Love Hurts:
The Influence of Social Relations on Exercise Self-Efficacy for Older Adults with Osteoarthritis

Kelly A. Cotter, MA
Brandeis University
Aurora M. Sherman, PhD
Oregon State University

Kelly Cotter is now at Sacramento State University, Psychology Department.
Reprint address: 6000 J Street, Sacramento, CA 95819. E-mail: kcotter@brandeis.edu.

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Abstract

Exercise self-efficacy is a powerful predictor of physical activity behavior, which enhances health and well-being for older adults. Social relations have been proposed as influential precursors for exercise self-efficacy. In a longitudinal study of 160 older adults with osteoarthritis (76.9% women), we found that social support (but not social strain) significantly predicted exercise self-efficacy in a structural equation model examining cross-sectional data: $\chi^2 (178, N = 160) = 264.57, p < .01; \text{RMSEA} = .06; \text{CFI} = .92; \text{TLI} = .90$. However when data were examined longitudinally, social strain (but not social support) significantly predicted lower exercise self-efficacy one year later: $\chi^2 (233, N = 160) = 288.64, p < .01; \text{RMSEA} = .04; \text{CFI} = .96; \text{TLI} = .95$. Results support the negativity effect (Rook, 1990), suggesting that social strain may be the more potent aspect of social relations and should be the target of interventions.
The Influence of Social Relations on Exercise Self-Efficacy for Older Adults with Osteoarthritis

According to the American College of Sports Medicine (ACSM, 2000), exercise and/or regular physical activity provide a number of health benefits, including decreased mortality and morbidity, reduced risk for heart disease, obesity, diabetes, stroke, cancer, and osteoporosis, enhanced cognitive functioning, and increased feelings of psychological well-being. Exercise is particularly beneficial for older adults with osteoarthritis (OA), as it helps to decrease pain, maintain joint function, and control weight (Bassey, 2000; Hughes et al., 2004).

Exercise is vital for the aging population. One of the most effective ways to promote exercise behavior is to enhance exercise self-efficacy, or perceived beliefs in control over one’s ability to exercise (e.g., Bandura, 1997; Rimal, 2001). Previous research has demonstrated that increasing social support for exercise promotes increased exercise self-efficacy, and enhances exercise behavior in turn (McAuley, Jerome, Marquez, Elavsky, & Blissmer, 2003). However, previous literature has not examined social strain, or the negative aspects of social relationships, for its influence on self-efficacy and exercise (Chogahara, Cousins, & Wankel, 1998), even though social strain may have a more powerful influence on self-efficacy than social support (Rook, 2001). Therefore, in the present study we examined the relative influences of social support and social strain on exercise self-efficacy in a sample of older adults with OA in order to inform health and well-being interventions.

Benefits of Exercise for OA

While exercise is beneficial for the general older adult population, it is particularly beneficial for older adults with OA, as exercise may both help to prevent the development of OA and treat symptoms of OA once the disease has developed (Vuori, 2001). Osteoarthritis is a...
degenerative joint disease which affects 21 million Americans (Arthritis Foundation, 2007) and it is the most common disease among older adults (Felson & Zhang, 1998). OA is characterized by a breakdown of the joint’s cartilage, which causes bones to rub against each other and can be painful and disabling (Arthritis Foundation, 2007). However, participation in physical activity may indirectly prevent OA by helping to prevent obesity, because exercise helps to control the excess weight that increases joint load (Vuori, 2001).

In addition to reducing the risk of OA, exercise can also be an effective treatment for OA symptoms. For example, exercise therapy, such as stationary cycling, has been shown to relieve pain and reduce disability from knee and hip OA (Vuori, 2001). Furthermore, Bassey (2000) reported that moderate exercise (e.g., walking, swimming, cycling) and strengthening the muscles supporting joints (e.g., quadriceps exercises for the knee joint) helps older adults with OA to maintain joint function, control weight, and avoid excessive joint load, which helps to control joint pain and minimize disability.

