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Effect of a motivational group intervention upon exercise self efficacy and outcome expectations for exercise in Schizophrenia Spectrum Disorders (SSDs)

Abstract

Background—Persons with SSDs contend with multiple barriers to exercise. Interventions are needed to enhance attitudes theoretically linked to exercise behavior.

Objective—Examine effect of **Walk, Address Sensations, Learn About Exercise, Cue Exercise** for SSDs (WALC-S) intervention upon exercise self efficacy (SEE) and outcome expectations (OEES) in 97 outpatients with SSDs.

Design—Experimental, pre test posttest. Randomization to experimental (WALC-S) or time-and-attention control (TAC) after baseline SEE and OEES measures. Measures repeated after WALC-S or TAC.

Results— $N = 97$, 46% female, 43% African American, average age 46.9 years ($SD = 2.0$). Mean SEE scores were significantly higher in WALC-S participants after intervention ($F_{(1,95)} = 5.92$, $p = 0.0168$), however, mean OEES scores were significantly higher in control participants after intervention ($F_{(1,95)} = 5.76$, $p = 0.0183$).

Conclusion—This is the first study to examine SEE and OEES in SSDs. Interventions to enhance exercise attitudes are a critical first step toward the ultimate goal of increasing exercise participation.

Keywords

Schizophrenia; motivation; exercise

Schizophrenia spectrum disorders (SSDs = schizophrenia, schizoaffective disorder and schizophreniform disorder) are the 8th leading cause of disability worldwide (Rossler, et al, 2005). The health burdens of these diseases encompass both mental and physical aspects. The most effective medications for managing psychiatric symptoms in SSDs—second generation antipsychotics (**SGAs**) such as clozapine and olanzapine—are associated with weight gain, glucose dysregulation and diabetes (Ananth, et al, 2004; Jin, Meyer & Jeste, 2004; Newcomer, 2004). Up to 80% of clients on antipsychotic medication exhibit weight gain that increases their body weight to 20% or more over their ideal weight (Ganguli, et al., 1999; Umbricht, Pollack & Kane, 1994).

Exercise, defined as planned, structured, repetitive body movement performed to improve or maintain physical fitness (National Institutes of Health, 1996), has many advantages as a treatment adjunct. This low-cost activity reduces obesity, cardiovascular disease (United States Department of Health and Human Services, 1996), diabetes (Kelley & Goodpaster, 1999), and hypertension (Pi-Sunger, 1999), and improves anxiety/depression (King, et al., 1989; North, McCullagh & Tran, 1990; Stein & Motta, 1992). Yet despite the health risks associated with obesity and the well-known benefits of exercise, persons with SSDs rarely adhere to exercise regimens; they are less physically active and fit than people with no mental illness or with other mental illnesses (Beebe et al, 2005; Chamove, 1986; Lindquist, 1981).

Barriers to exercise in persons with SSDs include amotivation, cognitive deficits, poverty, and lack of access to exercise education and programs. Multiple investigations have documented problems recruiting and retaining persons with SSDs in exercise programs due to low motivation (Archie, et al., 2003; Ball, Coons & Buchanan, 2001; Beebe et al, 2005; Centorrino et al., 2006; Chen, Chen & Huang, 2009; Dishman, 1994; Pelham, Campagna & Ritvo, 1993; Pendlebury, Haddad & Dursun, 2005), but only two published studies have directly addressed exercise motivation in SSDs. Archie and colleagues (2003) provided free access to a fitness facility to 20 outpatients with SSDs for 6 months and monitored their exercise behavior. Dropout rates were 40% after 4 months, 70% after 5 months and 90% after 6 months. These rates compare unfavorably with exercise cessation in the general population, which is approximately 50% after 6 months (Dishman, 1991). The most common reason given for dropout was lack of motivation (Archie, et al, 2003).

Menza and colleagues (2004) tested a 1-year weight control program in 31 outpatients with SSDs. Their intervention consisted of nutritional counseling, exercise, and behavioral interventions. Weight and body mass index (BMI) decreased significantly in the intervention group, with 20 of 31 patients completing the study for a 1-year retention rate of 66% (69% of sessions were attended). While this study shows that interventions can increase exercise adherence in persons with SSDs, because of its atheoretical nature, it provides no insight into the mechanism(s) by which such interventions influence behavior.

