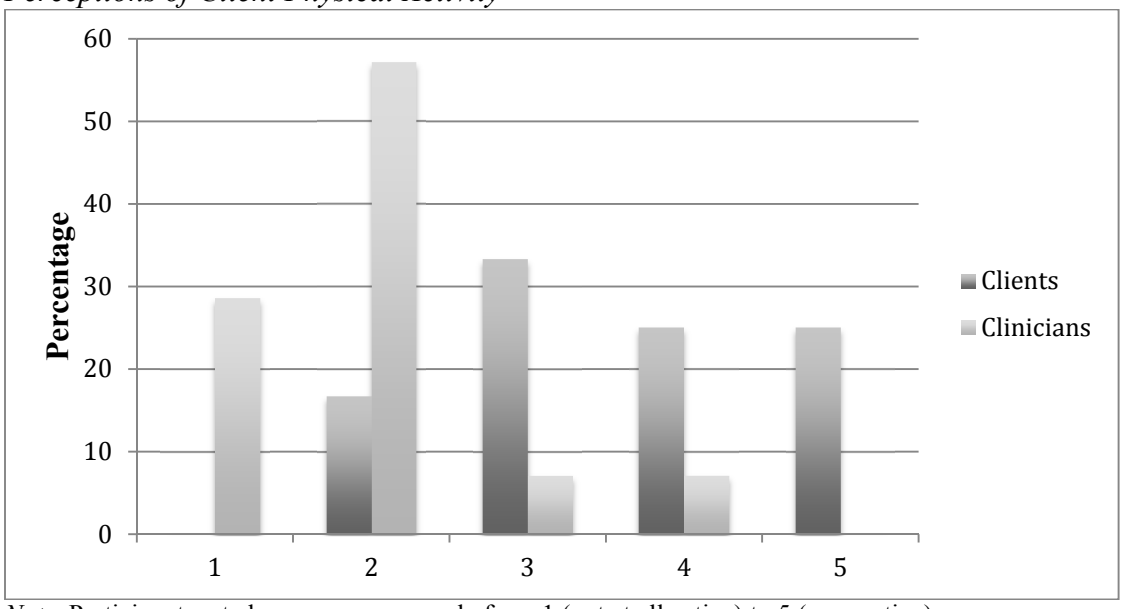
Incentives to Exercise



Note. The three most cited incentives to exercise are represented in the above figure for both clients and clinicians.

Figure 4

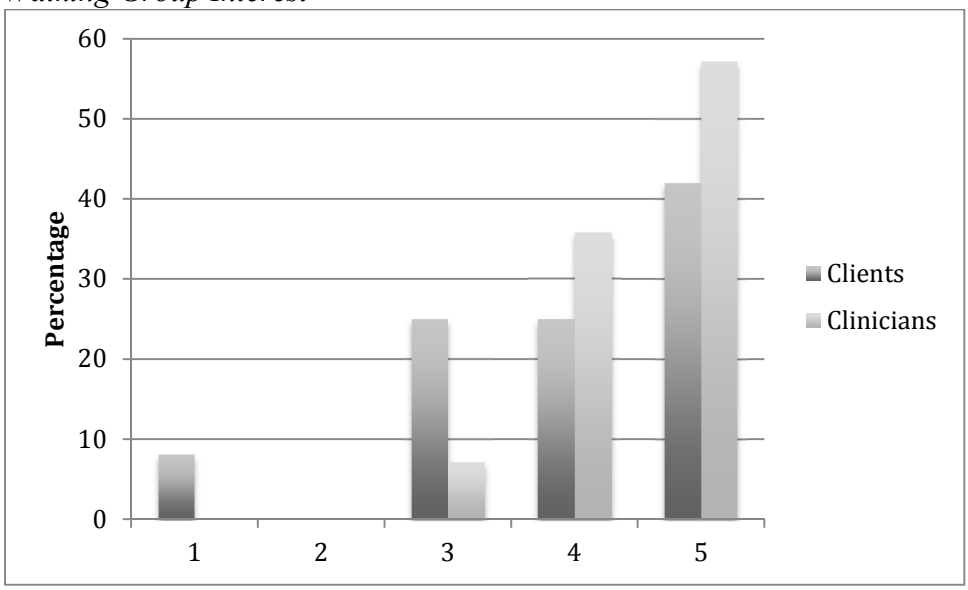
Perceptions of Client Physical Activity



Note. Participants rated responses on a scale from 1 (not at all active) to 5 (very active)

Figure 5

Walking Group Interest



Note. Clients rated interest in participating in a walking group and clinicians rated likelihood of referring clients to a walking group on a scale from 1 (not at all) to 5 (very).