Exercise Promotion

Enhancing exercise self-efficacy is one of the most effective methods for increasing exercise participation because it instills a sense of self-confidence in personal abilities to become and remain physically active (Bandura, 1997; Jette et al., 1998; McAuley et al., 2003). In fact, in two longitudinal studies of data from over 1,000 adults in the Stanford Five-City Project, a cardiovascular disease prevention field experiment in California, Rimal (2001) found that, in structural equation models (controlling for education, income, and age of participant), exercise self-efficacy was the strongest predictor of subsequent exercise behavior.
Increasing Exercise Self-Efficacy

Increasing exercise is a powerful tool for enhancing the health and well-being of older adults with OA, and bolstering exercise self-efficacy lays the foundation for increased exercise participation. Therefore, exercise interventions must address methods for increasing exercise self-efficacy. According to Social Cognitive Theory (Bandura, 1997), the social environment provides the context for behavior and contributes significantly to feelings of self-efficacy. However, the impact of the social environment on self-efficacy beliefs depends on the nature of the social environment: social relations can be positive (social support), providing good models, teachers, and positive feedback, thus bolstering self-efficacy, and negative (social strain), providing poor models and negative feedback, thus undermining self-efficacy.

Social Support vs. Social Strain

Most of the research conducted on exercise has investigated the influence of social support for exercise behavior, ignoring the potential impact of social strain (Chogohara et al., 1998). Such studies have shown that perceiving social support for exercise (e.g., encouragement) predicts exercise self-efficacy (e.g., Brassington et al., 2002; McAuley et al., 2003; Resnick, Orwig, Magaziner, & Wynne, 2002). However, the influence of social strain for exercise has not yet been widely examined in the context of exercise promotion despite the fact that some researchers (e.g., Rook, 2001) argue that social strain has a more potent and long-lasting effect than social support on health and well-being.

Rook (1990) has termed this differential influence of social strain over social support the negativity effect. She argues that social strain is more powerful than social support because acts of social strain violate our expectations that friends and family are supposed to be supportive (Rook & Pietromonaco, 1987). Therefore, social strain for exercise may play a more influential
role in exercise adoption and adherence than social support, especially over time, by undermining confidence in ability to exercise, thus squelching motivation to exercise. In fact, the few studies that have examined social strain for exercise behavior have reported that higher perceived social strain is associated with lower exercise participation (Chogahara, 1999; Hirvensalo et al., 2005).

**General vs. Exercise-Specific Social Relations**

In addition to the role of social strain, previous studies have also ignored the contribution of the broad social context to exercise self-efficacy and exercise participation, and instead have limited their focus to the contributions of domain-specific social interactions. For example, as stated above, researchers have examined the influence of social support for exercise on exercise self-efficacy and exercise behavior. However, general social support and general social strain have each demonstrated important influences on health and well-being, but have not yet been included in exercise studies. For example, general social support has been shown to promote positive health behaviors (Cohen, 2004) and positively affect physical and psychological well-being (Berkman, Glass, Brisstette, & Seeman, 2000; Heller & Rook, 2001; Seeman, 2000), as well as encourage exercise participation (Carron, Hausenblas, & Mack, 1996). Therefore, general social support may also have an impact on exercise self-efficacy. Furthermore, general social strain has been shown to negatively influence health and well-being (Antonucci, Akiyama, & Lansford, 1998; Rook, 1990). To our knowledge, the influence of general social strain on exercise self-efficacy or exercise behavior has not yet been investigated empirically, but should be, due to its potentially powerful effects on both outcomes.

Lachman and Weaver (1998) argue that demonstrating relationships between predictor variables and health and well-being outcomes using generalized measures would be even more
compelling than showing such relationships with domain-specific measures because significant relationships using generalized measures would apply to multiple domains of functioning. Therefore, if general social interactions influence exercise to a similar extent as do exercise-specific social interactions, interventions can aim to influence general social relations instead of exercise-specific social relations. This could have the added benefit of enhancing health behaviors and health outcomes in addition to exercise, which may lead to more comprehensive health interventions. In other words, targeting general social relations may result in less expensive and more effective interventions.

The Present Study

Based on the arguments presented above, in the present investigation we were interested in the influences of general social support and general social strain on exercise self-efficacy both simultaneously and over time. Specifically, we hypothesized that higher social support and lower social strain would predict higher exercise self-efficacy in cross-sectional and longitudinal analyses for older adults with OA (see Figure 1).

