THE MAINTENANCE AND ROLE OF ARTHRITIS RELATED EXERCISE SELF-EFFICACY IN OLDER ADULTS

A Thesis

Presented to the

Faculty of

San Diego State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Public Health

with a Concentration in

Health Promotion and Behavioral Science

by

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Summer 2013
SAN DIEGO STATE UNIVERSITY

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I dedicate my thesis to my family and friends, who have been encouraging and positive forces through every step of this process. I am very thankful for your love and support during my frustrations and my successes.
ABSTRACT OF THE THESIS

The Maintenance and Role of Arthritis Related Exercise Self-Efficacy in Older Adults

by

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Master of Public Health with a Concentration in Health Promotion and Behavioral Science
San Diego State University, 2013

Despite strong evidence that arthritis symptoms and disability can be reduced through physical activity, less than one quarter of U.S. adults with arthritis meet recommended physical activity guidelines. Research supports the use of self-efficacy enhancing strategies in interventions to improve symptoms and increase physical activity in older adults with arthritis. The aim of this study was to re-evaluate an intervention program called Choosing Arthritis Appropriate Physical Activity (CASAPA) from post-intervention to 1-month follow-up, to determine if improvements seen at post-intervention were maintained, and to examine the predictive ability of physical activity self-efficacy subtypes and intention for predicting physical activity. CASAPA was 4-week, psycho-behavioral, educational intervention designed to increase knowledge, skills, and confidence in selecting arthritis appropriate physical activity, delivered to an ethnically diverse, low-SES sample of older adults (n = 143, M age = 66.93), recruited from non-residential community senior centers in San Diego County. Participants completed written questionnaires at baseline, post-intervention, and 1-month follow-up to measure self-efficacy for arthritis related exercise, for overcoming barriers to exercise, and for choosing appropriate physical activity. McNemar’s test was used to determine if improvements in self-efficacy measures seen at post-intervention in the intervention group were maintained at 1-month follow-up. Linear regression was used to test the predictive ability of the self-efficacy subtypes and intention for physical activity. Results show no significant change in self-efficacy levels for the intervention or control group, suggesting that the intervention group maintained their improved self-efficacy, and remained higher than controls at 1-month follow-up. Results also show that neither the self-efficacy subtypes nor intention at post-intervention were significant predictors of physical activity at follow-up. Findings support evidence that arthritis related self-efficacy subtypes can be increased and maintained for some time following an intervention, but that further research is needed to understand the roles of these self-efficacy subtypes and physical activity intention on physical activity in older adults with arthritis.
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ACKNOWLEDGEMENTS

This thesis would not have been possible without my committee members: Dr. Elva Arredondo, Dr. Caroline Macera, and Dr. Susan Levy. I would like to thank them for their guidance and commitment to education. I would like to give a special thank you to Dr. Levy, for her patience, time, and spectacular teaching ability, which made this project a valuable and enjoyable experience in the world of research.
CHAPTER 1

INTRODUCTION

Arthritis is the leading cause of disability in the United States, disproportionately affecting older adults, and will continue to grow as a public health problem with the aging of the U.S. population (Centers for Disease Control and Prevention [CDC], 2009c; Hootman & Helmick, 2006). Despite strong evidence that arthritis symptoms and disability can be reduced through physical activity, only 24% of U.S. adults with arthritis meet recommended physical activity guidelines (Hootman, Macera, Ham, Helmick, & Sniezek, 2003). Research shows that self-efficacy for chronic disease self-management positively affects disease management behaviors and health outcomes, and it has been long established that efforts to increase self-efficacy for arthritis self-management should be incorporated into physical activity and self-management programs for older adults with arthritis (Lorig & Holman, 1993; Marks, Allegrante, & Lorig, 2005). The extent to which self-efficacy for self-management behaviors such as physical activity can be increased, maintained, and result in physical activity behavior change in this population requires further investigation.

ARTHRITIS IMPACT IN THE UNITED STATES

Arthritis refers to a group of over 100 rheumatic diseases and conditions that cause weakness, pain, and stiffness of the affected joints and surrounding tissues (CDC, 2012). Nearly 50 million, or 22.2%, of adults age 18 and older in the United States report having doctor-diagnosed arthritis, and prevalence increases with age at 29.8% in adults age 45-64, and 50% for adults age 65 or older (CDC, 2010). The most common form of arthritis is Osteoarthritis (OA) and most often affects the knees, hips, and hands (Lawrence et al., 2008). OA is also known as degenerative joint disease, often referred to as “wear and tear” arthritis, and is characterized by the breakdown of joint cartilage, surrounding tissues, and underlying bone, as well as development of bony overgrowths called bone spurs (CDC, 2009b). Another common and widely studied form of arthritis is Rheumatoid Arthritis (RA), which is systematic inflammation of multiple joints of the body, believed to be an autoimmune
disease, where inflammation within the joint eventually leads to erosion of cartilage and bone, as well as joint deformity (CDC, 2011c). Arthritis not only causes pain and discomfort, but also can lead to activity limitations and disability. Among U.S. adults with any type of arthritis, 42.4% report having Arthritis-Attributable Activity Limitations (AAAL), described as limitations in usual activities because of arthritis or joint symptoms (CDC, 2010). Arthritis and rheumatism cause 19% of all reported disability in U.S., making it the leading cause of disability among adults age 18 and older (CDC, 2009c). Adults with arthritis also have significantly lower Health Related Quality Of Life (HRQOL) and report greater numbers of physically unhealthy, mentally unhealthy, and activity limited days compared to adults without arthritis (Furner, Hootman, Helmick, Bolen, & Zack, 2011). People with arthritis often have comorbid conditions including diabetes, heart disease, and obesity, which can further decrease quality of life (CDC, 2008, 2009a, 2011b).

The direct and indirect costs due to arthritis add to its impact as a major public health problem. In the U.S. in 2003, arthritis and other rheumatic conditions totaled $128 billion in medical costs and lost wages (CDC, 2007). With the anticipated population growth and increasing age in the U.S., prevalence is expected to increase to 67 million diagnosed with arthritis, and 25 million people experiencing AAAL by the year 2030 (Hootman & Helmick, 2006). This prediction does not take into account the current obesity epidemic in the U.S. The excessive body fat and weight that define obesity put greater stress on the joints of the body and can accelerate the joint damage of arthritis. Reciprocally, individuals with arthritis tend to lead less active lifestyles that can further contribute to weight gain and obesity. Obesity will surely play an ongoing role in the increase of arthritis in the U.S. population as obesity rates in children and adults continue to rise, given that the prevalence of arthritis and AAAL both increase with increasing Body Mass Index (BMI) (CDC, 2011b; Flegal, Carroll, Kit, & Ogden, 2012).

**Arthritis & Physical Activity**

In 1996 the Surgeon General’s Report on Physical Activity and Health identified physical activity as a key recommendation to overall health and prevention of chronic disease (U.S. Department of Health and Human Services, 1996). For individuals with arthritis, fatigue and discomfort can lead to a decrease in normal physical activities and exercise.
(Hutton, Gamble, McLean, Butcher, Gow, & Dalbeth, 2010). Older adults report lack of knowledge of benefits of physical activity, environments unsupportive of physical activity, lack of physical activity advice from a physician, and poor health as reasons for not engaging in physical activity (Schutzer & Graves, 2004). However, there is strong evidence that physical activity can benefit individuals with arthritis by decreasing symptoms and increasing functional abilities and quality of life (Kelley, Kelley, Hootman, & Jones, 2011; Neuberger et al., 2007). Physical activity is associated with increased HRQOL and fewer physically and mentally unhealthy days among adults with arthritis (Abell, Hootman, Zack, Moriarty, & Helmick, 2005). HQROL is also lower in adults with arthritis who do not adhere to physical activity guidelines when compared to those that do (Austin, Qu, & Shewchuck, 2012). Though an exact dose of physical activity needed to produce benefits and minimize adverse events for individuals with arthritis has not been established, the Physical Activity Guidelines Committee Report (U.S. Department of Health and Human Services, 2008) states that, “exercise provides considerable disease-specific benefits for persons with OA and other rheumatic conditions without exacerbating symptoms or worsening disease progression,” (page G5-24) and suggests low-impact, moderate-intensity activities, 3-5 days per week, in 30-60 minute sessions. Beneficial activities include both endurance and resistance activities. The American College of Rheumatology (ACR) also recommends exercise as an effective non-pharmacological treatment for OA (Hochberg et al., 2012). Additionally, the CDC has assessed and identified a range of evidence-based arthritis programs emphasizing physical activity as a way to improve quality of life (Brady, Jernick, Hootman, & Sniezek, 2009).

Despite evidence and recommendations, U.S. adults with arthritis are not meeting the recommended physical activity guidelines (Hootman et al., 2003). Among adults with self-reported, doctor-diagnosed arthritis, more than 60% are not meeting recommended physical activity levels, of which 23.8% are completely inactive (Fontaine, Heo, & Bathon, 2004). The older adult population is of particular importance in promoting physical activity for arthritis management due the higher prevalence of arthritis comorbidity with other chronic diseases. Prevalence of inactivity for adults with arthritis 65 years or older is even higher at 31.1% (Fontaine et al., 2004). The chronic conditions found frequently with arthritis can all be improved through physical activity (Durstine, Burns, & Cheek, 2012). However, levels of physical activity for adults with arthritis and another chronic disease are lower than for adults
with only arthritis or other chronic disease alone (CDC, 2008, 2009a, 2011a), and arthritic adults who are active show lower levels of chronic disease (Hutton et al., 2010).

