Journal of Aging and Physical Activity, 2005, **13**, 45-60

Motivational Factors Influencing Older Adults Diagnosed With Knee Osteoarthritis to Join and Maintain an Exercise Program

Teresa M. Damush, Susan M. Perkins, Alan E. Mikesky, Melanie Roberts, and John O'Dea

In order to provide successful interventions to increase physical activity among inactive older adults, it is imperative to understand motivational factors influencing exercise. The authors present data from 191 (baseline) and 125 (12-month) community-dwelling men and women with mean ages of 68.71 (7.47) and 67.55 (7.55) years, respectively, from a strength-training trial. Approximately 53% had diagnosed knee osteoarthritis. Using a Likert scale, participants self-reported their degree of motivation from personal, social, and environmental factors. Using multivariate analyses, the authors evaluated demographic and clinical correlates of motivational factors to join and continue with exercise. The following results were reported: Knee osteoarthritis was positively related to motivation from an organized exercise opportunity and from efficacy/outcome expectations, and knee pain was positively related to motivation from social support and experience with the exercise task. Understanding these motivators might help in targeting recruitment efforts and interventions designed to increase physical activity in older adults with lower extremity arthritis.

Key Words: self-efficacy, outcome expectations, social support

With a greater proportion of the population in the United States nearing older adulthood, maintaining physical functioning and avoiding disability has become a critical area of research (LaCroix, Guralnik, Berkman, Wallace, & Satterfield, 1993; Rejeski, Brawley, & Haskell, 2003). Participating in regular physical activity can delay the onset of disability among older adults (Hirvensalo, Rantanen, & Heikkinen, 2000; Mor et al., 1989). In addition to maintaining physical functioning, the benefits of physical activity for older adults are plentiful (Blumenthal et al., 1989; Buchner et al., 1997). Nonetheless, few older adults participate regularly in recommended levels of physical activity (Yusuf et al., 1996).

Damush is with the Health Services and Research Development Dept., Richard L. Roudebush VAMC; the Indiana University Center for Aging Research; and the Regenstrief Institute. Perkins is with the Dept. of Medicine, Indiana University School of Medicine, Indianapolis, IN 46202. Mikesky is with the Dept. of Physical Education, Indiana University Purdue University, Indianapolis, IN 46202. Roberts and O'Dea are with the Nat'l. Institute for Fitness and Sport, 250 University Blvd., Indianapolis, IN 46202.

More specifically, the prevalence of regular strength training among older adults is extremely low. Only 11% reported participating in regular strength training at least twice a week in a recent study of 6,000 older adults age 65 years and older (Kruger, Brown, Galuska, & Buchner, 2004). In that study, older adults considered obese or in poor health and older women were least likely to report engaging in strength training (Kruger et al.).

Why older adults remain less physically active and what motivates them to engage in physical activity are elusive questions. Randomized controlled trials designed to increase physical activity among older adults have often shown positive results with the incorporation of social-cognitive-theory principles (Conn, Minor, Burks, Rantz, & Pomeroy, 2003). Following a social-cognitive theoretical framework (Bandura, 1986), researchers have often organized correlates of physical activity by personal, social, and environmental factors (King, 2001).

Personal correlates, exercise self-efficacy (McAuley, 1993; McAuley, Jerome, Marquez, Elavsky, & Blissmer, 2003; Orsega-Smith, Payne, & Godbey, 2003), and outcome expectations have demonstrated positive associations with older adult physical activity (Damush, Stump, Saporito, & Clark, 2001; Resnick, Zimmerman, Orwig, Furstenberg, & Magaziner, 2000). Demographic and health variables, also personal factors, have been related to physical activity. Being a woman, overweight, or a smoker; older age (Conn, Minor, & Burks, 2003); and having less education were factors associated with physical inactivity (Clark, 1996; King, 2001; Sternfeld, Ainsworth, & Quesenberry, 1999). Perceived poor health was another factor related to physical inactivity in older adults (Clark, 1999; Damush et al., 2001).

Among social factors, social support has been shown to correlate with physical activity in general populations (Sallis, Grossman, Pinski, Patterson, & Nader, 1987) and older adults (Orsega-Smith et al., 2003). In a recent self-report survey study of African American and rural older women, family support for physical activity was correlated with greater physical activity participation (Wilcox, Bopp, Oberrecht, Kammermann, & McElmurray, 2003). Other positive sources of social support studied among older adults were physician recommendations for physical activity (Damush, Stewart, Mills, King, & Ritter, 1999) and home-exercise support programs (Tudor-Locke et al., 2000).

