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Contributions of Leisure-Based Selective Optimization with Compensation and Leisure Activity Expenditure to the Health of Adults with Arthritis

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Abstract

Arthritis is one of the most prevalent chronic health conditions in mid to late life, and leisure may provide potential health benefits. The study aims were to establish the predictive utility of leisure activities and leisure-based selective optimization with compensation (L-SOC) in explaining arthritis-based health and to determine whether physically active leisure serves as a mediator of L-SOC and health. The study sample included 140 middle-aged and older adults with arthritis. A mediator model was not supported. Instead, L-SOC and leisure activity expenditures were significant independent predictors of arthritis-based health. Findings provide preliminary support for a measure of leisure-specific SOC and indicate that accumulating physical activity expenditures across diverse leisure activities is an important component of arthritis self-management.

Keywords: *aging; Arthritis Impact Measurement Scale; physically active leisure; selective optimization with compensation, self-regulation*

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Involvement in leisure activities has consistently been associated with promoting health and well-being in later life. Research suggests that participation in these types of activities is associated with decreases in mortality (Glass, Mendes de Leon, Marottoli, & Berkman, 1999; Janssen, Carson, Lee, Katzmarzyk, & Blair, 2013), depressive symptoms (Herzog, Franks, Markus, & Holmberg, 1998; Lee et al., 2012), and functional limitations (Everard, Lach, Fisher, & Baum, 2000) as well as improvements in cognitive functioning (Kåreholt, Lennartsson, Gatz, & Parker, 2011) and life satisfaction (Nimrod, 2007). Thus, maintaining involvement in leisure activities is an important factor in fostering quality of life and successful aging. However, as adults age, other factors, such as chronic conditions, may limit their ability to participate in some leisure activities.

Arthritis is one of the most common chronic conditions that affects middle-aged and older adults and is a leading cause of disability (CDC, 2010). Currently, over 46 million people have been diagnosed with arthritis in the U.S., and this number is expected to increase 50% by the year 2030 (CDC). Arthritis is progressively debilitating and incurable (Pimm & Weinman, 1998), and people are living with arthritis for longer periods of time than ever before (Leveille, Wee, & Iezzoni, 2005). A diagnosis of severe arthritis is associated with mobility limitations and poor health (Peat, Thomas, & Croft, 2006) as well as depression (Adams et al., 2008), anxiety (Covic et al., 2012), and pain (Parmelee, Harralson, McPherron, Decoster, & Schumacher, 2012).

Participation in physically active leisure may help mitigate symptoms for arthritis sufferers. Research suggests that a wide range of aerobic and muscle-building activities may provide relief. For example, walking combined with strength training has been associated with decreased pain intensity, pain frequency and self-reported disability (Messier et al., 2000). Aquatic exercise may improve quality of life for obese adults with osteoarthritis (Cadmus et al., 2010). Research on the Arthritis Foundation's exercise programs has demonstrated that physical activity can lead to improvements in functional health and symptom management (Callahan et al., 2008; Suomi & Lindauer, 1997). Additionally, research on the "*Fit & Strong!*" arthritis-based exercise program (CDC, 2010) revealed significant increases in self-efficacy and physical activity and decreases in lower extremity stiffness after two months as well as maintenance after six and 12 months (Hughes et al., 2006).

Although physically active leisure may improve health outcomes in adults with arthritis, there is reason to believe individuals may find it difficult to participate. Katz (1995) indicated that, on average, adults stop participating in 10% of their valued daily activities due to arthritis pain and symptoms. This was supported by a recent study by Machado, Gignac, and Bradley (2008) that identified the importance of both physical and psychological aspects of arthritis as they may serve as pathways to subsequent restrictions in activity. Other research studies indicate the effect of arthritis on adults' leisure participation is even more severe. For instance, Wikstrom, Isacsson, and Jacobsson (2001) have suggested adults may cease up to two-thirds of their leisure activities after receiving an arthritis diagnosis. Additionally, as many as 44% of adults with arthritis participate in no physically active leisure (Shih, Hootman, Krueger, & Helmick, 2002). One study by Wilcox et al. (2006) indicated that sedentary adults viewed arthritis symptoms as barriers to participation and were more likely to have stopped being physically active with the onset of symptoms. These research findings are concerning given the role that leisure activities play in promoting the health and well-being of individuals. Mock and colleagues (2010) noted that a sense of belonging, which can be fostered by participating in physical activities with others, may actually increase adults' ability to cope with their rheumatoid arthritis. Based on the findings described above—including the value of leisure activities for successful aging (e.g., Nimrod, 2007)—identifying ways to maintain or increase involvement in leisure activities with the onset of arthritis appears necessary for optimal quality of life.

Social cognitive theory (Bandura, 1997) proposes several factors that can account for variance in adults' participation in health-promoting behaviors such as leisure activities. One of these factors—self-regulation—relates to how individuals form representations about their illness, adopt behaviors to cope with the illness, and appraise the utility of these behaviors (Bandura, 2005; Leventhal, Nerenz, & Steele, 1984). Self-regulation, therefore, is an essential component to how adults manage chronic conditions. There are several processes associated with self-regulation, including self-efficacy, constraints, and negotiation. As an example, involvement in leisure activities may be affected by self-efficacy, or an individual's confidence in the ability to cope with a disease or situation (Bandura, 1997). This in turn may influence a person's motivation levels and subsequent self-management behaviors. Loucks-Atkinson and Mannell (2007) proposed that the greater individuals' confidence in being able to successfully utilize resources and negotiate constraints related to their disease, the greater their motivation to engage in these processes. There is growing interest in the relationship between physically active leisure and health promoting processes of individuals (Annesi, 2011; Anderson, Winett, Wojcik, & Williams, 2010; Umstattd & Hallam, 2007), although very few studies have been conducted in populations with chronic conditions. Understanding how adults with arthritis self-manage their leisure involvements may provide us with valuable information that could be used to improve their health and well-being. In addition, there is a need to investigate these processes in relation to a broad array of leisure activities with their attendant but varying contributions to recommended physical activity levels.

Kleiber, McGuire, Aybar-Damali, and Norman (2008) addressed the potential positive aspects of limits or constraints to activity. They suggest that restrictions in choice and activity—such as those faced by individuals with arthritis—may actually enhance a person's commitment to a goal, focus attention on more salient goals, and/or lead to intentional self-constraint for goal achievement. Thus, instead of limiting growth and development, this restriction in activity and choice becomes something that is adaptive and healthy for the individual. It has been suggested that self-management behaviors—such as goal setting and finding ways to maintain or sustain behavior—account for much of the variability in older adults' participation in physically active leisure (Ayotte, Margrett, Hicks-Patrick, 2010). Additionally, in a study conducted among older adults with multiple illnesses, action planning and coping planning were significant predictors of activity levels (Schüz et al., 2013). Because physical activity has clear ties to health and well-being (Haskell et al., 2007), it seems likely that those adults with arthritis who find ways to be more physically active during their leisure time may experience the greatest improvements to their health. This possibility has implications for arthritis management strategies and recommendations.