Though little is known about exercise motivation in persons with SSDs, studies have documented significant similarities in the causes of inactivity between elderly persons and those with SSDs, including lack of motivation (Archie et al.2003; Dishman, 1994; Resnick & Spellbring, 2000;), coexisting disease states (Green et al. 2000; Morey, Pieper & Cornoni-Huntley, 1998), unpleasant exercise sensations (Beebe & Smith, in press; Resnick, 1998), cognitive deficits (Alexopoulos et al.2005; Bacon, Izaute & Danion, 2007; Bates et al. 2009; Bilder et al.2006; Bowie & Jaga, 2007; Kiosses & Alexopoulos, 2005) and lack of knowledge regarding exercise benefits (Dishman, 1994; Green et al. 2000; Vreeland et al. 2003). We believe these similarities make using measures of exercise attitudes developed for elders a reasonable first step in our examination of attitudes associated with exercise behavior in persons with SSDs.

This paper reports the effect of the “Walk, Address sensations, Learn about exercise, Cue exercise for SSDs” (WALC-S) intervention upon *attitudes* theoretically linked to exercise motivation. We also report validity and reliability data on measures of self-efficacy and outcome expectations for exercise.

Theoretical Framework

For the purpose of this paper we defined motivation as a desire that energizes behavior. This desire flows from internal factors like values and external factors like encouragement. Self-efficacy theory provides a framework for an examination of motivation that incorporates both the internal and external aspects. Developed from social cognitive theory (Bandura, 1977, 1986, 1995, 1997), self-efficacy theory incorporates (a) self-efficacy expectations, which are an individual's beliefs in her or his ability to perform a behavior, and (b) outcome expectations, which are the individual's beliefs that the behavior will produce positive consequences. Hence, according to the theory of self-efficacy, the more strongly an individual believes in her or his ability to perform a course of action and in the positive outcomes of that course of action, the stronger that individual's motivation to initiate and persist in the activity. Thus, *we hypothesized* that participants receiving the WALC-S group intervention would have greater self-efficacy and outcome expectations for exercise post-intervention, than those receiving a time-and-attention control group (TAC).

Methods

Design and Sample

We used an experimental, pre-test–posttest design to compare exercise self-efficacy and outcome expectations for exercise in 97 outpatients with SSDs. Participants were recruited from a community mental health center (CMHC) located in the Southeastern United States. Inclusion criteria were 1) a chart diagnosis of schizoaffective disorder, schizophrenia (any subtype) or schizophreniform disorder, according to the criteria described in the Diagnostic and Statistical Manual for Mental Disorders (American Psychiatric Association, 2000), 2) English speaking, and 3) medical clearance for moderate exercise in writing from primary care provider. Exclusion criteria were 1) mental retardation, 2) developmental delay, 3) uncorrected visual or hearing impairments, 4) hospitalization within the past 12 months for angina pectoris, myocardial infarction, or cardiac surgery of any kind, 5) congestive heart failure, 6) cardiac pacemaker, 7) heart rate > 100 or < 50 beats per min (bpm) at rest, 8) uncontrolled hypertension, defined as blood pressure exceeding 140/90 on three consecutive readings despite adequate treatment, 9) history of spinal or hip fractures or hip or knee arthroplasty, and 10) neuromuscular or orthopedic limitations to normal, unassisted ambulation.

Prior to data collection, university Institutional Review Board (IRB) approval as well as the approval of the research committee at the CMHC were obtained. The CMHC's notice of privacy practices (signed by all patients) allows disclosure of protected health information for research, which authorized the initial case reviews and communications required to identify potential participants. After potential participants were identified, researchers verified inclusion criteria by chart review then approached potential participants while they were at the CMHC for regularly scheduled treatment appointments. The Evaluation to Sign Consent (DeRenzo, Conley & Love, 1998) form was used to document the potential participant's ability to provide informed consent and was completed prior to the signing of the consent forms.

We approached 150 persons who met inclusion criteria over 16 months. Of these, 97 agreed to participate and 53 declined. The majority of those declining failed to specify a reason. Among those specifying a reason, the most common reasons for nonparticipation were being too busy with other activities ($n = 9$) and lack of interest in the project ($n = 7$). See Figure 1.