Method

Participants

Participants were recruited for Time 1 data collection through newspaper ads, flyers, group newsletters, and presentations at local senior centers. One hundred sixty older adults aged 58 to 94 years \( (M = 73.25, SD = 8.00) \) volunteered to participate at Time 1 (76.9% women). All participants resided in the Boston area, spoke fluent English, and experienced pain from self-reported OA in the knee or the hip joints on at least three days in the typical week. Most participants considered themselves Caucasian (85.6%), one-third of the participants were married (31.9%), participants were well educated, and the median annual income was $20,001-$50,000.
(see Table 1 for demographic characteristics). Participants were informed at Time 1 that we would ask for their participation at Time 2, although they were, of course, free to decline Time 2 participation.

For Time 2 data collection, we attempted to contact all Time 1 participants 9-12 months after their first appointment and asked them to participate in another interview. Eighty three percent of participants were retained for the second wave of data collection. Of the 25 participants lost to follow-up, one died, two were hospitalized or too sick to participate, eight were not interested in participating the second time or generally declined future participation, and fourteen were unreachable by phone or mail. There were no significant differences on any baseline variables between participants who were retained at Time 2 and those who were not.

Measures

Self-efficacy for exercise was assessed using three scales: one measure of self-efficacy for exercise, one measure of attitudes about exercise and health, and one measure of beliefs about control over exercise behavior. Each exercise self-efficacy subscale was used as an indicator of the latent construct of exercise self-efficacy in structural equation models.

The Self-Efficacy for Exercise Scale (Jette et al., 1998) is a scale consisting of 9 items that measure participants’ confidence that they will exercise under various circumstances. Responses are given on a 4-point scale (1=very sure, 4=not at all sure) with a fifth option of “I do not usually do this” (with a value of 0). Responses are summed with possible scores ranging from 0 to 36. Scores for this sample also ranged from 0 to 36 ($M = 23.94$, $SD = 8.21$ at Time 1, $M = 23.41$, $SD = 8.15$ at Time 2). Jette et al. (1998) have reported high internal consistency for this scale ($\alpha = .88$). The present sample revealed a high Cronbach’s alpha at Time 1 ($\alpha = .93$) and at Time 2 ($\alpha = .93$).
The Attitudes about Exercise and Health Scale (Jette et al., 1998) consists of 3 items, which evaluate the extent to which participants believe that exercising is desirable and beneficial to their health. Responses are measured on a 5-point scale (1=strongly agree, 5=strongly disagree) and summed, with possible scores ranging from 3 to 15. Scores for this sample ranged from 3 to 15 ($M = 13.67$, $SD = 2.24$) at Time 1 and from 7 to 15 ($M = 13.80$, $SD = 1.89$) at Time 2. Jette et al. (1998) have reported low internal consistency for this scale ($\alpha=.57$). Reliability analyses with the present sample revealed an acceptable Cronbach’s alpha at Time 1 ($\alpha=.73$) but a relatively low Cronbach’s alpha at Time 2 ($\alpha=.65$).

The Beliefs about Control over Exercise Behavior Scale (Jette et al., 1998) consists of 6 items, which evaluate participants’ beliefs about the extent to which they can control their exercise behavior. Responses are given on a 5-point scale (1=strongly agree, 5=strongly disagree) and summed, with possible scores ranging from 6 to 30. Scores for this sample ranged from 6 to 30 ($M = 25.06$, $SD = 4.36$) at Time 1 and from 16 to 30 ($M = 24.76$, $SD = 3.56$) at Time 2. Jette et al. (1998) have reported low internal consistency for this scale ($\alpha=.59$). However, reliability analyses with the present sample revealed a high Cronbach’s alpha at Time 1 ($\alpha=.84$) and a reasonable alpha at Time 2 ($\alpha=.76$).