Environmental factors of physical activity have recently received attention (Sallis, Kraft, & Linton, 2002). Program-related factors have not been rigorously studied as a product or service. One program factor, however, home versus group-based physical activity, has been studied. Older adults, on average, tend to prefer home-based activity with some instruction (Brownson et al., 1999) and are more likely to adhere to exercise in a home-based exercise program (King, Haskell, Taylor, Kraemer, & DeBusk, 1991). It is unknown whether older adults with chronic disease prefer professional, supervised instruction or home-based physical activity.

In addition to correlates of physical activity, research has identified personal and environmental barriers to physical activity among older adults. A recent cross-sectional survey of perceived barriers to physical activity among older Australians

reported the following as the most prevalent barriers: already active enough, injured or disabled, poor health, too old, lack of time, and perceptions of not being the "sporty type" (Booth, Bauman, & Owen, 2002). In another study, over two thirds reported health symptoms (e.g., pain, fear of chest pain, and shortness of breath) and environmental reasons (e.g., weather, fear of crime) as barriers to physical activity participation among a stratified random sample of older, low-income primary-care patients (Clark, 1999). Most recently, Tu, Stump, Damush, and Clark (2004), found that objective measures of weather and sociodemographic neighborhood were barriers to adherence to a structured group-exercise program in the community.

Given that health perceptions and pain are barriers to older adult physical activity, the purpose of this study was to explore personal, social, and environmental motivators to join and continue participating in an exercise program that was offered to community-dwelling older adults with radiographic knee osteoarthritis and self-reported pain. This article is a secondary analysis of a randomized, controlled clinical trial. Using social-cognitive theory as our theoretical framework (Bandura, 1986), we queried participants on personal, social, and environmental factors (see Appendix) motivating them to join and maintain the exercise program. We assessed motivation by age, gender, race, education, marital status, treatment group, radiographic knee osteoarthritis, presence of knee pain, and presence of an exercise partner. We hypothesized that exercise self-efficacy, outcomes expectations, health status, and professional and social support were the most common motivators related to physical activity. Understanding older adults' motivation to begin (i.e., adopt) physical activity and continue (i.e., maintain) it might provide valuable insight for the design of future physical activity programs to increase participation rates.

Methods

This study is a secondary analysis of data from a larger randomized controlled trial that evaluated the efficacy of strength training on reduction of knee pain from osteoarthritis. The local institutional review board approved the research presented in this article. In this trial, participants from the community with knee pain were recruited, their knees were x-rayed to verify knee osteoarthritis status, and then they were randomized to either a supervised strength-training program or a flexibility-exercise class at a downtown fitness facility located adjacent to the large university campus. Their spouses were permitted to attend the facility-based program and exercise alongside them in the same arm of the intervention (some chose to be in the study as a participant, others did not) to promote adherence.

In the strength-training program, participants received individual instruction from a certified and degreed exercise trainer until they were able to follow a routine on their own using a written exercise log developed with the trainer at the facility twice a week. The participants in the control group received group instruction twice a week. Facility-based exercise was gradually tapered after 3 months to

promote home-based exercise for long-term adherence. After 1 year, participants were completely transferred to a home-based exercise program, and those in the strength-training arm were provided with Therabands®, a pictorial guidebook, and an instructional video. Participants in the flexibility, control, group received a guidebook demonstrating the flexibility exercises.

As part of the study trial protocol, participants underwent a comprehensive assessment of physical fitness (i.e., strength), clinical tests (i.e., bone-density scan, X-rays to establish the presence of radiographic knee osteoarthritis), and a battery of self-reported measures of health and quality of life at baseline and after 12 months of follow-up in the study.

After the participants joined the study, completed the baseline assessment, received randomized assignment, and began to exercise, their motivation to join the exercise program was assessed using both a closed- and an open-ended questionnaire. Because the questionnaire queried respondents on aspects of the exercise facility, professionals, and program, participants were queried after they experienced these factors in order to have a framework from which to reply. This process was repeated at the 12-month follow-up assessment to assess motivation to continue with participation in the exercise program. The results of both the baseline and 12-month questionnaire are reported in this article.

PARTICIPANTS

Adults age 50 years and older living in the community were invited to participate in an exercise study on knee osteoarthritis and pain. Potential participants were excluded if they had rheumatoid arthritis, lupus, fibromyalgia, hip or knee-joint replacement, unstable chronic disease, severe chronic diseases (e.g., stroke), severe cognitive impairment, or terminal illness or were unable to walk. A total of 235 were interested and eligible. Of these 235, 12 completed the clinical and survey assessment but did not complete the fitness testing at baseline. In addition, 2 participants completed baseline assessment and were randomized but did not participate any further. Of the remaining 221 participants enrolled in the study (113 intervention and 108 control), 191 (86%) participants completed the motivation-to-join questionnaire. Of the 137 (62%) participants (59 intervention, 78 control) remaining at 12 months, 125 (91%) also completed the motivation-to-continue questionnaire at that time.

