Published in final edited form as:
J Women Aging. 2009 ; 21(1): 48–62. doi:10.1080/08952840802633719.

Social Support for Exercise by Experts in Older Women Post–Hip Fracture

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Abstract

Using the data of the Baltimore Hip Study 5 (a home-based exercise intervention), this study examined how social support for exercise by experts (SSE-E) affected the self-efficacy, outcome expectations, and exercise behavior among older women following a hip fracture. The total sample included 164 females aged 65 years (M = 81.0; SD = 6.9) who had surgical repair of a non-pathologic hip fracture. Model testing showed a direct relationship between SSE-E and outcome expectations for exercise. There was, however, no direct or indirect relationship between SSE-E and self-efficacy or exercise behavior. The positive effect of SSE-E on the outcome expectations for exercise in older women recovering from a hip fracture provides an opportunity for health care providers in improving physical activity in this population.

Keywords

hip fracture; older women; exercise; social support; self-efficacy

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INTRODUCTION

Hip fracture is one of the most serious public health problems in older adults. In 2003, approximately 309,500 older adults were hospitalized for hip fractures with 72% of the hospitalizations occurring in women (National Center for Health Statistics, 2006). What makes the incidence of hip fracture a serious public health concern is that as many as 20% of hip fracture patients will die within a year of their injury (Leibson, Toteson, Gabriel, Ransom, & Melton, 2002). Even if they survive from the hip-fracture incident, the majority do not fully regain prefracture function (Magaziner et al., 2000) and approximately 38 to 50% need assistance to walk or are unable to walk (Boonen et al., 2004). Opportunely, exercise post–hip fracture can optimize recovery by improving strength and overall physical function (Host et al., 2007; Jones, Jakobi, Taylor, Petrella, & Vandervoort, 2006; Mangione, Craik, Tomlinson, & Palombaro, 2005). Yet, the majority of older adults do not engage in regular exercise. Past studies suggest that many factors influence older adults' motivation and willingness to exercise, such as poor health, disability, lack of knowledge about exercise and its benefits, lower sense of self-efficacy for exercise (Schutzer & Graves, 2004), and fear of falling and injury (Lees, Clark, Nigg, & Newman, 2005).

Motivation to exercise has also been found to be influenced by the social milieu of the individual and/or the care setting (Dunbar & Capezuti, 2008). Social interactions, however, can be positive or negative and could influence an individual's motivation for exercise. To promote exercise in older adults, therefore, it is essential to consider appropriate and effective ways to motivate older adults to exercise through the provision of social support (Jackson, 2006).

SOCIAL SUPPORT FOR EXERCISE

Social support is defined as the interpersonal relations that offer assistance and protections to others, and is usually conceptualized in four dimensions: emotional, instrumental, informational, and appraisal (Langford, Bowsher, Maloney, & Lillis, 1997). Social support may come from various sources: family, friends, or health care providers such as physicians, nurses, social workers, therapists, or exercise trainers. Past research has suggested that social support networks are important determinants of exercise behavior among older adults (Resnick, Orwig, Magaziner, & Wynne, 2002).

Studies of social support and health outcomes point to a differential influence of social support from family, friends, and providers (Resnick, Magaziner, Orwig, & Zimmerman, 2002). Social support from friends during structured exercise programs has been noted to have a positive influence on older adults and their adherence to these programs (Hendry, Williams, Markland, Wilkinson, & Maddison, 2006) as has the influence of nonfamilial others (Anderson, King, Stewart, Camacho, & Rejeski, 2005). Social support from family and friends has also been identified as a significant predictor of self-regulation for physical activities (Umstattd, Saunders, Wilcox, Valois, & Dowda, 2006).

While the majority of prior work in the area of social support for exercise has focused on family and friends, results from prior studies suggest that experts could also play a key role in promoting physical activity (Tulloch, Fortier, & Hogg, 2006). In a review of studies that examined the effectiveness of physical activity counseling delivered by a range of health care providers, Tulloch et al. (2006) found a significant increase in physical activity in all provider categories (physician-only, combined-provider, and allied health professional-only) both in the short and long term. Among those reviewed, many involved motivational counseling or interviews where the providers encouraged the patients to engage in physical activity. Despite these promising outcomes, little published work has been done and, to the authors' knowledge, no studies other than the original study (Resnick et al., 2007) specifically examined support for exercise in older adults by experts. Therefore, the purpose of this study was to examine how social support for exercise by experts (SSE-E) affected exercise behavior among older women following a hip fracture.