Selective optimization with compensation (SOC) is a model that integrates the concepts of self-regulation, coping (e.g., with constraints), and adaptation. It has been used in leisure and health research to describe adults' experiences when facing limitations across the life course. SOC was originally described by Baltes and Baltes (1990) and then further articulated in other works (Baltes & Carstensen, 1996; Freund, Li, & Baltes, 1999). Specifically, this framework asserts that individuals reach optimal functioning in the face of declining health by selecting from an array of choices, optimizing abilities and skills, and compensating with the use of environmental supports (e.g., physical aids, social support). As the name of the theory suggests, there are three primary components of age-based self-regulation and adaptation: selection, optimization and compensation. Selection refers to the process of identifying and selecting a new or modified goal or activity. Optimization is defined as maximizing activity involvements through internal or external regulation and adaptation. Lastly, compensation refers to the adaptation and modification of activities when faced with personal or environmental limitations. Freund and Baltes (1998) investigated the associations of SOC to indicators of successful aging in a sample of older Germans. Of relevance to the current study, their study provided one of the first (and one of the relatively few) examinations of the relationship of SOC to measures of health. They found that SOC was associated with positive emotions and subjective physical health but not subjective mental health. This study provided initial evidence of the relationship between SOC and health in older adults.

Burnett-Wolle and Godbey (2007) have articulated the importance of using selective optimization with compensation (SOC) to improve our understanding of leisure behaviors during later life. Perhaps surprisingly, there is relatively little empirical research on SOC, leisure, and health. However, the limited findings are promising. Janke and Davey (2004) found that SOC was related to informal, formal, and physically active leisure in later life, with SOC in formal leisure activities associated with reduced depressive symptoms. Additionally, Son, Kerstetter, Mowen, and Payne (2009) found that in adults aged 50 and older, SOC was related to the constraint negotiation of physically active leisure as well as the length of time spent engaged in such pursuits. In their qualitative study, Kleiber and Nimrod (2009) reported that a relatively healthy sample of older adults adapted and accommodated to constraints in their leisure in ways that reflect SOC processes. This included finding ways to persist with activities by optimizing or compensating in different ways, abandoning activities and reprioritizing leisure goals, and compensating through the substitution of new activities to promote adaptation.

Of particular relevance to the current study, there have been a few studies conducted that explore the role of selective optimization with compensation (SOC) in leisure activities specifically for adults with arthritis. Gignac, Cott, and Bradley (2002) were among the first to apply these self-regulatory and adaptive processes to individuals with arthritis, focusing on their discretionary and valued activities. They found that virtually all individuals in their study used at least one of these strategies to manage their condition, and they appeared to use compensatory strategies more often than selection or optimization. They also noted that perceptions of change in ability to engage in activities with arthritis—more so than the actual experience of reductions in functioning—might be the most important factor in motivating individuals to make behavior changes. In another study, Janke, Son, and Payne (2009) explored the effects of SOC strategies related to leisure involvements and the health and well-being of adults with arthritis. They found that, except for loss-based selection, SOC strategies to engage in leisure were associated with more positive health outcomes. Using focus groups with a subsample of the adults from the 2009 study, Janke and colleagues (2012) found SOC strategies were used to help individuals cope and adapt to changes in leisure activities as well as to help individuals stay engaged in leisure. Moreover, adults identified SOC as health promoting. Janke et al. (2012) also found that the use of SOC strategies differed based on access to resources.

It has been suggested that finding ways older adults can continue their involvement in a variety of leisure activities when faced with arthritis may play a role in helping them to maintain their health and well-being (Payne, Mowen, & Montoro-Rodriguez, 2006). It is commonly acknowledged that adults can "accumulate credit" in an additive fashion to increase energy expenditures (Haskell et al., 2007) from involvement in a range of moderate and vigorous leisure-time physical activities. However, there is little research on physical activity credits that are accumulated from a broad array of leisure-time activities (e.g., Goeppinger et al., 2009), particularly those not typically considered to be predominantly "physical" in nature. However, it may be particularly important for adults with arthritis to accumulate such credit for their activities by participating in several light and/or moderate intensity activities rather than a few vigorous ones to obtain the recommended levels (i.e., doses) of physical activity given that their symptoms may limit or alter their involvement to some extent.

Measuring the pooled or cumulative intensity of individuals' regular activities across a typical week may be one such way to examine the relationship of leisure-based SOC and health among this population. In the case of leisure activities, energy expenditures can be identified for a wide range of activities, providing a useful indicator of intensity (Ainsworth et al., 1993, 2000). For instance, energy expenditures can be identified for and then summed across such disparate leisure activities as playing cards, singing, yoga, and swimming. As a result, it is possible to examine the intensities of leisure activities as they accrue across a typical week for individuals who might need "every moment to count"—such as arthritis sufferers. It may also be useful to investigate leisure involvement as a multidimensional measure across the frequency, duration and intensity of activities. A multidimensional measure provides a more robust way in which to investigate the leisure activity involvement of adults with arthritis.

Given the limited research on the relationships between SOC, leisure, and health, it may not be surprising that many questions on this topic remain largely unanswered. For example, a question such as, "What are the relationships between leisure activity, SOC and health?" appears to be relevant. A few recent studies have examined associations between SOC and leisure, and may provide some ideas about the attendant relationships. In one study of undergraduate students, Dugas, Gaudreau, and Carraro (2012) found that both selection and compensation mediated the relationship between planning and leisure-time physical activity goals. Unfortunately, Dugas et al. did not examine actual physical activity participation as an outcome variable and, as a result, it is unclear whether SOC would have been associated with physically active leisure. In another study with older adults, Son et al. (2009) found that SOC interacted with outcome expectations to affect constraint negotiation and the duration of physically active leisure. Neither of these studies investigated SOC and leisure in relation to health however.

There is another study of SOC that includes a measure of well-being that may provide some additional insight. In a sample of orthopedic rehabilitation patients, Ziegelmann and Lippke (2007) found that optimization and elective selection strategies significantly predicted exercise and, in turn, exercise significantly predicted subjective well-being. The relationship of optimization and elective selection to subjective well-being was fully mediated by exercise. Subjective well-being was measured using a scale comprising nonagitation, satisfaction with one's own aging, and satisfaction with life. Some notable features of this study were 1) the researchers investigated and confirmed exercise as a mediator of SOC and well-being, and 2) they used an outcome measure of health, albeit a measure limited in scope to age and life satisfaction and nonagitated states. All three of the studies outlined herein were limited to exercise rather than a broader conceptualization and measurement of leisure activities and domains. Moreover, none of these studies pertained to adults with arthritis and their unique health challenges. Thus, there appears to be a need for further research on the topic of SOC, leisure and health for individuals with arthritis.