DATA COLLECTION AND MEASURES

Participants completed a self-administered questionnaire of motivation to join or continue to participate in an exercise program at the fitness facility after they joined the study in order to make a judgment about the exercise facility, professional support, and the program and did so again after their 12-month follow-up assessment (see the Appendix for questionnaire items). Questionnaire items included both closed- and open-ended formats. Closed-ended items were developed to encompass

personal, social, and environmental aspects of exercise participation. Participants rated the degree of motivation on a Likert scale of 1 to 4 on which 1 denoted *did not motivate* and 4 indicated *extremely motivated*. Open-ended questions were added for respondents to disclose other factors that motivated them to join or continue to participate in the exercise program.

METHODS OF ANALYSIS

Factor analysis was performed separately on the motivation-to-join and motivation-to-continue questionnaires. Common factor analysis (principle-axis extraction with promax rotation) was used. The final number of factors was determined by considering the percentage of common variance explained, Scree plots, the magnitude of eigenvalues, and interpretability.

After the factors represented in the questionnaire had been identified, Cronbach's alpha coefficients were computed on each domain to assess internal reliability, and summary scores for each domain were calculated as unweighted averages of items that loaded together on the same factor. Within each domain for a particular participant, missing data were replaced with the mean of that participant's responses for that domain, as long as at least two thirds of the questions in that domain were not missing. Summary scores were compared across age, gender, race, education, marital status, treatment group, radiographic knee osteoarthritis, knee pain present, and whether the participant had a partner to exercise with two-sided, two-sample *t* tests. The Satterthwaite approximation to the degrees of freedom was used when the equal-variance assumption was violated. Similarly, participants who completed both the motivation-to-join and -to-continue questionnaires were compared with those who completed only the motivation-to-join questionnaire using chi-square tests for dichotomous variables and *t* tests for continuous variables. Finally, multivariable regression was used to identify significant associations between demographic and clinical characteristics and motivation factors. Values for *p* less than or equal to .05 were considered statistically significant. SAS version 8.2 software was used for all analyses.

Results

CHARACTERISTICS OF PARTICIPANTS

A total of 191 participants completed the motivation-to-join questionnaire. Demographic characteristics of participants are reported in Table 1. The average ages of the men and women in this sample were 68.71 (S*D* = 7.47, range = 56–87) and 67.55 (*SD* = 7.55, range = 55–94), respectively. Eighteen percent of the participants were 75 years of age or older, 57% were women, and 92% were White. Over half of the sample had radiographic knee osteoarthritis, and approximately 80% reported achieving education beyond high school. Of those who completed the motivation-to-join questionnaire, 125 (65%) also completed the motivation-to-continue questionnaire at the 12-month follow-up. Those who completed both

questionnaires were significantly older, more likely to be women, less likely to be in the strength-training group, and less likely to have knee pain than were participants who did not complete the 12-month questionnaire (see Table 2).

Table 1 Baseline Demographics and Clinical Characteristics (*N* = 191)

Factor	%
Age ≥ 75 years	18.3
Female	56.5
White	91.5
Education > 12 years	79.6
Married	65.5
Strength-training group	51.3
Radiographic knee osteoarthritis	53.4
Knee pain	35.6
Partner to exercise with	37.2

Note. Radiographic knee osteoarthritis was assessed by X-rays and diagnosed by radiologists at baseline. Knee pain was assessed by the WOMAC scale at baseline. Race was missing for 3 participants.

Table 2 Comparisons Between Participants Who Did and Did Not Complete the Motivation-to-Continue Assessment at 12 Months

	Completed, *n* = 125	Did not complete, *n* = 66	χ^2 (*df*)	*p*
Age ≥ 75 years	23%	9%	5.75 (1)	.017
Female	53%	26%	12.86 (1)	.000
White	92%	91%	0.06 (1)	.797
Education > 12 years	78%	82%	0.31 (1)	.577
Married	69%	59%	1.80 (1)	.180
Strength-training group	43%	66%	9.52 (1)	.002
Radiographic knee osteoarthritis	53%	55%	0.05 (1)	.818
Knee pain	28%	50%	9.12 (1)	.003
Partner to exercise with	42%	29%	3.04 (1)	.081
Motivation to join:			*T* (*df*)	
organized exercise opportunity	3.4 (0.6)	3.5 (0.5)	–1.66 (1)	.099
social support	1.9 (0.8)	2.0 (0.9)	–0.81 (1)	.419
incentives	1.8 (0.7)	1.7 (0.7)	0.38 (1)	.705
efficacy and outcome expectations	3.0 (0.8)	3.1 (0.8)	–0.71 (1)	.479