THEORETICAL FRAMEWORK

Social cognitive theory (Bandura, 1997) has been reported to most consistently and comprehensively explain exercise behavior and forms the basis of the conceptual framework for this study. According to this theory, human motivation and behavior are regulated by both self-efficacy (the belief in one's ability to perform a specific behavior in order to attain a desired result) and outcome expectations (the belief that a particular behavior will bring about a certain result). Efficacy expectations are dynamic and are both appraised and enhanced by four mechanisms (Bandura, 1995): (a) enactive mastery experience, or successful performance of the activity of interest; (b) verbal persuasion, or verbal encouragement given by a credible source that the individual is capable of performing the activity of interest; (c) vicarious experience or seeing like individuals perform a specific activity; and (d) physiological and affective states such as pain, fatigue, or anxiety associated with a given activity. Social supports and appropriate social interactions, therefore, can strengthen self-efficacy and outcome expectations related to exercise by using these mechanisms. Previous research has pointed to both outcome expectations and self-efficacy as influential cognitive perspectives that affect people's adoption and adherence to exercise activities (McAuley, Jerome, Elavsky, Marquez, & Ramsey, 2003).

Strengthening these expectations should increase an older adult's willingness to initiate and adhere to a given exercise program. The Exercise Plus Intervention was designed based on the theory of self-efficacy. It was developed and implemented such that exercise trainers, or experts, utilized all four sources of efficacy intervention to strengthen self-efficacy and outcome expectations associated with exercise and to increase the participant's time spent in exercise. Other research has likewise supported the conceptual relationship between exposure to health care experts and promotion of exercise activity in younger adults (Tulloch et al., 2006). Less work has been done, however, to more extensively quantify the social interactions that occurred and describe the impact of interactions with experts on exercise behaviors among older adults, especially following an acute event such as a hip fracture.

In addition to self-efficacy and outcome expectations, increased age is generally associated with a decline in exercise (Lim & Taylor, 2005), although this may be complicated by increased risk of comorbidities. Further, women tend to be less physically active than men (Singh, Chin, Paw, Bosscher, & van Mechelen, 2006), and individuals with multiple comorbid conditions tend to be less likely to engage in exercise (deJong & Franklin, 2004). Older adults with lower perceived mental health are less likely to engage in adequate exercise (Conn, Burks, Pomeroy, & Cochran, 2003; Lim & Taylor, 2005). Similarly, those with worse perceived health were less likely to exercise (Lim & Taylor, 2005), as were individuals with pain or a fear of falling (Li, Fisher, Harmer, & McAuley, 2005).

Recognizing these many factors that influence exercise, we hypothesized that social support for exercise from experts would directly and indirectly influence exercise behavior in these individuals through their self-efficacy and outcome expectations for exercise.

METHODS

Design and Data Source

This is a secondary data analysis of the Baltimore Hip Study 5 (BHS 5) study data. The original study was designed to test the efficacy of the Exercise Plus Program (EPP), a self-efficacy-based intervention focused on increasing the time older women post–hip fracture engage in exercise. The original study was a randomized controlled trial (2 × 2 factorial design) with participants randomized to one of four groups: Exercise Plus, Exercise Only, Plus Only, or routine care. Baseline testing was conducted within the first 22 days post–hip fracture, and random assignment was done after baseline testing was completed. Follow-up data collection was done at 2, 6, and 12 months post–hip fracture in the home setting during a face-to-face interview; the 2-and 6-month data are included in this study. The 12-month data were not included in this study because the first 6 months post–hip fracture was the period of time during which the participants had the greatest exposure to experts.

The details of the EPP have been previously published (Resnick et al., 2007). Briefly, the EPP included two separate components, the Exercise Training component and the motivational or Plus component. Participants randomized to the Exercise Plus group were exposed to both components, the Exercise Only group was exposed to exercise training only, the Plus Only group was exposed to the motivational interventions only, and the control group received routine care (traditional rehabilitation services but no visits from the exercise trainer). In all treatment groups, visits from the trainer were initially twice a week for the first 2 months; this decreased to once a month in the final 4 months of the program, with weekly telephone calls for those exposed to the Plus component of the intervention during the weeks when no visits were scheduled. All visits were an hour in length. Subjects were expected to exercise five times per week for 45 minutes. Assuming that the participant completed all Medicare-covered rehabilitation services by 1 month post-fracture, the maximum number of visits was 38.