Measures

Self-efficacy for exercise (SEE)—The SEE scale (Resnick & Jenkins, 2000) is a nine-item Likert-type scale in which participants rate their confidence in their ability to engage in exercise given a variety of hypothetical situations. Responses range from 0 (not confident) to 10 (very confident) for each item. Items are summed. The mean score constitutes the total SEE score, which ranges from 0 to 10, with higher scores indicating greater exercise self-efficacy. The measure has shown reliability ($\alpha = 0.93$) in older adult populations and was significantly related to exercise activity in elders, with all factor loadings > 0.50 (Resnick & Jenkins, 2000). The measure has demonstrated construct validity through hypothesis testing (Resnick et al. 2004) and confirmatory factor analysis (Resnick & Jenkins, 2000; Resnick, 2000, 2001, 2002). To our knowledge, this is the first study to use the scale in persons with SSDs.

Outcome expectations for exercise (OEES)—The OEES scale (Resnick et al. 2001) is a nine-item Likert-type scale in which participants rate their degree of agreement with statements concerning exercise from 1 (strongly disagree) to 5 (strongly agree). Items are summed. The mean score constitutes the OEES score, which ranges from 1 to 5, with higher scores indicating more positive exercise expectations. Measures of internal consistency ranged from 0.88 to 0.93, and a statistically significant relationship has been demonstrated between OEES scores and exercise behavior in older adults. Confirmatory factor analysis showed a

good fit of the data to the measurement model with all factor loadings > 0.50 . (Resnick et al. 2001; Resnick et al, 2000). To our knowledge, this is the first study to use the scale in persons with SSDs.

Study Intervention

The WALC-S intervention consisted of four weekly hour-long groups (8-9 participants per group). During groups, participants were provided information about the basics of walking for exercise as well as support and motivation to undertake walking independently and safely. Participants were educated about appropriate attire (layers during cooler months or light-colored clothing during warmer months), the importance of starting slowly and gradually increasing walking time, the process of warming up and cooling down the muscles, and the importance of maintaining adequate hydration. Project staff assisted with goal setting and provided suggestions on reducing common exercise discomforts such as using heat or massage for muscular soreness; and provided instruction on exercise benefits and overcoming barriers to exercise. Participants were provided with a booklet reinforcing this content. They were given calendars and instructed to place them in a prominent location at home (e.g., refrigerator) and to record their personal goals, WALC-S group attendance and any exercises performed independently.

Time-and-Attention Control (TAC)

TAC consisted of four weekly, hour-long groups (8-9 participants per group). TAC groups were conducted by the same research personnel as WALC-S groups and consisted of didactic content, socialization exercises, music and games. Specific topics covered included medication education, relaxation techniques, smoking cessation and leisure activities. TAC groups included no motivational or exercise-related content.

Procedure

Demographic data were collected at study entry via record review. We assigned participants to the experimental (WALC-S) or control group (TAC) upon study entry utilizing a randomization schedule designed by the project statistician (A.T.). A doctorally prepared psychiatric nurse (K.S.) provided all groups following training by the first author. Groups met at the recruitment site on Wednesday afternoons for four weeks and were provided sequentially until the sample was complete. Participants completed the SEE and OEES at study entry and immediately after the final WALC-S or TAC group.

Results

The sample consisted of 97 persons with SSDs receiving care at a CMHC located in the southeastern United States. The sample was approximately equally divided on gender. The majority of participants were diagnosed with schizoaffective disorder; they ranged in age from 21 to 72 years with an average age of 46.9 years ($SD = 2.0$). Participant weights ranged from 103-423 pounds with a mean of 189.5 pounds ($SD = 55.9$). The most commonly prescribed psychiatric medications were oral atypical antipsychotics and the most commonly prescribed nonpsychiatric medications were antihypertensives. There were no statistically significant differences between the intervention and control groups in diagnosis, gender, race, age, self-reported educational level or weight at baseline. Greater numbers of control participants (53.1%) than experimental participants (41.7%) reported engaging in exercise at study recruitment (N/S). See Table 1.

Baseline SEE scores for the full sample ranged from 0 to 10 with an average score of 5.97 ($SD = 2.7$). Baseline SEE scores averaged 6.2 ($SD = 2.4$) for experimentals and 5.8 ($SD = 2.9$) for controls. Baseline OEES scores for the full sample ranged from 2 to 5 with an average score

of 4.3 ($SD = 0.66$). Baseline OEES scores averaged 4.2 ($SD = 0.75$) for experimentals and 4.4 ($SD = 0.57$) for controls. There were no statistically significant baseline differences between the two groups. See Table 2.