FACTOR ANALYSES AND SUMMARY SCORES

The factor analyses identified five factors of motivation to join and continue with the exercise program. The factors included organized exercise opportunity (such as being part of a study and having access to an exercise facility), social support (from spouse, other family members, friends, doctor), incentives (such as financial reimbursement and distance to exercise facility), efficacy and outcome expectations (such as making scheduled appointments to exercise and noticeable mood and health improvement), and experience with the exercise task (such as having access to a fitness trainer and difficulty of the exercise; see Appendix). Experience with the exercise task was not present as a factor for motivation to join, as would be expected. There were no differences between those who completed and those who did not complete both questionnaires on the motivation-to-join factors (Table 2).

Summary scores for each factor for motivation to join and motivation to continue are reported in Table 3. For motivation to join, two factors—organized exercise opportunity and efficacy and outcome expectations (e.g., improve health)—had mean scores above 3.0 (3.4 and 3.1, respectively), indicating that participants on average were motivated quite a bit by these factors. Two factors—social support and incentives—had mean scores near 2.0 (1.9 and 1.7, respectively), indicating that participants on average were motivated a little by these factors. Cronbach's-alpha internal-consistency-reliability coefficients for motivation-to-join factors ranged from .67 to .82, indicating good reliability. For motivation to continue, organized exercise opportunity and efficacy and outcome expectations had mean scores at or above 3.0 (3.4 and 3.0, respectively). Experience with exercise task and social support had mean scores midway between *motivated a little* and *quite a bit* (2.6

Table 3 Summary Scores of the Motivational Factors

Factor	*n*	*M* (*SD*)	Range	Cronbach's α
Motivation to join:				
organized exercise opportunity	191	3.4 (0.5)	1.0–4.0	.82
social support	181	1.9 (0.8)	1.0–4.0	.75
incentives	187	1.7 (0.7)	1.0–4.0	.67
efficacy and outcome expectations	189	3.1 (0.8)	1.0–4.0	.78
Motivation to continue:				
organized exercise opportunity	125	3.4 (0.5)	1.6–4.0	.82
social support	120	2.3 (0.9)	1.0–4.0	.85
incentives	121	1.8 (0.7)	1.0–4.0	.77
efficacy and outcome expectations	123	3.0 (0.7)	1.0–4.0	.85
experience with exercise task	117	2.6 (0.7)	1.0–4.0	.69

Table 4 Multivariate Models Regressing Exercise-Motivation Factors on Demographic and Clinical Correlates

	Motivational Factors—Dependent Variables								
	Organized Exercise Opportunity		Social Support		Incentives		Efficacy and Outcome Expectations		Experience With Exercise Task
Correlates—independent variables	Join, $n = 188$	Continue, $n = 123$	Join, $n = 178$	Continue, $n = 118$	Join, $n = 184$	Continue, $n = 119$	Join, $n = 186$	Continue, $n = 121$	Continue, $n = 115$
Age ≥75 years									
β	**–.38**	**–.23**	–.14	.20	.02	.23	**–.31**	**–.29**	.13
p	**.00**	**.05**	.36	.27	.90	.11	**.05**	**.05**	.38
Female									
β	**.17**	.03	**.30**	.20	.21	.10	**.33**	–.01	–.04
p	**.04**	.81	**.02**	.22	.06	.43	**.02**	.91	.78
White									
β	–.19	–.08	**–.42**	**–.59**	**–.62**	**–.61**	–.18	–.24	**–.64**
p	.18	.67	**.04**	**.04**	**.00**	**.01**	.44	.30	**.01**
Education >12 years									
β	–.01	–.15	**–.36**	**–.52**	**–.37**	**–.31**	–.17	–.16	**–.46**
p	.94	.24	**.02**	**.01**	**.00**	**.04**	.28	.32	**.01**

Married									
β	.04	.10	**.26**	.34	–.02	.01	.22	.10	.22
p	.66	.38	**.05**	.06	.83	.92	.13	.48	.14
Knee osteoarthritis									
β	.09	**.23**	.02	.11	.11	.23	.10	**.34**	.10
p	.28	**.03**	.89	.49	.30	.06	.44	**.01**	.47
Knee pain									
β	.01	–.21	**.31**	**.44**	–.070	.08	–.06	.13	**.47**
p	.93	.09	**.01**	**.02**	.52	.57	.67	.39	**.00**
Have exercise partner									
β	–.03	.17	**.37**	.30	.11	–.07	.02	–.13	.07
p	.74	.10	**.00**	.06	.28	.58	.89	.31	.59
Strength-training group									
β	–.01	.09	–.10	.09	–.08	.19	–.05	.03	.09
p	.94	.40	.38	.57	.45	.11	.68	.83	.46

Note. *p* values ≤.05 were considered significant. Three participants at baseline and 2 at 12 months were missing race. Sample sizes vary because of differences in the number of outcome scores available (see Table 3). Experience with exercise-task factor was only assessed at 12-month follow-up. Motivation to join was assessed at baseline, and motivation to continue was assessed at the 12-month follow-up. Figures in boldface indicate statistically significant analyses.

and 2.3, respectively), and incentives had a mean score of 1.8. Cronbach's-alpha internal-consistency-reliability coefficients for motivation-to-continue factors ranged from .69 to .85, indicating good reliability.

