

PERCEIVED BARRIERS TO PHYSICAL ACTIVITY  
AMONG WOMEN WITH ARTHRITIS

By

SARA A. HILLARD

B.S., Indiana University, Bloomington, IN, 2000

A THESIS

Submitted in partial fulfillment of the  
requirements for the degree

MASTER OF SCIENCE

Department of Kinesiology  
College of Arts and Sciences

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

2008

Approved by:

---

Major Professor  
Mary McElroy, PhD

## Abstract

Arthritis is one of the most prevalent and debilitating chronic health conditions for Americans. As no cure exists for arthritis, one emphasis of treatment focuses on the self-management of the disease through regular physical activity. Despite the well known health benefits, low physical activity rates exist among people with arthritis, particularly women. Research needs to focus on what influences decisions to participate in physical activity, one such influence is barriers. The purpose of the study was to examine the relationships among perceived barrier presence and perceived barrier limitation of 25 general and 16 arthritis-specific barriers and moderate physical activity. Participants were 279 women ( $M_{age} = 48.57$ ) with arthritis who completed a web-based survey. A hierarchical multiple regression to predict moderate physical activity was significant ( $p < .001$ ). General barrier limitation contributed the most to predicting total moderate physical activity participation. Education, body mass index, general barrier presence, arthritis-specific barrier presence, and arthritis-specific barrier limitations were also significant independent predictors. Findings suggest that the more general and arthritis-specific barriers identified (barrier presence) and higher extent of limitation (barrier limitation) was associated with lower levels of participation in physical activity. Future research would benefit from including a measurement of frequency of perceived barriers to better understand the impact of barriers to physical activity. A greater understanding of general and arthritis-specific barriers to physical activity may be used as a basis for targeted interventions to help women with arthritis participate in physical activity.

# Table of Contents

	Page
List of Tables.....	v
Acknowledgement.....	vi
CHAPTER 1: INTRODUCTION.....	1
Perceived Barriers and Gender Roles.....	2
Personal and Situational Barriers.....	3
General and Population Specific Barriers.....	4
Barriers to Physical Activity among People with Arthritis.....	5
Barrier Limitation.....	7
Study Purpose and Hypothesis.....	7
CHAPTER 2: METHODS.....	9
Participants.....	9
Measures.....	15
Dependent Variable.....	15
Moderate Physical Activity.....	15
Independent Variable.....	16
Barrier Measures.....	16
Recruitment and Procedures.....	17
Individuals Meeting Study Inclusion Criteria.....	20
Statistical Analyses.....	20

CHAPTER 3: RESULTS.....	22
Data Screening.....	22
Descriptives.....	23
Bivariate Correlations.....	25
Barrier Presence and Mean Limitation Scores.....	27
Hierarchical Multiple Regression Analysis.....	32
Exploratory Hierarchical Multiple Regression Analyses.....	34
CHAPTER 4: DISCUSSION.....	38
Perceived Barriers and Women with Arthritis.....	38
Strengths.....	42
Limitations.....	43
Future Directions.....	44
Summary.....	45
References.....	47
Appendices.....	53
A. Barrier Survey.....	53
B. Search Engine Key Words.....	65
C. Email Sent to Possible Contacts.....	67
D. Informational Flyer.....	69
E. Websites Identified for Contact.....	71

## List of Tables

Table 1. Sociodemographic Characteristics.....	11
Table 2. Barrier and Physical Activity Variables.....	24
Table 3. Bivariate Correlations among Study Variables.....	26
Table 4. Barrier Presence and Mean Limitation Scores for All Barrier Measures.....	28
Table 5. Prediction of Total Moderate Physical Activity Using Hierarchical Multiple Regression Analysis.....	33
Table 6. Prediction of Moderate Physical Activity by Days per Week Using Hierarchical Multiple Regression Analysis.....	35
Table 7. Prediction of Moderate Physical Activity by Minutes per Day Using Hierarchical Multiple Regression Analysis.....	37

## **Acknowledgement**

I would like to thank the following members of my thesis committee. For sharing her knowledge and expertise in the area of barriers to physical activity and arthritis, I thank Dr. Nancy Gyurcsik. Her continued support and confidence that I could complete this project was invaluable. Dr. Mary McElroy's encouragement and ability to keep me on track in the final weeks brought everything together. I thank Dr. Carol Ann Holcomb for providing technical support and insightful comments throughout the thesis process.

I am thankful to Dr. Dani Brittain for sharing her skills, knowledge, and experience, especially with the on-line survey system at K-State. For her excellent work on the focus-group study, without which this project would not have happened, I thank Candace Bloomquist. To both Candace and Dani for the exceptional childcare they provided, I am grateful. For his time, patience, and ability to explain statistical mysteries, I would like to thank Dr. Aaron Carlstrom.

To the arthritis related organizations that posted the link to the survey, especially those at the Arthritis Foundation, my sincerest appreciation. To the participants who took the time to participate in the survey, without which this project would have been impossible, my gratitude to each.

My family and friends, near and far, for all the support and encouragement over the years, I offer my unending gratitude. For his belief, assurance, devotion, patience, I will be forever grateful, Derek, my love always. Sophia Rose and Stella Violet, my little inspirations. For taking naps, keeping me playful, and all the kisses, I dedicate this work to you both.

## **CHAPTER 1: Introduction**

Arthritis is one of the most prevalent and debilitating chronic health conditions for Americans. In 2005, an estimated 47.8 million people in the United States reported having arthritis and this number is expected to grow to 67 million by the year 2030 (Hootman & Helmick, 2006). More than 100 types of the disease can be diagnosed, such as osteoarthritis, rheumatoid arthritis, fibromyalgia, and lupus (Centers for Disease Control and Prevention (CDC), 2008). Presently, arthritis has no known cause or cure; however, risk factors such as the “wear and tear” of life, joint trauma, obesity, and repetitive joint use are among the suspected causes.

Without a known cure for arthritis, self-management strategies to help individuals manage their condition are a common focus of most treatment programs. According to the National Arthritis Action Plan, one way to self-manage arthritis and the associated negative health impacts is through regular physical activity (Arthritis Foundation, Association of State and Territorial Health Officials, & Centers for Disease Control and Prevention, 1999). Research has suggested that physical activity can lessen pain and increase ability to perform daily tasks; in particular, physical activity can keep joints, muscles, bones, and tissues healthy and improve balance and flexibility (Clyman, 2001; Ettinger et al., 1997). Other physical benefits of regular physical activity for people with arthritis include increased endurance, improved sleep, and enhanced weight loss (Rejeski, Brawley, & Shumaker, 1996; Stenström & Minor, 2003) Physical activity can also increase confidence and improve the quality of life for people with arthritis (Rejeski, Focht, Messier, Morgan, Pahor, & Pennix, 2002). Coping difficulties, depression, anxiety, and low self-efficacy are recognized

psychological concerns among persons with arthritis and have been shown to be improved through regular physical activity (Gecht, Connell, Sinacore, & Prohaska, 1996).

Despite the potential health benefits of physical activity, many people with arthritis fail to meet the minimum levels of participation (i.e., at least 3 days per week for at least 30 minutes per day; Minor, Stenstrom, Klepper, Hurley, & Ettinger, 2003). For example, Fontaine, Heo, and Bathon (2004) compared the physical activity rates of a sample of United States adults and concluded that almost 62% of adults with arthritis were inactive or insufficiently active compared to 53% of adults without arthritis. Of those that were inactive or insufficiently active, 64% were women (Fontaine et al., 2004). Thus, six out of every ten women with arthritis that reported being inactive or insufficiently active, did not comply with the current recommendations of an accumulation of 30 minutes of moderate intensity activity on most days of the week (Minor et al., 2003; Shih, Hootman, Kruger, & Helmick, 2006). Another study by Hootman and Helmick (2006) reported that 9.86% of women with doctor-diagnosed arthritis responded to having arthritis-attributable activity limitation, almost twice as many as men.

### ***Perceived Barriers and Gender Roles***

To address the issue of why people do not engage in a sufficient amount of physical activity researchers have begun to focus on factors, such as barriers, that may prevent or hinder participation in regular physical activity (Gyurcsik, Bray, & Brittain, 2004; Myers & Roth, 1997). Due to the documented low activity rates among women with arthritis, women are of a particular interest. Because of their multiple potential roles as caregivers, as well as income earners, women may report obstacles or barriers to establishing leisure time and in achieving an active lifestyle (Reynolds, 2001). For example, parenthood may have a negative



effect on physical activity participation, with younger mothers not being active and older mothers not getting enough activity (Verhoef, Love, & Rose, 1992). Other barriers to participation in leisure time physical activity, including self-consciousness and poor body image, often manifest at a young age among women and can lead to a lack of skill or ability to participate in specific physical activities, especially as women grow older (Shaw & Henderson, 2000).

### ***Personal and Situational Barriers***

To better understand participation in physical activity, identifying perceived barriers that are personal or factors that are individual in nature is the logical first step. However, a narrow focus on individual-level barriers may not provide critical information concerning factors outside the individual (i.e., situational barriers) that may hinder participation in physical activity. Bandura's social cognitive theory (1986) suggests that "impediments" or barriers prevent effective self-management of health habits. Bandura (2004) recommends barriers be designated as either personal (internal) or situational (external, social, and environmental). For example, a personal barrier may include being tired or busy whereas a situational barrier may include a lack of an exercise facility or poor sidewalks. In recent studies, researchers have distinguished between personal and situational barriers using different models and theories (Brittain, Gyurcsik, & McElroy, in press; Gyurcsik et al., 2004; Wilcox et al., 2006).

Personal barriers frequently reported by women include lack of time, caregiving duties, and lack of energy (King, Castro, Wilcox, Eyler, Sallis, and Brownson, 2000). In a study of 249 women, Heesch and Masse (2004) investigated the personal barrier of "lack of time." Women reported devoting much of their time to their responsibilities of work,

housekeeping, motherhood, and marriage which often interfered with their plans to be physically active. However, on average, 28 hours per week were spent on sedentary leisure-time activities. Actual time commitments did not predict perceived lack of time for physical activity. These findings suggest that while “lack of time” may be perceived as a barrier to physical activity among women, other factors, for example, time management, may be the culprit.