**INCREASING PHYSICAL ACTIVITY**

In light of the lack of physical activity among older adults with arthritis, intervention programs have been developed to manage arthritis symptoms and disability through increased physical activity. For those individuals who are not able to meet physical activity guidelines, even small increases in physical activity can still be beneficial (Dunlop, Song, Semanik, Sharma, and Chang, 2011). Investigation of data from a prospective natural history study, the Osteoarthritis Initiative, Dunlop et al. (2011) found a graded relationship between increase in amount of physical activity and better functional performance in older adults with OA of the knee. Participants were divided into quartiles by level of physical activity using the Physical Activity Scale for the Elderly (PASE) (Washburn, Smith, Jette, & Janney, 1993), which includes exercise and lifestyle activities such as housework or gardening. Cross-sectional analysis of baseline data and data collected at 1 year both showed that with each increase physical activity quartile, functional performance also increased. Dunlop et al. (2011) emphasize the importance of promoting physical activity in adults with arthritis, because individuals can reap benefits of minor increases in physical activity even if they cannot adhere completely to all guidelines.

Interventions designed to increase physical activity in adults with arthritis can be divided into two broad categories: self-management education and physical activity interventions. Both types of interventions may incorporate arthritis education on symptom management strategies, problem solving, goal setting, and developing healthy habits to improve disease outcomes. The difference between the two types of interventions lies in that physical activity interventions involve organized physical activity participation as a component of the intervention treatment. The CDC promotes both self-management education and physical activity interventions for adults with arthritis, and provides access to multiple recommended programs of both types (Brady et al., 2009). Self-management education programs, both general chronic disease and arthritis specific, have been widely disseminated and have found success in improving pain, disability, and quality of life in older adults (Nuñez, Keller, & Ananian, 2009). As defined, self-management programs do not
provide supervised exercise to the participants. However, data from the 2004 Behavioral Risk Factor Surveillance Survey (BRFSS) shows that adults who had taken an arthritis education course were more likely to exercise in the last 30 days than those who had not, suggesting that even single components of self-management programs, such as arthritis education, are associated with higher levels of physical activity (Fontaine & Haaz, 2006). Self-efficacy enhancing strategies have been successful in increasing self-efficacy for various arthritis self-management behaviors and have been increasingly incorporated as a key component of interventions (Allegrante & Marks, 2003; Marks et al., 2005). Self-efficacy is defined as an individual’s confidence in his or her ability to perform a task or behavior under a variety of circumstances (Bandura, 1986). Arthritis interventions that promote self-efficacy for becoming more physically active, medication adherence, and managing symptoms have been found to be more successful when compared to interventions without the inclusion of self-efficacy enhancing strategies (Lorig & Holman, 1993).

**THEORETICAL BASES**

Social Cognitive Theory (SCT; Bandura, 1986) and the Theory of Planned Behavior (TPB; Ajzen, 1991) will guide the current study’s examination of self-efficacy related to arthritis management and the roles of self-efficacy and behavioral intention in explaining and predicting physical activity behavior in older adults with arthritis. The psychological construct of self-efficacy, originally identified in SCT, refers to an individual’s confidence in his or her ability to perform a task or behavior under various circumstances that may either facilitate or impede the desired behavior (Bandura, 1977). Self-efficacy is the central construct of SCT and influences behavior directly as well as through its influence on the other constructs or determinants of behavior: Outcome Expectations, Socio-structural factors, and Goals (Bandura, 2011). Determinants of health behaviors include knowledge of health risks and benefits of health promoting behaviors and outcome expectations of those behaviors, perceptions of control over health behavior, the goals and plans individuals set, and facilitators and impediments to the desired health behavior changes (Bandura, 2004). Self-efficacy can influence what activities an individual approaches, how much effort is put forth toward the activity, the level of persistence to succeed at the activity in the face of failure or adverse circumstances, as well as influence mood, attitudes, and motivation levels.
toward health promoting behaviors (Bandura, 1986; Marks, 2001). In the context of physical activity, specifically exercise, self-efficacy for exercise would include having the belief that one has the knowledge and skills to exercise, confidence in one’s ability to use these cognitive resources and motivation necessary to both schedule and complete exercise, and confidence in overcoming barriers to exercise in a given situation (Bandura, 1977; DuCharme & Brawley, 1995). Circumstances that could affect the ability of older adults with arthritis to exercise could consist of situations such as pain and discomfort while exercising, lack of knowledge or skills to exercise, or an environment unsupportive of physical activity. In accordance with SCT, individual behavior can also be influenced by environmental or socio-structural factors, termed facilitators and impediments. For older adults with arthritis, a wide array of impediments or barriers to physical activity may exist, and Courneya and McAuley (1995) contend that increasing exercise self-efficacy could benefit from strategies that identify barriers to exercise and ways to overcome them. Patients with rheumatoid arthritis taking part in a low impact aerobic exercise program engaged in more minutes of exercise per week when baseline scores in perceived benefits and barriers were high (better) and fatigue was low (Neuberger et al., 2007). Increasing self-efficacy to overcome barriers to exercise in effort to lower the perception of these barriers, while increasing patients’ knowledge of the benefits of exercise could improve exercise participation. The main focus of the present study is on self-efficacy for physical activity in the context of arthritis management. However, behavioral intention for physical activity is also of interest.

Although behavioral intention is not explicitly identified as a construct within the SCT framework, Bandura (2004) has stated that behavioral intention is essentially “proximal goal setting” (p. 146) and goal setting is influenced by self-efficacy beliefs. However, the Theory of Planned Behavior (TPB) (Ajzen, 1991) identifies “behavioral intention” as it’s central construct, and immediate antecedent to behavior, proposing that strong beliefs in one’s capability to perform a behavior are not enough to predict behavior, and that the individual must want to, or intend to, perform the behavior as well. Behavioral Intention includes motivational factors for a specific behavior, as well as indicates how much effort people plan to, and will, put towards a behavior in order to complete it (Ajzen, 1991). Stronger intentions are said to be predictive of how hard a person will try, making it more likely that the behavior will occur, but is also dependent upon the amount of control the
individual has over performing the behavior (Ajzen & Madden, 1986). Intentions for physical activity in older adults with arthritis would be indicative of how much physical activity they plan or intend to perform, but does not address their beliefs of ability or resources to be physically active.

TPB was originally developed in response to shortcomings of an earlier theory, Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975), in which intention was the only predictor of behavior and was influenced by attitudes toward the behavior and subjective norms regarding the behavior. The TRA did not take into account actual or perceived control factors for performing a behavior, which made the TRA less able to explain and predict behaviors that are not under complete control of the individual (Ajzen & Madden, 1986). Control over a behavior can depend on resources and opportunities (both internal and external to the individual) for performing the behavior. For older adults with arthritis, control factors that may impede or facilitate physical activity could include knowledge or skills to perform exercises, an environment supportive or unsupportive of physical activity, lack of time, space, or equipment available for exercise, and pain, stiffness, or poor range of motion of affected joints during or after physical activity. In these situations where behavior is not under complete “volitional control,” behavior also depends on perceived behavioral control (PBC), or the perceived ease or difficulty given available resources and opportunities for performing a behavior (Ajzen & Madden, 1986). The addition of PBC to the model is what differentiates the TPB from the TRA. PBC is said to affect behavior both directly and indirectly through its influence on behavioral intention, and can be used in direct prediction of behavior to extent that it accurately reflects actual control over the specific behavior (Ajzen, 1991). According to Ajzen (2002) there is overlap between Bandura’s (1977) self-efficacy construct and PBC, and that self-efficacy can be placed in a hierarchical model of PBC including perceived controllability and perceived self-efficacy for a given behavior.

Both self-efficacy and behavioral intention have found empirical support for their importance in predicting behavior (Armitage & Conner, 2001). More specifically, self-efficacy for exercise and intention to exercise have both been found to be strong and consistent predictors of physical activity (Bauman, Sallis, Dzewaltowski, & Owen, 2002). Self-efficacy for physical activity has been also shown to be a strong predictor of physical activity behavior in adults with chronic diseases such as Diabetes (Plotnikoff, Lippke,
Courneya, Birkett, & Sigal, 2008). The effects of self-efficacy may differ when in the presence of disease as well between genders. In older women with arthritis, stronger arthritis self-efficacy (coping with arthritis) was found to be associated with better functional performance in daily activities compared to in older men with arthritis (Gaines, Talbot, & Mette, 2002). Interestingly, in a study of healthy older adults, functional performance was found to be associated with arthritis self-efficacy in men but not in women (Seeman, Unger, McAvay, & Mendes de Leon, 1999).

Although intention and self-efficacy for disease management and physical activity have both been found to predict physical activity, results in this area are mixed as to which is a better predictor. For example, Lucidi, Grano, Barbaraneli, and Violani (2008) found that in older adults already enrolled in an exercise program, control dimensions of perceived behavioral control and self-efficacy were the strongest predictors of intention to exercise, but they did not show significant direct effects on exercise participation (class attendance). Intention did, however, show a significant effect on exercise behavior. In another study of older adults, Gretebeck et al. (2007) found perceived behavioral control to again be the best predictor of intention for physical activity (recreational, leisure, or occupational). However, in contrast to Lucidi et al. (2008), the direct effect of perceived behavioral control was found to be stronger than the effect of intention on physical activity behavior.