MULTIVARIATE REGRESSION ANALYSES

Results from the multivariable regression models for motivation to join and continue with exercise participation of older adults are presented in Table 4. Beta coefficients and *p* values are reported. Results are summarized by each factor as follows.

Organized Exercise Opportunity. Participants 75 years of age or older were less motivated to join ($p = .00$) and less motivated to continue with the exercise program ($p = .05$) by having an organized exercise opportunity than were participants under 75 years of age. Women were more motivated to join the exercise program because of having an organized exercise opportunity ($p = .04$) than were men, but there was no significant gender difference for motivation to continue. Finally, participants with knee osteoarthritis ($p = .03$) were more motivated to continue to exercise with the program by having an organized exercise opportunity than were participants without diagnosed knee osteoarthritis. Having knee osteoarthritis at baseline, however, was not significant for motivation to join.

Social Support. Social support motivated women to join the exercise program more than it did men ($p = .02$), but there were no gender differences with regard to motivation to continue. White participants who had 12 or more years of education were less motivated by social support than were participants of other race or with less than a high school education for both motivation to join ($p = .04$ and .04, respectively) and motivation to continue to exercise ($p = .02$ and .01, respectively). Participants who were married and had a partner were more motivated by social support to join the exercise program than were single participants or those without an exercise partner ($p = .05$ and .00, respectively), and participants with knee pain were more motivated by social support to continue exercising than were those without knee pain ($p = .0137$).

Incentives. Participants who were White and had 12 or more years of education were less motivated to join ($p = .00$ and .00, respectively) and less motivated to continue ($p = .01$ and .04, respectively) based on incentives offered for participation than were participants of other race or with less than 12 years of education.

Efficacy and Outcome Expectations. Participants 75 years of age or older were less motivated than younger participants to both join ($p = .05$) and to continue ($p = .05$) by efficacy and outcome expectations. Women were more motivated than men to join the exercise program by efficacy and outcome expectations ($p = .02$), but there were no gender differences with regard to motivation to continue. Finally, participants with knee osteoarthritis were more motivated than participants without knee osteoarthritis to continue with the exercise program based on efficacy and outcome expectations ($p = .01$), although they were not more motivated to join based on this factor.

Experience With Exercise Task. For this factor, which is relevant only for motivation to continue, participants who were White and had 12 or more years of education were less motivated by their experience with the exercise task (e.g., having difficulty with the exercise) than were participants of other race and with less than 12 years of education ($p = .01$ and $p = .00$, respectively), but participants with self-reported knee pain were more motivated to continue to exercise by this factor ($p = .00$) than were those without self-reported knee pain.

Other Motivational Factors. In order to understand any other motivational factors that influenced our sample to join and continue participation in the exercise program, we queried respondents in an open-ended format. The responses to the open-ended question "What else motivated you to join/continue with the exercise program?" varied. The most frequent responses reported were wanting to improve physical functioning (i.e., ability to walk; 13%), wanting to alleviate pain or arthritis (11%), wanting to improve physical-fitness level (10%), enjoying the social aspect of the program (9%), wanting to improve psychological well-being (5%), and enjoying exercise (4%).

Discussion

In order to elucidate the motivational influences on joining an exercise program and continuing for a year, a sample of older adults who enrolled in a structured exercise program were queried. This program was part of a randomized, controlled strength-training trial targeting participants with knee osteoarthritis and knee pain. The results confirmed the study's hypothesis and expanded on the application of social-cognitive theory (Bandura, 1986) to exercise adoption and adherence by focusing on the motivators of older adults with chronic knee osteoarthritis and pain. Social support from friends, relatives, and physicians was rated as a significant motivator to join and continue with exercise among those with knee pain and those who tend to be less physically active: women, minorities, and the less educated (Kruger et al., 2004). Presenting an organized exercise opportunity conducted by professionals was an important factor to women and those with knee osteoarthritis for continuing with the exercise program. Likewise, Gillis, Grossman, McLellan, King, and Stewart (2002) reported that participants of their community-based physical activity program for older adults enjoyed the personal attention and support from the staff. Moreover, participants having an exercising partner alongside them rated social support as a significant motivator to join and continue in our exercise program.