Based on Bandura's (2005) hypotheses about the primacy of self-regulation for enhancing health promoting behaviors, it seems reasonable to propose that adults with arthritis who engage in more SOC strategies also would engage in more leisure activities, in general, and physically active leisure in particular. In turn, these increased leisure engagements would be expected to relate to increases in health and well-being (Iwasaki & Mannell, 2000). This possibility reflects a proposition of mediation. Additionally, across several studies, physically active leisure has been significantly associated with improved health for arthritis sufferers (Callahan et al., 2008; Hughes et al., 2006). More specifically, based on the review of the literature, it seems plausible that activity expenditures across a wide array of leisure activities might be particularly important in improving the health outcomes of individuals with arthritis. Ziegelmann and Lippke's (2007) findings provide preliminary support for the expectation that SOC would be positively related to physically active leisure and such activity in turn would be positively related to health outcomes. This study aims to extend these findings to a broader conceptualization of physical activity to include activity accrued across diverse leisure activities.

Study Purpose and Hypotheses

Given the large percentage of adults with arthritis who report declines in their involvement in leisure activities with the onset of arthritis (Shih et al., 2002; Wikstrom, Isacsson, and Jacobsson; 2001), understanding useful levels and types of SOC for adults with arthritis may assist in increasing health promoting behaviors such as leisure in this population. It may provide insights into how to maintain and increase leisure engagements—including more physically active leisure—which has implications for health and well-being. Therefore, the primary purpose of this study was to investigate the roles of leisure-based SOC and leisure activity involvement on the health of middle-aged and older adults with arthritis. In an effort to extend Ziegelmann and Lippke's (2007) study, we examined a mediation model of leisure-based SOC on arthritis-related health, in particular focusing on the possible mediating role of leisure activity expenditure (i.e., activity intensity) as a measure of accrued physical activity across diverse leisure activities. We also utilized a multidimensional measure of activity across frequency, duration and intensity as an additional way to measure physical activity during leisure. The present study attempts to extend the Ziegelmann and Lippke study by including: 1) a wider array of leisure activities (as opposed to physical exercise only); 2) a multidimensional measure of health that includes physical, mental, and social components (as opposed to only subjective well-being); and 3) a sample of individuals with arthritis (as opposed to orthopedic patients).

The specific hypotheses were:

H1: Leisure-based SOC will be positively associated with arthritis-based health.

H2a: Leisure activity expenditure (PA intensity) will be positively associated with arthritis-based health.

H2b: Overall physically active leisure (including intensity, frequency and duration) also will be positively associated with arthritis-based health.

H3a: Leisure-based SOC will be positively associated with leisure activity expenditure.

H3b: Leisure-based SOC also will be positively associated with overall physically active leisure.

H4a: Leisure activity expenditure will mediate the relationship between leisure-based SOC and arthritis-based health.

H4b: Overall physically active leisure will also mediate the relationship between leisure-based SOC and arthritis-based health.

Figure 1 provides a depiction of the expected mediation model. We hypothesized that leisure activity expenditure would mediate the relationship between leisure-based SOC and arthritis-based health. Those with greater use of leisure-based SOC strategies were expected to have higher leisure activity expenditures that, in turn, would be associated with better arthritis-based health. We also expected similar results using a multidimensional measure of physical activity across frequency, duration and intensity. Each of these hypotheses was expected to be confirmed even when controlling for significant covariates in the models.

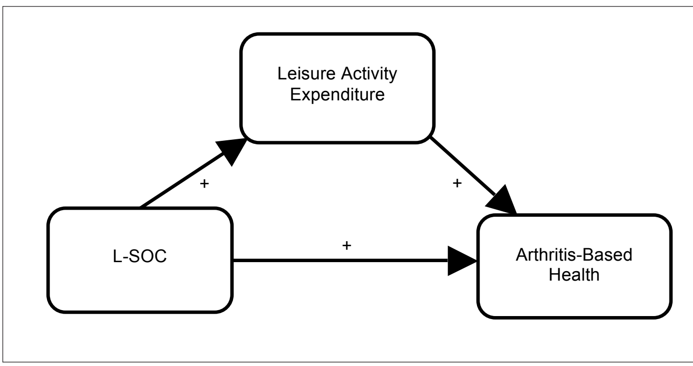

Figure 1. Hypothesized mediation model of the relationships between leisure-based selective optimization with compensation (L-SOC), leisure activity expenditures (intensity) (LAE), and arthritis-based health (A-B Health). Plus signs (+) indicate the expectation of positive relationships between model factors. Also examined but not displayed here was a proposed mediation model with a measure of physically activity leisure across frequency, duration and intensity (PAL) as a mediator of L-SOC and A-B Health. Mediation was expected given controls for significant covariates (not displayed here).

Method

Sampling Procedures

We received IRB human subjects approval for all study procedures, including recruiting participants and collecting data. We used a purposive sampling strategy; study recruitment targeted individuals residing in independent living communities and subsidized housing. Housing directors assisted in identifying residents with arthritis. After providing written informed consent, participants completed the questionnaire on-site at housing facilities or recreation centers, and the investigators were available to answer questions and assist with the completion of forms (e.g., difficulty writing due to arthritis symptoms). Some participants chose not to complete the questionnaire on-site (e.g., wanted more time for completion) and instead completed and returned the questionnaire via postage-paid mail within two weeks of the original data collection period. The sample was comprised of 178 middle-aged and older adults with arthritis residing in a small metropolitan area (SMA) of the Midwestern U.S. Thirty-eight of the 178 participants had questionnaires with data missing not at random (MNAR; Schafer & Graham, 2002), leaving a study sample of 140 participants for the current study.

Participant Characteristics

Participants were predominantly female (82.4%), Caucasian (92.8%; 6.5% African-American; .7% Other Race), and had a diagnosis of osteoarthritis (62%; 10% had rheumatoid arthritis, 7% had both, and 21% had another rheumatic condition). Twenty-eight percent of the sample resided in low-income housing, 39% resided in independent living communities, and the remaining 33% of the sample were community-dwelling participants. On average, participants were 73 years old, with a range from 51 to 95. Thirty-seven percent of the participants were married, 34% were widowed, 22.5% were divorced and 6.5% were never married. The majority of the study sample indicated having arthritis for more than five years (62%) and over a third (38%) felt that arthritis interfered with their daily life quite a bit or a great deal.