**SELF-EFFICACY IN ARTHRITIS INTERVENTIONS**

Pioneering the way in self-management education for adults with arthritis was the Arthritis Self-Management Program (ASMP). This widely disseminated and evaluated program, which also been called the Arthritis Foundation Self-Help Program (AFSHP), Arthritis Self-Management Course (ASMC) and the Arthritis Self-Help Course (ASHC), is on the CDC’s list of recommended programs for adults with arthritis. The program includes information on the disease and medication use, assistance in designing personal exercise and pain management programs, and problem solving, taught in 2-hour group sessions, once a week for six weeks. Interventions utilizing the ASMP or similar materials are delivered by lay leaders or peer educators, which is in line with SCT concepts on which ASMP is based. Social Cognitive Theory proposes that self-efficacy can be enhanced through vicarious
experience and verbal persuasion (Bandura, 1977), and peer educators managing arthritis themselves serve to enhance self-efficacy through these mechanisms.

In a review of studies on different versions of the ASMP, Lorig and Holman (1993) found that the original version, which did not include self-efficacy enhancing strategies, led to some improvements in health status and health behavior for the treatment group compared to controls, but that these were not found to be highly associated. Evaluation of the ASMP program that incorporated self-efficacy enhancing strategies found greater increases in self-efficacy for managing pain, for managing other symptoms, and for function, as well as beneficial results in pain and exercise behavior, compared to controls. The improvements seen in this study were also greater than those observed using the original version of the ASMP without self-efficacy enhancing strategies. The validated Arthritis Self-Efficacy Scales (ASES; Lorig, Chastain, Ung, Shoor, & Holman, 1989) were used to evaluate self-efficacy in this study, and exercise behavior was measured in blocks usually walked per week. In further investigation, Lorig & Holman (1993) found that change in self-efficacy for managing pain and level of pain were more highly correlated than were change in exercise behavior and level of pain. Results also showed changes in self-efficacy for arthritis management were not correlated with changes in exercise behavior. Although in this study increased self-efficacy for managing arthritis did not appear to be related to increased exercise behavior, it is important to note that the types of self-efficacy measured in this study (pain, disability, depression, and function) were not specific to exercise, and this may have led to the lack of correlation observed between self-efficacy levels and exercise behavior. However, improved self-efficacy for managing arthritis can still have a positive effect on the lives of participants by decreasing symptoms such as perceived pain, as evidenced by the findings of Lorig and Holman (1993) that self-efficacy for symptom management was correlated with decreased pain. When individuals feel a greater sense of control over their pain, it may decrease their perceptions of pain whether or not their physical state has actually changed. Also, because exercise behavior change was less correlated to decreased pain, these findings demonstrate the important role of self-efficacy for improving health status even if behavior change does not or cannot actually occur. Examining the sustainability of these improvements is important for understanding the long-term impact of arthritis interventions.
Even small improvements in self-efficacy and symptoms such as perceived pain could greatly improve the overall well-being of adults living with arthritis if maintained over time.

In a study of the sustainability of benefits of arthritis self-management programs, a longitudinal follow-up study of 457 Australian older adults (mean age 62.8) used the group-based Arthritis Self-Management Course (ASMC) and found that aerobic exercise and self-efficacy for managing arthritis increased from baseline to 6 months and 2-year follow-up (Osborne, Wilson, Lorig, & McColl, 2007). A 4-item version of the 8-item ASES was used in this study to assess confidence in ability to manage arthritis symptoms such fatigue, pain, distress and daily activities. Findings suggest that increased self-efficacy was associated with improvements in pain, fatigue, and quality of life, but was not associated with exercise behavior, reported in minutes of aerobic exercise (walking). These findings were consistent with those found by Lorig and Holman (1993). Again, this lack of association between self-efficacy for arthritis management and exercise behavior may be due to the fact that Osborne et al. (2007), like Lorig and Holman (1993), utilized a measure of self-efficacy not specific to exercise. Findings by Osborne et al. (2007) of sustainable changes in health status produced by the ASMC are limited by lack of a control group. However, the authors note that the findings are consistent with controlled trials of similar programs.

Self-management programs that do not focus specifically on arthritis have also found success in improving arthritis related health status for older adults with arthritis (Lorig, Ritter, & Plant, 2005). When the ASMP was compared to a similar program for general chronic disease, the Chronic Disease Self-Management Program (CDSMP), both programs resulted in significant improvements in activity limitations four months after baseline. Improvements in pain, fatigue, health distress (worry and concern caused by chronic condition), self-efficacy for managing chronic disease, in minutes per week of aerobic exercise, and in strength and stretching, were only significant in the ASMP group (Lorig et al., 2005). The ASMP program also resulted in greater improvements in fatigue and global health (a self-reported measure of health taken from the National Health and Nutrition Examination Survey) 1 year after baseline compared to the CDSMP group. A version of the ASMP with added focus on exercise goal setting was assessed in an RCT of adults with OA of the knee in Hong Kong (Yip, et al., 2007). Study findings suggest outcomes similar to ASMP-based programs without emphasized exercise goal setting, in that only the
intervention group significantly improved self-efficacy for managing pain and other symptoms, as well as hours per week of light exercise 4 months after the intervention. Significant improvements in self-efficacy for managing pain and other symptoms were maintained at 1-year follow-up compared to baseline for the intervention group but not the control group (Yip, Sit, Wong, Chong, & Chung, 2008). The added exercise goal-setting component consisted of action planning using three types of exercise and pedometers to take home for positive reinforcement in walking. It is important to note that Yip et al. (2007) only examined changes at 4-month follow-up relative to baseline. With this approach, any potential changes that may have occurred from post-intervention to follow-up would not be detected. In fact, in the 1-year follow-up study Yip et al. (2008) mention that, although it was not explicitly analyzed, there was an observed a decline exercise behavior from 4-months follow-up to 1-year follow-up. The authors note that the mutual support between participants in small group exercise practice was helpful in promoting exercise behavior and suggest that reinforcement of self-management behaviors in a group reunion may be necessary to produce longer lasting improvements in exercise behavior.

An arthritis program utilizing an individual educational session in addition to group sessions also produced improvements for adults with arthritis (Gronning, Skomsvoll, Rannestad, & Steinsbekk, 2012). This randomized controlled trial of an arthritis education program for Norwegian patients with polyarthritis (arthritis affecting 5 or more joints) consisted of three 3-hour group sessions every other week, and one 45 minute individual session. This educational material used in the intervention was similar to the ASMP. Four months after baseline, the intervention produced significant benefits compared to the control group in global well-being as assessed by the Arizona Integrative Outcomes Scale (Bell, Cunningham, Caspi, Meek, & Ferro, 2004), and self-efficacy for controlling their arthritis symptoms assessed with a 6-item ASES pain and other symptoms subscale. Interestingly, the intervention did not improve participants’ self-efficacy for symptom management, but rather maintained the level measured at baseline, whereas there was a decline in self-efficacy for symptom management in the control group. This suggests that this intervention with only four sessions, one of which is an individual session, was not successful in improving self-efficacy for symptom management at four months after baseline, but was able to prevent the decline in self-efficacy for symptom management over time seen in the control group. The
intervention group also showed decreased pain, but not an increase in self-efficacy for managing pain. Gronning et al. (2012) note that this may be due to the intervention focusing on the impact of arthritis in many areas of health status and functioning, rather than heavy emphasis placed on coping with pain. The smaller number of classes compared to the standard ASMP and inclusion of an individual session may not have allowed enough reinforcement of pain management material and provided social support from group sessions less often. Perhaps this program would produce greater benefits for adults with OA or individuals not dealing with multiple arthritic joints. The sample was also less representative of older adults, as the mean age of participants was 58 years (SD 11).

Another program structured differently than the standard ASMP, the Lifestyle Management for Arthritis Program (LMAP), consisted of two modules, each with four 2.5-hour group sessions, and one 2 hour review session (Hammond, Bryan, & Hardy, 2008). The modules focused on symptom management and exercise, including education, skills practice, goal setting, action planning, and feedback. The LMAP also differed from other self-management education programs like the ASMP in that the participants could attend the group sessions when convenient for them, over a 3 to 9 month period, and intervention sessions were delivered by trained Rheumatology therapists. The control group received a standard arthritis education program consisting of five 2-hour group sessions. The standard program was an information-based arthritis education program that did not include the self-monitoring, skills training and feedback, goal setting, and action planning that the LMAP provided. Significant differences emerged between groups, with LMAP participants showing greater improvements in self-efficacy for arthritis self-management on the Rheumatoid Arthritis Self-Efficacy scale (RASE) (Hewlett, Cockshott, Kirwan, Barrett, & Haslock, 2001), self-efficacy for managing symptoms on the ASES, and in the use of exercise compared to the standard program group at six months after baseline. At 12 months after baseline, improvements for the LMAP group were maintained in the self-efficacy measures, but improvements were not maintained in exercise. The authors note that because of the use of an arthritis education program as a control group, the effects of the LMAP may be even greater when compared to usual care receiving no additional arthritis education. As in the Gronning et al. (2012) study, participants in the LMAP study had been diagnosed with RA and Psoriatic arthritis (a type of joint inflammation associated with Psoriasis) and had a mean
age (55.4 years, SD 12.54), which makes these findings less generalizable for an older adult population, and those with OA. It is also important to point out that because participants could complete the program modules when convenient for them over a 3-9 month period, the number of months it took for completion of the program varied. Questionnaires were mailed 6 and 12 months after baseline measures regardless of when the program was completed. This makes it difficult to determine how long the improvements seen in the LMAP intervention group truly lasted, because participants may have been in different stages of the program or further removed from the program when completing the questionnaires.