Social support was measured with the Medical Outcomes Study - Social Support Survey (MOS-SSS, Sherbourne & Stewart, 1991), which measures assistance and companionship given to participants by people in their lives. The questions ask the respondent to rate the availability of specific domains of help on a 5 point scale (1=none of the time, 5=all of the time), including emotional/informational ($\alpha = .96$), affection ($\alpha = .91$), tangible ($\alpha = .92$), and positive interaction support ($\alpha = .94$). Each social support subscale was used as an indicator of the latent construct of social support in structural equation models. Possible scores for the emotional/informational
support subscale ranged from 8 to 40 ($M = 29.15$, $SD = 7.70$ for the present sample). Possible scores for affection ranged between 3 and 15 ($M = 11.08$, $SD = 3.23$ for the present sample). Possible scores for tangible support ranged between 4 and 20 ($M = 13.73$, $SD = 4.35$ for the present sample). Possible scores for positive interaction ranged between 3 and 15 ($M = 11.28$, $SD = 2.97$ for the present sample). Sherbourne and Stewart (1991) have reported high convergent and divergent validity, as well as high internal consistency for the subscales (see above).

Reliability analyses with the present sample also revealed high reliability for the tangible ($\alpha = .89$), affection ($\alpha = .91$), emotional/informational ($\alpha = .96$), and positive interaction ($\alpha = .93$) subscales.

*Social strain* was measured with the Test of Negative Social Exchange (TENSE; Ruehlman & Karoly, 1991), which measures unsupportive actions and negative interactions with people involved in the subject’s life. The 18 questions are rated on a 4 point scale (1=very seldom, 4=more than once a week). Responses are divided into four subscales with acceptable reliability (Ruehlman & Karoly, 1991): hostility/impatience ($\alpha = .83$), insensitivity ($\alpha = .82$), interference ($\alpha = .75$), and ridicule ($\alpha = .70$). These four indicators of social strain were used as manifest indicators of the latent construct social strain in structural equation models. Scores on the hostility/impatience subscale range from 6 to 24 ($M = 8.54$, $SD = 3.72$ for the present sample). Scores on the insensitivity subscale range from 5 to 20 ($M = 7.35$, $SD = 2.78$ for the present sample). Scores on the interference subscale range from 4 to 16 ($M = 5.46$, $SD = 2.05$ for the present sample). Scores on the ridicule subscale range from 3 to 12 ($M = 3.53$, $SD = 1.22$ for the present sample). Reliability analyses for the subscales in this sample revealed good Cronbach’s alphas for all of the subscales ($\alpha=.92$ for hostility/impatience, $\alpha=.81$ for insensitivity, $\alpha=.75$ for interference, and $\alpha=.75$ for ridicule).
Perceived osteoarthritis severity was measured with 4 items asking participants to rate the severity of their OA symptoms on an 11-point scale (0 = none, 10 = severe). Items were: “How much pain have you had in the past week?”, “How much stiffness did you experience in the past week?”, “How much difficulty did you have with physical activities you wanted to do over the past week because of your osteoarthritis symptoms?”, and “Considering all the ways that osteoarthritis affects you, rate how you are doing on the following scale.” A composite severity score is computed by summing participants’ responses to all items, with a higher score indicating more perceived OA severity. Possible scores range from 0 to 40. The range of scores for this sample was 0 to 40 ($M = 18.50$, $SD = 7.86$). Reliability in this sample was high ($\alpha = .83$).

Physical disability was measured with a physical disability measure from the Fitness and Arthritis in Seniors Trial (FAST, Ettinger et al., 1997). The measure consists of 23 items asking participants to rate the amount of difficulty, in the past month, they have had doing each of the listed daily activities because of their arthritis (e.g., “How difficult was it climb a flight of stairs?”). Participants rate each item on 5-point Likert-type scale (1 = Not difficult to 5 = I was unable to do this activity). We added a sixth option (with a value of 0), “I do not usually do this activity for other reasons unrelated to my arthritis,” to distinguish participants who did not do an activity because of their physical condition from those for whom the activity was not applicable for some other reason (e.g., they did not have any stairs in their home). A composite disability score is computed by summing participants’ responses to all items. Possible scores range from 0 to 115. One item from the scale (“How difficult was it to take care of a family member?”) was deleted from analyses due to a high frequency of selecting the “I do not usually do this activity” option (36.6%), thus changing the possible range of scores to 0 to 110. The range of scores for this sample was 22 to 79 ($M = 38.01$, $SD = 11.31$). Reliability for the original disability subscale
of the FAST is high (α = .79, Ettinger et al., 1997), and reliability for the modified scale in the present sample was also high (α = .88).