In addition, being familiar with the exercise task and having positive outcome expectations of exercise (i.e., reduced pain, better functioning) influenced exercise motivation to continue among those with knee osteoarthritis in this study similarly to other older adults (Damush et al., 2001; McAuley, 1993; Resnick et al., 2000). Finally, receiving rewards for exercise behavior was another motivating factor for those who tend to be inactive: women, minorities, and the less educated

(e.g., incentives-environmental factors; Jeffrey, Wing, Thorson, & Burton, 1998).

The desire of older adults with knee pain and osteoarthritis to improve their health and the expectation that exercise is the method by which to accomplish this appeared to be overwhelming motivators. In fact, although we queried respondents on health improvements as motivators in the closed-ended items, participants still felt compelled to self-report as motivators the desire to improve physical functioning and alleviate pain in the open-ended-response format. Gillis et al. (2002) also reported that participants joined their physical activity program to improve health and physical functioning. This is an important result because poor health was the most frequently reported barrier to exercise among older adults (Booth et al., 2002; Cohen-Mansfield, Marx, & Guralnik, 2003). Participants with health problems in this study appeared to be ready to change their behavior and begin exercising.

Providing a structured, supervised exercise program that is promoted specifically to alleviate the symptoms of chronic osteoarthritis and pain with tangible incentives and social support might be appealing to community-dwelling older adults. These adults with chronic disease might repeatedly receive messages that they should exercise from friends, family, and physicians; however, they might never have had the tools or opportunity to begin. Social support from family, friends, and physicians were reasons that older adult women reported for joining their physical activity program in other studies of older adults' physical activity (Gillis et al., 2002; O'Neill & Reid, 1991).

These data suggest that enhancing positive outcome expectations might motivate those with knee osteoarthritis to maintain their physical activity participation. Thus, it might be worthwhile to educate such participants about potential positive outcomes early in the program. Moreover, our data suggest that targeting friends, family, and professionals to deliver this message on positive outcomes of physical activity might be equally worthwhile in motivating older adults with chronic knee pain to begin and maintain their exercise.

Limitations

Because this was a secondary analysis of a randomized trial, this study had several limitations. First, some participants enrolled in the study did not complete the baseline motivation survey. Some participants were already beyond the initial phase of the study when we implemented the survey. Second, there was some attrition during the 12-month assessment. Some participants stated that the reason they did not complete a 12-month assessment was because they did not complete their home exercise. Third, participants were recruited from public announcements in the local newspaper. Thus, our sample was a volunteer sample and might be biased toward those who can read and can afford a daily newspaper. Finally, the exercise facility was located downtown. Thus, older adult participants had to be healthy enough to drive approximately 15–20 min to this location and walk from a distant parking lot.

Conclusion

Despite the limitations identified, this study provided insight into the motivational influences on exercise adoption and maintenance among older adults with knee osteoarthritis and pain. Community-dwelling middle-aged and older adults with chronic knee osteoarthritis and pain desire professional, organized instruction along with social support from peers and relatives. Such programs might increase participation and adherence by focusing on exercise self-efficacy and positive outcome expectations in their marketing materials for those with knee osteoarthritis and their support system. Because this study was conducted among a single, volunteer sample in the Midwest, the generalizability of the results might be limited. A regional or national survey might identify other important motivators.

Acknowledgment

This study was supported in part by NIH Multipurpose Arthritis Center Grant #P60-AR20582-22 SR3.

References

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Blumenthal, J.A., Emery, C.F., Madden, D.J., George, L.K., Coleman, R.E., Riddle, M.W., et al. (1989). Cardiovascular and behavioral effects on aerobic exercise training in healthy older men and women. *Journal of Gerontology*, **44**(5), M147-M157.

Booth, M.K., Bauman, A., & Owen, N. (2002). Perceived barriers to physical activity among older Australians. *Journal of Aging and Physical Activity*, **10**, 271-280.

Brownson, R.C., Eyler, A.A., King, A.C., Shyu, Y.L., Brown, D.R., & Homan, S.M. (1999). Reliability of information on physical activity and other chronic disease risk factors among US women aged 40 years and older. *American Journal of Epidemiology*, **149**(4), 379-391.

Buchner, D.M., Cress, M.E., de Lateur, B.J., Esselman, P.C., Margherita, A.J., Price, R., et al. (1997). The effect of strength and endurance training on gait, balance, fall risk, and health services use in community-living older adults. *Journal of Gerontology: Medical Sciences,* **52A**, M218-M224.