In promoting physical activity for arthritis management, self-efficacy for function and physical activity or exercise may be increased further by incorporating physical activity behavior into the intervention. According to SCT, self-efficacy is thought to be strengthened by increasing efficacy expectations through successfully performing the desired behavior (Bandura, 1977). Arthritis interventions that incorporate exercise into intervention sessions present opportunities for successful completion of the desired behavior. Many interventions to increase physical activity that include regular exercise as an intervention component, as opposed to simply learning the skills to become physically active, have been developed and evaluated. In a small study of older adults participating in a 3-month Arthritis Foundation Aquatic Program (AFAP), Gou, Yang, and Malkin (2009) examined the relationship of aquatic exercise and self-efficacy. The AFAP consisted of only aquatic exercise with no self-management education provided, and was able to produce increases in arthritis self-efficacy scores on the ASES and a decrease in over all impact of arthritis from baseline and post-intervention. Significant increases were seen in self-efficacy subscales for managing pain and other symptoms, but were not seen in the subscale for function. However, the results of this study are limited by a lack of control group and very small sample size (n=6). A preliminary evaluation of another exercise-based intervention, Fitness and Exercise for People with Arthritis (FEPA), Levy et al., (2012) showed that a community based multi-component exercise program improved physical function, pain perceptions, and self-efficacy for managing pain. Participants were grouped into middle aged (mean age 54.8 years) and older adults (mean age 76 years). Pain perceptions and physical function were significantly improved for both age groups. However, self-efficacy for managing pain was only improved significantly in the middle-aged adult group, and was not significant in the older adult group.
Neither group showed significant improvements in self-efficacy for managing other symptoms. This study, again, lacked control group, which limits its findings for the success of these interventions. Findings from the Gou et al., (2009) and Levy et al., (2012) studies suggest that utilizing only exercise, without other arthritis education components, can increase arthritis related self-efficacy and well-being.

Physical activity can be beneficial in arthritis management both physically and psychologically, and perhaps the optimal way to increase self-efficacy and behavior for self-management and physical activity is to combine both aspects of arthritis management into the intervention. An implementation study in the Netherlands evaluated a program for OA of the knee that combined exercise and health education (De Jong, Hopman-Rock, & Tak et al., 2004). The OA Knee program aimed to increase mobility and pain reduction, knowledge, and self-efficacy for managing arthritis, and was the same number and length of sessions as the ASMP (one a week for 6 weeks). However, each 2-hour session was broken up into one hour of education and one hour of exercise. Participants also received a home-based exercise program. De Jong et al., (2004) found increases in the self-efficacy subscale for pain management, but not in self-efficacy for function or managing other symptoms at post-intervention. Decreases in pain severity and increases in pain tolerance were also found at post-intervention. Although this study did not include a control group, previous RCT studies of the OA Knee program had produced similar results, finding that self-efficacy for managing all symptoms (including pain) increased in the intervention group compared to controls at 6 month follow-up, and that (Hopman-Rock & Westhoff, 2000). Physical activity also increased at post-intervention in RCT evaluation, but was not maintained 6 months follow-up. De Jong et al. (2004) did not report measures of physical activity or any follow-up measures for the implementation study.

The People with Arthritis Can Exercise (PACE) program was another RCT evaluating a community-based arthritis management program incorporating exercise. The intervention consisted of an 8-week program, with group sessions twice a week for one hour each. These sessions included both exercise and arthritis management education implemented at senior centers, fitness or wellness centers, retirement communities, and churches. Program material was delivered by trained instructors consisting of nurses, physical therapists, health education specialists, and trained exercise instructors. At post-
intervention, significant improvements were seen for the intervention group compared to controls in pain and self-efficacy for managing arthritis, assessed using the 28-item RASE (Callahan et al., 2008). This intervention, however, did not result in any significant improvement in physical activity behavior. Follow-up measures 6 months after baseline showed decreases in pain and fatigue and increases in self-efficacy for arthritis management. Interestingly, function and scores on the Self-efficacy for Physical Activity (SEPA) (Marcus, Selby, Niaura, & Rossi, 1992) declined compared to baseline. Callahan et al., (2008) state that the reason for this decline in function and self-efficacy for physical activity compared to baseline may have to do with the older age of the participants (mean age 70 years) compared to other studies. The authors suggest that the older adults may require the structure, frequency, and social support gained from attending classes to maintain confidence exercising. Callahan et al. (2008) report that participants who were voluntarily continuing with home-based PACE exercises after the completion of the program did not show a decline in function at 6-months compared to baseline, providing evidence that continuing with program components can lead to greater benefits. PACE is now called the Arthritis Foundation Exercise Program (AFEP), and is on the list of interventions recommended by the CDC (Brady et al., 2009).

In a study with a similarly older aged sample (mean age 70.35 years), Hughes et al. (2006) found that the Fit and Strong program showed improvements in physical activity and exercise self-efficacy. This program is similar to the PACE program in that it combines exercise classes with arthritis education, but consists of more sessions than PACE with 90 minute group sessions three days a week, for 8-weeks. Sessions involve flexibility, walking, and resistance training for 60 minutes, followed by 30 minutes of education to enhance self-efficacy for adherence to exercise. Physical therapists trained in geriatrics served as session instructors. The program also assists participants in developing a post-intervention exercise plan for at home or in the community, meant to serve as reinforcement of health education and exercise performed during program sessions. At the conclusion of the 8-week program, the intervention group showed increases in arthritis-related exercise self-efficacy on the ASES, and remained higher than baseline at 6 and 12-month follow-up, whereas the control group declined at all three time points. The intervention group showed no significant increases in self-efficacy for addressing barriers to exercise on McAuley, Lox, and Duncan’s
(1993) barrier self-efficacy scale, but did show increased self-efficacy for adherence to exercise over time at the 6 and 12-month follow-up, assessed with the McAuley et al. (1993) adherence self-efficacy scale. The intervention group showed significantly higher minutes of exercise per week at post-intervention, 6, and 12-month follow-up. The greater frequency and total number of classes during the 8-week Fit and Strong program may have led to the sustained changes in exercise self-efficacy over 12 months that were not present in the Callahan et al. (2008) PACE intervention study. The Fit and Strong program is currently on the list of CDC recommended programs for adults with arthritis.

Stemstrom (1994) found that focusing on exercise goal setting instead of focusing on pain management of participants may lead to greater improvements in exercise self-efficacy and that multi-level self-efficacy enhancing techniques may improve compliance with exercise programs. In a home-based exercise program for adults with RA, a cognitive treatment was added in the form of either pain management advice or goal setting advice. The exercise program resulted in improvements in self-efficacy for managing symptoms such as mood and fatigue, but not for self-efficacy in managing pain or self-efficacy for function, although pain and function were improved by the intervention for both the pain group and goal-setting group. No differences were seen between the two subgroups other than the goal setting subgroup showed greater decreases in pain for lifting to nose level and set goals to increase their exercise load (thicker resistance bands for exercises) significantly more so than the pain attention group. Although this study did not assess exercise self-efficacy, Stemstrom (1994) proposed that lower perceived pain while exercising in the goal-setting group could, in turn, contribute to increased self-efficacy for exercise.

The interventions discussed to this point vary in number of classes, and length of classes and over-all program. Therefore, it is difficult to directly compare arthritis interventions to determine the amount of sessions and length of program needed for optimal results. Some researchers have attempted to identify a dose-response relationship in arthritis self-management programs. Lorig, Gonzalez, Laurent, Morgan, and Laris, (1998) compared a three-week version of the ASMP with the standard six-week version. They found that while participants in both programs showed improved self-efficacy for controlling pain and other symptoms and increased use of stretching techniques only occurred in participants in the 6-week version. More recently, however, a meta-analysis of interventions consisting of
community-deliverable exercise for adults with arthritis showed consistent improvements in pain and physical functioning among various programs, but a dose-response relationship has not yet been established (Kelley et al., 2011).

**AIMS OF PRESENT STUDY**

The current study seeks to build on previous research showing the modifiable nature of self-efficacy for arthritis management and that increased self-efficacy in this area can lead to improvements in arthritis symptoms and health outcomes. This study will re-evaluate a 4-week, psycho-behavioral, educational intervention, “Choosing Arthritis Specific Appropriate Physical Activity,” (CASAPA) from post-intervention to 1-month follow-up. Previous multilevel analysis of CASAPA found that compared to baseline, participants in the intervention group reported higher arthritis-related exercise self-efficacy, self-efficacy for overcoming barriers to physical activity, and self-efficacy for choosing appropriate physical activity at post-intervention and follow-up, compared to the control group (Levy & Macera, n.d.). Past research provides a rationale to further investigate the maintenance of self-efficacy for arthritis management and physical activity, and their predictive value for physical activity behavior and intention. As previously discussed, arthritis self-efficacy, including for managing pain and other symptoms, has been associated with lower levels of pain, and less associated with increased exercise behavior. Other self-efficacy types such as self-efficacy for exercise and exercise adherence, as well as barrier self-efficacy have been incorporated in intervention programs, with varying degrees of improvements seen.