Sample

The participants were recruited from nine hospitals in the greater Baltimore area. Eligible patients were female, 65 years of age or older, community-dwelling at the time of fracture, had a nonpathologic fracture within 72 hours of admission, surgical repair of the hip fracture, and were free of medical problems that would potentially put them at risk for falls when exercising at home alone (e.g., neuromuscular conditions). The participants had to meet fairly rigorous selection criteria, including walking without human assistance prior to the fracture and having only mild cognitive impairment (score ≥ 20 on the Folstein Mini Mental State Exam) (Folstein, Folstein, & McHugh, 1975). Institutional Review Board approvals were obtained from the University of Maryland School of Medicine as well as the study hospitals; all enrolled subjects provided their own informed consent. Recruitment was initiated in August of 2000, and data collection on the final participant was completed in September of 2005. A Data and Safety Monitoring Board (DSMB) met quarterly and reviewed all adverse events and safety reports.

The average age of the participants was 81.0 years old ($SD = 6.9$), all were female, and 97.1% were Caucasian. The majority (57.2%) were widowed and had a high school education (66.7%). Of the 209 initially recruited into the study, 165 women (79%) were available for 2-month assessments, and 169 (81%) were available for 6-month follow up. One case was deleted postrandomization due to being ineligible (no surgery was performed post–hip fracture), resulting in a total sample size of 164.

Measures

Exercise behavior—Exercise behavior was one of the dependent variables and measured by the Yale Physical Activity Survey (YPAS). YPAS is a reliable and valid interviewer-administered questionnaire that includes five categories of common types of work, exercise, and recreational activities performed during a typical week (Osborne, Hawthorne, Lew, & Gray, 2003). The five-item exercise subscale was used for this analysis.

Outcome expectations—The Outcome Expectations for Exercise Scale (OEE) (Resnick, Zimmerman, Orwig, Furstenberg, & Magaziner, 2000) assesses the perceived consequences of exercise for older adults. The validity and reliability of the OEE have been established in previous studies (Harnirattisai & Johnson, 2002; Resnick, Zimmerman, Orwig, Furstenberg, & Magaziner, 2001).

Self-efficacy—The Self-Efficacy for Exercise scale (SEE) (Resnick & Jenkins, 2000) is a nine-item measure that addresses the confidence to overcome the barriers to exercise and is designed to assess the self-efficacy expectations related to the ability to continue to exercise. Prior use of the SEE measure with older adults provided evidence of reliability and validity (Harnirattisai & Johnson, 2002; Resnick & Jenkins, 2000).

Social support for exercise from experts—The Social Support for Exercise Habits Scale (SSEH) includes three 15-item subscales that reflect social interactions (from friends, family, or exercise classmates) that might influence exercise behavior (Sallis, Grossman, Pinski, Patterson, & Nader, 1987). Participants are asked, for example, how frequently a family member or friend offers to exercise with them or gives them helpful reminders to exercise. Prior use has established evidence of reliability and validity (Resnick, Orwig, Magaziner, & Wynne, 2002; Sallis et al., 1987). For the purposes of this study, we revised the “classmates” sub-scale to focus on the social support provided by experts (exercise trainers, physicians, home health aid, physical therapists). Initial consideration of the reliability and validity of the revised subscale (Resnick et al., 2008) indicated that there were five items in which all participants had the same response (either “none” or “very often”): “Experts get angry at me for exercising”; “Experts criticize me or make fun of me exercising”; “Experts plan for exercise on recreational outings”; “Experts help plan activities around my exercise”; “Experts take over chores so I have more time to exercise.” Given the lack of variance, these five items were removed from the Experts sub-scale and the remaining 10 items on the SSEH-E measure were used for this study. The 10-item SSEH-E measure had evidence of internal consistency with alphas of 0.80 or greater and some support for the construct and criterion-related validity.

Other measures used in the model—The status of physical and mental health was measured by the 36-item Short Form Health Survey (SF-36) (Ware & Sherbourne, 1992). SF-36 consists of eight subscales, which are summed into two measures: physical health status and mental health status. There is support for the reliability and validity of this measure when used with older adults (Cranney et al., 2005; Osborne et al., 2003; Stewart, King, & Haskell, 1993). Comorbidities were considered using the Charlson Comorbidity Index (CCI) (de Groot, Beckerman, Lankhorst, & Bouter, 2003). Fear of falling was evaluated by asking the participant to rate her fear of falling on a scale of 0–4 with a higher score indicating more fear (Resnick & Daly, 1998). Pain was measured using the 0–10 Numeric Rating Scale (NRS) with a higher rate indicating more pain (Herr, Spratt, Mobily, & Richardson, 2004). Lastly, depression was measured using the Center for Epidemiological Studies Depression Scale (CESD), a 20-item scale widely used in health research as a reliable and valid instrument measuring depressive symptoms in older adults (Radloff, 1977).