Experimental participants' ($n = 20$) final scores on the SEE ranged from 2.9 to 10 with a mean of 6.6 ($SD = 2.3$). Control participants' final scores ($n = 22$) on the SEE ranged from 0 to 8.9 with a mean of 4.8 ($SD = 2.3$). To test the hypothesis that participants receiving the WALC-S would have higher self-efficacy for exercise post intervention than those receiving TAC, data were analyzed using a mixed model (proc MIX). Missing data were excluded from analysis. For the total model, results indicated a significant group difference, but the time*GROUP interaction was equivocal ($p = 0.074$). We next examined group differences at baseline and after intervention separately using tests of effect slices. This analysis indicated a statistically significant ($p = 0.0168$) difference in SEE scores between experimental and control participants after intervention. See Table 3.

Experimental participants' final scores on the OEES ranged from 2 to 5 with a mean of 4.2 ($SD = 0.77$). Control participants' scores on the final OEES ranged from 3.8 to 5 with a mean of 4.6 ($SD = 0.43$). To test the hypothesis that participants receiving the WALC-S would have higher outcome expectations for exercise post intervention than those receiving TAC, data were analyzed using a mixed model (proc MIX). Missing data were excluded from analysis. For the total model, results indicated a significant group difference, but the time*GROUP interaction was not statistically significant. We next examined group differences at baseline and after intervention separately using tests of effect slices. This analysis indicated a statistically significant ($p = 0.0183$) difference in OEES scores between experimental and control participants after intervention. See Table 4.

There was evidence for the internal consistency of the SEE and OEES in persons with SSDs, with baseline and final alpha coefficients of 0.828 and 0.827 for the SEE and 0.907 and 0.909 for the OEES, respectively. Pearson correlations of test-retest scores were significant for both the SEE ($r = 0.48$, $p = .001$) and the OEES ($r = 0.33$, $p = .033$).

Discussion

To our knowledge this is the first study to examine exercise self-efficacy and outcome expectations in SSDs. Our total sample alpha coefficients for the SEE are slightly lower than those reported in other populations. Resnick and Jenkins (2000) reported an internal consistency of 0.91-0.92 in samples of mostly White females over 65 years of age. These differences may be partly explained by differences in the samples: While Resnick's sample (2000) was exclusively over age 65, mostly Caucasian (98%) and female (82%), our participants were approximately equally divided as to gender, 44% were African American, and their average age was 46.9 years. Nevertheless, our alpha coefficients on the SEE are sufficiently high to demonstrate internal consistency (Nunnally & Bernstein, 1994). Our alpha coefficients on the OEES are comparable to those reported in other samples. Resnick and colleagues reported alpha coefficients between 0.88 and 0.93 on the OEES (2000; 2001; 2006). Lastly, we found a statistically significant correlation between SEE and OEES scores ($r = 0.411$, $p = .001$) in the current study, providing evidence for construct validity.

Our total sample baseline SEE scores (mean 5.97) are comparable to those of Resnick et al. (2000), who reported baseline SEE scores of 5.7 ($SD = 2.7$) in 166 African American elders. In contrast, Resnick et al. (2006) reported higher SEE scores (mean 6.4, $SD = 2.7$) in a sample of 166 elderly women (97% Caucasian). Possible explanations for these differences relate to the samples examined: While over one third of our sample was African American, Resnick and colleagues' (2006) sample was overwhelmingly Caucasian.

Our baseline total sample OEES scores (mean 4.3) are higher than those reported in elderly patients, both in African American (Resnick, 2000) and Caucasian (Resnick et al. 2006) samples. This finding may be due to age-related differences between middle-aged and elderly persons. While elders can achieve exercise-related improvements, research has documented that the physiological capacities of elders are reduced by approximately 8-15% per decade despite exercise (Pollock et al. 1997); thus, the lower exercise outcome expectations of elders may reflect their experience of reduced physiological capacity even in the face of exercise.

Our findings provide partial support for the application of self-efficacy theory to exercise attitudes in persons with SSDs. Support for our hypothesis regarding the effect of the WALC-S intervention upon final SEE scores was mixed. We observed a time*GROUP effect for the total model that approached statistical significance ($p = 0.074$), along with significantly higher SEE scores in experimental participants than controls after intervention ($p = 0.0168$). Experimental participants SEE scores increased from baseline to post-intervention while the scores of control participants declined. This scenario resulted in a final SEE score difference of 2.2 points between the two groups. A difference of 2.2 points on a scale ranging from 0-10 is likely to be clinically meaningful. Thus, while it appears that our intervention resulted in relatively small improvements in SEE scores, it is also important to note, that *without intervention*, the SEE scores of controls declined. This finding indicates that SEE fluctuates over time in this group, and may not be maintained without active assistance from providers.