The CASAPA intervention is distinct from previous studies in that self-efficacy for choosing appropriate physical activity was specifically targeted and measured. Lacking knowledge of what types of physical activity are appropriate, beneficial, and will not cause more pain and discomfort may be a deterrent to exercise behavior. Thus, the present study evaluates a additional subtype of self-efficacy: self-efficacy for choosing arthritis appropriate physical activity. Changes in levels of arthritis-related exercise self-efficacy, self-efficacy for overcoming barriers to physical activity, and self-efficacy for choosing appropriate physical activity will be investigated to determine if previously observed improvements persisted from post-intervention to 1-month follow-up.
The current study also aims to extend previous knowledge of the roles of these three types of self-efficacy and physical activity intention in predicting physical activity. From a SCT perspective, self-efficacy (for a given behavior) is the central construct and should directly influence the likelihood of the behavior occurring, as well as indirectly influence the behavior through its effects on other determinants. As described previously, TPB provides an alternative pathway of influence, where intention (for a given behavior) is the central construct and immediate antecedent to the behavior. This gives intention an opportunity to mediate the influence of self-efficacy on the behavior. One must not only feel confident in their ability to perform a behavior but also have the intention perform it. The current study will examine the role of physical activity intention in the relationship between self-efficacy (for arthritis-related exercise, for overcoming barriers to physical activity, and for choosing appropriate physical activity) and physical activity. However, as opposed to evaluating associations between self-efficacy for physical activity and physical activity behavior at one time point as seen in other studies, the current study examines the value of intention and physical activity self-efficacy at post-intervention in predicting physical activity behavior at follow-up. Identifying which types, if any, of self-efficacy play a role in predicting physical activity at follow-up can help determine which areas of self-efficacy should be emphasized over others for lasting improvements in physical activity once older adults with arthritis are no longer attending an arthritis program. Assessments from the CASAPA intervention of arthritis-related exercise self-efficacy, self-efficacy for overcoming barriers to exercise, self-efficacy for choosing appropriate physical activity, physical activity intention, and physical activity behaviors will be examined to answer the following questions:

1. Were the increases in arthritis-related exercise self-efficacy, self-efficacy for overcoming barriers to exercise, and self-efficacy for choosing appropriate physical activity seen at post-intervention in the intervention group maintained at 1-month follow-up compared to controls?

   Hypothesis: Improvements in arthritis-related exercise self-efficacy, self-efficacy for overcoming barriers to exercise, and self-efficacy for choosing appropriate physical activity were maintained at 1-month follow-up relative to post-intervention in the intervention group compared to controls.

2. If improvements did persist to follow-up, were arthritis-related exercise self-efficacy, self-efficacy for overcoming barriers to exercise, and self-efficacy for choosing
appropriate physical activity at post-intervention predictive of physical activity behavior at 1-month follow-up?

Hypothesis: Arthritis-related exercise self-efficacy, self-efficacy for overcoming barriers to exercise, and self-efficacy for choosing appropriate physical activity will predict physical activity behavior at 1-month follow-up.

3. Does physical activity intention mediate the relationship of self-efficacy subscales and physical activity behavior in older adults with arthritis?

Hypothesis: Physical activity intention will partially mediate the relationship between self-efficacy subscales and physical activity, but self-efficacy subscales will still contribute to the prediction of physical activity at follow-up.
CHAPTER 2

METHODS

The current investigation is a secondary analysis of data from the CASAPA intervention conducted in 2009. Findings from previous analyses suggested that compared to baseline, improvements in self-efficacy for arthritis-related exercise, self-efficacy for overcoming barriers to exercise, and self-efficacy for choosing appropriate physical activity were greater at the conclusion of the 4-week intervention and 1-month follow-up for the intervention group compared to controls (Levy & Macera, n.d.). The current study evaluates the maintenance of the observed changes more closely, by examining effects during the 1-month post-intervention to follow-up period. Additionally, relationships between physical activity self-efficacy subtypes, physical activity intention, and physical activity will be explored. The CASAPA study received approval from the San Diego State University Institutional Review Board for the protection of human subjects.

THE CASAPA INTERVENTION

Choosing Arthritis Specific Appropriate Physical Activity (CASAPA) was a study that evaluated the efficacy of a short, 4-week psycho-behavioral education intervention designed to increase knowledge, skills, and confidence for selecting arthritis appropriate physical activity in older adults with arthritis. The intervention consisted of one, 60-minute group session per week, for four weeks. Instructors were hired by the study investigators to deliver the program curriculum and were required to hold a Masters degree in exercise science or related field of study. A total of two instructors were hired for the study. Both instructors were female, one identified as Pacific Islander, and the other as Caucasian. The instructors were trained by the study investigators to use the CASAPA curriculum, which was designed to be interactive, and encourage participants to take an active role in discussion. Participants were given handouts to work on during sessions and take home for reference, as well as provided with information on additional resources. Group sessions were held at non-residential community senior centers and an additional research center site.
The CASAPA curriculum focuses largely on different aspects of self-efficacy for physical activity, and is thus rooted in Social Cognitive Theory. Session 1 included interactive discussion exploring participants’ perceptions of arthritis and exercise, and presented information on pain management techniques, benefits of exercise for arthritis, debunking misconceptions about exercise and arthritis, and recommended types of exercise for arthritis. Socio-structural factors are thought to influence health related behaviors in form of either facilitators or impediments (Bandura, 2004), and may include factors such as health systems, living conditions, economic or environmental systems (Conner, 2010). For older adults with arthritis, these may consist of factors such as neighborhood safety for walking, opportunities and money to use exercise equipment, or transportation to a workout facility. To begin addressing this aspect of behavior change, this session also lead participants in identifying potential barriers to physical activity.

Session 2 focused on identifying exercise options and opportunities, along with strategies for goal setting and action planning. One way to develop self-efficacy is through mastery experiences, where overcoming obstacles to successfully complete a behavior creates more resilient self-efficacy in the face difficulty or failure compared to completing a task under easier circumstances (Bandura, 2011). Thus, identifying more opportunities for exercise provides more opportunities for mastery experiences. Participants worked in teams during this session to create an exercise goal for review the following week. Goal setting is a key component of SCT in that setting and attaining short-term personal goals provides self-incentives and evaluative opportunities to guide future behavior (Bandura, 2011). Working in teams, as well as the group structure of sessions in general, helps to create an environment of social approval, which is a main aspect of outcome expectations influencing behavior (Bandura, 2004). This session also covered guidelines for safety while exercising, which should help avoid adverse exercise experiences, as this can decrease self-efficacy for exercising in the future (Bandura, 1977).

Session 3 focused on continuing to build self-efficacy and developing strategies to adhere to new behavior patterns. Participants reviewed successes and difficulties with goals set during the previous week. Creating a goal and assessing performance taps self-evaluative outcome expectations, for which people tend to behave in ways that avoid self-dissatisfaction (Bandura, 2004). The final session, Session 4, dealt with facilitating movement forward with
participants’ action plans, and encouraged use of self-monitoring goal setting techniques. Benefits of exercise were reiterated and additional resources were presented.

**SAMPLE**

Participants were selected from an ethnically diverse, low Socio-Economic Status (SES) sample of older adults with arthritis who attended non-residential community senior centers. Senior centers used for recruitment were located in San Diego County and were chosen with assistance from San Diego County Health and Human Services’ Aging and Independent Services (AIS), who served as a community partner. A nutrition program run by AIS provides lunch plans to seniors at community centers across San Diego County, and were asked helped to identify centers with the desired ethnically diverse, low-SES, target population and space available to conduct a group session with 10-12 individuals and an instructor. AIS sites selected were Lemon Grove Senior Center, St. Charles Nutrition Program Center, Broadway Senior Community Center, Beech Senior Community Center, George L. Stevens Senior Center, College Avenue Senior Center, Sussex Gardens Senior Center, and Neighborhood House Association Senior Center. These centers are located in urban and suburban San Diego County, serving the areas of Lemon Grove, National City, Chula Vista, Mid-city San Diego, and Downtown San Diego. Each of these centers serves lunch to between 30 and 100 seniors during the week. The racial/ethnic breakdown of the centers varies depending on location, but no center exceeded 50% Caucasian, with the majority being Hispanic, Asian, or African American.

CASAPA intervention staff visited each senior center to describe the study to potential participants. Flyers were also given out at AIS lunch sessions and other gatherings at the senior centers. Recruitment also occurred through postings in community newspapers, Internet sites such as Craig’s List and the San Diego Reader Backpage, and rheumatologists’ offices. Participants were told that the study was being conducted in order to evaluate a short arthritis education program and were informed that this was a randomized controlled trial, meaning they had the chance of being placed in the waitlist control group. It was explained that those in the control group would be offered the CASAPA program at the conclusion of the study. Participants were told they would be compensated $50.00 for completing questionnaires at each of the three measurement periods. The measurement questionnaire
took approximately 20 minutes for participants to complete. To be eligible, individuals must have been told by a health professional that they had arthritis or joint pain in the past three months. Participants showing interest in the study at the initial site visit were screened for arthritis or joint pain at that time. If eligible, participants provided contact information, and later scheduled over the phone for their baseline measures at the senior center. Responders to public postings contacted the research office, were screened over the phone for arthritis or joint pain in the past 3 months, and eligible participants were scheduled for baseline measures to be held at the Alvarado research office. Participants were also required to receive clearance to become more physically active using the Physical Activity Readiness Questionnaire (PAR-Q; Canadian Society for Exercise Physiology, 1994) prior to beginning the program.

Following recruitment, participant demographics were used to match sites, which were then randomly assigned as an intervention or waitlist control site. The program was implemented at the community senior centers and an additional research center site (for those not recruited at senior centers), resulting in 9 intervention sites (n=90), and 6 control sites (n=81), for a total of 171 participants enrolled in the study. Of the 90 individuals enrolled in the intervention group, 6.7% (n=6) attended 1 class, 8.9% (n=8) attended 2 classes, 32.2% (n=29) attended 3 classes, and 52.2% (n=47) attended all four classes. The mean number of classes attended by the intervention group was 3.3 (SD 0.892). For the current study, only participants completing measures at all three time periods were included.