Data Analysis

To test the impact of the EPP on strengthening social support for exercise by experts among participants, we used a repeated measures analysis of variance including the 2- and 6-month testing time points post–hip fracture. Simple comparisons were done between groups using a Bonferonni adjustment. Model testing was done using the Amos statistical program. The sample covariance matrix served as input, and a maximum likelihood solution was sought. The chi-square statistic, the normed fit index (NFI), and Steigers Root Mean Square Error of Approximation (RMSEA) were used to estimate model fit (Bollen, 1989; Loehlin, 1998). Path significance was based on the Critical Ratio (CR) (Arbuckle, 1997). A $p < 0.05$ level was used for all analyses.

RESULTS

The SSEH-E scores increased over time in all four groups with means of 15.4 (*SD* = 1.1) to 17.6 (*SD* = 3.7) for the control group, 18.0 (*SD* = 3.2) to 27.3 (*SD* = 9.6) for the Exercise Only group, 17.8 (*SD* = 3.1) to 23.7 (*SD* = 7.3) for the Plus Only group, and 20.3 (*SD* = 4.1) to 28.9 (*SD* = 7.3) for the Exercise Plus group. As seen in these numbers, increases were larger in the treatment groups who were exposed to the exercise trainer. Table 1 provides a summary of pairwise comparisons of SSEH-E scores and shows that there was a statistically significant increase in social support for exercise between participants in the control versus any of the treatment groups over time ($F = 5.4$ $p = 0.002$). The control group consistently reported less social support for exercise and did not show an increase in social support for exercise over time compared to those in any of the treatment groups. There was also a statistically significant difference between the Plus Only group and the Exercise Plus group such that those who were exercising with the trainer and receiving the Plus component of the intervention had stronger social support for exercise than those exposed to the Plus component alone.

Model testing of the factors that influence exercise showed that seven paths were statistically significant (Figure 1). Age and fear of falling were related to outcome expectations, indicating that those who were younger and had less fear of falling had stronger outcome expectations. Mental health status was related to self-efficacy and depression, as the participants who reported better mental health reported higher self-efficacy and fewer depressive symptoms. Treatment group assignment was related to social support from the experts, such that those exposed to the trainer had stronger social support for exercise. Treatment group assignment (treatment was equivalent to being exposed to any of the treatment groups) also had direct impact on exercise behavior, indicating exposure to treatment increased the participants' exercise activities. Social support from experts also showed a significant relationship with outcome expectations such that those who had stronger social support to exercise from the expert reported stronger outcome expectations for exercise. There was not, however, a direct or indirect relationship between social support for exercise by experts on exercise behavior. There was a poor fit of the model to the data ($\chi^2 = 144.5$, $df = 33$, ratio of 4.3, NFI of 0.78, and RMSEA of 0.13). The fit improved when nonsignificant paths were removed ($\chi^2 = 84.5$, $df = 28$, ratio of 3.0, NFI of 0.76, and RMSEA of 0.10), although this was still a poor fit of the model to the data and only explained 12% of the variance in exercise.

DISCUSSION

This study was designed to explore the impact of exposing older adults post–hip fracture to social support for exercise from experts using self-efficacy-based interventions. It demonstrated the influence of experts on increasing the perceived social support for exercise experienced by the participants. While verbal encouragement has previously been reported to have a greater impact on social support for exercise than an obligatory commitment (Gabriele, Walker, Gill, & Harber, 2005), our findings indicate that those who were not exposed to this type of encouragement and only exercised with the trainer also had an improvement in social support for exercise. This result reflects that of past studies, showing that supervised exercise programs produce more positive outcomes than unsupervised ones in older adults (Carmeli, Sheklow, & Coleman, 2006). It is possible that even without verbal encouragement, having someone who is a regular exercise companion may be perceived as social support for exercise.