Instruments

The measures of primary interest in this study were leisure-based selective optimization with compensation (L-SOC), leisure activity expenditure (LAE; intensity), overall physically active leisure (PAL), and arthritis-based health (A-B Health). Additionally, we examined the following variables as possible covariates: age, gender, race/ethnicity, marital status, resident resources (e.g., low-income subsidized housing as an indicator of fewer resources), arthritis severity, and health satisfaction.

Leisure-based SOC (L-SOC). We wanted to measure selective optimization with compensation in reference to leisure activities and arthritis. The items on the original instrument assess global life management strategies; however, the SOC model may require domain and context-specific elaboration in order to be applied (Freund & Baltes, 2002). In their SOC technical report on the short and long versions of the SOC scale, Baltes, Baltes, Freund, and Lang (1999) provide templates for both domain-general and domain-specific instructions. We modified Baltes et al.'s items and instructions to specifically reflect leisure activities in relation to arthritis pain and symptoms. To reduce participant burden on individuals with arthritis, 34 items from Baltes et al.'s (1999) long version 48-item scale were used across the leisure-based selection, optimization, and compensation (L-SOC) dimensions. We wanted to keep the subscales of the original long version instrument largely intact and have subscales for S, O, and C while reducing the total number items. Between the two Selection subscales (loss-based and elective-based), we deemed the loss-based selection (LBS) subscale the more salient given the study population. As a result, the LBS scale was retained along with the Optimization and Compensation scales. Additionally, one pair of items was removed from the Optimization subscale to reduce redundancy. Seventeen statements represented "target" selection, optimization, and compensation items with the remaining 17 statements representing "distractor" items to reduce social desirability bias (Baltes et al.; Freund & Baltes). Participants indicated either "Yes" or "No" to the item statements instead of the Person A/Person B format in the original instrument. The Yes/No response options were used because a previous investigation of SOC by the first author indicated participant confusion with the Person A/B format. We used six items to measure loss-based selection, with items such as, "When I am not able to participate in as many leisure activities due to my arthritis, I pursue the most important activities to me first." We used five items to measure optimization (e.g., "When I choose to engage in a leisure activity, I am also willing to invest much effort in it.") and six items to measure compensation (e.g., "When I can't engage in a leisure activity as well as I used to, I ask others for help or advice."). After performing a factor analysis and reliability checks of the items, nine items were retained and used to compute a sum score ($KR20 = .72$). (Details on the factor analysis and reliability results are presented in the Results and Table 1.)

Leisure activity expenditure (LAE) and physically active leisure (PAL). We included a list of 20 common types of leisure activities in the survey and asked participants to identify up to 12 leisure activities in which they typically participated on a weekly basis, including information on frequency (days/week) and duration (minutes/session). Because participants were asked to complete detailed information pertaining to activities, frequencies, and durations, we felt that asking participants to list up to 12 activities would capture the majority of typical weekly activities and at the same time reduce participant burden. Several activity domains were included in the list of examples to capture social, physical, cognitive, spiritual, and entertainment leisure activities, including cultural and entertainment events; reading; socializing; religious activities; arts, music and singing; gardening; and physical recreation and sports. We also included an "other" category so that participants would be prompted to fill in activities not provided in the list of examples. We used Ainsworth et al.'s (1993, 2000) compendium to assign metabolic equivalency task (MET) values to each leisure activity. The compendium of MET values provides the relative energy expenditure for each leisure activity, with higher values indicating higher activity intensities (Ainsworth et al.). One MET is approximately one kcal per kilogram body weight per hour, or the rate at which an adult expends 1 kcal at rest. For example, the resting metabolic rate obtained during quiet sitting is one MET (Ainsworth et al., 2000). MET values of activities range from 0.9 (sleeping) to 18 (running at 17.5 km/h). The compendium is the best standardized measure of energy expenditure estimates in self-report physical activity measures (Matthews, 2002) and has been validated in clinical and observational physical activity studies (Ainsworth et al., 2000). To measure leisure activity expenditure (LAE; intensity), we computed a MET sum score across the leisure activities adults reported performing in a typical week (MET_{wk}; Matthews). Additionally, to include a multidimensional measure of activity as well, we calculated each individual's weekly overall physically active leisure with the equation: frequency (days/wk) x duration (minutes/session) x intensity (METs) (MET-minutes; Matthews).

Arthritis-based health (A-B Health). We used the 44-item Arthritis Impact Measurement Scale (AIMS), a global measurement of health and well-being for individuals with arthritis. The AIMS includes nine dimensions of physical, social, and emotional health and well-being (Meenan, Gertman, & Mason, 1980). These subscales include mobility, dexterity, physical activity, social activity, household activity, activities of daily living (ADLs), pain, depression and anxiety. This scale has demonstrated good internal consistency and validity (Wallston, Brown, Stein, & Dobbins, 1989), and has been translated and validated among several different ethnic groups and cultures (McDowell, 2006). Meenan et al.'s scoring protocol was used, including reverse scoring on some items, so that higher values represent more health difficulties due to arthritis. To ease interpretation of analyses, the sum scores were then reverse scored so that higher scores would represent better arthritis-based health, with a possible range of 0 to 131. The scale demonstrated adequate reliability in this sample ($\alpha = .85$).

Arthritis severity and health satisfaction. We measured arthritis severity with the single 5-point item, "How much does arthritis affect your daily life?" with response options ranging from 0 ("not at all") to 4 ("a great deal"). This sample had a mean of 2.12 (*SD* = 1.09). Similarly, we measured health satisfaction with a 5-point item from 0 ("not at all satisfied") to 4 ("completely satisfied"), with a mean of 2.19 (*SD* = .997).

Data Analysis Procedures

PASW/Amos 17.0 was used for analyses. Factor analysis was undertaken on the L-SOC measure because several modifications were made to the instrument: 1) the measure was reduced from 48 to 34 items to reduce participant burden, 2) it was modified in reference to leisure-specific selection, optimization and compensation, 3) three of four subscales were used to represent S, O, and C, and 4) it was modified into a yes/no format as opposed to a Person A/B format. These modifications represented changes to the original scale and, therefore, factor analysis was deemed an important step in which to measure the validity of the modified scale. Tabachnick and Fidell (2006) was used to guide the factor analysis, including the use of oblique rotation due to the conceptual interrelatedness of the SOC factors (Baltes et al., 1999). Items with cross-loadings within .10 (Tabachnick & Fidell) and items loading predominantly on a factor other than indicated in the Baltes et al. (1999) scale were omitted (e.g., a compensation item loading primarily or entirely onto selection).