Osuji, Lovegreen, Elliot and Brownson (2006) assessed the relationship between barriers and physical activity among 1,877 adult women. The personal barriers, “being too tired” and “lack of time”, were the most frequently cited. Women reporting these personal barriers in this study were less likely to meet physical activity recommendations. More specifically, the more barriers identified had a dose-response to the amount of participation in physical activity (i.e., the more barriers, the less active). While both of these studies provide insight into the personal barriers to physical activity encountered by women, they fail to identify a broad range of situational barriers that may also hinder participation in physical activity.

### ***General and Population Specific Barriers***

Although studies examining barriers have been conducted across various populations, the majority of these studies have included only general barriers (those common across populations) excluding population-specific barriers (those particular to a specific group). Often, studies involve lists of barriers from research conducted in one population for use in another which may not capture salient barriers in the population under study, such as women or people with chronic illnesses (Brawley, Martin, & Gyurcsik, 1998).

Gyurcsik et al. (2004) identified general and population specific barriers to participation in vigorous physical activity among students transitioning from high school to university. General barriers were defined as those barriers common across populations. For example, the general barriers, lack of time (personal), meeting with friends (situational), and job taking too much time (situational), were cited. Population specific barriers were defined as those barriers specific to first-year students. The most frequently cited population specific barriers included lack of sleep (personal), heavy school workload (situational), and time needed to study for exams (situational). Their findings suggest the need to look at population specific barriers.

Although some barriers exist (e.g. too tired or busy) across populations, specific populations with chronic diseases may experience barriers distinct to their health conditions. Dube, Valois, Prud'homme, Weisnagel, and Lavoie (2005) sought to develop and validate a questionnaire measuring perceived barriers to physical activity among people with diabetes. Example items included loss of control over diabetes, risk of hypoglycemia, fear of being tired, low fitness level, and work schedule. Risk of hypoglycemia was found to be the strongest population specific barrier. The data revealed that hypoglycemia is the most frequent and feared acute complication of physical exercise in diabetes patients and therefore should be considered when addressing physical activity participation. This study illustrates the need to distinguish between population specific and general barriers to physical activity among people with chronic conditions.

### ***Barriers to Physical Activity among People with Arthritis***

Identifying potential arthritis-specific barriers to participation in physical activity is important. Wilcox et al. (2006), for example, investigated perceived exercise barriers,

benefits and enablers in both exercising and nonexercising adults with arthritis. Barriers were categorized as physical, psychological/behavioral, social, and environmental. In this study, physical activity was measured using the 2001 Behavioral Risk Factor Surveillance System physical activity module. Personal barriers specific to arthritis included pain, stiffness, fatigue, and mobility problems. Situational barriers specific to arthritis included lack of programs or facilities; general situational barriers included environmental conditions, cost and transportation. Researchers concluded that while general and arthritis-specific barriers were prevalent among both exercisers and nonexercisers, exercisers were more likely to experience improvements through exercise and adapt to accommodate their disease, whereas nonexercisers were more likely to have stopped exercising since developing arthritis. These findings indicate that barriers play an important role in the understanding of participation in physical activity.

Gecht et al. (1996) conducted a cross-sectional study to examine the relationship between exercise beliefs and participation in exercise among adults with arthritis. They developed a measure to capture the following personal barriers: exercise takes too much time, exercise is a waste of time, and exercise is boring. Results regarding the relationship between barriers and physical activity were atypical compared to other populations, meaning barriers did not influence participation in exercise (Robertson & Keller, 1992). The researchers acknowledged that their measurement of barriers may have been ill-defined and did not capture the full range of barriers to physical activity among people with arthritis. Their findings illustrate the need for eliciting a broad range of barriers, general and arthritis-specific, personal and situational.

Davis, Hiemenz, and White (2002) investigated barriers to pain management in older adults with arthritis. The study identified nine themes associated with barriers to pain management. Barriers to pain management included hesitancy to take medications, co-morbidity issues, and reluctance to use non-pharmacological methods for pain relief, such as physical activity. Although these findings identified arthritis associated pain as a barrier to participation in physical activity, the exclusion of other general and situational barriers failed to reveal the complexity of barriers experienced by adults with arthritis.

### ***Barrier Limitation***

Coupled with identifying barriers as general and population specific, personal and situational, assessing the extent of perceived limitation of each barrier is also important. Brawley et al. (1998) suggest researchers obtain a measure of saliency in the form of assessing not only whether individuals experience a barrier but how limiting the barrier is to physical activity once it occurs. For example, “being tired” may be a barrier to physical activity for two different people with arthritis; however the intensity of the barrier may vary. As a result, for one person the barrier may fully limit participation in physical activity whereas for another person it may only slightly limit participation in physical activity. To this end, identifying personal, situational, general, and population specific barriers may be further enhanced by assessing the extent of their limitations.

### ***Study Purpose and Hypothesis***

Previous studies have identified barriers to physical activity among people with arthritis, though many have not encompassed a full range of personal and situational, general and arthritis-specific barriers nor assessed the extent of limitation of identified barriers. In addition, previous studies of barriers to physical activity among people with arthritis failed to

examine whether the presence of barriers is related to actual participation in physical activity. Therefore, the study had two goals. The first goal was to identify personal and situational, general barriers as well as personal and situational arthritis-specific barriers as reported by women with arthritis and to assess the perceived limitation for each barrier. The second goal was to examine whether general and arthritis-specific barrier presence and barrier limitation were related to participation in moderate physical activity among women with arthritis. More specifically, it was hypothesized that a higher prevalence of perceived general and arthritis-specific barriers and their associated barrier limitation would predict lower levels of participation in moderate physical activity among women with arthritis.

The present study also explored whether the way moderate physical activity was measured altered the relationship among physical activity and the barrier measures. More specifically, associations between barrier presence, barrier limitation, and physical activity as measured by days per week and minutes per day were considered.

## CHAPTER 2: Methods

The method section contains four parts. The first part includes information on the selection and description of participants. The second part outlines the dependent and independent variables in the study. The third part outlines recruitment strategies and procedures used to collect the data. The fourth part contains an overview of the statistical analyses used to examine the study hypothesis.

### *Participants*

Participant inclusion criteria were being an adult woman (i.e., aged 18 years or older), residing in the United States, and having arthritis. Arthritis was defined as being doctor-diagnosed and/or as individuals reporting chronic joint symptoms, which included having pain, aching, stiffness, or swelling in or around a joint in the past 12 months with the symptoms being present on most days for at least one month (CDC, 2002). Only women were included in the study because previous research has shown women and men may have different barriers to physical activity (Rimer, McBride, & Crump, 2001).

Participants were 279 adult women with arthritis. See Table 1 for demographic characteristics of the participants. Participants ranged in age from 18 to 83 years ( $M = 48.57$  years,  $SD = 13.33$ ), with 12 participants not reporting age. The mean body mass index (BMI) of the sample, calculated from self-reported weight and height, was  $29.29 \text{ kg/m}^2$  ( $SD = 7.98 \text{ kg/m}^2$ ), which indicated on average the sample population was overweight. The majority of the participants were Caucasians ( $n = 249$ : 88.9%) with Blacks ( $n = 12$ : 4.3%), Hispanics ( $n = 4$ : 1.4%), and Asians ( $n = 2$ : 0.7%), comprising the remainder of the sample. Thirteen participants did not report their race (4.7%). One hundred and sixty-two of the participants were married (58.1%), 56 participants (20.1%) were single, 31 (11.1%) participants were

divorced, 16 (5.7%) participants were not married but living with a partner, and 9 (3.2%) participants were widowed. Five participants did not report their marital status (1.8%). The majority of the participants were college graduates or had completed graduate school or a professional degree ( $n = 166$ : 59.5%). Participants were: employed full-time ( $n = 140$ : 50.2%), held multiple jobs ( $n = 32$ : 11.5%), unable to work ( $n = 29$ : 10.4%), employed part-time ( $n = 19$ : 6.8%), retired ( $n = 19$ : 6.8%), homemakers ( $n = 17$ : 6.1%), self-employed ( $n = 8$ : 2.9%), students ( $n = 7$ : 2.5%), or out of work ( $n = 6$ : 2.2%). Two (0.7%) participants did not report their employment status. The median household income reported by participants was \$50,000 to \$59,000 excluding 16 (5.7%) participants who did not report their income.

Two hundred and forty-eight participants (88.9%) reported doctor-diagnosed arthritis with the remainder reporting chronic joint symptoms (11.1%). The median number of years participants had arthritis was between six and ten years. Osteoarthritis was the most common type of arthritis ( $n = 89$ : 31.9%) followed by rheumatoid arthritis ( $n = 66$ : 23.7%), and having multiple types of arthritis ( $n = 65$ : 23.3%). Additional types of arthritis included other types ( $n = 21$ : 7.5%), fibromyalgia ( $n = 8$ : 2.9%), and lupus ( $n = 2$ : 0.7%). Twenty (7.2%) participants did not know their type of arthritis and eight (2.9%) participants did not provide a response. Two hundred and twenty-nine (82.1%) participants reported taking over the counter medication or prescription medication to control their arthritis pain. The pain experienced during a typical week from arthritis was 6 ( $SD = 1.96$ ) on a 1 (*no pain*) to 10 (*severe pain*) point scale. Two hundred thirty-six (84.6%) participants indicated that they were limited in activity participation (i.e., yes) due to the pain of their arthritis. One hundred and six (38.0%) participants reported having one or more co-morbid conditions (e.g., heart disease, high blood pressure, or cancer).