Our hypothesis concerning of the effect of the WALC-S intervention upon OEES scores was not supported, as no significant group effect was observed for the total model. However, contrary to our prediction, final OEES scores were significantly higher ($p = 0.0183$) in controls. Experimental participants' final OEES scores were unchanged from baseline, while those of the control group increased by 0.2 points. On scales such as the OEES, where scores range from 1-5, a change of 0.2 is unlikely to be clinically significant. There are several possible explanations for these findings. Small differences may be statistically significant when sample sizes are large. It is possible that, while the WALC-S intervention was intended to provide approximately equal emphasis upon self-efficacy and positive exercise outcomes, experimental participant attention to and/or retention of content regarding self-efficacy was more robust. Another possibility relates to the fact that greater numbers of control (53.1%) than experimental participants (41.7%) reported engaging in exercise at study recruitment. Researchers have documented that exercise participation increases OEES scores (Resnick et al. 2000, 2001). Thus, greater numbers of control subjects than experimentals may have personally experienced positive exercise outcomes.

Limitations

There are several reasons our results must be viewed with caution. Our high rate of refusal, while similar to other investigations with this population (Beebe, 2001; Beebe & Tian, 2004; Beebe et al, 2005), may have resulted in a nonrepresentative sample. In particular, the high rates of self-reported exercise at the outset of the study may have inflated baseline OEES scores. It is also possible that SEE and/or OEES scores may be associated with psychiatric symptom levels, which were not measured in the present inquiry. The SEE and OEES are limited due to their self-report nature. Rates of study noncompletion may have been influenced by sedative or extrapyramidal effects of medications or transportation difficulties. Finally, the effect of the WALC-S intervention upon exercise *behavior* is yet to be examined.

Conclusion

This is the first study to use the SEE and OEES in persons with SSDs. Exercise attitudes are important due to their theoretical linkage with health behaviors, but the equivocal nature of these findings calls into question the validity of these measures in this population, particularly

the OEES. Our ultimate aim is the development of interventions to enhance exercise attitudes and thereby increase exercise behavior in persons with SSDs. Future studies should broaden inclusion criteria in order to obtain the most representative sample possible. Post intervention exit interviews of participant perceptions about which intervention content is more important/relevant, may shed light on the lack of change in OEES scores in the experimental group. Covariates such as exercise activity and symptomatology should be taken into account as investigators continue their search for a theoretically valid, feasible and clinically meaningful measure of exercise attitudes in persons with schizophrenia spectrum disorders.

References

- Alexopoulos GS, Kiosses DN, Heo M, Murphy CF, Shanmugham B, Gunning-Dixon F. Executive dysfunction and the course of geriatric depression. *Biological Psychiatry* 2005;58:204–210. [PubMed: 16018984]
- American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th ed., text revision. Author; Washington, DC: 2000.
- Ananth J, Venkatesh R, Burgoyne K, Gadasalli R, Binford R, Gunatilake S. Atypical antipsychotic induced weight gain: Pathophysiology and management. *Annals of Clinical Psychiatry* 2004;16:75–85. [PubMed: 15328901]
- Archie W, Wilson JH, Osborne S, Hobbs H, McNiven J. Pilot study: Access to fitness facility and exercise levels in olanzapine-treated patients. *Canadian Journal of Psychiatry* 2003;48:628–632.
- Bacon E, Izaute M, Danion JM. Preserved memory monitoring but impaired memory control during episodic encoding in patients with schizophrenia. *Journal of the International Neuropsychological Society* 2007;13:219–227. [PubMed: 17286879]
- Ball MP, Coons VB, Buchanan RW. A program for treating olanzapine-related weight gain. *Psychiatric Services* 2001;52:967–969. [PubMed: 11433117]
- Bandura A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review* 1977;84:191–215. [PubMed: 847061]
- Bandura, A. Social foundations of thought and action. Prentice Hall; Upper Saddle River, NJ: 1986.
- Bandura, A. Self-efficacy in changing societies. Cambridge University Press; NY: 1995.
- Bandura, A. Self-efficacy: The exercise of control. W.H. Freeman and Company; New York: 1997.
- Bates A, Donaldson A, Lloyd B, Castell S, Krolík P, Coleman R. Staying active, staying strong: Pilot evaluation of a once weekly, community based strength training program for older adults. *Health Promotion Journal of Australia* 2009;20:42–47. [PubMed: 19402815]
- Beebe LH. Community nursing support for schizophrenic clients. *Archives of Psychiatric Nursing* 2001;15(5):214–222. [PubMed: 11584350]
- Beebe LH, Tian L. TIPS: Telephone Intervention – Problem Solving for persons with Schizophrenia. *Issues in Mental Health Nursing* 2004;25(3):317–329. [PubMed: 14965849]
- Beebe LH, Smith K. Feasibility of the Walk, Address, Learn and Cue (WALC) intervention for persons with schizophrenia spectrum disorders. *Archives of Psychiatric Nursing*. in press.
- Beebe LH, Tian L, Morris N, Goodwin A, Allen SS, Kuldau J. Effects of exercise on mental and physical health parameters of persons with schizophrenia. *Issues in Mental Health Nursing* 2005;26:661–676. [PubMed: 16020076]
- Bilder RM, Reiter G, Bates J, Lencz T, Szeszko P, Goldman RS, Robinson D, Lieberman JA, Kane JM. Cognitive development in schizophrenia: Follow-back from the first episode. *Journal of Clinical and Experimental Neuropsychology* 2006;28:270–282. [PubMed: 16484098]
- Bowie CR, Jaga K. Methods for treating cognitive deficits in schizophrenia. *Expert Reviews in Neurotherapeutics* 2007;7:281–287.
- Centorrino F, Wurtman JJ, Duca KA, Fellman VH, Fogarty KV, Berry JM, Guay DM, Romeling M, Kidwell J, Cincotta CL, Baldessarini RJ. Weight loss in overweight patients maintained on atypical antipsychotic agents. *International Journal of Obesity* 2006;30:1011–1016. [PubMed: 16432547]
- Chamove AS. Positive short-term effects of activity on behavior in chronic schizophrenic patients. *British Journal of Clinical Psychology* 1986;25:125–133. [PubMed: 3730648]