Figure 6

Flowchart of Participant Referrals, Screening, and Enrollment

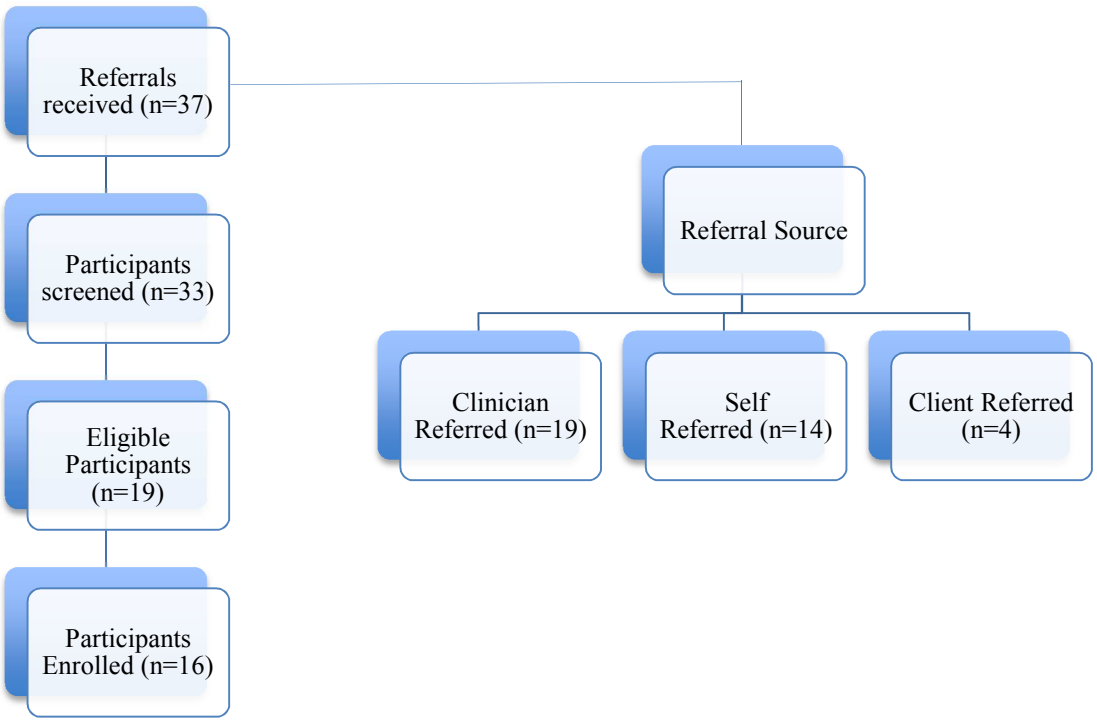
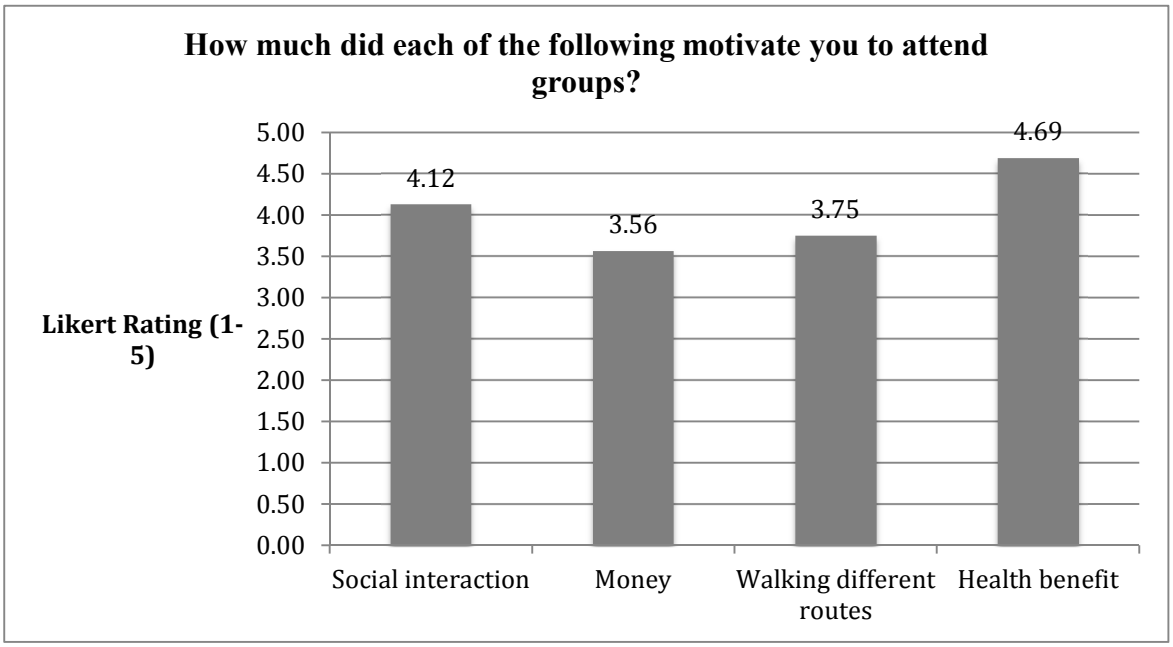


Figure 7

Participant Motivation



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