Table 1

*Sociodemographic Characteristics (N = 279)*

Characteristic	No.	%	Mean	SD	Median
Age	265		48.57	13.33	
BMI	279		29.29	7.98	27.45
Marital status	274				
Married	163	58.2			
Widowed	9	3.2			
Divorced	31	11.1			
Single	56	20.0			
Living with partner	16	5.7			
Race	267				
Asian	2	0.7			
American Indian	0				
Black or African American	12	4.3			
Hispanic	4	1.4			
Native Hawaiian	0				
White	249	88.9			
Education	279				
Some high school	8	2.9			
High school graduate	24	8.6			
Some college/tech school	81	29.0			
College graduate	94	33.7			

Table Continues

Table 1

*Sociodemographic Characteristics (N = 279)*

Characteristic	No.	%	Mean	SD	Median
Graduate school/professional degree	72	25.8			
Occupational status	277				
Employed full-time	140	50.0			
Employed part-time	19	6.8			
Homemaker	17	6.1			
Student	7	2.5			
Retired	20	7.1			
On disability	29	10.4			
Self-employed	8	2.9			
Out of work (>1 year)	5	1.8			
Out if work (<1 year)	1	0.4			
Multiple occupations	32	11.4			
Income	264				
\$0 - \$9,999	16	5.7			
\$10,000 - \$19,999	14	5.0			
\$20,000 - \$29,999	19	6.8			
\$30,000 - \$39,999	35	12.5			
\$40,000 - \$49,999	34	12.1			
\$50,000 - \$59,999	22	7.9			
\$60,000 - \$69,999	20	7.1			

Table Continues

Table 1

*Sociodemographic Characteristics (N = 279)*

Characteristic	No.	%	Mean	SD	Median
\$70,000 - \$79,999	20	7.1			
\$80,000 or more	84	30.0			
Medical conditions	235				
Lung disease	5	1.8			
High blood pressure	45	16.1			
Heart disease	2	0.7			
Diabetes	5	1.8			
Cancer	3	1.1			
None	129	46.1			
Multiple disease	44	15.7			
Years with arthritis	275				
Less than 1	28	10.0			
1-5 years	96	34.3			
6-10 years	67	23.9			
11-15 years	21	7.5			
16-20 years	21	7.5			
21 or more years	43	15.4			
Type of arthritis	271				
Rheumatoid arthritis	66	23.6			
Osteoarthritis	90	32.1			

Table Continues

Table 1

*Sociodemographic Characteristics (N = 279)*

Characteristic	No.	%	Mean	SD	Median
Fibromyalgia	8	2.9			
Lupus	2	0.7			
Other	21	7.5			
Don't know	20	7.1			
Multiple types	65	23.2			
Doctor-diagnosed arthritis	249	88.9			
Chronic joint symptoms	31	11.1			
Pain ranking 1 ( <i>no pain</i> ) to 10 ( <i>severe pain</i> )	279		5.47	1.96	6.00
Arthritis-related activity limitation	279				
Yes	236	84.6			
No	39	14.0			
Don't know	4	1.4			

## *Measures*

All data were collected through a web-based survey. The survey assessed demographic variables (e.g., age, income, and employment status) and arthritis-related variables (e.g., pain due to arthritis). The survey also assessed the dependent variable of moderate physical activity and the independent variables of barriers (i.e., presence and limitation).

### *Dependent Variable*

*Moderate Physical Activity.* Self-reported moderate physical activity was assessed using the 2001 Behavioral Risk Factor Surveillance System (BRFSS) questions (CDC, 2003). Moderate physical activity was first defined as: “Moderate exercise includes organized sports participation, as well as activities like brisk walking, swimming, cycling, dancing, gardening, and yard work. Moderate activities cause small increases in breathing or heart rate. You should be able to carry on a conversation when doing moderate activities” (see Appendix A). After reading this definition, participants indicated if they do moderate exercise for at least 10 minutes in a typical week (i.e., yes or no response). If answered affirmatively (*yes*), participants were asked two additional questions: (a) In a usual 7-day period how many days do you do moderate exercise? and (b) On each of these days how many minutes in total do you spend doing moderate exercise?

Each participant’s total moderate physical activity was calculated for the regression analysis. To do so, total bouts of moderate physical activity per week (i.e., number of days) was multiplied by the total number of minutes (i.e., number of minutes per day) spent on each bout. For the exploratory regression analyses, scores for days per week and minutes per day were used individually.

## *Independent Variables*

*Barrier Measures.* A 41-item researcher-provided list of barriers was utilized to assess the presence and extent of limitation of general barriers (i.e., common across populations) and arthritis-specific barriers (i.e., population specific) (see Appendix A). Prior to completing the barriers measure, participants were provided with a definition of barriers. Similar to prior research, barriers were defined as factors that may prevent or hinder an individual from being physically active (Gyurcsik et al., 2004). The 41 items were derived from pilot research (Bloomquist, Hillard, Gyurcsik, Hacker, & Morales, 2004), which involved four focus groups of adult women with arthritis as well as published research involving the identification of barriers to physical activity among adult women (Brittain, Baillargeon, McElroy, Aaron, & Gyurcsik, 2006). Of the 41 barriers, 25 barriers were general in nature. Of these 25 general barriers, 6 barriers were personal and 19 barriers were situational. The remaining 16 barriers were arthritis-specific, with 5 of these barriers being personal and 11 barriers being situational.

For each of the 41 barriers, participants indicated if the barrier was a "barrier" or was "not a barrier" to participating in moderate physical activity in a typical week (i.e., barrier presence). If participants responded that the item was a "barrier"; they then reported the extent to which the barrier limits participating in moderate physical activity in a typical week on a 0 (*doesn't limit me*) to 9 (*fully limits me*) scale (i.e., barrier limitation). Barriers have been assessed in this manner in previous research (Brittain et al., 2006). Barrier limitation was important to assess in addition to barrier presence in order to provide a more accurate measure of barrier influence on physical activity (Brawley et al., 1998). For example, two participants may identify that arthritis pain is a barrier to exercise (i.e., barrier is present).

However, this barrier may be very limiting for one woman because she has a low tolerance for pain but less limiting to another woman because her tolerance is higher.

General barrier presence and barrier limitation as well as arthritis-specific barrier presence and barrier limitation scores were calculated for each participant. Similar to prior research (Brittain et al., 2006), for general barrier presence, the total number of barriers reported as being present (i.e., responded was a “barrier”) was divided by the total number of possible general barriers (i.e., 25). This score represented the proportion of general barriers that were present for each participant. Similar to prior research (Brittain et al., 2006), to calculate general barrier limitation, a summation of all of the individual limitation scores was divided by the total number of barriers reported as being present for that individual. This score represented the average general barrier limitation for each participant and ranged from 0 (*doesn't limit me*) to 9 (*fully limits me*). For example, if a participant identified 7 barriers, with limitations of 4, 4, 6, 6, 8, 8, and 3, her general barrier presence score would be 0.28 and her general barrier limitation score would be 5.57. The same process was repeated when calculating arthritis-specific barrier presence and arthritis-specific barrier limitation scores for each participant.

### ***Recruitment and Procedures***

After approval by the Kansas State University Institutional Review Board in January 2006, a notice of the study and a link to the web-based survey were posted on various internet websites beginning in March 2006. To identify websites that might post the study notice and survey link, the search engine, Google, was utilized. Key words were entered into the search engine and included: arthritis, support group, physical activity, exercise, and self-management. Key words were entered in various combinations (see Appendix B) by the

researcher to further enhance the identification of possible sites for posting the study notice and survey link.

After reviewing the search results, the researcher visited the individual sites, and assessed the possibility of posting the survey. Preference was given to sites that offered access to educational information about arthritis, as well as some means of interaction available to visitors of the site, such as questions and answers, chat groups, or list-serves. Sites that promoted arthritis research and self-management strategies were also targeted. Once a site was identified, the researcher sent an email to the site's contact email address and sought permission to promote the study and post the survey link on the host's website. In addition, if a list-serve or method of emailing site members existed, a request was made that the link to the survey be sent to the members. All contact was made via email and information describing the study purposes was made clear. See Appendix C for a sample of the email and Appendix D for the informational flyer. Web-sites ( $n = 58$ ) contacted via email can be found in Appendix E. The snowballing technique in which individuals, who had participated in the study, forwarded the study on to other potential participants was also utilized. The survey link was accessible from March 2006 – March 2007 and individuals could complete the survey at a computer of their choosing. The survey took approximately 20 minutes to complete.

Participants accessing the survey were directed to the initial page, whereby they were informed that their participation was voluntary. In addition, they were informed that there were no right or wrong answers; that they were free to not answer any question, and they could withdraw from the study at anytime without consequence. Participation was anonymous.



Inclusion criteria for study participation included being a woman, aged 18 years or older, residing in the United States, and having arthritis (i.e., doctor-diagnosed or chronic joint symptoms as outlined above). Screening was done within the initial five questions of the survey (see Appendix A). In the first screening question participants identified their gender (i.e. female or male). If the response was male, participants were told that since the research was targeting women, they could not participate and were thanked for their interest. In the second screening question, participants were asked if they were residents of the United States (i.e. yes or no). If the response was no, individuals were ineligible for study participation and thanked for their interest. In the third screening question, participants were asked if a doctor had told them they had arthritis (i.e. yes or no). If individuals responded affirmatively, the survey was set up to immediately proceed to the demographics section. If individuals answered negatively, individuals then had to report if they had pain, aching, stiffness, or swelling in or around a joint in the past 12 months (i.e. yes or no); fourth screening question. If participants answered negatively, individuals were ineligible for study participation and thanked for their interest. If the response was yes, individuals were guided to the fifth screening question, which asked if the above mentioned symptoms were present on most days for at least a month (i.e. yes or no). If individuals responded negatively, individuals were ineligible for study participation and thanked for their interest. If individuals answered affirmatively, the survey was set up to proceed to the demographic section of the survey.

*Individuals Meeting Study Inclusion Criteria.* Four hundred and sixty-seven individuals accessed the online survey. However, 24 individuals responded as males, 19 individuals responded as not residing in the United States, 15 individuals did not respond to

the arthritis question, and 38 individuals responded that they did not have arthritis, neither doctor-diagnosed nor chronic joint symptoms. These 96 individuals were not permitted to complete the survey since they did not meet participant inclusion criteria. Of the 371 remaining individuals, 73 individuals did not complete any portion of the moderate physical activity measure on the survey. As this variable was crucial to the data analyses, these 73 individuals were removed from the data set. Two additional individuals were removed from the data set due to non-response for the general and arthritis-specific barrier limitation variables, leaving 296 participants in the data set.

### *Statistical Analyses*

Quantitative data were analyzed using the Statistical Package for the Social Sciences 13.0 (SPSS: SPSS, Inc., Chicago, Illinois). Data were initially screened through various analyses for accuracy of data entry, missing values, and the fit between their distributions and the assumptions of multivariate analysis. Descriptive statistics for the barrier study variables (general barrier presence, general barrier limitation, arthritis-specific barrier presence, and arthritis-specific barrier limitation) and the moderate physical activity variables (i.e., total moderate physical activity, days of moderate physical activity per week, and minutes of moderate physical activity per day) are presented first in the results section. Pearson bivariate correlations among the study variables and the outcome variables, as listed above, are then presented. Overall frequency scores for general and arthritis-specific barriers categorized as personal or situational are then presented. Further, barrier presence and limitation for each barrier item are presented.