There were two proposed mediator models: one with leisure activity expenditure as a mediator of leisure-based SOC and arthritis-based health (L-SOC → LAE → A-B HEALTH) and the other with physically active leisure as a mediator of the SOC-health relationship (L-SOC → PAL → A-B HEALTH). Multiple regression model diagnostics on the A-B Health variable indicated that the standardized residuals conformed to ordinary least squares assumptions. However, the model diagnostics on LAE and PAL indicated some assumptions were not met. For LAE, the assumptions of independent residuals, normally distributed residuals and homoscedasticity were not met. For PAL, the assumptions of normally distributed residuals and homoscedasticity were not met. As a result, log and square root transformations were conducted on LAE and PAL. The square root transformation on PAL met the OLS assumptions and therefore the transformed PAL variable was examined as a mediator. Neither transformation improved the lack of independent residuals for LAE. The obtained Durbin-Watson (d) statistic was .89 (.88 and .87 with log and square root variables), with lower and upper critical values ranging from 1.58 to 1.64 (Savin & White, 1977). An obtained value less than the lower bound critical value results in the rejection of the null hypothesis of non-autocorrelated residuals. As a result, Hypothesis 4a with LAE as a mediator could not be tested. LAE was examined as a predictor of A-B Health using multiple regression analysis instead.

Significant covariates of the PAL mediator (as an outcome of SOC) and the dependent variable were controlled in their respective analyses: resources were included as a covariate of PAL; age, arthritis severity, health satisfaction, marital status and resources were included as covariates of A-B HEALTH. Backward stepwise regression analysis was conducted with both models (PAL mediator model and LAE regression model) to identify the full and reduced (statistically significant factors only) models. Hierarchical regressions on the full and reduced models were examined to determine the contributions of the predictor variables (PAL and L-SOC in the mediator model; LAE and L-SOC in the regression model) to the explanation of A-B Health (ΔR^2) (Field, 2005). Similarly, the contribution of L-SOC to the explanation of PAL was examined using the same statistical procedures.

Graham, Cumsille, and Elek-Fisk's (2003) procedures for using Amos for regression analysis—including analysis of mediator models—were followed. Amos is a useful statistical analysis tool even when sample sizes are too small to conduct structural equation modeling because all paths are estimated simultaneously and full information maximum likelihood (FIML) maximizes sample size (Graham et al.). Amos provides accurate parameter estimates and standard errors. PASW/Amos provides several measures of effect size including unstandardized regression coefficients (B), standardized regression coefficients (β) and R^2. The effect size value R^2_{change} (ΔR^2) can be calculated from the output provided in Amos. PASW provides 95% confidence intervals (CI) for unstandardized regression coefficients (B), which are estimated using listwise deletion of cases with missing data.

Results

Descriptive Information

In terms of L-SOC, every participant used at least three strategies of selective optimization with compensation to maintain involvement in leisure activities. Thirty-six percent of the sample used all selection strategies, 46% used all optimization strategies and 33% used all compensation strategies. The arthritis-based health (A-B Health) of the sample was fairly good on average (M = 38.54, SD = 13.40); the poorest A-B Health reported was 54 points better than the worst health score possible for the scale. Weekly leisure activity expenditures (LAE) ranged from 2.8 to 38.1 METs (M = 14.34, SD = 7.55), with some participants typically engaged in sedentary leisure activities throughout the week while others were more active during their weekly leisure-time activities. The average number of leisure activities listed per participants was 6.84 (SD = 2.87), and the median and mode response was six activities. Across the first four activity mentions listed by participants on the survey, on average 27.5% of the sample listed activities that were predominantly physically active (vs. sedentary). The most common physical activity was walking. Other physically active leisure types included bicycling, gym or home exercise, swimming, gardening, and yoga.

Table 1 provides the results of the Exploratory Factor Analysis (EFA) of L-SOC. The EFA (Principle Components Analysis with Promax rotation) indicated five factors. The scree plot for the 5-factor model indicated little contribution of the last two factors so the three items loading on these two factors were omitted. Additionally, two items with cross-loadings within .10 (Tabachnick and Fidell, 2006) and three items loading predominantly on a factor other than indicated were omitted. The reduced EFA model with the items from the three largest factors was more parsimonious, explaining more variance (63% vs. 60%) with fewer factors. Reliability and correlation analysis indicated adequate internal consistencies (.60; Cortina, 1993): Selection had three items ($KR20$ = .61), optimization had four items ($KR20$ = .67), and compensation had two items (r = .62, $p < .001$). There was adequate reliability for the 9-item scale: $KR20$ = .72.

Table 2 provides the Pearson product-moment correlation matrix for each of the model factors. Significant correlations with arthritis-based health (A-B Health) were low to moderate ($r_{absolute}$ = .23 to .51). As expected, arthritis severity was associated with worse A-B Health and health satisfaction was associated with better A-B Health. Leisure activity expenditure (LAE), age and resources were associated with better A-B Health. Resource-poor adults reported greater arthritis severity, tended to have lower LAE and PAL values, and were less likely to be older, married and Caucasian. Married individuals had higher LAE. L-SOC was positively associated with LAE.

Model Testing to Predict Arthritis-Based Health and Physically Active Leisure

Although L-SOC was positively associated with LAE (Hypothesis 3a confirmed), we were not able to test LAE as a mediator of SOC-health due to lack of conformity with all OLS assumptions (Hypothesis 4a remained untested). Table 3 provides the full and reduced hierarchical regression models with LAE, L-SOC and covariates on A-B Health. Adding L-SOC and LAE to the full and reduced covariates models contributed significantly to the explanation of A-B Health (in the reduced model, $\Delta R^2 = .0402$, $F_{\Delta\,(2,\,136)} = 4.19$, $F_{critical} = 3.09$, $p < .05$). The final reduced model explained 35% of the variance in A-B Health. L-SOC was negatively associated with A-B Health outcomes (B = -1.05 [CI_{LL} = -1.954, CI_{UL} -.165], β = -.16, $p < .05$) and therefore Hypothesis 1 was not supported (in the opposite direction than expected). Hypothesis 2a was supported: LAE was positively associated with better health outcomes (B = .27 [CI_{LL} = .026, CI_{UL}

Table 1

Exploratory Factor Analysis (EFA) and Reliabilities for Leisure-Based Selective Optimization with Compensation (L-SOC)