Procedure

Participants were recruited through advertisements and presentations at local senior centers and senior housing. Older adults with OA who were interested in participating in the study phoned the investigators to schedule a time and location for the interview (e.g., on campus, at the participant’s home, or a safe public location like a public library). After a full informed consent process, including answering any questions from participants, the experimenter explained how to use the computer to complete the questionnaire and allowed the participant to practice with several sample questions to adjust to the computer format.

The survey was conducted on the Windows research software MediaLab (Empirisoft), which presented individual questionnaires in random order for the first half of the survey, and fixed order for the second half. Thirty-one participants opted to fill out paper surveys for two reasons: either discomfort using a computer or because they participated in a small group interview where there were not enough computers for each participant\(^1\). The order of individual questionnaires within the paper surveys was not randomized. The researcher remained available throughout the study to answer participants’ questions. At the completion of the survey, participants were debriefed and given a $20 honorarium. Identical procedures were followed for Time 2 interviews.

\(^1\) There were a few significant differences between responses from paper surveys and responses from computer surveys. Participants who completed paper surveys reported significantly lower exercise self-efficacy \((t (35.32) = 2.63, p < .05)\), significantly lower attitudes about exercise \((t (31.06) = 2.22, p < .05)\), significantly lower beliefs about control over exercise \((t (31.87) = 2.45, p < .05)\), significantly higher physical disability scores \((t (35.06) = -2.26, p = .05)\), significantly lower education \((\chi^2 (1) = 13.07, p < .01)\), significantly lower income \((\chi^2 (1) = 12.75, p < .01)\), and were significantly less likely to be married \((\chi^2 (1) = 6.15, p < .05)\). Due to these differences, we controlled for survey mode of administration in all analyses.
Analysis Plan

In order to examine the relative contributions of social support and social strain to exercise self-efficacy, variables were examined in structural equation models using AMOS 6.0 software (Arbuckle, 2004). Because multiple indexes of fit are preferable when explaining how well data fit the structural equation models (Byrne, 1998), we reported the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI), and the Tucker-Lewis Index (TLI)/Non-Normed Fit Index (NNFI) (Boomsma, 2000). The RMSEA is an index of fit that takes the error of approximation of the population into account. A value less than .05 reflects a good fit, a value less than .08 reflects a reasonable fit, and a value greater than .10 indicates a poor fit (Browne & Cudeck, 1993). The CFI reflects the degree to which an independent model matches the observed data, with values greater than .95 indicating an acceptable fit, and values greater or equal than .97 indicating a good fit (Schermelleh-Engel, Moosbrugger, & Müller, 2003). The TLI/NNFI is based on a comparison of a null model to the hypothesized model, with indexes greater than .95 indicating an acceptable fit, and values greater than .97 indicating a good fit (Schermelleh-Engel, Moosbrugger, & Müller, 2003).

Results

Examining Normality

First, variables were examined for normality of distribution. The social strain subscales (hostility/impatience, insensitivity, interference, and ridicule) were highly skewed such that nearly all participants reported low social strain. A log 10 transformation of the strain subscales yielded greater similarity to the normal curve, thus these transformed strain subscales were used in all further analyses. All other variables in the analyses were normally distributed.
Next, bivariate correlation analyses were conducted between variables (see Table 2). Based on patterns of correlation, in subsequent models we controlled for the following demographic variables: marital status, education, gender, income, duration of OA, severity of OA symptoms, pain, physical disability, and mode of survey administration (paper versus computer).

**Hypothesized Structural Equation Model: Cross-sectional Analysis**

We first examined the hypothesized cross-sectional model (see Figure 2) in which Time 1 social support and Time 1 social strain predicted Time 1 exercise self-efficacy. To control for the effects of chance when conducting multiple significance tests simultaneously, we adopted the False Discovery Rate (FDR) method (Benjamini & Hochberg, 1995; Keselman, Cribbie, & Holland, 1999) for determining the statistical significance of a path coefficient. In accordance with others who have applied this method to structural equation modeling (Lackner, Jaccard, & Blanchard, 2004), a family of tests was defined as the path coefficients leading from the exogenous variables to a given endogenous variable. The hypothesized model yielded a moderate fit to the data: $\chi^2 (178, N = 160) = 264.57, p < .01$; RMSEA = .06; CFI = .92; TLI = .90 (attempts to improve model fit did not result in significantly different fit statistics). In the cross-sectional model, 6.2% of the variance in Time 1 exercise self-efficacy was explained. Time 1 social support had a significant influence on Time 1 exercise self-efficacy ($\hat{\beta} = .23, p < .05$), suggesting that higher social support is related to higher exercise self-efficacy. However, contrary to predictions, social strain did not have a significant cross-sectional relationship with exercise self-efficacy ($\hat{\beta} = -.10, p = ns$).