Clark, D.O. (1996). Age, socioeconomic status, and exercise self-efficacy. *The Gerontologist,* **36**(2), 157-164.

Clark, D.O. (1999). Physical activity and its correlates among urban primary care patients aged 55 years or older. *Journal of Gerontology: Biological Sciences,* **54B**, 41-48.

Cohen-Mansfield, J., Marx, M.S., & Guralnik, J.M. (2003). Motivators and barriers to exercise in an older community-dwelling population. *Journal of Aging and Physical Activity,* **11**, 242-253.

Conn, V.S., Minor, M.A., & Burks, K.J. (2003). Sedentary older women's limited experience with exercise. *Journal of Community Health and Nursing,* **20**(4), 197-208.

Conn, V.S., Minor, M.A., Burks, K.J., Rantz, M.J., & Pomeroy, S.H. (2003). Integrative review of physical activity intervention research with aging adults. *Journal of the American Geriatrics Society,* **51**, 1159-1168.

Damush, T.M., Stewart, A.L., Mills, K.M., King, A.C., & Ritter, P.L. (1999). Prevalence and correlates of physician recommendations to exercise among older adults. *Journals of Gerontology: Medical Sciences,* **54**(8), 423-427.

Damush, T.M., Stump, T.E., Saporito, A., & Clark, D.O. (2001). Predictors of older primary care patients' participation in a submaximal exercise test and a supervised, low-impact exercise class. *Preventive Medicine,* **33**(5), 485-494.

Gillis, D.E., Grossman, B.Y., McLellan, B.Y., King, A.C., & Stewart, A.L. (2002). Participants' evaluations of components of a physical-activity promotion program for seniors (CHAMPS II). *Journal of Aging and Physical Activity,* **10**, 336-353.

Hirvensalo, M., Rantanen, T., & Heikkinen, E. (2000). Mobility difficulties and physical activity as predictors of mortality and loss of independence in the community-living older population. *Journal of the American Geriatrics Society,* **48**, 493-498.

Jeffrey, R.W., Wing, R.R., Thorson, C., & Burton, L.R. (1998). Use of personal trainers and financial incentives to increase exercise in a behavioral weight-loss program. *Journal of Consulting and Clinical Psychology,* **66**(5), 777-783.

King, A.C. (2001). Interventions to promote physical activity by older adults. *Journals of Gerontology: Medical Sciences,* **56**(2), 36-46.

King, A.C., Haskell, W.L., Taylor, C.B., Kraemer, H.C., & DeBusk, R.F. (1991). Group- vs home-based exercise training in healthy older men and women. *Journal of the American Medical Association,* **266**(11), 1535-1542.

Kruger, J., Brown, D.R., Galuska, D.A., & Buchner, D. (January 23, 2004). Strength training among adults aged ≥ 65 years—United States, 2001. *Morbidity and Mortality Weekly Report,* **53**(02), 25-28.

LaCroix, A.Z., Guralnik, J.M., Berkman, L.F., Wallace, R.B., & Satterfield, S. (1993). Maintaining mobility in late life. Smoking, alcohol consumption, physical activity and body mass index. *American Journal of Epidemiology*, **137**, 858-869.

McAuley, E. (1993). Self-efficacy and the maintenance of exercise participation in older adults. *Journal of Behavioral Medicine,* **16**, 103-113.

McAuley, E., Jerome, G.J., Marquez, D.X., Elavsky, S., & Blissmer, B. (2003). Exercise self-efficacy in older adults: Social, affective, and behavioral influences. *Annals of Behavioral Medicine,* **25**(1), 1-7.

Mor, V., Murphy, J., Masterson-Allen, S., Willey, C., Razmpour, A., Jackson, M.E., et al. (1989). Risk of functional decline among well elders. *Journal of Clinical Epidemiology,* **42**, 895-904.

O'Neill, K., & Reid, G. (1991). Perceived barriers to physical activity by older adults. *Canadian Journal of Public Health,* **82**, 392-396.

Orsega-Smith, E., Payne, L.L., & Godbey, G. (2003). Physical and psychosocial characteristics of older adults who participate in a community-based exercise program. *Journal of Aging and Physical Activity,* **11**, 516-531.

Rejeski, W.J., Brawley, L.R., & Haskell, W.L. (2003). The prevention challenge: An overview of this supplement. *American Journal of Preventive Medicine*, **25**(3 Suppl. 2), 107-109.

Resnick, B., Zimmerman, S.I., Orwig, D., Furstenberg, A.L., & Magaziner, J. (2000). Outcome expectations for exercise scale: Utility and psychometrics. *Journal of Gerontology: Social Sciences,* **55B**, S352-S356.