Leisure-Based Selective Optimization with Compensation (L-SOC)	Factor loadings 1	2	3	*Percent (%)*
Leisure Activity Selection				
When I can't do a leisure activity as well as I used to, I think about what exactly about that activity was important to me.		.81		.68
When I am not able to participate in a leisure activity as well as before my diagnosis with arthritis, I consider what exactly about that activity is important to me.		.82		.73
When a leisure activity becomes more difficult for me due to arthritis, I define my goals for that activity more exactly.		.58		.78
Leisure Activity Optimization				
If a leisure activity matters to me, I devote myself fully and completely to it.	.73			.72
When I choose to engage in a leisure activity, I am also willing to invest much effort in it.	.80			.86
When I have started engaging in a leisure activity that is important to me, but I realize that I have little chance of engaging in it the same way I did before I had arthritis, I make a particular effort to find a way to continue the activity.	.63			.80
If there is a leisure activity that is important to me, I think about exactly how I can best maintain my participation in it.	.70			.88
Leisure Activity Compensation				
When I can't engage in a leisure activity as well as I used to, I ask others for help or advice.			.88	.53
When I can't participate in important leisure activities independently anymore, I accept help from others.			.89	.65
Eigenvalue	2.91	1.46	1.29	
Variance Explained (%)	32.32	16.23	14.38	62.94
KR20[a], Pearson's r^b (*$p < .001$)	.67	.61	.62*	
Total Scale (9-item *KR20*)				.72

Notes. [a] *KR20* (Kuder-Richardson reliability index) is to the same as Cronbach's alpha except it is used for dichotomously scored data. [b] Pearson's *r* is used as a measure of item correlation when there are only two items.

= .558], β = .15, $p < .05$). Additionally, arthritis severity and health satisfaction were significant covariates of A-B Health. Arthritis severity was associated with poorer A-B Health (B = -3.40 [CI_{LL} = -5.365, CI_{UL} = -1.502], β = -.28, $p < .001$) whereas health satisfaction was associated with better A-B Health (B = 4.61 [CI_{LL} = 2.484, CI_{UL} = 6.810], β = .34, $p < .001$).

Table 2

Intercorrelations between Model Factors

Variables	1	2	3	4	5	6	7	8	9	10	11
1. A-B Health[a]	----										
2. LAE	.24**[b]	----									
3. PAL[c]	.06	.43***	----								
4. L-SOC	-.12	.17*	.13	----							
5. Age	.24**	-.01	-.17	-.00	----						
6. Female	-.01	.11	.00	.15#	.06	----					
7. White	.10	.04	.10	-.03	.16#	-.06	----				
8. Resources	.23**	.16#	.22*	.00	.31***	-.04	.23**	----			
9. Married	.18*	.21*	.17	.09	-.01	-.20*	.12	.35***	----		
10. Art Sev	-.45***	-.13	-.16	-.07	-.16#	.10	-.15#	-.17#	-.19*	----	
11. HSat	.51**	.24**	.05	.00	.28***	-.05	.05	.28***	.11	-.47***	----

Note. [a] Acronyms: Arthritis-Based Health (A-B Health), LAE (Leisure Activity Expenditure), PAL (Physically Active Leisure), L-SOC (Leisure-Based Selective Optimization with Compensation), Art Sev (Arthritis Severity), HSat (Health Satisfaction). [b] *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$, #$p \leq .10$ (trend). [c] Square root transformation of PAL.

Table 3

Hierarchical Regression Model for the Prediction of Arthritis-Based Health: L-SOC and Leisure Activity Expenditure (LAE)

	Arthritis-Based Health (A-B Health)					
	Fully Saturated Model			Final Reduced Model		
Variables	*B*	*SEB*	β	*B*	*SEB*	β
Constant	81.96	9.06		92.43	4.96	
Step 1[a]						
Age	.14	.11	.09	--	--	--
Married	1.23	2.09	.04	--	--	--
Resources	.71	2.34	.02	--	--	--
Art Severity	-3.26	.96	-.27***	-3.41	.96	-.28***
Health Satis.	4.17	1.11	.31***	4.61	1.07	.34***
Step 2						
L-SOC	-1.01	.44	-.16*	-1.05	.44	-.16*
LAE	.26	.13	.14*	.27	.13	.15*
ΔR^2	.03*			.04*		
R^2	.36			.35		

Notes. [a] Step 1: Covariates, Step 2: Predictors. -- indicates that these items were not significant and were removed in the final reduced model. *$p < .05$, ***$p < .001$. Acronyms: Health Satis. (Health Satisfaction), L-SOC (Leisure-Based Selective Optimization with Compensation), LAE (Leisure Activity Expenditure).

Results indicated that overall physically active leisure (PAL) was not a mediator of L-SOC and A-B Health; therefore, Hypothesis 4b was not supported. PAL was not significantly related to A-B Health (Hypothesis 2b not supported) and L-SOC was not significantly related to PAL (Hypothesis 3b not supported). Table 4 provides the full and reduced hierarchical regression models with PAL, L-SOC and covariates on A-B Health. The final reduced model included arthritis severity, health satisfaction and L-SOC. The ΔR^2 by adding L-SOC to the covariates model to predict A-B Health approached significance: $\Delta R^2 = .0191$, $F_{\Delta\,(1,\,137)} = 3.904$, $F_{critical} = 3.876$, $p = .051$, but as with the LAE model, the relationship was in the opposite direction than expected (Hypothesis 1 was not supported).

Table 4
Hierarchical Regression Models for the Prediction of Arthritis-Based Health and Physically Active Leisure (PAL) (N =140)

	Arthritis-Based Health (A-B Health)						Physically Active Leisure (PAL)					
	Fully Saturated Model			Final Reduced Model			Fully Saturated Model			Final Reduced Model		
Variables	*B*	*SEB*	β	*B*	*SEB*	β	*B*	*SEB*	β	*B*	*SEB*	β
Constant	84.99	9.48		94.24	4.96		18.45	3.26				
Step 1[a]												
Age	.12	.11	.08	--	--	--						
Married	1.97	2.09	.07	--	--	--						
Resources	1.12	2.43	.04	--	--	--	3.77	2.02	.20	--	--	--
Art Severity	-3.23	.98	-.26***	-3.42	.97	-.28***						
Health Satis.	4.64	1.10	.34***	5.08	1.07	.38***						
Step 2												
L-SOC	-.81	.45	-.13	-.88	.44	-.14*	.52	.43	.13	--	--	--
PAL	-.04	.14	-.03	--	--	--						
ΔR^2	.02			.02#			.02					
R^2	.35			.33			.06					

Notes. [a] Step 1: Covariates, Step 2: Predictor. -- indicates that these items were not significant and were removed in the final reduced model. Acronyms: Health Satis. (Health Satisfaction), L-SOC (Leisure-Based Selective Optimization with Compensation), PAL (Physically Active Leisure Square Root Transformation). $^{\#}p \le .10$, $^{*}p \le .05$, $^{***}p \le .001$.