We next examined the hypothesized longitudinal model (see Figure 3) in which Time 1 social support and Time 1 social strain predicted Time 2 exercise self-efficacy (controlling for Time 1 exercise self-efficacy). Using the FDR method, the hypothesized model yielded an
adequate fit to the data: $\chi^2 (233, N = 160) = 288.64, p < .01$; RMSEA = .04; CFI = .96; TLI = .95 (attempts to improve model fit did not result in significantly different fit statistics). The longitudinal model explained 56.3% of the variance in Time 2 exercise self-efficacy. As predicted, social strain had a significant longitudinal influence on exercise self-efficacy ($\beta = -.17, p < .05$), suggesting that higher social strain predicts lower exercise self-efficacy a year later, while adjusting for the effect of baseline self-efficacy. However, contrary to predictions, social support did not have a significant influence on exercise self-efficacy over time ($\beta = .08, p = ns$).

Discussion

The results of the present study suggest two important implications: first, that social strain has an important longitudinal influence on exercise self-efficacy, and second, that health and well-being interventions for older adults with OA could target general social relations.

Importance of Social Support and Social Strain

Consistent with hypotheses, higher baseline reports of social support were related to higher baseline reports of exercise self-efficacy. These results support the wealth of research touting the benefits of social support for health (Cohen, 2004), well-being (Berkman, Glass, Brisstette, & Seeman, 2000; Heller & Rook, 2001; Seeman, 2000; Walen & Lachman, 2000), and exercise participation (Carron, Hausenblas, & Mack, 1996). However, most of this previous work did not assess social support concurrently with social strain.

In our cross-sectional structural equation model, we found that baseline reports of social strain were not related to baseline reports of exercise self-efficacy. However, in the longitudinal model, higher reports of baseline social strain significantly predicted reports of lower exercise self-efficacy one year later. Baseline reports of social support were not related to reported exercise self-efficacy one year later in the longitudinal model.
Our results are consistent with recent work by Newsom, Nishishiba, Morgan, and Rook (2003), who reported that social strain was a more potent longitudinal predictor of psychological outcomes than social support. Using comparable measures of support and strain, Newsom et al. found that when cross-sectional data were analyzed, data supported a “domain-specific model” in which social support predicted positive affect and social strain predicted negative affect. The present results are consistent with the results of Newsom et al., as the positive predictor social support predicted the positive outcome of exercise self-efficacy, while the negative predictor social strain had no cross-sectional relationship with the positive outcome exercise self-efficacy.

However, when Newsom et al. (2003) analyzed longitudinal data (change over six weeks), they found support for a negativity effect (Rook, 1990), wherein social strain predicted longitudinal outcomes (both positive and negative affect) but social support did not significantly predict either outcome. The present results are consistent with the results of Newsom et al., as the negative predictor social strain predicted the positive outcome of exercise self-efficacy, while the positive predictor social support had no longitudinal relationship with the positive outcome exercise self-efficacy. Furthermore, the present study extends the findings of Newsom et al. (2003) to demonstrate the negativity effect when change is examined over a longer period of time (one year).

It is possible that social strain is the more powerful and long-lasting predictor of outcomes for older adults with OA, and the scientific community has been focusing interventions on the less powerful and less enduring aspect of social relationships. Previous studies examining social support’s longitudinal relationship to health and well-being outcomes that did not control for social strain may have yielded different results had social strain been measured and included in analyses. Future studies should revisit the already investigated relationships of social support to
outcomes, controlling for social strain, in order to confirm or disconfirm this suggestion in order to make interventions as powerful as possible.