Hierarchical multiple regression analysis was conducted in order to examine whether the study variables, as listed above, were predictive of participation in total moderate

physical activity, specifically, the total minutes of moderate physical activity per week. The order of entry of the predictors in the analysis was determined after theoretical considerations and past research (Tabachnik & Fidell, 2007). In the first step, demographic variables which were significantly correlated with the outcome variable (total moderate physical activity) were entered. The variables included BMI and education. The second step controlled for the arthritis-related variables of pain due to arthritis and arthritis-related activity limitation. In the third step, general barrier presence and general barrier limitation predictors were entered. Arthritis-specific barrier presence and arthritis-specific barrier limitation variables were entered on the fourth step in order to determine whether arthritis-specific barriers explained significant variance above and beyond general barriers.

Two additional hierarchical multiple regression analyses, exploratory in nature, were performed. The first exploratory analysis examined whether the variables included in the previous hierarchical regression analysis, were predictive of participation in physical activity when entering days per week as the dependent variable. The second exploratory analysis examined whether the same variables were predictive of participation in physical activity when minutes per day was the dependent variable.

## CHAPTER 3: Results

### *Data Screening*

The data from the initial study sample of 296 participants, who met study inclusion criteria, was examined through various SPSS programs for accuracy of data entry, missing values, and fit between their distributions and the assumptions of multivariate analysis. The total moderate physical activity variable was highly skewed (2.77), ( $n = 291$ ,  $M = 105.94$ ,  $SD = 145.32$ ). The moderate physical activity data were first checked for entry errors and found to be accurate, which suggested the presence of outliers and extreme cases. As such, standardized z-scores were calculated and investigated. Nine cases of standardized scores greater than 3.29 ( $p < .001$ ) were identified. To further check for univariate outliers and extreme cases, boxplots were utilized. An initial boxplot identified 11 cases as extreme or outliers. A follow-up boxplot revealed 5 more cases as outliers. To improve linearity and skewness for the total moderate physical activity variable, the 16 cases were deleted from the data set, resulting in a sample of 280 participants. Finally, residual casewise diagnostics run in the multiple regression analysis revealed one outlier that was greater than 3 standard deviations from the mean. This outlier was deleted from the data set, resulting in a final sample of 279 participants.

Five missing cases for total moderate physical activity remained in the final sample of 279 participants. These participants did have a response for performing moderate physical activity (1 = yes), but days per week and minutes per day were left blank, therefore producing a missing value for total moderate physical activity. These five missing values were replaced by 82, which was the mean score for the sample (Tabachnick & Fidell, 2007). After the aforementioned deletions and substitution of the sample mean, the average score of

total moderate physical activity was only slightly skewed (1.00), ( $N = 279$ ,  $M = 77.92$ ,  $SD = 81.13$ ).

Three missing values for education were replaced with an estimated value of central tendency, 4 (college graduate), three missing values for BMI were replaced by the mean for all cases ( $29.08 \text{ kg/m}^2$ ), four missing values for typical pain due to arthritis were replaced by 5 (moderate pain) the midpoint on the scale, and four missing values for limitation in activities due to arthritis pain were replaced with an estimated value of central tendency, 1 (yes) (Tabachnick & Fidell, 2007).

### *Descriptives*

Table 2 contains the proportions, means, standard deviations, and medians where appropriate for the barrier and physical activity variables used for the multiple regression analyses. Overall general barrier presence indicated that participants identified between 7 and 8 general barriers (i.e., out of a possible 25 general barriers). General barrier limitation ( $M = 6.15$ ,  $SD 2.39$ ) indicated that, on average, participants reported the general barriers as slightly more than moderately limiting on a scale of 0 (*doesn't limit me*) to 9 (*fully limits me*). Overall arthritis-specific barrier presence indicated that participants identified approximately 5 arthritis-specific barriers (i.e., out of a possible 16 arthritis-specific barriers). Arthritis-specific barrier limitation ( $M = 5.44$ ,  $SD 3.11$ ) indicated that, on average, participants reported the arthritis-specific barriers as moderately limiting on a scale of 0 (*doesn't limit me*) to 9 (*fully limits me*). Participants reported engaging in total moderate physical activity on almost 3 days in a typical week ( $M = 2.61$  days per week,  $SD = 2.18$ ) and approximately 20 minutes per day ( $M = 19.77$  minutes,  $SD = 18.42$ ) which resulted in participation in total moderate physical activity of almost 80 minutes per week ( $M = 77.92$  minutes,  $SD = 81.13$ ).

Table 2

*Barrier and Physical Activity Variables (N = 279)*

Variable	Proportion	Mean	SD	Median
General barrier presence 0 ( <i>no</i> ), 1 ( <i>yes</i> )	.30 <sup>a</sup>			
General barrier limitation 0 ( <i>doesn't limit me</i> ) to 9 ( <i>fully limits me</i> )		6.15	2.39	
Arthritis-specific barrier presence 0 ( <i>no</i> ), 1 ( <i>yes</i> )	.30 <sup>a</sup>			
Arthritis-specific barrier limitation 0 ( <i>doesn't limit me</i> ) to 9 ( <i>fully limits me</i> )		5.44	3.11	
Days per week of moderate physical activity		2.61	2.18	3.00
Minutes per day of moderate physical activity		19.77	18.42	20.00
Total moderate physical activity		77.92	81.13	60.00

<sup>a</sup>*n* = proportion could range from 0 – 1, 1 = presence of all general barriers or all arthritis-specific barriers.

### ***Bivariate Correlations***

Bivariate correlations between the study variables of education, BMI, pain due to arthritis, arthritis-related activity limitation, general barrier presence, general barrier limitation, arthritis-specific barrier presence, and arthritis-specific barrier limitation, and the outcome variables (i.e., total moderate physical activity, days per week, and minutes per day) are presented in Table 3. Education was positively and significantly correlated with total moderate physical activity ( $r = .25$ ). The more education a participant reported the greater the participation in total moderate physical activity. Activity limitation was positively and significantly correlated with total moderate physical activity ( $r = .18$ ). The remaining variables of BMI ( $r = -.26$ ), pain due to arthritis ( $r = -.24$ ), general barrier presence ( $r = -.35$ ), general barrier limitation ( $r = -.43$ ), arthritis-specific barrier presence ( $r = -.22$ ), and arthritis-specific barrier limitation ( $r = -.36$ ) were all negatively and significantly correlated with total moderate physical activity. As each of these variables increased, (i.e., higher BMI, more pain, more barriers and higher limitation) total moderate physical activity participation decreased.

Table 3

*Bivariate Correlations between Study Variables*

Variable	1	2	3	4	5	6	7	8	9	10	11
1. BMI	-	-.18**	-.08	.12*	.24**	.25**	.23**	.23**	-.23**	-.24**	-.26**
2. Education		-	.07	-.29**	-.13*	-.22**	-.19**	-.22**	.17**	.23**	.25**
3. Activity limitation			-	-.44**	-.08	-.19**	-.39**	-.47**	.05	.16**	.18**
4. Pain				-	.16**	.27**	.43**	.57**	-.15*	-.22**	-.24**
5. G B presence					-	.60**	.52**	.44**	-.17**	-.32**	-.35**
6. G B limitation						-	.38**	.49**	-.23**	-.40**	-.43**
7. A-S B presence							-	.68**	-.07	-.20**	-.22**
8. A-S B limitation								-	-.21**	-.31**	-.36**
9. PA days per week									-	.63**	.80**
10. PA min. per day										-	.88**
11. PA total											-

*Note.* N = 279. The acronyms are as follows: BMI = body mass index, Activity Limitation = activity limitation due to pain, G B presence = general barrier presence, G B limitation = general barrier limitation, A-S B presence = arthritis-specific barrier presence, A-S B limitation = arthritis-specific barrier limitation, PA days per week = moderate physical activity by days per week, PA min. per day = moderate physical activity by minutes per day, PA total = total moderate physical activity.

\* $p < .05$ .

\*\* $p < .01$ .



### ***Barrier Presence and Mean Limitation Scores***

Table 4 presents the presence and mean limitation scores for all barrier items included on the survey. Two general personal barriers, *the temperature outside keeps me from exercising* (56.60%;  $M_{limitation} = 7.10$ ) and *I can't find a time to exercise that fits with my schedule* (50.50%;  $M_{limitation} = 7.04$ ) were reported by over 50% of the sample. Frequently cited general situational barriers included *working long hours makes me tired so I don't feel like exercising* (54.80%;  $M_{limitation} = 7.51$ ) and *my health insurance doesn't cover exercise costs* (e.g. memberships, programs) (45.2%;  $M_{limitation} = 7.42$ ).

Three arthritis-specific personal barriers were frequently reported by the participants. *I don't exercise because of the pain from my arthritis* (67.00%;  $M_{limitation} = 7.23$ ), *I don't exercise because my arthritis limits what my body can do* (60.60%;  $M_{limitation} = 7.17$ ), and *arthritis makes my body and joints too stiff to exercise* (57.70%;  $M_{limitation} = 6.89$ ) were all reported by more than 50% of the sample. Two of the most frequently cited arthritis-specific situational barriers were *the local fitness facility doesn't offer arthritis-specific programs* (31.90%;  $M_{limitation} = 7.21$ ) and *there aren't any exercise programs for people with arthritis in the community where I live* (29.40%;  $M_{limitation} = 7.96$ ).