Discussion

Selective Optimization with Compensation in this Sample

The study findings extend previous research on the selective optimization with compensation of leisure activities (Gignac et al., 2002; Janke & Davey, 2006; Lang et al., 2002) and physically active leisure in later life (Umstattd & Hallam, 2007). This study also provides preliminary support for the use of a domain-specific measure of selective optimization with compensation (Boerner & Jopp, 2007; Dugas et al., 2012). To our knowledge, this study is the first to test a leisure-domain SOC measure and the results appear promising. Measures of validity (EFA) and reliability (*KR*20) indicated acceptable preliminary results for the measure of leisure-based SOC used. One of the noteworthy findings of this study was the relatively high use of leisure-based SOC strategies by study participants. Each SOC item was used by 53% to 88% of the sample. The highest usage strategies were for three of the four optimization items such as investing much effort (86%), finding a way to do the activity despite arthritis (80%), and thinking through how to maintain an important leisure activity (88%). The next most highly used strategies were in selection: defining goals more exactly (78%) and determining what is important about a leisure activity (73%). These study findings indicate that the middle-aged and older adults in this sample were managing leisure behaviors based on arthritis-related functional losses, including selecting leisure activities, optimizing participation, and modifying aspects of the activities.

Hypothesis Testing of the Mediator Model

In this study, we were interested in examining the relationship between SOC and physically active leisure (Annesi, 2011; Anderson et al., 2010; Umstattd & Hallam, 2007) and physically active leisure as a mediator of SOC and health (Ziegelmann & Lippke, 2007). Our results *supported Hypothesis 3a*, indicating a positive relationship between SOC and leisure activity expenditure (LAE). However due to the lack of independence of the error terms when investigating LAE as an outcome variable of select covariates and SOC, we were unable to examine LAE as a possible mediator of SOC and health (*Hypothesis 4a untested*). Additionally, the findings did not support a relationship between SOC and overall physically active leisure across frequency, duration and intensity (*Hypothesis 3b not supported*) or physically active leisure as a mediator of SOC and health (*Hypotheses 2b and 4b not supported*).

The Role of Leisure Activity Expenditures Accrued Across Diverse Activities

The study findings *supported Hypothesis 2a*; a positive relationship between leisure activity expenditures and arthritis-based health was found. In this study, intensities for a wide range of leisure activities were identified and calculated using METs (Ainsworth et al., 2000). This finding supports previous research findings that higher intensity physical activity is associated with better health outcomes for individuals with arthritis (Callahan et al., 2008; Hughes et al., 2006). One of the keys to successful arthritis management is to engage in physical activities that are low-impact but moderate to high intensity (Lorig et al., 1993). Only a few adults in our sample engaged in high impact activities like running or playing basketball. More commonly noted were low-impact activities such as walking, swimming, and bicycling. It may be that adults selected lower impact activities due to arthritis symptoms. Those with high weekly leisure activity expenditures tended to be engaged in multiple low-impact activities ranging from low to high intensity, thereby accruing physical activity "credits" throughout the week in a multitude of ways (Haskell et al., 2007). These study results indicate that even low intensity activities when pooled with other higher intensity activities can provide an important contribution to activity expenditures as part of a person's weekly activity mix.

Along this same vein, previous research indicates that a combination of active and passive leisure activities leads to better health outcomes for adults with arthritis. For instance, the *Arthritis Self-Management Program* educates adults on both physically active and passive leisure behaviors—such as low-impact physical activities, relaxation techniques, and cognitive coping strategies—finding that both types of behaviors are important in promoting positive health outcomes for participants (Goeppinger et al., 2009; Lorig et al., 1993). Further research is needed investigating the best mix of leisure activity types for older adults with arthritis (Payne et al., 2006). In this way, "mixed activity" treatment regimens can be developed that promote the best physical and mental health outcomes.

Possible Relationships between SOC and Arthritis-Based Health

Research on age-related chronic conditions has indicated social cognitive factors (e.g., self-regulation) positively impact health outcomes (Jette, 2006; Verbrugge & Jette, 1994), and some of these features are reflected in SOC strategies. Kleiber et al. (2008) have suggested that restrictions in choice and activity may lead to SOC strategies such as commitment to a goal, focus attention on more salient goals, and/or lead to intentional self-constraint for goal achievement that in turn lead to adaptation and better health. Counter to expectation, leisure-based SOC was significantly associated with *worse* arthritis-based health outcomes in this study (*Hypothesis 1 not supported*). The current study findings suggest that employing high levels of SOC strategies could be counterproductive. Further examination of the associations between the SOC subcomponents and arthritis-based health indicated that loss-based selection was the factor that was negatively associated with health ($r = -.23$, $p < .01$). Perhaps more loss-based selection of leisure activities results in more activity restrictions than are necessary (selecting out of activities), which may lead to a negative reinforcing cycle of decreased activity involvements and increased functional limitations (Walsmith & Roubenoff, 2002; Zautra et al., 1995). In essence, overregulation of one's leisure would be at fault. Wilcox et al.'s (2006) finding that the onset of arthritis symptoms was the departure point for physical activity in previously active adults supports this possibility. There is an alternative explanation to the negative association between SOC and arthritis-based health. It could be the case that poor arthritis-based health spurs the use of SOC strategies. In other words, SOC might occur in response to health problems. This alternative explanation fits with the SOC theory of adaptation, coping and self-regulation in the face of functional limitations (Baltes & Baltes, 1990; Kleiber et al., 2008).

Other significant findings related to the negative SOC-health relationship were the presence of suppressor effects. LAE and arthritis severity were suppressor effects of SOC; including these variables in the regression model revealed a significant relationship between SOC and arthritis-based health that was nonsignificant in bivariate analyses. Closer examination of their individual and combined effects revealed LAE and arthritis severity each independently increased the SOC beta weight to approach significance at $p = .051$ with their combined effects increasing the SOC beta weight to significance ($p = .019$). Additionally, the strength of the relationship between LAE and A-B Health changed depending on the model variables. LAE was significantly and positively related to A-B Health in bivariate analyses ($p = .005$). Adding the covariates arthritis severity and health satisfaction reduced its effect to nonsignificance ($p = .090$). Adding SOC increased its effect back to significance ($p = .034$). One way to examine the contributions of LAE and SOC is by looking at the change in R^2 when LAE is added to the model with SOC and significant covariates and, likewise, the change in R^2 when SOC is added to the model with LAE and significant covariates. Results indicated that LAE and SOC independently increased the explained variance in A-B Health ($\Delta R^2_{LAE} = .0210$, $F_{\Delta\,(1,\,136)} = 4.38$, $p = .039$; $\Delta R^2_{SOC} = .0263$, $F_{\Delta\,(1,\,136)} = 5.48$, $p = .025$). These findings taken together suggest that SOC and LAE were reciprocal suppressors mutually suppressing irrelevant variance in each other to affect the beta weights and increase the explained variance in health (Conger, 1974; Lutz, 1983). The observed Durbin-Watson statistics in both the full and reduced models (1.777 and 1.729, respectively) were above the critical value ranges at the 1% significance level (1.40 – 1.693 and 1.461 – 1.625, respectively), providing an indicator that these were not spurious effects (Granger & Newbold, 1974).