**Measures**

Both psychological and behavioral outcome variables were measured through self-reported responses to questionnaires. To examine psychosocial and physical activity changes and maintenance between the intervention and control groups at post-intervention, data from questionnaires administered at the conclusion of the 4-week program and at follow-up one month later were analyzed.

**Physical Activity**

Questions used to measure physical activity were taken from the Behavioral Risk Factor Surveillance Survey (BRFSS), covering frequency, duration, and intensity of physical activity, and have demonstrated moderate to high reliability (κ ranging from 0.35 to 0.86)
and construct validity coefficients similar to other physical activity measures (Evenson & McGinn, 2005; Levy & Readdy, 2009; Yore et al., 2007). Physical activity was measured by asking participants to report their physical activity for a typical week during the past month. Moderate or vigorous physical activity was defined for study participants as activities that cause increases in breathing or heart rate. Participants were given examples such as brisk walking, bicycling, vacuuming, gardening, or anything else that causes increases in breathing or heart rate, and could be done at work, for recreation, exercise, to get to and from places, or for any other reason. Participants were asked to report whether or not they had performed any moderate or vigorous activities for at least ten minutes at a time (Yes or No), how many days per week, and how many minutes per day. Participants received a 0 for days per week and minutes per day if they responded that they did not engage in any moderate or vigorous physical activity in the past month. If they were physically active in past next month, answers were scored in number days per week (ranging 1-7) and number of minutes per day (minimum 10 minutes). Total scores for physical activity behavior were obtained by multiplying the number of days by the number of minutes of physical activity, for a total number of minutes per week.

**Physical Activity Intention**

Intention to engage in physical activity was measured through questions with the same format, moderate and vigorous definitions, and examples as the physical activity measure. Participants were asked about their plans do any moderate or vigorous activities in the coming month at least ten minutes at a time. Participants responded to whether they planned on doing any of this type of physical activity (Yes or No), as well as how many days per week, and minutes per day they planned to do it. This measure was scored in the same manner as physical activity. Participants received a 0 for days per week and minutes per day if they responded that they did not plan on doing any moderate or vigorous physical activity in the coming month. If they planned to be physically active in the next month, answers were scored in number days per week (ranging 1-7) and number of minutes per day (minimum 10 minutes). Total scores for intention to be physically active were obtained by multiplying the number of days by the number of minutes of physical activity planned, for a total number of minutes per week.
SELF-EFFICACY MEASURES

Self-Efficacy for Arthritis Related Exercise was evaluated using a subscale of the Chronic Disease Self-Efficacy Scales (Lorig et al., 1996). This subscale measured participants’ confidence in being able to regularly perform exercises specifically related to arthritis including aerobic exercise and muscle strengthening and flexibility, without making their symptoms worse. This 3-item assessment tool has demonstrated internal consistency and test-retest reliability above 0.80, and construct validity has been examined through correlations of self-efficacy with health behaviors and health outcomes (Lorig et al., 1996). Responses were scaled on a 100-point scale, in 10-point increments from 0 (No confidence at all) to 100 (Complete confidence).

Self-efficacy for overcoming barriers to exercise, or “exercise barrier self-efficacy,” measured the degree to which participants felt confident in being able to exercise in the face of various circumstances and obstacles (McAuley, Jerome, Marquez, Elavsky, & Blissmer, 2003). For example, “If the weather was very bad,” or “If I felt pain or discomfort when exercising.” Participants responded on a 100-point scale, in 10-point increments from 0 (Not at all confident) to 100 (Highly confident). The 13-item “barrier self-efficacy scale” has demonstrated good internal consistency in older adults ($\alpha = .92$) (McAuley et al., 2003).

Self-efficacy for choosing appropriate physical activity was assessed with a single question designed specifically for the CASAPA intervention. The question reads, “How certain are you that you can choose exercise programs and physical activity appropriate for your arthritis?” (Levy & Macera, n.d.). This question was added to the end of the 5-item Arthritis Self-Efficacy Scale (ASES) pain subscale (Lorig et al., 1989). The ASES subscale for pain has shown acceptable internal consistency reliability with Cronbach’s alpha at 0.76 and test-retest reliability coefficient at .87 (Lorig et al., 1989). Construct validity has also been examined through correlations with health outcomes, such as psychological well-being (Barlow, Williams, & Wright, 1997; Lorig et al., 1989). The single question used to assess self-efficacy for choosing appropriate physical activity was formatted in the same manner as the Lorig (1989) ASES pain subscale, where responses are reported on a 10-point scale, from 1 (Very uncertain) to 10 (Very certain).
DATA ANALYSIS

Data were analyzed using Statistical Package for Social Statistics (SPSS), version 20 (IBM, 2011). Descriptive statistics were then obtained for all variables. Imputation of means was utilized for participants with one missing response in a particular subscale to create a subscale total. Participants with more than one missing response within a subscale were not included in analysis of that variable.

Examination of the normality of the data found that many of the variables showed a non-normal distribution. The self-efficacy subscale variables were negatively skewed, and physical activity intention and physical activity were positively skewed. Standardized skewness and kurtosis values ranged from (–.08 to 8.48) and (–.67 to 12.79), respectively. Log transformation was used to create a more normalized distribution of the physical activity and intention variables. However, attempts to correct the distribution of the self-efficacy variables were unsuccessful, and in some cases made the distribution even more skewed. Due to this, the arthritis related exercise self-efficacy, exercise barrier self-efficacy, and self-efficacy for choosing appropriate physical activity variables were dichotomized. The median value at post-intervention was used to split each variable and create a new dichotomized variable at post-intervention and follow-up. Those below the median score were categorized as having “low” self-efficacy, and those with scores at the median and above were categorized as having “high” self-efficacy for a specific subscale.

To address the first research question regarding maintenance of improved self-efficacy subscales from post-intervention to follow-up, McNemar’s test was utilized to compare the proportions of those with “high” self-efficacy at each time point. Three McNemar’s tests were performed: for arthritis related exercise self-efficacy, exercise barrier self-efficacy, and self-efficacy for choosing appropriate physical activity. Intervention and control groups were examined separately to reveal changes in both groups. Thus, if no significant change in proportion of those with high self-efficacy in a particular scale occurred between post and follow-up measures for either group, it would suggest that the intervention group remained higher than controls at 1-month follow-up.

To address the second research question, linear regression was used to determine whether or not the self-efficacy subscales at post-intervention were predictive of physical activity behavior at follow-up. Due to moderate to high correlations between the self-efficacy
variables (Table 1), each self-efficacy subscale was examined separately. Three separate linear regressions were performed with physical activity at follow-up as the dependent variable, controlling for physical activity at post-intervention. The first regression included arthritis related exercise self-efficacy as the predictor variable, the second regression included exercise barrier self-efficacy as the predictor variable, and the third regression included self-efficacy for choosing appropriate physical activity as the predictor variable.

Table 1. Correlations for Self-Efficacy Subscales and Physical Activity Intention

<table>
<thead>
<tr>
<th>Measure</th>
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<th>3</th>
<th>4</th>
<th>5</th>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2. ExBarrSE</td>
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<td>1.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>3. SEChPA</td>
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<td>.53</td>
<td>1.0</td>
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<tr>
<td>4. PA Intention</td>
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<td>5. PA post-intervention</td>
<td>.28</td>
<td>.02</td>
<td>-.01</td>
<td>.78</td>
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Note. All correlations significant at p < .05.

To address the final research question regarding the roles and relationship of the self-efficacy subscales and physical activity intention in predicting physical activity at follow-up, steps for testing mediation outlined by Baron and Kenny (1986) were employed. The first of these steps is described above for self-efficacy subscales predicting physical activity at follow-up. Next, for subscales proving to be significant predictors in step one, separate linear regressions were run with the potential mediator (physical activity intention) as the dependent variable, controlling for physical activity at post-intervention. In the final step, for self-efficacy subscales showing significant relationships to both physical activity and physical activity intention, one more regression was performed with physical activity at follow-up as the dependent variable and both the self-efficacy subscale and physical activity intention as predictor variables, again controlling for physical activity at post-intervention. Alpha was set to .05 for all tests of significance.
CHAPTER 3

RESULTS

Overall, enrolled participants had a mean age of 66.26 years (SD = 11.98) ranging from 28 -94 years, 66.3% were female, 41.5% were white, 45.0% were African American, 14.2% were of other ethnic backgrounds, 19.2% were married or partnered, and 56.8% reported attending some college or beyond, 17.0% graduated high school, and 12.3% attended vocational or technical school.

Of the 171 enrolled participants, a total of 143 completed both the post-intervention and follow-up measures. Of the 90 intervention participants, 75 (83.3%) individuals completed the post-intervention questionnaire, and of those, 70 (93.3%) individuals completed the follow-up questionnaire. Of the 81 participants in the control group, 75 (93.8%) individuals completed the post-intervention questionnaire, and of those, 73 (97.3%) individuals completed follow-up measures. These 143 participants had a mean age of 66.93 years (range 28 -92 years), 67.1% were female, 40.6% were white, 46.1% were African American, 13.3% were of other ethnic backgrounds, 18.9% were married or partnered, and 61.4% reported attending some college or beyond, 18.6% graduated high school, and 9.3% attended vocational or technical school. Demographics for intervention and control groups at post-intervention measures are found in Table 2. Chi-squared and independent sample t-tests, where appropriate, revealed no significant differences (p > .05) in demographics for the group of participants enrolled at baseline and the group that completed post and follow-up measures used for analysis.