- Chen CK, Chen YC, Huang YS. Effects of a 10-week weight control program on obese patients with schizophrenia or schizoaffective disorder: A 12-month follow up. *Psychiatric Clinics of North America* 2009;63:17–22.
- DeRenzo EG, Conley RR, Love R. Assessment of capacity to give consent for research: State of the art and beyond. *Journal of HealthCare Law and Policy* 1998;1:66–87.
- Dishman R. Increasing and maintaining exercise and physical activity. *Behavioral Therapy* 1991;21:345–373.
- Dishman R. Motivating older adults to exercise. *Southern Medical Journal* 1994;87:s79–s82. [PubMed: 8178208]
- Ganguli R. Weight Gain Associated with Antipsychotic Drugs. *Journal of Clinical Psychiatry* 1999;61(9):678.
- Green AI, Patel RM, Goisman RM, Allison DB, Blackburn G. Weight gain from novel antipsychotic drugs: Need for action. *General Hospital Psychiatry* 2000;22:224–235. [PubMed: 10936629]
- Jin H, Meyer JM, Jeste DV. Atypical antipsychotics and glucose dysregulation: A systematic review. *Schizophrenia Research* 2004;71:195–212. [PubMed: 15474892]
- Kelley DE, Goodpaster BH. Effects of physical activity on insulin action and glucose tolerance in obesity. *Medicine and Science in Sports and Exercise* 1999;31:S619–S623. [PubMed: 10593537]
- King AC, Taylor CB, Haskell WL, DeBusk RF. Influence of regular aerobic exercise on psychological health. *Health Psychology* 1989;8:305–324. [PubMed: 2767021]
- Kiosses DN, Alexopoulos GS. IADL function, cognitive deficits and severity of depression: A preliminary study. *American Journal of Psychiatry* 2005;13:244–249.
- Lindquist JE. Activity and vestibular function in chronic schizophrenics. *Occupational Therapy Journal of Research* 1981;1:56–78.
- Menza M, Vreeland B, Minsky S, Gara M, Radler DR, Sakowitz M. Managing atypical antipsychotic-associated weight gain: 12-month data on a multimodal weight control program. *Journal of Clinical Psychiatry* 2004;65:471–477. [PubMed: 15119908]
- Morey M, Pieper C, Cornoni-Huntley J. Physical fitness and functional limitations in community-dwelling older adults. *Medicine and Science in Sports and Exercise* 1998;30:715–723. [PubMed: 9588614]
- National Institutes of Health. Consensus Development Conference. Physical activity and cardiovascular health. *Journal of the American Medical Association* 1996;276:241–246. [PubMed: 8667571]
- Newcomer JW. Abnormalities of glucose metabolism associated with atypical antipsychotic drugs. *Journal of Clinical Psychiatry* 2004;65:36–46. [PubMed: 15600383]
- North TC, McCullagh P, Tran Z. Effect of exercise on depression. *Exercise and Sport Science Review* 1990;18:379–415.
- Nunnally, JC.; Bernstein, IH. *Psychometric theory*. 3rd ed. McGraw-Hill; New York: 1994.
- Pelham TW, Campagna PD, Ritvo PG. The effects of exercise therapy on clients in a psychiatric rehabilitation program. *Psychosocial Rehabilitation Journal* 1993;16:75–84.
- Pendlebury J, Haddad P, Dursun S. Evaluation of a behavioral weight management programme for patients with severe mental illness: 3-year results. *Human Psychopharmacology* 2005;20:447–448. [PubMed: 16106486]
- Pi-Sunger FX. Comorbidities of overweight and obesity: Current evidence and research issues. *Medicine and Science in Sports and Exercise* 1999;31:S602–S608. [PubMed: 10593535]
- Pollock ML, Mengelkoch LJ, Graves JE, Lowenthal DT, Limacher MC, Foster C, Wilmore JH. Twenty year follow up of aerobic power and body composition of older track athletes. *Journal of Applied Physiology* 1997;82:1508–1516. [PubMed: 9134900]
- Resnick B. Efficacy beliefs in geriatric rehabilitation. *Journal of Gerontological Nursing* 1998;24:34–45. [PubMed: 9801529]
- Resnick B. Functional performance and exercise of older adults in long-term care. *Journal of Gerontological Nursing* 2000;26:7–16. [PubMed: 11111626]
- Resnick B. A prediction model of aerobic exercise in older adults living in a continuing-care retirement community. *Journal of Aging and Health* 2001;13:287–310. [PubMed: 11787516]