Sallis, J.F., Grossman, R.M., Pinski, R.B., Patterson, T.L., & Nader, P.R. (1987). The development of scales to measure social support for diet and exercise behaviors. *Preventive Medicine*, **16**(6), 825-836.

Sallis, J.F., Kraft, K., & Linton L.S. (2002). How the environment shapes physical activity: A transdisciplinary research agenda. *American Journal of Preventive Medicine,* **22**, 208.

Sternfeld, B., Ainsworth, B.E., & Quesenberry, C.P. (1999). Physical activity patterns in a diverse population of women. *Preventive Medicine*, **28**(3), 313-323.

Tu, W., Stump, T.A., Damush, T.M., & Clark, D.O. (2004). The effects of health and environment on exercise class participation in older, urban women. *Journal of Aging and Physical Activity*, **12**(4), 480-496.

Tudor-Locke, C., Myers, A.M., Jacob, C.S., Jones, G., Lazowski, D.A., & Ecclestone, N.A. (2000). Development and formative evaluation of the centre for activity and aging home support exercise program for frail older adults. *Journal of Aging and Physical Activity,* **8**, 59-75.

Wilcox, S., Bopp, M., Oberrecht, L., Kammermann, S.K., & McElmurray, C.T. (2003). Psychosocial and perceived environmental correlates of physical activity in rural and older African American and White women. *Journal of Gerontology: Psychological Sciences,* **58**(6), P329-P337.

Yusuf, H.R., Croft, J.B., Giles, W.H., Anda, R.F., Casper, M.L., Caspersen, C.J., et al. (1996). Leisure-time physical activity among older adults. *Archives of Internal Medicine,* **156**, 1321-1326.

Appendix:
Questionnaire on Motivation to Join or Continue to Participate in Exercise Program [factors are listed in brackets]

For each part of the Knee OA fitness program, please rate the degree to which it motivated you to *JOIN/CONTINUE* participating in the program.

For each question, please *circle the number* that best describes your level of motivation.

RESPONSE FORMAT

Did not motivate me to *join/continue*	Motivated me a little to *join/continue*	Motivated me quite a bit to *join/continue*	Extremely motivated me to *join/continue*
1	2	3	4

1. How much did having the opportunity to be part of a study motivate you to *join/continue* participating in the program? [organized exercise opportunity]

   1 2 3 4

2. How much did having the opportunity to train in an exercise study motivate you to *join/continue* participating in the program? [organized exercise opportunity]

   1 2 3 4

3. How much did having access to an exercise facility motivate you to *join/continue* participating in the program? [organized exercise opportunity]

   1 2 3 4

4. How much did having the opportunity to socialize motivate you to *join/continue* participating in the program? [social support]

   1 2 3 4

5. How much did wanting to do something about your health motivate you to *join*/*continue* participating in the program? [efficacy and outcome expectations]

   1 2 3 4

6. How much did having the opportunity for a scheduled commitment outside the homemotivate you to *join*/*continue* participating in the study? [efficacy and outcome expectations]

   1 2 3 4

7. How much did your spouse/significant other motivate you to *join*/*continue* participating in the study? [social support]

   1 2 3 4

8. How much did your other family members motivate you to *join*/*continue* participating in the study? [social support]

   1 2 3 4

9. How much did your friend(s) motivate you to *join*/*continue* participating in the study? [social support]

   1 2 3 4

10. How much did your doctor motivate you to *join*/*continue* participating in the study? [social support]

    1 2 3 4

11. How much did receiving financial reimbursements motivate you to *join*/*continue* participating in the study? [incentives]

    1 2 3 4

12. How much did the round-trip distance to the IUPUI campus motivate you to *join*/*continue* participating in the program? [incentives]

    1 2 3 4

13. How much did having the opportunity to work with a fitness trainer motivate you to *join*/*continue* participating in the program? [organized exercise opportunity]

    1 2 3 4

14. How much did having the opportunity to set aside time to exercise motivate you to *join*/*continue* participating in the program? [efficacy and outcome expectations]

    1 2 3 4

15. How much did your sore muscles motivate you to *join*/*continue* participating in the study?

    1 2 3 4

16. How much did noticing improvements in your mood motivate you to *join*/*continue* participating in the study? [efficacy and outcome expectations]

    1 2 3 4

17. How much did noticing improvements in your health motivate you to *join*/*continue* participating in the program? [efficacy and outcome expectations]

    1 2 3 4

18. How much did receiving the SOAR T-shirt motivate you to *join*/*continue* participating in the program? [incentives]

    1 2 3 4

19. How much did the difficulty of the exercise motivate you to *join*/*continue* participating in the program? [experience with the exercise task]

    1 2 3 4

20. What else influenced you to *join*/*continue* participating in the Knee OA program that is not listed above?