The study also tested the theoretical model of the indirect relationship anticipated between social support for exercise and exercise behavior through self-efficacy and outcome expectations. The results showed social support for exercise by experts increased from 2 to 6 months in the participants who were exposed to the social support interventions provided by the trainers. In addition, social support for exercise from the experts had a positive relationship with outcome expectations among the older women recovering from a hip fracture. Specifically, those who reported stronger social support for exercise from experts had stronger outcome expectations for exercise. There was, however, no significant relationship between expert social support and self-efficacy expectations. Further, in contrast to our theoretically hypothesized model, there was neither a direct nor indirect relationship between social support from experts and exercise behavior among the hip-fracture participants. In addition, while expert social support for exercise strengthened outcome expectations, there also was no relationship between outcome expectations and exercise behavior. Although theoretically incongruent, prior self-efficacy research has noted similar findings (McAuley, Marquez, Jerome, Blissmer, & Katula, 2002).

Thus, there is cause to consider why the theoretical relationship was not supported in this study. It is possible that the participants in this study evaluated their self-efficacy and outcome expectations based on beliefs they held about themselves prior to a hip fracture, particularly given the relatively high ratings noted among the participants. Moreover, there may have been a response shift such that those with high self-efficacy and outcome expectations were actually less likely to invest energy in actually trying to exercise and were less influenced by the experts. Further, the model proposed may have neglected important factors such as information about the individuals’ earlier exercise behaviors (Iversen et al., 2004). While the finding that social support was not related to actual exercise is theoretically incongruent, it is consistent with prior research findings. Health care providers may believe in the benefits of physical activity, but they lack sufficient knowledge as to what physical activity to recommend and so refrain from recommending a physical activity program (Dauenhauer, Podgorski, & Karuza, 2006). This uncertainty is not expected to have been the case for the trainers in this project, but it is possible that the subjects themselves were less convinced about the suggested exercises absent their physician’s express support. Thus, continued study is needed to facilitate the translation of support to actual behavior.

Finally, it also is possible that the lack of a direct relationship between social support from the experts and exercise behavior may in part be due to the sample included. The majority of the participants in the study were Caucasian and had volunteered to participate in this exercise intervention study. Prior research has shown that the benefits of social support seem to be more relevant for African American women (Bopp, Wilcox, Oberrecht, Kammermann, & McElmurray, 2004; Greene et al., 2006) and among specific diagnostic groups such as those with cardiovascular disease (Boutin-Foster, 2005). The volunteer nature of the sample may also indicate that the participants already believed in their ability and the benefits of exercise and were generally motivated to exercise. Consequently, stronger social support for exercise did not influence behavior in this sample.

While the significant relationship between social support from experts and outcome expectations may not be influencing current exercise behavior, it may be important for long-term adherence to exercise. Outcome expectations for exercise have repeatedly been identified as a significant predictor of exercise behavior over time (McAuley et al., 2003; Wilcox, Castro, & King, 2006), pointing to a critical long-term impact of outcome expectations on exercise adherence. The influence of experts on strengthening outcome expectations, therefore, may have a lasting effect on the hip-study participants.

The findings from this study are limited with regard to generalizability, as the older women in this study were mostly Caucasian, had just sustained a hip fracture, and willingly participated in an exercise-intervention study. Because the purpose of this study was to examine the effects of experts' social support for exercise in older women post–hip fracture, we only tested social support from experts in the model. Given that there was a poor fit of the model to the data and the significant paths only explained a small percent of the variance in exercise, the consideration of additional variables that explain exercise among these individuals is needed. Despite these limitations, the study is an important first step in demonstrating the impact of social support from experts on exercise behavior in women post–hip fracture.

Acknowledgments

Support for this project was provided by National Institute on Aging (NIA) grants R37 AG09901, R01-AG18668, R01 AG17082, and partially supported by the National Institute on Aging (NIA) Claude D. Pepper Older Americans Independence Center P30 AG028747. Authors also would like to thank Thera-Band Academy for their generous contribution of Thera-Band® resistive bands used by study participants, hospitals and personnel participating in the Baltimore Hip Studies, and research staff who worked with study patients and their families. The authors also would like to thank hip-fracture patients and their families for volunteering their time and information for this work.