Table 4

*Barrier Presence and Mean Limitation for all Barrier Survey Measures*

<b>BARRIERS</b> Total Sample (N = 279)	Barrier Presence		M <sub>limit</sub> (SD)
	n	%	
<b><u>General Personal</u></b>			
The temperature outside keeps me from exercising.	158	56.6	7.10 (1.96)
I can't find a time to exercise that fits with my schedule.	141	50.5	7.04 (2.00)
When I exercise around other people, I'm worried about how my body looks.	111	39.8	7.06 (2.09)
I don't feel like I am athletic enough to be a part of an exercise group.	105	37.6	6.68 (2.18)
I don't like changing into and out of exercise clothes.	68	24.4	6.15 (2.18)
I have an injury or health issue (not arthritis) that stops me from exercising	61	21.9	6.89 (2.32)
<b><u>General Situational</u></b>			
Working long hours makes me tired so I don't feel like exercising.	153	54.8	7.51 (2.08)
My health insurance doesn't cover exercise costs (e.g. memberships, programs)	126	45.2	7.42 (2.76)
I have a hard time scheduling an exercise time with another person.	112	40.1	6.40 (2.12)
I don't have time to exercise because I spend so much time at work.	109	39.1	7.39 (2.03)
When I go to a place to exercise, other people exercising there make me feel uncomfortable.	108	38.7	6.86 (2.04)

Table Continues

Table 4

*Barrier Presence and Mean Limitation for all Barrier Survey Measures*

<b>BARRIERS</b> Total Sample (N = 279)	Barrier Presence		M <sub>limit</sub> (SD)
	n	%	
I don't exercise because it costs too much for memberships/participation.	106	38.0	7.80 (2.34)
It's hard for me to find someone with similar skills to exercise with.	102	36.6	6.73 (2.03)
It takes too much time to get to and from an exercise facility.	101	36.2	6.92 (1.94)
There are no free exercise facilities where I can go to in the community where I live.	98	35.1	7.51 (2.75)
My workplace doesn't have a place to exercise.	91	32.6	6.36 (2.68)
There are no streetlights in my neighborhood so it is hard for me to exercise at night.	73	26.2	7.33 (2.49)
Being on a fixed income (Social Security) makes it difficult for me to afford to exercise (e.g. memberships, programs).	50	17.9	7.76 (2.74)
I have to take care of children/grandchildren so I don't have time to exercise.	45	16.1	6.91 (2.13)
My friends don't exercise.	44	15.8	6.77 (1.92)
My spouse/partner doesn't exercise	43	15.4	6.49 (2.56)
It is unsafe in my neighborhood to exercise.	38	13.6	6.89 (2.81)
There are no public parks/trails that I can use for exercise in the community where I live.	34	12.2	7.26 (2.60)

Table Continues

Table 4

*Barrier Presence and Mean Limitation for all Barrier Survey Measures*

<b>BARRIERS</b> Total Sample (N = 279)	Barrier Presence		M <sub>limit</sub> (SD)
	<i>n</i>	%	
My spouse/partner isn't supportive of me exercising.	24	8.6	5.75 (2.27)
My friends aren't supportive of me exercising.	15	5.4	5.80 (2.43)
<b><u>Arthritis-Specific Personal</u></b>			
I don't exercise because of the pain from my arthritis.	187	67.0	7.23 (1.91)
I don't exercise because my arthritis limits what my body can do.	169	60.6	7.17 (1.98)
Arthritis makes my body and joints too stiff to exercise.	161	57.7	6.89 (2.14)
Having arthritis makes me feel down in the dumps so I don't exercise.	123	44.1	6.58 (2.24)
I don't exercise because I'm afraid I might fall due to my arthritis.	55	19.7	6.71 (2.43)
<b><u>Arthritis-Specific Situational</u></b>			
The local fitness facility doesn't offer arthritis-specific programs.	89	31.9	7.21 (2.50)
There aren't any exercise programs for people with arthritis in the community where I live.	82	29.4	7.56 (2.33)
Exercise class instructors don't tell me how to do the exercises differently when my arthritis flares up.	81	29.0	7.30 (2.49)
Exercise class instructors don't consider the pain I have from my arthritis when teaching the class.	73	26.2	7.14 (2.37)

Table Continues

Table 4

*Barrier Presence and Mean Limitation for all Barrier Survey Measures*

<b>BARRIERS</b> Total Sample (N = 279)	Barrier Presence		M <sub>limit</sub> (SD)
	<i>n</i>	%	
Exercise class instructors don't consider how arthritis limits my body when teaching the class.	72	25.8	7.10 (2.46)
Exercise class instructors don't consider the stiffness I have from my arthritis when teaching the class.	71	25.4	7.10 (2.49)
I don't know others who exercise and also have arthritis.	71	23.0	6.70 (2.57)
My local/state policy makers don't make laws to make it easy for people with arthritis to exercise.	54	19.4	7.69 (2.21)
The sidewalks where I want to exercise are in bad shape making it hard for me to exercise when my arthritis flares up.	52	18.6	7.02 (2.46)
My friends don't want me to exercise because I have arthritis.	10	3.6	6.40 (3.01)
My spouse/partner doesn't want me to exercise because I have arthritis.	7	2.5	6.86 (2.85)

### ***Hierarchical Multiple Regression Analysis***

Table 5 presents the results of the hierarchical multiple regression analysis predicting total moderate physical activity as well as the statistical changes per step. Each step accounted for a significant additional amount of variance. Step 1 (BMI and education) explained 10% of the variance. Step 2 (pain and activity limitation) explained an additional 3% of the variance. Step 3 (general barrier presence and limitation) increased the explained variance by 11% and Step 4 (arthritis-specific barrier presence and limitation) accounted for another 2% of the variance. The combination of variables significantly predicted participation in total moderate physical activity,  $F(8,278) = 12.26, p < .001, R^2_{\text{adjusted}} = .25$ , with six variables significantly contributing to the prediction. As hypothesized, general and arthritis-specific barrier presence and limitation were significantly independent predictors. The beta weights, presented in Table 5, revealed that general barrier limitation contributed the most to predicting total moderate physical activity participation. Education and BMI were also significant independent predictors.

Table 5

*Prediction of Total Moderate Physical Activity  
Using Hierarchical Multiple Regression Analysis (N =279)*

Model	R <sup>2</sup> Adjusted	Std. Error of the Estimate	Change Statistics				
			R <sup>2</sup> Change	F Change	df1	df2	Standardized Beta
Step 1	.10**	76.84	.11**	16.95	2	276	
Education							.13*
BMI							-.14*
Step 2	.13**	75.69	.03**	5.22	2	274	
Pain							-.05
Activity limitation							.06
Step 3	.23**	71.15	.11**	19.08	2	272	
General barrier presence							-.16*
General barrier limitation							-.22**
Step 4	.25*	70.51	.02*	3.47	2	270	
Arthritis-specific barrier presence							.18*
Arthritis-specific barrier limitation							-.19*

\* $p < .05$ .

\*\* $p < .01$ .

### *Exploratory Hierarchical Multiple Regression Analyses*

Table 6 presents the exploratory hierarchical multiple regression analysis predicting days per week of moderate physical activity and statistical changes per step. Steps 1 (BMI and education), 3 (general barrier presence and limitation), and 4 (arthritis-barrier presence and limitation) accounted for a significant additional amount of variance. Step 2 (pain and activity limitation) did not account for any additional variance. The full combination of variables significantly predicted participation in days per week of moderate physical activity,  $F(8,278) = 4.76, p < .001, R^2 \text{ adjusted} = .12$ , with three variables significantly contributing to the prediction. The beta weights, presented in Table 6, revealed that BMI contributed the most to predicting participation in days per week of moderate physical activity. Arthritis-specific barrier presence and arthritis-specific barrier limitation were also significant independent predictors.



Table 6

*Prediction of Moderate Physical Activity Days per Week  
Using Hierarchical Regression Analysis (N = 279)*

		<i>Change Statistics</i>						
Model		R <sup>2</sup> Adjusted	Std. Error of the Estimate	R <sup>2</sup> Change	F Change	df1	df2	Standardized Beta
Step 1	Education	.06**	2.11	.07**	10.39	2	276	.09
	BMI							-.17**
Step 2	Pain	.07	2.11	.01	1.37	2	274	-.07
	Activity limitation							-.03
Step 3	General barrier presence	.08*	2.09	.02*	3.13	2	272	-.08
	General barrier limitation							-.10
Step 4	Arthritis-specific barrier presence	.12*	2.07	.02*	3.66	2	270	.21**
	Arthritis-specific barrier limitation							-.19*

\* $p < .05$ .

\*\* $p < .01$ .

### *Exploratory Hierarchical Multiple Regression Analyses*

Table 7 presents the hierarchical multiple regression analysis predicting minutes per day of moderate physical activity and the statistical changes per step. Steps 1 (BMI and education), 2 (pain and activity limitation), and 3 (general barrier presence and limitation) accounted for a significant amount of variance whereas Step 4 (arthritis-specific barrier presence and limitation) did not contribute additional significant variance. Step 2 explained an additional 3% of the variance. Step 3 increased the explained variance by 10%. The combination of variables significantly predicted participation of minutes per day of moderate physical activity,  $F(8,278) = 9.86, p < .001, R^2 \text{ adjusted} = .20$ , with four variables significantly contributing to the prediction. The beta weights, presented in Table 7, revealed that general barrier limitation contributed the most to predicting participation of minutes per day of moderate physical activity. Education, BMI, and general barrier presence were also significant independent predictors.

Table 7

*Prediction of Moderate Physical Activity by Minutes per Day  
Using Hierarchical Multiple Regression (N=279)*

		<i>Change Statistics</i>						
Model		R <sup>2</sup> Adjusted	Std. Error of the Estimate	R <sup>2</sup> Change	F Change	df1	df2	Standardized Beta
Step 1	Education	.09**	17.61	.09**	14.10	2	276	.13*
	BMI							-.12*
Step 2	Pain	.11*	17.43	.03*	3.99	2	274	-.05
	Activity limitation							.07
Step 3	General barrier presence	.20**	16.50	.10**	16.78	2	272	-.15*
	General barrier limitation							-.23**
Step 4	Arthritis-specific barrier presence	.20	16.45	.01	1.90	2	270	.15
	Arthritis-specific barrier limitation							-.12

\* $p < .05$ .

\*\* $p < .01$ .

## CHAPTER 4: Discussion

This study examined a broad-range of general and arthritis-specific perceived barriers and their relationship to participation in moderate physical activity among women with arthritis. Consistent with the study hypothesis, general and arthritis-specific barrier presence and barrier limitation predicted participation in moderate physical activity among women with arthritis. Specifically, as barrier presence and barrier limitation increased, participation in moderate physical activity decreased.

### *Perceived Barriers and Women with Arthritis*

The present study found that higher presence of perceived barriers and limitation predicted lower levels of participation in moderate physical activity among women with arthritis. These findings support previous research by Osuji et al. (2006) who also found a dose-response relationship between the quantity of barriers identified and meeting physical activity recommendations among a sample of rural women. As suggested by both studies, barriers likely play an important role in the lack of participation in physical activity.