No means were imputed for arthritis related exercise self-efficacy, and 1.4% of participants had more than one missing value in this scale and was excluded in analysis. Means were imputed for self-efficacy for overcoming barriers to exercise in 12.6% of participants at post-intervention, in 8.4% of participants at follow-up, and 5.6% participants had more than one missing value and were excluded from analysis. There were no missing values for self-efficacy for choosing appropriate physical activity.
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Intervention (n=70)</th>
<th>Controls (n=73)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>$M = 67.17$ (SD 10.65)</td>
<td>$M = 66.71$ (SD 12.19)</td>
</tr>
<tr>
<td>Age range (years)</td>
<td>40-91</td>
<td>28-92</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>34.3% (n=24)</td>
<td>31.5% (n=23)</td>
</tr>
<tr>
<td>Female</td>
<td>65.7% (n=46)</td>
<td>68.5% (n=50)</td>
</tr>
<tr>
<td>Education Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did not complete high school</td>
<td>11.4% (n=8)</td>
<td>9.3% (n=7)</td>
</tr>
<tr>
<td>High school grad</td>
<td>20.0% (n=14)</td>
<td>17.3% (n=13)</td>
</tr>
<tr>
<td>Some college</td>
<td>34.3% (n=24)</td>
<td>20.0% (n=15)</td>
</tr>
<tr>
<td>2 yr College grad</td>
<td>10.0% (n=7)</td>
<td>14.7% (n=11)</td>
</tr>
<tr>
<td>4 yr College grad</td>
<td>4.3% (n=3)</td>
<td>16.0% (n=12)</td>
</tr>
<tr>
<td>Prof or Grad School</td>
<td>12.9% (n=9)</td>
<td>12.0% (n=9)</td>
</tr>
<tr>
<td>Vocational/Technical School</td>
<td>7.1% (n=5)</td>
<td>10.7% (n=8)</td>
</tr>
<tr>
<td>Ethnicity</td>
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<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>41.4% (n=29)</td>
<td>39.7% (n=29)</td>
</tr>
<tr>
<td>African-American</td>
<td>37.1% (n=26)</td>
<td>54.7% (n=40)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>10.0% (n=7)</td>
<td>6.8% (n=5)</td>
</tr>
<tr>
<td>Asian</td>
<td>2.9% (n=2)</td>
<td>1.4% (n=1)</td>
</tr>
<tr>
<td>American Indian or Alaska Native</td>
<td>2.9% (n=2)</td>
<td>1.4% (n=1)</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td>4.3% (n=3)</td>
<td>-</td>
</tr>
<tr>
<td>Filipino</td>
<td>1.4% (n=1)</td>
<td>-</td>
</tr>
<tr>
<td>Other</td>
<td>2.9% (n=2)</td>
<td>1.4% (n=1)</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(table continues)
Table 2. Continued

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Post-Intervention</th>
<th>Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>32.9% (n=23)</td>
<td>31.5% (n=23)</td>
</tr>
<tr>
<td>Married/Partnered</td>
<td>21.4% (n=15)</td>
<td>16.4% (n=12)</td>
</tr>
<tr>
<td>Separated/Divorced</td>
<td>25.7% (n=18)</td>
<td>32.9% (n=24)</td>
</tr>
<tr>
<td>Widowed</td>
<td>20.0% (n=14)</td>
<td>19.2% (n=14)</td>
</tr>
</tbody>
</table>

Note. The total N for ethnicity exceeds the total N for participants due to some participants reporting more than one ethnicity.

Variables with values more than 3.3 SD from the mean were deemed outliers and excluded from analysis relating to that variable. No outliers were found in the self-efficacy subscale measures. Two outliers were excluded from analysis involving physical activity behavior at follow-up (with scores 840 and 950 min/wk). There were also 2 participants with missing scores for physical activity behavior at follow-up, leaving 139 participants for analysis of physical activity behavior. One outlier was excluded for physical activity intention (with a score of 960 min/wk), and 13 participants had missing scores, leaving 129 participants for analysis of physical activity intention.

**DESCRIPTIVE STATISTICS OF ALL VARIABLES**

The proportion of participants with high or low scores for each self-efficacy subscale is presented, by group, in Table 3. Means and standard deviations for physical activity behavior at follow-up and physical activity intention at post-intervention of the intervention group are found in Table 4. Correlations for predictor variables used in regression analysis are presented in Table 1.

**MAINTENANCE OF SELF-EFFICACY INCREASES**

Results of the McNemar’s test of arthritis related exercise self-efficacy revealed that the percentages of participants with high arthritis related exercise self-efficacy at post-intervention and follow-up were not significantly different for the intervention group (p < .826) or control group (p < .101). Results of the McNemar’s test of exercise barrier self-efficacy revealed that the percentages of participants with high exercise barrier self-efficacy at post-intervention and follow-up were not significantly different for the intervention group (p < .360) or control group (p < .425). Results of the McNemar’s test of self-efficacy for choosing appropriate physical activity revealed that the percentages of participants with high
Table 3. Descriptive Statistics for Arthritis Related Exercise Self-Efficacy (ArExSE), Exercise Barrier Self-Efficacy (ExBarrSE), and Self-Efficacy for Choosing Appropriate Physical Activity (SEChPA)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Post-intervention</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>ArExSE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>65.7%, n = 46</td>
<td>34.3%, n = 24</td>
</tr>
<tr>
<td>Controls</td>
<td>40.8%, n = 29</td>
<td>59.2%, n = 42</td>
</tr>
<tr>
<td>ExBarrSE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>58.2%, n = 28</td>
<td>41.8%, n = 39</td>
</tr>
<tr>
<td>Controls</td>
<td>42.6%, n = 29</td>
<td>57.4%, n = 39</td>
</tr>
<tr>
<td>SEChPA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>78.6%, n = 55</td>
<td>21.4%, n = 15</td>
</tr>
<tr>
<td>Controls</td>
<td>46.6%, n = 34</td>
<td>53.4%, n = 39</td>
</tr>
</tbody>
</table>

self-efficacy for choosing appropriate physical activity at post-intervention and follow-up were not significantly different for the intervention group (p < .389) or control group (p < .097). These results suggest that the intervention group maintained their improved levels and remained higher in all three self-efficacy scales from post-intervention to follow-up compared to controls.

**Prediction of Physical Activity Behavior at Follow-up**

Linear regression revealed that, for the intervention group, when controlling for physical activity at post-intervention: Arthritis related exercise self-efficacy at post-intervention.
intervention was not a significant predictor of physical activity at follow-up, $\Delta R^2 = .010$, $\Delta F (1, 53) = .895$, $p < .349$; exercise barrier self-efficacy at post-intervention was not a significant predictor of physical activity at follow-up, $\Delta R^2 = .016$, $\Delta F (1,52) = 1.404$, $p < .242$; and self-efficacy for choosing appropriate physical activity at post-intervention was also not a significant predictor of physical activity at follow-up, $\Delta R^2 = .028$, $\Delta F (1,53) = 2.526$, $p > .119$.

**ROLE OF INTENTION AS MEDIATOR**

In testing the role of physical activity intention as a mediator, first, a significant relationship between the independent variable (self-efficacy subscales) and dependent variable (physical activity) is required. This relationship, however, is not significant for any of the self-efficacy subscales, as reported above. Thus, continuing with the steps to test for mediation is unnecessary, but because the intention variable is of interest, its relationships with self-efficacy subscales at post-intervention and physical activity at follow-up were still examined. None of the self-efficacy subscales were significantly related to intention when controlling for physical activity at post-intervention (all p-values > .05). Finally, intention at post-intervention was also not significant in predicting physical activity at follow-up (when controlling for physical activity at post-intervention), $\Delta R^2 = .000$, $\Delta F (1,50) = .023$, $p < .881$. It should be noted that in each of the regressions reported, physical activity at post-intervention was controlled for, and in all cases it alone was significantly predictive of physical activity at follow-up ($p < .05$).
CHAPTER 4

DISCUSSION

Findings support the first research hypothesis and indicate that CASAPA is able to produce improvements in arthritis related exercise self-efficacy, self-efficacy for overcoming exercise barriers, and self-efficacy for choosing appropriate physical activity, that were maintained for at least one month following completion of the CASAPA program.

These findings provide additional support for the modifiable nature of self-efficacy in arthritis management, and that changes can be sustained for some time following an intervention program. However, CASAPA provides evidence of a new subscale of self-efficacy, self-efficacy for choosing appropriate physical activity, which can be increased through self-management education. The CASAPA program was shorter in length and total number of sessions, with one 1-hour session per week for four weeks, compared to many other arthritis programs that consist of more than four sessions of at least 2 hours in length. The standard ASMP evaluated in many studies consists of six, 2-hour sessions (Hammond et al., 2008; Lorig & Holman, 1993; Osborne et al., 2007; Yip et al., 2007). Gronning et al. (2012) examined a program similar to CASAPA in using four sessions, however, these sessions were 2 hours longer than CASAPA sessions and the final session was done on an individual basis. Many of these studies, however, did not target or evaluate any type of exercise-related self-efficacy as an outcome. Interventions incorporating physical activity as a piece of the group session included measures of exercise-related self-efficacy subscales more often (Callahan et al., 2008; Hughes et al., 2006). In the Callahan et al. (2008) evaluation of the PACE program, it was found the self-efficacy for physical activity (SEPA) actually declined 6 months after baseline. However, Hughes et al., (2006) found that arthritis related exercise self-efficacy, measured using the same ASES 3-item scale used in the CASAPA study, was increased by the Fit and Strong program and remained higher than baseline 6 and 12 months later. Interestingly, using the same 13-item scale to measure self-efficacy for overcoming barriers to exercise as used in the CASAPA study, Fit and Strong did not produce significant differences between interventions and controls in self-efficacy
subscale at post-intervention or follow-up (Hughes et al., 2006). Fit and Strong was a much longer program (90 minutes session, three times per week for eight weeks) compared to CASAPA, however, CASAPA was able to produce increases in self-efficacy for overcoming exercise barriers where Fit and Strong could not. The superiority of CASAPA in this area may be due the fact Fit and Strong sessions were more focused on 60-minutes of exercise, with only 30 minutes of group discussion and education. CASAPA most likely had more focus on discussing strategies for overcoming barriers to exercise, which was reinforced during each session. Participants in Fit and Strong may have relied on the program itself for engaging in exercise regularly and felt less confident in overcoming barriers to regular exercise on their own. Participants in the CASAPA program were responsible for finding their own time and ways to exercise, both during and after the program.