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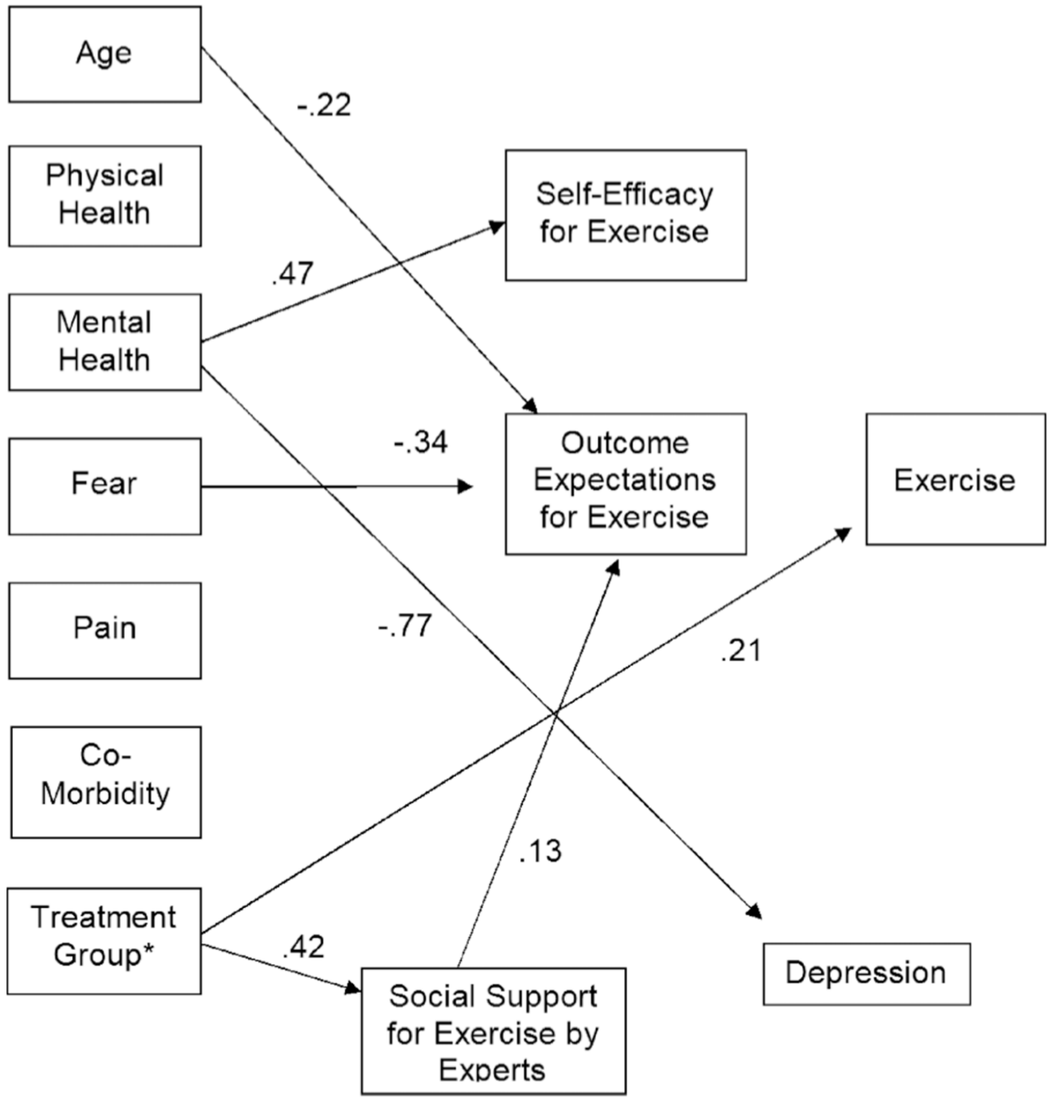

FIGURE 1.
Hypothesized model and significant paths.

TABLE 1

Pairwise Comparisons of Social Support for Exercise Score Between Control and Treatment Groups over Time

(I)	(J)	Mean difference (I − J)	Std. error	Sig.[a]	95% Confidence interval for difference[a] Upper bound	95% Confidence interval for difference[a] Lower bound
Control	Exercise Only	−6.161(*)	1.272	0.000	−9.576	−2.745
	Plus Only	−4.147(*)	1.221	0.006	−7.427	−0.867
	Exercise Plus	−8.109(*)	1.236	0.000	−11.430	−4.789
Exercise only	Plus Only	2.014	1.139	0.479	−1.046	5.073
	Exercise Plus	−1.949	1.155	0.566	−5.051	1.154
Plus only	Exercise Plus	−3.962(*)	1.099	0.003	−6.915	−1.010

Based on estimated marginal means.

*The mean difference is significant at the 0.05 level.

[a]Adjustment for multiple comparisons: Bonferroni.