In contrast, Gecht et al. (1996) reported a weak association between barriers and participation in physical activity among a small group of people with arthritis. Neuberger, Kasal, Smith, Hassanein, and DeViney, (1994) investigated determinants of exercise in people with arthritis, including barriers to participation. Contrary to the findings in the present study, barriers were not identified as predictors of exercise. A possible explanation for the inconsistency in findings between the present study and the works of Gecht et al. (1996) and Neuberger et al (1994) may exist in the barrier measures used.

The present study was the first to identify and use a broad range of general and arthritis-specific barriers as well as to assess both the presence *and* limitation of such barriers

among women with arthritis. Specifically, this study found that personal general barriers and barrier limitations such as, *the temperature outside keeps me from exercising* and *I can't find a time to exercise that fits with my schedule* were the most frequently reported and were found to be highly limiting. The latter finding is similar to those of Brittain et al.'s (2006) investigation of barriers to physical activity in which they found time constraints important predictors of physical activity. These findings suggest that general barriers, specific to time management, may provide pertinent information regarding the relationship between barriers and physical activity.

Situational general barriers and barrier limitations pertaining to work and costs, such as *working long hours makes me tired so I don't feel like exercising* and *my health insurance doesn't cover exercise costs (e.g. memberships, programs)* were the most prevalent barriers cited in the present study. For individuals who identified these barriers, moderately high limitation was also reported. Jaffee, Lutter, Rex, Hawkes and Bucaccio (1999) found similar results in their examination of working women. Specifically, lack of time in the work day was reported most often. Situational barriers related to work, community, and public policy are important factors when identifying barriers to physical activity among women.

Interestingly, in the present study, women with arthritis did not identify the general barriers *my friends aren't supportive of me exercising* and *my spouse/partner isn't supportive of me exercising* as important. These findings imply women were able to develop personal networks to gain social support. This finding was in contrast to the results reported by Osuji and colleagues (2006) in which they found a lack of social support to hinder meeting physical activity recommendations among a group of rural women. The contrast to the present study may be related to the particularities of study samples, that is, women with

arthritis have created social support networks that encourage physical activity, whereas women in rural communities may find difficulty in doing so.

Arthritis-specific personal barriers and barrier limitations related to pain such as, *I don't exercise because of the pain from my arthritis*, *I don't exercise because my arthritis limits what my body can do*, and *arthritis makes my body and joints too stiff to exercise* were reported by more than half of the sample. These findings are similar to Davis et al.'s (2002) study which identified pain management barriers, such as reluctance to be physically active, among older adults with arthritis. Der Ananian, Wilcox, Saunders, Watkins, and Evans (2006) found pain to be the most common barrier to exercise and limited exercise participation for nonexercisers and insufficiently active people with arthritis. These similarities suggest that pain is an important factor when identifying barriers to participation in physical activity among women with arthritis.

Arthritis-specific situational barriers and barrier limitations frequently cited included items related to availability of programs for people with arthritis, such as *the local fitness facility doesn't offer arthritis-specific programs* and *there aren't any exercise programs for people with arthritis in the community where I live*. A high degree of limitation was reported for these arthritis-specific barriers. Similarly, Der Ananian, Wilcox, Abbot et al.'s (2006) focus group study reported the lack of availability of individualized tailored programs as a major concern among insufficiently active people with arthritis. These findings suggest it is likely important to identify community barriers to participation in physical activity among people with arthritis.

Four of the situational arthritis-specific barriers identified in the present study specifically targeted group exercise instructors' knowledge of physical limitations among

women with arthritis. These barriers were identified with a moderate degree of limitation by nearly 25% of the sample. Wilcox et al. (2006) reported that both exercisers and nonexercisers with arthritis described the need for instructors who understand issues related to arthritis and exercise. These findings suggest that fitness professionals should be better educated regarding the physical limitations among women with arthritis.

An interesting statistical finding related to the arthritis-specific barrier presence predictor variable was identified. As expected, initial investigation of arthritis-specific barrier presence and its relationship to physical activity was found to be negatively correlated; that is, the more arthritis-specific barriers identified; the lower levels of participation in physical activity. However, findings from the hierarchical multiple regression indicated that arthritis-specific barrier presence predicted higher participation in physical activity. Close inspection of the regression revealed that arthritis-specific barrier presence acted as a net or negative suppressor on arthritis-specific barrier limitation. Identification of a suppressor variable may account for an enhancement of another variable by suppression of its irrelevant variance (Tabachnick and Fidell, 2007).

Findings from the exploration of physical activity as measured by days per week identified arthritis-specific barrier presence and barrier limitation as having a significant, but weak association with participation in moderate physical activity. It is possible that barriers specific to arthritis, for example, pain or lack of facilities, may prevent women with arthritis from participating in physical activity on a regular schedule (e.g., three times a week). Another possible explanation for these findings may be related to physical limitations of arthritis. “Flare-ups” may prevent people with arthritis from participating in physical activity even when they have the desire.

In the second exploratory analysis, general barrier presence and barrier limitation significantly predicted physical activity as measured by minutes per day. General barriers for example, lack of time or too tired, may have a greater influence on how much actual time is spent or not spent participating in physical activity as a result of work or other obligations.

These differences found in the exploratory analyses may also be the result of the failure of the physical activity measurement tool to accurately capture participation in physical activity. Use of other measures of physical activity, for example a diary or log, may provide a more precise report of participation in physical activity. Further research is certainly needed to better understand the implication regarding measuring physical activity.

### ***Strengths***

The current study had several strengths. In particular, the study attempted to overcome some of the methodological issues found in previous barriers research. First, the present study was the first to assess the extent of barrier limitation of both general and arthritis-specific barriers among women with arthritis. Assessment of barrier limitation is important and may aid in the identification of true reasons or barriers for not being active. For example, although, *I don't exercise because it costs too much for memberships/participation and my local/state policy makers don't make laws to make it easy for people with arthritis to exercise* were not the most prevalent barriers cited, they were identified as highly limiting.

Second, similar to Wilcox et al. (2006), the present study used aspects of social cognitive theory (Bandura, 1986) to identify salient barriers, including both personal and situational factors. Identifying personal and situational barriers is important to gain a more complete understanding of the role of barriers on participation in physical activity.



Specifically, the ability to identify not only internal factors that prevent participation in physical activity, but also to reveal that barriers found within social and environmental surroundings provide a greater understanding of obstacles to participation encountered by women with arthritis.

Third, the present study identified general and population-specific barriers, similar to other studies by Gyurcsik et al. (2004) and Brittain et al. (2006). Identifying general and population-specific barriers may provide better insight into the barriers that present themselves under specific health conditions, for example arthritis. As the present study's findings suggest, barriers specific to women with arthritis have an important relationship with participation in physical activity.

Finally, the study also expands the limited amount of current research on women with arthritis. Several studies have identified and examined barriers among people with arthritis (Gecht et al., 1995, & Wilcox et al., 2006); however none have expressly targeted women. The findings from this study suggest that gender-specific factors, such as *when I exercise around other people, I'm worried about how my body looks* and *I don't like changing into and out of exercise clothes* may be important to understanding participation in physical activity.

### ***Limitations***

Several limitations may have impacted the results of the present study. First, study demographics may present limitations. Similar to studies by Davis et al. (2002) mostly white, well-educated and affluent women with arthritis participated in the present study. Therefore, findings may not be generalized to the population of women with arthritis as a whole.

Second, findings from this study were based on a self-report recall measure for

physical activity. While this type of measure is cost effective and easy to use, it is subject to both socially desirable responses (answering to please) and poor memory (Lox, Ginis, & Petruzzello, 2006). Use of objective or technological devices such as pedometers or observational techniques such as recording attendance by a fitness leader may provide for a more accurate measure of physical activity.

Finally, the use of a computer-based survey allowed only people with computer access and computer skills to participate, thus excluding a population of women with arthritis that do not have computer access or skills. Computers also are susceptible to error, both technological and human.

### ***Future Directions***

Future research on barriers to physical activity among women with arthritis should incorporate a measure of barrier frequency in addition to barrier presence and barrier limitation. Addition of barrier frequency would enhance the measure by including specific counts or occurrences for each barrier and therefore capture barriers that are more variable and temporary (Brawley et al., 1998). Identifying that a barrier is present and limiting is important, but also knowing how often the barrier occurs may provide a more accurate determination of the influence of a barrier on participation in physical activity.

Future investigation of general and arthritis-specific barriers should look at specific types of arthritis. Identifying arthritis-specific barriers for specific types of arthritis may provide a clearer understanding of the obstacles encountered within a particular population. For example, due to the nature of the disease, people with rheumatoid arthritis may experience more barriers associated with pain, fatigue, and depression.

In addition to utilizing a researcher provided list of both general and arthritis-specific barriers, such as this one, future research could benefit from using open-ended items allowing for barriers to be elicited from the study population. An open-ended approach may generate a greater identification of barriers to physical activity and may provide a more extensive and thorough base of barriers to examine among women with arthritis. In particular, identification of arthritis-specific barriers may be more forthcoming when allowing for individual experiences to be reported.

Finally, including a measure of self-efficacy may help identify additional correlates of physical activity important to women with arthritis. Efficacy beliefs about overcoming barriers may predict the adoption of participation in physical activity. In addition, gaining information about overcoming identified barriers could provide for future intervention programs that incorporate self-management strategies for women with arthritis to become active.

### *Summary*

The present study found that barrier presence and barrier limitation predicted participation in physical activity among women with arthritis. Barriers were categorized as personal and situational in an attempt to capture a broad range of barriers pertaining to personal as well as social and environmental surroundings. Barriers were also identified as either general or arthritis-specific. Identification of barriers across common populations is important, however, eliciting barriers specific to arthritis provides valuable information unique to the population. Capturing the limitation of the barrier presence provided useful information about the specific individual influence of the barrier. The identification of both general and arthritis-specific personal and situational barriers and the extent of barrier

limitation to participation in physical activity can guide the design and implementation of interventions that are likely to impact the health of women with arthritis by addressing barriers to physical activity.