The focus of the present study was on changes that may occur after completion of the intervention, with a secondary goal of examining the predictive ability of post-intervention self-efficacy subscales and physical activity intention on physical activity behavior at follow-up. The results established that the intervention group maintained their improved self-efficacy subscales during the month following the intervention. However, these three types of self-efficacy did not predict physical activity at follow-up for the intervention group, as was hypothesized. When controlling for physical activity at post-intervention, having high self-efficacy for arthritis related exercise, for overcoming exercise barriers, or for choosing appropriate physical activity did not significantly predicted follow-up physical activity. Similarly, when controlling for physical activity at post-intervention, intention to be physically active at post-intervention was not a significant predictor of physical activity at follow-up. Not only did none of these variables predict physical activity, but the three self-efficacy subscales were also not significant predictors of intention at post-intervention. Due to the lack of findings of predictive ability, it was unnecessary, and not possible to test for intention as a mediator, as was hypothesized.

The lack of findings of self-efficacy subscales and intention as predictors of physical activity is in contrast to previous empirical evidence and to established behavioral theories from which the constructs are drawn. From a Social Cognitive Theory perspective, one would expect self-efficacy to make a direct, significant contribution to the prediction of behavior even when including other influential constructs (Bandura, 2011). From a Theory of
Planned Behavior perspective, physical activity intention should be a significant, and even larger, contributor to the prediction of behavior (Ajzen, 1991). Previous studies have found evidence of both constructs consistently predicting physical activity and in a variety of populations including older adults and those with chronic disease (Bauman et al., 2002; Plotnikoff et al., 2008), as well as evidence of self-efficacy for exercise predicting exercise intentions (Gretebeck et al., 2007; Lucidi et al., 2008). In contrast, findings from the CASAPA study suggest that in this sample of older adults with arthritis, physical activity is not significantly influenced by either theoretical construct, and may be influenced mainly by past physical activity behavior.

There are a variety of possible reasons for the lack of predictability found in the intention and self-efficacy variables in the CASAPA study. First, it is possible that because the self-efficacy subscale variables were dichotomized using the median score to split the variable, differences in physical activity levels at follow-up between those with high scores and those with low scores were not sufficiently detected. In future analysis of the data, perhaps creating a dichotomized variable by dropping the middle third of scores (or those who score in the average range), would create more difference between high and low self-efficacy scores and would reveal a significant prediction of physical activity levels.

Secondly, it should be noted that physical activity at post-intervention, which was controlled for in all regression models, significantly predicted a large portion of physical activity at follow-up ($R^2 = .391$) and was very highly correlated with physical activity intention ($r = .78$). This is important because controlling for “condition” (physical activity at post-intervention) could mask the significant contributions of the predictor variables. It could be argued that physical activity at post-intervention should not be controlled for in this case because it would already factor into the self-efficacy subscale scores, and would be over accounted for by controlling for it in the model. Social cognitive theory posits that self-efficacy for a specific behavior and the behavior itself show reciprocal determinism, where they mutually influence each other (Bandura, 1986). Thus, past physical activity experiences (physical activity measured at post-intervention) may be some somewhat accounted for within a self-efficacy scale at post-intervention, and disrupt the results of the regression analysis.
Lastly, it must be noted that the definition of physical activity in the CASAPA study may have affected the results. The measures used to assess physical activity and physical activity intention did not exclusively refer to exercise, but included any type of physical activity (leisure, recreational, occupational, exercise, household work, or to get from one place to another). This is important for two reasons: First, the majority of studies in the area of arthritis and physical activity only evaluate the exercise portion of physical activity. Exercise is a subcategory of physical activity that refers to planned or structured movement performed to increase physical fitness, whereas physical activity refers to any body movement by the skeletal muscles that creates energy expenditure (Caspersen, Powell, & Christenson, 1985). Therefore when comparing these findings to the literature, it is important to keep in mind the type of physical activity reported. Second, the types of self-efficacy assessed in the CASAPA study were specific to exercise. Perhaps if the questions within the self-efficacy scales used had included other types of physical activity, different relationships may have been found between self-efficacy, intention, and physical activity in this study.

**LIMITATIONS**

Findings of the current study are limited by a relatively small sample size, and larger randomized controlled trials of the CASAPA program would strengthen support for its effectiveness. This study is also limited by a short follow-up period compared to other intervention studies. Studies of the ASMP and similarly based self-management programs have reported improvements maintained over a much longer period of time (Lorig et al., 2005; Lorig & Holman, 1993; Osborne et al., 2007; Yip et al., 2007; Hammond et al., 2008). However, given the short duration of the CASAPA intervention, an initial shorter follow-up measurement seems appropriate. Future studies of this program should examine changes over a greater follow-up period. Like many studies using self-reported physical activity, there is potential for reporting and recall biases, and therefore uncertainty of accurate evaluation of physical activity behavior. However, the measure used in the current study has shown comparable validity and reliability to other self-reported measures of physical activity (Evenson & McGinn, 2005; Levy & Readdy, 2009; Yore et al., 2007). Future studies of CASAPA could benefit from use of an objective measure of physical activity (i.e. a
pedometer, accelerometer, or attendance to exercise classes) to accompany self-reported behavior and reduce bias.

Randomization by site, not by individual, was utilized to reduce possible cross-contamination of intervention and controls. It is of course possible that some control group individuals may have been aware of CASAPA intervention components through contact with intervention group individuals in another context. However, this is unlikely due to the distance between study sites. Additionally, because participants voluntarily enrolled in this study either after being approached by the study investigators or by responding to public postings, a self-selection or volunteer bias may exist and older adults not interested in learning about managing their arthritis may respond differently to the CASAPA program. The design of the study attempted to use a generalizable sample of participants, but it should be noted that CASAPA program participants were generally well educated, with over half of the enrolled participants completing some college or beyond. This may have led to participants being better equipped to effectively absorb the CASAPA curriculum.

Findings of the present study are also limited by lack of research on self-efficacy for choosing appropriate physical activity. Due to the fact that this self-efficacy subscale was created specifically for the CASAPA intervention, it is difficult to compare to the available body of research, as it appears that no other studies have measured this self-efficacy subscale.

**Recommendations for Further Research**

Future studies should evaluate the CASAPA program over a longer follow-up period to determine if increases are maintained longer than one month, or if any other improvements develop over time. It is thought that successful completion of behaviors further increase self-efficacy, which should further increase the behavior (Bandura, 1977), and perhaps a longer follow-up period providing more time to participate in physical activity, would lead to greater in improvements than those seen during the intervention or 1-month follow-up.

Future studies should also examine the effects of CASAPA and other interventions on muscle strengthening and flexibility exercise behavior. Most studies on arthritis related self-efficacy and physical activity look at aerobic style exercise such as walking, as opposed to reporting self-efficacy effects on muscle strengthening or flexibility physical activity.
Arthritis related exercise self-efficacy in this study included questions regarding strength and flexibility as well as aerobic activities. Perhaps the predictive ability of arthritis related exercise self-efficacy would be stronger for muscle strengthening and flexibility style physical activity than it was for aerobic style physical activity. This may hold importance if older adults with arthritis see aerobic exercise as a more daunting task to undertake in the presence of their arthritis symptoms. If arthritis related exercise self-efficacy is a stronger predictor of intended and actual strength and flexibility physical activity then perhaps focus should be placed on this first. Stronger muscles could potentially make aerobic exercise like walking less difficult and less painful on joints, which may aid in increasing self-efficacy for aerobic style physical activity, and in turn increase aerobic physical activity behavior, producing greater overall improvements in health, function, and quality of life.

As previously mentioned, self-efficacy for choosing appropriate physical activity has not been examined in other studies. Future studies should continue to investigate this type of self-efficacy for its potential in increasing physical activity in older adults with arthritis.

**Conclusion**

Findings of the present study add to the available body of research on arthritis self-management by showing that a short, psycho-behavioral, education intervention can produce lasting improvements in arthritis related exercise self-efficacy, self-efficacy for overcoming barriers to exercise, and self-efficacy for choosing appropriate physical activity in older adults with arthritis. Where other published studies have looked at post-intervention and follow-up changes relative to baseline, this study examined the changes from post-intervention to follow-up. Changes in self-efficacy during this time are important for understanding when any changes, specifically decreases, may occur following an intervention program, and shed light on when reinforcement of intervention material might be needed. This study also provides evidence that, although self-efficacy for arthritis related exercise, overcoming barriers to exercise, and choosing appropriate physical activity can be increased and maintained, they do not necessarily predict physical activity behavior. The lack of significant predictive relationships found in this study, contrasting previous research findings, sets the stage for further examination of these self-efficacy subtypes and their role in arthritis interventions to increase physical activity in older adults with arthritis.
REFERENCES