Importance of General Intervention Targets

In addition to demonstrating the importance of social strain as a longitudinal influence on self-efficacy beliefs, the present study also demonstrates an efficacious possibility for intervention reform. While exercise-specific social relations were not addressed in the present study, interventions that focus on decreasing exercise-specific social strain might be more powerful than interventions focusing on decreasing general social strain for the purpose of increasing exercise self-efficacy and exercise behavior. However, as mentioned above, Lachman and Weaver (1998) argue that the relationships of social and personal predictors with health and well-being using generalized measures would be even more compelling than with the use of domain-specific measures because they would apply to multiple domains of functioning.

Previous studies have demonstrated that social strain influences health in several domains (Davis & Swan, 1999; Rook, 1984; Sherman, 2003). In the present study we demonstrated that social strain influences exercise self-efficacy over time. Therefore, if interventions for older adults with OA focus on reducing social strain in relationships they will not only be influencing future exercise self-efficacy, they may also promote other future health behaviors as well as general well-being.

Limitations and Future Directions

There are some important limitations to the present study. First, participants were mostly Caucasian, educated, wealthy, and healthy. These sample characteristics limit the generalizability of our results. If possible, future investigations should examine more representative samples of older adults with OA. Second, all variables were measured with a survey. Therefore, shared
method variance may have limited our ability to detect true relationships. However, this limitation was at least partially controlled through the use of structural equation modeling, which takes into account measurement error, allowing for more confident interpretation of the results. Furthermore, as stated above, enhancing exercise self-efficacy is one of the most effective methods for increasing exercise participation (Bandura, 1997; Jette et al., 1998; McAuley et al., 2003; Rimal, 2001). However, the present study would have benefited from the inclusion of an objective measure of physical activity behavior in order to determine whether exercise self-efficacy was an effective proxy for physical activity behavior with this sample. Finally, comparable measures of social support and social strain were not available for the present study. Without similar measures it is difficult to determine the relative influences of support and strain. Thus, future studies should examine these relationships using measures of support and strain with parallel content and equivalent reliability and validity to eliminate bias introduced by differences between questionnaires.

Conclusion

Health and well-being interventions for older adults with OA should focus on improving the quality of social relationships, specifically decreasing social strain. Not only could this potential improvement positively influence exercise self-efficacy, and possibly exercise participation in turn, but the health and well-being of older adults with OA may also be improved via improved social relationships with others.
References


Table 1

Summary of Demographic Characteristics ($N = 160$)

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<tr>
<th>Ethnicity</th>
<th>Education</th>
<th>Annual Income</th>
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<tr>
<td>Caucasian</td>
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<td>African American</td>
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<td>Hispanic/Latino(a)</td>
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### Table 2

Bivariate Correlations Between All Variables \((N = 160)\)

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<td>2 Gender</td>
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<td>-.31**</td>
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Bivariate Correlations Between All Variables ($N = 160$)

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Table 2 continued…

Bivariate Correlations Between All Variables ($N = 160$)

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Figure Captions

Figure 1. Conceptual model: higher social support and lower social strain predict higher exercise self-efficacy.

Figure 2. Cross-sectional structural equation model in which higher social support predicts higher exercise self-efficacy.

Figure 3. Longitudinal structural equation model in which lower social strain at Time 1 predicts higher exercise self-efficacy one year later.
Chi square= 264.57, df= 178, p<.01
RMSEA=.06, CFI=.92, TLI=.90
Self-Efficacy 2 R square=.062
All black paths are significant (p<.05) using FDR adjustment.
All gray paths are not significant (p>.05) using FDR adjustment.
Standardized coefficients are reported.

Note. Gender was dichotomized such that 0=men, 1=women; ethnicity was dichotomized such that 0=Caucasian, 1=other; marital status was dichotomized such that 0=single/widowed/divorced/separated, 1=married; education was dichotomized such that 0=some college or less, 1=Associate’s degree or higher; annual income was dichotomized such that 0=$20,000 or less, 1=$20,001 or more; duration of OA symptoms was dichotomized such that 0=2 years or less, 1=more than 2 years; survey mode was dichotomized such that 0=computer administration, 1=paper and pencil administration.
Chi square= 288.64, df= 233, p<.01
RMSEA= .04, CFI= .96, TLI= .95
Self-Efficacy 2 R square= .563
All black paths are significant (p<.05)
using FDR adjustment.
All gray paths are not significant (p>.05)
using FDR adjustment.
Standardized coefficients are reported.

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