## References

- Arthritis Foundation, Association of State and Territorial Health Officials, and Centers for Disease Control and Prevention. (1999). *National arthritis action plan: A public health strategy*. Atlanta (GA): Centers for Disease Control and Prevention.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bandura, A. (2004). Health promotion by social cognitive means. *Health Education & Behavior, 31*(2), 143-164.
- Bloomquist, C. D., Hillard, S., Gyurcsik, N. C., Hacker, T., & Morales, R. (2004). An investigation of barriers to physical activity among women with arthritis using an ecological approach. [Abstract]. *Journal of Sport and Exercise Psychology, 26*(S37)
- Brawley, L. R., Martin, K. A., & Gyurcsik, N. C. (1998). Problems in assessing perceived barriers to exercise: Confusing obstacles with attributions and excuses. In J. Duda (Ed.), *Advances in sport and exercise psychology measurement* (pp. 337-350). Morgantown, WV: Fitness Information Technology.
- Brittain, D. R., Gyurcsik, N. C., & McElroy, M. (in press). Perceived barriers to physical activity among adult lesbians. *Women in Sport and Physical Activity Journal*.

Brittain, D. R., Baillargeon, T., McElroy, M., Aaron, D., & Gyurcsik, N. C. (2006). Barriers to moderate physical activity in adult lesbians. *Women & Health, 43*(1), 75-92.

Centers for Disease Control and Prevention. (2002). Prevalence of self-reported arthritis or chronic joint symptoms among adults, US 2001. *Morbidity and Mortality Weekly Report, 51*(42), 948-950.

Centers for Disease Control and Prevention. (2003). Prevalence of physical activity, including lifestyle activities among adults, US 2000-2001. *Morbidity and Mortality Weekly Report, 53*(32), 764-769.

Centers for Disease Control and Prevention. (2008). *Targeting arthritis: Improving quality of life for more than 46 million Americans*. Retrieved April 2, 2008, from [http://www.cdc.gov.er.lib.ksu.edu/nccdphp/aag/aag\\_arthritis.htm](http://www.cdc.gov.er.lib.ksu.edu/nccdphp/aag/aag_arthritis.htm)

Clyman, B. (2001). Exercise in the treatment of osteoarthritis. *Current Rheumatology Reports, 3*, 520-523.

Davis, G. C., Hiemenz, M. L., & White, T. L. (2002). Barriers to managing chronic pain of older adults with arthritis. *Journal of Nursing Scholarship, 34*(2), 121-126.

Der Ananian, C., Wilcox, S., Abbott, J., Vrazel, J., Ramsey, C., Sharpe, P., et al. (2006). The exercise experience in adults with arthritis: A qualitative approach. *American Journal of Health Behavior, 30*(6), 731-744.

Der Ananian, C., Wilcox, S., Saunders, R., Watkins, K., & Evans, A. (2006). Factors that influence exercise among adults with arthritis in three activity levels. *Preventing Chronic Disease; Public Health Research, Practice, and Policy*, 3(3), 1-16.

Dube, M., Valois, P., Prud'homme, D., Weisnagel, S. J., & Lavoie, C. (2006). Physical activity barriers in diabetes: Development and validation of a new scale. *Diabetes Research and Clinical Practice*, 72(1), January 15, 2006.

Ettinger, W. H., Jr, B. R., Messier, S. P., Applegate, W., Rejeski, W. J., Morgan, T., et al. A randomized trial comparing aerobic exercise and resistance exercise with a health education program in older adults with knee osteoarthritis. The fitness arthritis and seniors trial (FAST). *JAMA*, 277(1), 25-31.

Fontaine, K., Heo, M., & Bathon, J. (2004). Are US adults with arthritis meeting public health recommendations for physical activity? *Arthritis & Rheumatism*, 50(2), 624-628.

Gecht, M. R., Connell, K. J., Sinacore, J. M., & Prohaska, T. R. (1996). A survey of exercise beliefs and exercise habits among people with arthritis. *Arthritis Care and Research*, 9(2), 82-88.

Gyurcsik, N. C., Bray, S. R., & Brittain, D. R. (2004). Coping with barriers to vigorous physical activity during transition to university. *Family and Community Health*, 27(2), 130-142.

- Heesch, K. C., & Masse, L. C. (2004). Lack of time for physical activity: Perception of reality for African American and Hispanic women? *Women & Health, 39*(3), 45-62.
- Hootman, J. M., & Helmick, C. G. (2006). Projections of US prevalence of arthritis and associated activity limitations. *Arthritis & Rheumatism, 54*(1), 226-229.
- Jaffee, L., Lutter, J., Rex, J., Hawkes, C., & Bucaccio, P. (1999). Incentives and barriers to physical activity for working women. *American Journal of Health Promotion, 13*(4), 215-218.
- King, A., Castro, C., Wilcox, S., Eyler, A., Sallis, J., & Brownson, R. (2000). Personal and environmental factors associated with physical inactivity among different racial-ethnic groups of U.S. middle-aged and older-aged women. *Health Psychology, 19*(4), 354-364.
- Lox, C., Ginis, K., & Petruzzello, S. (2006). *The psychology of exercise: Intergrading theory and practice* (2nd ed.). Scottsdale, Arizona: Holcomb Hathaway.
- Minor, M., Stenström, C., Klepper, S., Hurley, M., & Ettinger, W. (2003). Work group recommendations: 2002 exercise and physical activity conference, St. Louis, Missouri. *Arthritis & Rheumatism, 49*(3), 453-454.
- Myers, R. S., & Roth, D. L. (1997). Perceived benefits of and barrier to exercise and stage of exercise adoption in young adults. *Health Psychology, 16*(3), 277-283.



- Neuberger, G. B., Kasal, S., Smith, K. V., Hassanein, R., & DeViney, S. (1994). Determinants of exercise and aerobic fitness in outpatients with arthritis. *Nursing Research, 43*(1), 11-17.
- Osuji, T., Lovegreen, S., Elliot, M., & Brownson, R. (2006). Barriers to physical activity among women in the rural Midwest. *Women & Health, 44*(1), 41-55.
- Rejeski, B., Focht, C., Messier, S., Morgan, T., Pahor, M., & Pennix, B. (2002). Obese, older adults with knee osteoarthritis: Weight loss, exercise, and quality of life. *Health Psychology, 21*(5), 419-426.
- Rejeski, W. J., Brawley, L. R., & Shumaker, S. (1996). Physical activity and health-related quality of life. *Exercise and Sport Sciences Review, 24*, 71-108.
- Reynolds, F. (2001). Strategies for facilitating physical activity and wellbeing: A health promotion perspective. *British Journal of Occupational Therapy, 64*(7), 330-336.
- Rimer, B. K., McBride, C. M., & Crump, C. (2001). Women's health promotion. In A. Baum, A. Revenson & J. E. Singer (Eds.), *Handbook of health psychology* (pp. 519-540). Mahwah, New Jersey: Lawrence Earlbaum Associates.
- Robertson, D., & Keller, K. (1992). Relationships among health beliefs, self-efficacy, and exercise adherence in patients with coronary artery disease. *Heart and Lung, 21*, 56-63.

- Shaw, S., & Henderson, K. (2000). Physical activity, leisure, and women's health. In L. Sherr, & J. St. Lawrence (Eds.), *Women, health and the mind*. Chichester, U.K.: John Wiley & Sons.
- Shih, M., Hootman, J., Kruger, J., & Helmick, C. (2006). Physical activity in men and women with arthritis national health interview survey, 2002. *American Journal of Preventive Medicine*, 30(5), January 15, 2008.
- Stenström, C. H., & Minor, M. (2003). Evidence for the benefit of aerobic and strengthening exercise in rheumatoid arthritis. *Arthritis & Rheumatism*, 49(3), 428-434.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Needham Heights, MA: Allyn & Bacon.
- Verhoef, M. J., Love, E. J., & and Rose, M. S. (1992). Women's social roles and their exercise participation. *Women & Health*, 19, 15-29.
- Wilcox, S., Der Ananian, C., Abbott, J., Vrazel, J., Ramsey, C., Sharpe, P., et al. (2006). Perceived exercise barriers, enablers, and benefits among exercising and nonexercising adults with arthritis: Results from a qualitative study. *Arthritis & Rheumatism (Arthritis Care & Research)*, 55(4), 616-627.

**APPENDIX A**  
**BARRIER SURVEY**

(Reduced Font)

## **Barrier Survey**

Your participation in this study is entirely voluntary and anonymous. Participation in the study will not result in any foreseeable risks to yourself. Please read each question carefully and complete it to the best of your ability. There are no right or wrong answers so please give your immediate reaction. You are free to not answer any question. You can withdraw from this study at any time without consequence. This survey will take about 20 minutes to complete.

Thank you for your participation.

For information regarding the rights of human subjects, contact Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 1 Fairchild Hall, Manhattan, KS, 66506, (785)532-3224.

For additional information on the study, please contact Sara Hillard, Graduate Masters Student, Department of Kinesiology, 1A Natatorium, Manhattan, KS, 66506, [shillard@ksu.edu](mailto:shillard@ksu.edu), (785)317-4611.

If you would like to receive an electronic a copy of the results, please email the lead researcher, Sara Hillard at [shillard@ksu.edu](mailto:shillard@ksu.edu).

If you would like to receive a paper copy of the results, please call Sara Hillard at (785)317-4611.