- Resnick B. Testing the impact of the WALC intervention on exercise adherence in older adults. *Journal of Gerontological Nursing* 2002;28:40–49. [PubMed: 12071273]
- Resnick B, Luisi D, Vogel A, Junaleepa P. Reliability and validity of the self-efficacy for exercise and outcomes expectations for exercise scales with minority older adults. *Journal of Nursing Measurement* 2004;12:235–247. [PubMed: 16138727]
- Resnick B, Jenkins L. Reliability and validity testing of the self-efficacy for exercise scale. *Nursing Research* 2000;49:154–159. [PubMed: 10882320]
- Resnick B, Orwig D, Zimmerman S, Hawkes W, Golden J, Werner-Bronzert M, Magaziner J. Testing of the SEE and OEE post-hip fracture. *Western Journal of Nursing Research* 2006;28:586–601. [PubMed: 16829639]
- Resnick B, Spellbring AM. The factors that influence exercise behavior in older adults. *Journal of Gerontological Nursing* 2000;26:34–42. [PubMed: 11111629]
- Resnick B, Zimmerman S, Orwig D, Furstenberger AL, Magaziner J. Outcome Expectations for Exercise Scale: Utility and psychometrics. *Journal of Gerontology* 2000;55:S352–S356.
- Resnick B, Zimmerman S, Orwig D, Furstenberg A, Magaziner J. Model testing for reliability and validity of the Outcome Expectations for Exercise Scale. *Nursing Research* 2001;50:293–299. [PubMed: 11570714]
- Rössler W, Salize HJ, van Os J, Riecher-Rössler A. Size of burden of schizophrenia and psychotic disorders. *European Neuropsychopharmacology* 2005;15:399–409. [PubMed: 15925493]
- Stein PN, Motta RW. Effects of aerobic and nonaerobic exercise on depression and self-concept. *Perceptual and Motor Skills* 1992;74:78–89.
- Umbricht DS, Pollack S, Kane JM. Clozapine and weight gain. *Journal of Clinical Psychiatry* 1994;55:157–160. [PubMed: 7961563]
- United States Department of Health and Human Services. Physical activity and health: A report of the Surgeon General. U.S. Dept. of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion; Atlanta, GA: 1996.
- Vreeland B, Minsk S, Menza M, Rigussio-Radler D, Roemheld-Hamm B, Stern R. A program for managing weight gain associated with atypical antipsychotics. *Psychiatric Services* 2003;54:1155–1157. [PubMed: 12883145]

Figure 1.
Recruitment and retention of persons with schizophrenia spectrum disorders (SSDs).