These suppressed effects and the negative association between SOC and arthritis-based health indicate the need for more sophisticated statistical tests with longitudinal data to test the possible bidirectional or multidirectional pathways among these factors. Some researchers maintain that SOC leads to health (Freund & Baltes, 1998; Janke et al., 2009), whereas others indicate that health leads to SOC (Gignac et al., 2002). Perhaps both are true. A time series analysis of a possible feedback loop between arthritis-based health, SOC and physical activity would be useful. To explain this idea further, one proposition might be that worse arthritis-based health outcomes lead to the use of SOC strategies that then lead to an increase in physically active leisure. Physically active leisure would then improve arthritis-based health and complete the feedback loop. Additionally, perhaps arthritis-based health prompts SOC up to a point and thereafter SOC leads to better arthritis-based health. Kline (2011) cautions against conducting such nonrecursive (feedback) models using cross-sectional data because of the challenges in meeting the assumptions of equilibrium and stationarity. The equilibrium assumption is that the system is in a steady state and the stationarity assumption is that the causal structure does not change over time. Neither assumption can be satisfactorily determined statistically with cross-sectional data and therefore rely instead upon rational arguments (Kaplan, Harik, & Hotchkiss, 2001, as cited in Kline, 2011). The current investigators did not feel confident in proposing such arguments with this dataset. Additionally, with a cross-sectional design there is no way to test bidirectional hypotheses (bidirectional models are unidentified when using cross-sectional data). Further research with longitudinal data would help elucidate these possible processes.

Practical Implications

Taken together, these findings—that activity expenditures accrued from a wide range of leisure activities were associated with better health and that loss-based selection was associated with worse health—point to the role leisure education can play as a component of health programs targeting older adults with chronic conditions like arthritis. For instance, a leisure education module in a program like the arthritis-based *Fit & Strong!* physical activity program (CDC, 2010) might include evidence about the detrimental effects of limiting leisure activities due to symptoms. Additionally, a leisure education module could include information on the following: a wide range of low-impact activities beyond those in the intervention; a discussion on suitable mixed activities (a picnic followed by a walk at a local park); useful leisure-based coping strategies; and information about community resources available for adults that offer a range of leisure options. Leisure practitioners also should encourage adults with arthritis to select several leisure activities of varying intensity levels in which to engage rather than just one or a few high intensity physical activities. This way, individuals with arthritis have more opportunities to accumulate activity expenditures across a wide range of activities. They also would have a greater likelihood of staying engaged rather than risking pain or injury to reach the same level of expenditures in high intensity but higher impact activities, and as a result drop out of meaningful activities. Leisure providers should also educate clients on the importance of identifying optimization and compensation strategies to maintain or increase leisure involvements as a first step before selecting out of activities.

Study Limitations and Future Directions

One of the unique aspects of this investigation was the examination of the relationships of leisure and SOC to arthritis-specific health. One clear limitation was the fact that we were unable to examine the LAE mediation model due to the lack of conformity of the measure to all OLS assumptions. Although the item series on leisure activities was useful in providing a wide range of activities to determine weekly METs levels, perhaps a different measure of LAE would have met the OLS assumptions. One of the limitations of this measure is the fact that it is self-reported, which may lead to inaccurate information on activity expenditures (Matthews, 2002). Additionally, we asked participants to list up to 12 typical leisure activities across the week. Although the number of activities allowed likely captured the most common activities participants engaged in on a weekly basis, it might not have revealed the full range of activities for all participants. Moreover, future investigations should examine intensity levels using a more objective measure, such as accelerometers, to corroborate and extend the self-report measures. Additional limitations of the study include the high proportions of Caucasians and women in the sample. Although the authors made an effort to reach African Americans by recruiting participants at housing centers and recreation centers serving an African American clientele, the resulting sample was only 6.5% African American. Race and low SES are often confounded in studies of adults. This study included a proxy of low SES (housing type) with 28% of this study sample residing in low-income housing. However, it is possible different findings might be observed with a sample that is more racially diverse and/or with more male representation. As described above, due to the cross-sectional nature of the study, it was not possible to examine bidirectional or multidirectional models of these factors.

Leisure activities may be one of the few arenas where adults with arthritis can feel a sense of accomplishment and satisfaction (Giorgino et al., 1994), thereby leading to the ability to engage in substantially more activities than in other life domains such as work. Further research on SOC and leisure might include other measures, such as self-efficacy and coping. The effects on health functioning alongside different types and combinations of leisure could then be compared. For example, from the physical activity literature, we know that having goals associated with one's physical activity and developing plans to establish exercise as part of one's weekly routine are important self-management strategies to staying physically active (Rovniak, Anderson, Winett, & Stevens, 2002). Additionally, self-management strategies to overcome common constraints to physically active leisure—such as time and money—also help ensure activity maintenance (Son et al., 2009). Use of additional measures of adaptation and self-regulation would provide important insights into the relationships between leisure and health in adults with arthritis, and thereby inform programs for this demographic.

These study findings need to be replicated with a probability sample of adults with arthritis to further support this research direction and its implications. To provide further illumination of the possible processes involved, future research might consider the examination of multiple social cognitive factors and their relationships to leisure and health for this demographic. For instance, researchers might examine the relationships of outcome expectancies, self-efficacy and self-regulation of leisure in the arthritis severity-health process. Researchers might also include nonleisure activities and then compare models of activity expenditure, SOC, and health for leisure vs. nonleisure activities. The preliminary findings of this study suggest that further research on leisure-based SOC and leisure activity expenditure is warranted with adults with arthritis.

Conclusion

To conclude, the study findings provide preliminary evidence on the importance of accruing activity expenditures via a wide range of leisure activities to attenuate arthritis-based health problems. This study also provides preliminary support for a measure of leisure-based selective optimization with compensation as well as evidence of a relationship between leisure-based SOC and arthritis-based health. Additionally, this study uncovered relationships that point to future directions for research. We provide propositions about the possible ways that selective optimization with compensation could be used as a framework to understand the relationships between leisure and health for adults with arthritis, with particular attention to bidirectional and multidirectional models with time series data. Given the relative absence of research investigating the relationships between SOC, leisure activities and health, this study provides some initial steps toward understanding these relationships and their practical implications for the health of adults with arthritis.

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