Table 1

Baseline characteristics of participants in experimental (WALC-S =walk, address sensations, learn about exercise, cue exercise for SSDs) and control (TAC =time-and-attention) groups

Characteristic	All Participants (N = 97)	WALC-S Participants (n =48)	TAC Participants (n = 49)
	<u>n (%)</u>	<u>n (%)</u>	<u>n (%)</u>
Diagnosis			
Schizoaffective	69(71.1)	30(62.5)	39(79.6)
Schizophrenia	28 (28.9)	18(37.5)	10(20.4)
Sex			
Female	46(47.4)	25(52.1)	21(42.9)
Male	51(52.6)	23(47.9)	28(57.1)
Race			
Caucasian	53(54.6)	23(47.9)	30(61.2)
African			
American	43(44.4)	24(50)	19(38.8)
Asian	1(1)	1(2.1)	0(0)
Living Arrangement			
Alone	36(37.1)	15(31.3)	21(42.9)
With family	42(43.3)	23(47.9)	19(38.8)
With paid			
Caregiver	19(19.6)	10(20.8)	9(18.4)
Educational Level [#]			
Less than HS	36(40.9)	21(48.8)	15(33.3)
HS graduate	36(40.9)	15(34.8)	21(46.6)
More than HS	16(18.2)	7(16.4)	9(20.1)
Prescribed Medications			
Oral atypicals	68 (65.9)	23(48)	20(40.8)
Oral typicals	5 (5.2)	2(4.2)	2(4.1)
Depot Typicals	38(39.2)	13(27.1)	12(24.5)
Depot Atypicals	10(10.3)	3(6.3)	5(10.2)
Antidepressants	46(47.4)	15(31.3)	11(22.4)
Mood stabilizers	29(29.8)	17(35.4)	12(24.5)
Antianxiety	26(26.8)	10(20.8)	6(12.2)
Antiparkinsonian	54(55.6)	22(45.8)	21(42.8)
Hypnotics	13(13.4)	4(8.3)	3(6.1)
Other [*]	75(77.3)	27(56.3)	20(40.1)

Note:

* other = Includes medications prescribed for physical illnesses, most commonly antihypertensives (n = 35), proton pump inhibitors (n = 31) and lipid lowering agents (n = 27).

[#] = missing data; HS = high school

Table 2

Baseline and final scores on SEE and OEES of persons with schizophrenia spectrum disorders assigned to experimental (WALC-S; baseline $n = 48$, final $n = 20$) versus control (TAC; baseline $n = 49$, final $n = 22$) groups

Group	Baseline SEE	Final SEE	Baseline OEES	Final OEES
Experimental	6.2(2.4)	6.6(2.3)	4.2(0.75)	4.2(0.78)
Control	5.8(2.9)	4.8(2.3)	4.4(0.57)	4.6(0.43)
Difference	0.4	+2.2*	0.2	-0.4*

Note: data reported as mean (SD)

SEE = Self efficacy for exercise scale

OEES = Outcome expectations for exercise scale

* = significant at 0.05 level

Mixed Model Type III Test Table and tests of effect slices for comparison of self efficacy for exercise (SEE) scale scores of persons with schizophrenia spectrum disorders

Table 3

Tests of Fixed Effects				
Effect	NumDf [#]	DenDf [@]	F	p
GROUP	1	95	4.03	0.0476 [*]
Time	1	95	2.06	0.1543
Time*GROUP	1	95	3.27	0.0738 [*]

Tests of effect slices				
Effect	time	NumDf [#]	DenDf [@]	F p
Time*GROUP	1	1	95	0.42 0.52
Time*GROUP	2	1	95	5.92 0.012 [*]

[#] = Numerator degrees of freedom
[@] = Denominator degrees of freedom
^{*} = significant at .05 level

Mixed Model Type III Test table and tests of effect slices for comparison of outcome expectations for exercise scale (OEES) scores of persons with schizophrenia spectrum disorders

Table 4

Tests of Fixed Effects				
Effect	NumDf [#]	DenDf [@]	F	p
GROUP	1	95	5.35	0.023*
Time	1	95	0.21	0.65
Time*GROUP	1	95	2.18	0.14

Tests of effect slices				
Effect	time	NumDf [#]	DenDf [@]	F p
Time*GROUP	1	1	95	1.34 0.25
Time*GROUP	2	1	95	5.76 0.018*

[#] = numerator degrees of freedom

[@] = denominator degrees of freedom

* = significant at 0.05 level