**1) What is your gender (check ✓ one):**

Female     Male

**2) Are you a resident of the United States (check ✓ one):**

Yes  No

**3) Has a Doctor told you that you have arthritis (check ✓ one):**

Yes  No

**4) In the past 12 months, did you have pain, aching, stiffness, or swelling in or around a joint (check ✓ one):**

Yes  No

**5) If YES, were these symptoms present on most days for at least a month (check ✓ one):**

Yes  No

**NOTE:**

**These screening questions will direct participants to one of two options on the online survey:**

**1 – They will meet the criteria and be asked to complete the barriers survey.**

**or**

**2- They will be thanked for their time, but informed that the survey is specifically looking at women with arthritis (doctor diagnosed or by the chronic joint symptom definition) who are residents of the United States.**

**1) Highest year of school that you have completed (check ✓ one):**

- Some high school                       High school graduate                       Some college or technical school
- College graduate                       Graduate school or professional degree

**2) What is your birthdate:** \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_?  
Month                      Day                      Year

**3) How tall are you without your shoes:** \_\_\_\_\_ Feet \_\_\_\_\_ Inches

**4) How much do you weigh without your shoes:** \_\_\_\_\_ lbs.

**5) Which one or more of the following would you say is your race (check ✓ all that apply):**

- White                       Black or African American                       American Indian
- Asian                       Native Hawaiian or Other Pacific Islander                       Other: \_\_\_\_\_ (please write down)

**6) What is your marital status (check ✓ one):**

- Single                       Married                       Divorced                       Widowed                       Not married, but living with a partner

**7) Are you currently (check ✓ all that apply):**

- Employed full-time                       Employed part-time                       A Homemaker                       A Student                       Retired                       On Disability
- Self-employed                       Out of work for more than 1 year                       Out of work for less than 1 year

**8) Your household TOTAL INCOME from ALL SOURCES (check ✓ one):**

- \$0-9,999                       \$10,000-19,999                       \$20,000-29,999                       \$30,000-39,999                       \$40,000-49,999
- \$50,000-59,999                       \$60,000-69,999                       \$70,000-79,999                       \$80,000 or more

**9) Medical conditions that you have (check ✓ all that apply):**

- Lung Disease                       High blood pressure                       Heart disease                       Diabetes                       Cancer                       Other

**10) Number of years that you've had arthritis (check ✓ one):**

- Less than 1 year       1-5 years       6-10 years       11-15 years     16-20 years     Over 20 years

**11) What kind(s) of arthritis do you have (check ✓ all that apply):**

- Rheumatoid arthritis     Osteoarthritis     Fibromyalgia     Lupus     Do not know

Other...please list: \_\_\_\_\_

**12) Are you limited in any way in any activities because of your arthritis (check ✓ one):**

- Yes     No       Don't know

**13) Do you take any over the counter medication or prescription medication to control your arthritis (check ✓ one):**

- Yes     No

**14) Please indicate the pain you have during a typical week from your arthritis (circle a number):**

0	1	2	3	4	5	6	7	8	9	10
No Pain			Moderate Pain					Severe Pain		

## Barriers to Exercise

Barriers may stop you from doing moderate exercise. Moderate exercise includes organized sports participation, as well as activities like brisk walking, swimming, cycling, dancing, gardening, and yard work. Moderate activities cause small increases in breathing or heart rate. You should be able to carry on a conversation when doing moderate activities.

**For each question below, read the statement in Step #1, then follow the directions for Step #2 and Step #3.**

**Step #2:** Circle “**not a barrier**” → if the statement in Step #1 does not stop you from doing moderate exercise in a typical week.

Circle “**barrier**” → if the statement in Step #1 stops you from doing moderate exercise in a typical week → **If a "barrier"**  
**continue to Step #3.**

**Step #3:** Circle a number from 0 to 9 telling how much the barrier limits you from exercising in a typical week.



**Step #1**

**Read the statement below**

**Step #2**

**Circle “not a barrier” or “barrier”**

**If a “barrier” continue to Step #3**

**Step #3**

**If a barrier, how much does this barrier limit you from doing moderate exercise in a typical week?**

		0	1	2	3	4	5	6	7	8	9
1. My workplace does not have a place to exercise.	Not a barrier Barrier (continue →)	0	1	2	3	4	5	6	7	8	9
2. I don't feel like I am athletic enough to be a part of an exercise group.	Not a barrier Barrier (continue →)	0	1	2	3	4	5	6	7	8	9
3. I have an injury or a health issue (not arthritis) that stops me from exercising	Not a barrier Barrier (continue →)	0	1	2	3	4	5	6	7	8	9
4. When I go to a place to exercise, the other people exercising there make me feel uncomfortable.	Not a barrier Barrier (continue →)	0	1	2	3	4	5	6	7	8	9
5. My spouse/partner isn't supportive of me exercising.	Not a barrier Barrier (continue →)	0	1	2	3	4	5	6	7	8	9
6. I don't like changing into and out of exercise clothes.	Not a barrier Barrier (continue →)	0	1	2	3	4	5	6	7	8	9
7. My friends aren't supportive of me exercising.	Not a barrier Barrier (continue →)	0	1	2	3	4	5	6	7	8	9
8. I have to take care of my children/grandchildren so I don't have time to exercise.	Not a barrier Barrier (continue →)	0	1	2	3	4	5	6	7	8	9
9. I have a hard time scheduling an exercise time with another person.	Not a barrier Barrier (continue →)	0	1	2	3	4	5	6	7	8	9
10. It takes too much time to get to and from an exercise facility	Not a barrier Barrier (continue →)	0	1	2	3	4	5	6	7	8	9

**Step #1**

**Read the statement below**

**Step #2**

**Circle “not a barrier” or “barrier”**

**If a “barrier” continue to Step #3**

**Step #3**

**If a barrier, how much does this barrier limit you from doing moderate exercise in a typical week?**

		0	1	2	3	4	5	6	7	8	9
11. There are no street lights in my neighborhood so it is hard for me to exercise at night.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9
12. My friends don't exercise.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9
13. It's hard for me to find someone with similar skills to exercise with.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9
14. When I exercise around other people, I'm worried about how my body looks.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9
15. The temperature outside keeps me from exercising.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9
16. My spouse/partner doesn't exercise.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9
17. I don't exercise because it costs too much for participation.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9
18. My health insurance doesn't cover exercise costs (e.g. memberships, programs, equipment).	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9
19. It is unsafe in my neighborhood to exercise.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9
20. I can't find a time to exercise that fits with my schedule.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9

**Step #1**

**Read the statement below**

**Step #2**

**Circle “not a barrier” or “barrier”**

**If a “barrier” continue to Step #3**

**Step #3**

**If a barrier, how much does this barrier limit you from doing moderate exercise in a typical week?**

		0	1	2	3	4	5	6	7	8	9
21. Working long hour’s makes me tired so I don't feel like exercising.	Not a barrier Barrier ( <b>continue →</b> )	0	1	2	3	4	5	6	7	8	9
22. I don’t have time to exercise because I spend so much time at work.	Not a barrier Barrier ( <b>continue →</b> )	0	1	2	3	4	5	6	7	8	9
23. Being on a fixed income (Social Security) makes it difficult to afford exercise (e.g. memberships and participation).	Not a barrier Barrier ( <b>continue →</b> )	0	1	2	3	4	5	6	7	8	9
24. There are no public parks/trails that I can use for exercise in the community where I live.	Not a barrier Barrier ( <b>continue →</b> )	0	1	2	3	4	5	6	7	8	9
25. There are no free exercise facilities where I can go in the community where I live.	Not a barrier Barrier ( <b>continue →</b> )	0	1	2	3	4	5	6	7	8	9

*Now we are interested in barriers to moderate exercise  
that you may face because of your arthritis*

**Step #1**

**Read the statement below**

**Step #2**

**Circle “not a barrier” or  
“barrier”**

**If a “barrier” continue  
to Step #3**

**Step #3**

**If a barrier, how much does this barrier limit you from  
doing moderate exercise in a typical week?**

		Doesn't limit me									Fully limits me
26. I don't exercise due to the pain from my arthritis.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9
27. Arthritis makes my body and joints to stiff to exercise.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9
28. There aren't any exercise programs for people with arthritis in the community where I live.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9
29. I don't exercise because my arthritis limits what my body can do.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9
30. I don't exercise because I am afraid I might fall due to my arthritis.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9
31. Exercise class instructors don't consider the pain I have due to my arthritis when teaching the class.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9
32. Exercise class instructors don't consider the stiffness I have due to my arthritis when teaching the class.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9
33. I don't know others who have arthritis and exercise.	Not a barrier Barrier ( <b>continue</b> →)	0	1	2	3	4	5	6	7	8	9

**Step #1**

**Read the statement below**

**Step #2**

**Circle “not a barrier” or “barrier”**

**If a “barrier” continue to Step #3**

**Step #3**

**If a barrier, how much does this barrier limit you from doing moderate exercise in a typical week?**

		0	1	2	3	4	5	6	7	8	9
34. My friends don't want me to exercise because I have arthritis.	Not a barrier Barrier ( <b>continue →</b> )										
35. Having arthritis makes me feel down in the dumps so I don't exercise.	Not a barrier Barrier ( <b>continue →</b> )										
36. The local fitness facility doesn't offer arthritis-specific programs.	Not a barrier Barrier ( <b>continue →</b> )										
37. Exercise class instructors don't consider how arthritis limits my body when teaching the class.	Not a barrier Barrier ( <b>continue →</b> )										
38. My spouse/partner doesn't want me to exercise because I have arthritis.	Not a barrier Barrier ( <b>continue →</b> )										
39. Exercise class instructors don't tell me how to do the exercises differently when my arthritis flares up.	Not a barrier Barrier ( <b>continue →</b> )										
40. The sidewalks where I want to exercise are in bad shape making it hard for me to exercise when my arthritis flares up.	Not a barrier Barrier ( <b>continue →</b> )										
41. My local/state policy makers don't make laws that make it easy for people with arthritis to exercise.	Not a barrier Barrier ( <b>continue →</b> )										

**Moderate Exercise**

We are now interested in moderate exercise. Moderate exercise includes organized sports participation, as well as activities like brisk walking, swimming, cycling, dancing, gardening, and yard work. Moderate activities cause small increases in breathing or heart rate. You should be able to carry on a conversation when doing moderate activities.

1) Now, think about the moderate exercise that you do in a usual week. Do you do moderate activities for at least 10 minutes at a time that cause small increases in breathing or heart rate?

No (If you checked no, **thanks, you are finished!!**)

Yes: (If you checked yes, **please answer A and B below**)

↳ **A)** In a usual 7-day period **how many days** do you do moderate exercise: \_\_\_\_\_ (Number of days)

↳ **B)** On each of these days **how many minutes** in total do you spend doing moderate exercise: \_\_\_\_\_ (Minutes)

Thank you for completing this survey.

Your comments are very valuable to us.

Please feel free to make any additional comments below.

## **APPENDIX B**

### **SEARCH ENGINE KEY WORDS**

## **Search Engine Key Words:**

Arthritis

Arthritis Support

Arthritis Listserv

Arthritis Education

Arthritis Self-Management

Arthritis and Physical Activity

Arthritis and Exercise

Arthritis Support and Physical Activity

Arthritis Education and Physical Activity

Arthritis Self-Management and Physical Activity



## **APPENDIX C**

### **EMAIL SENT TO POSSIBLE CONTACTS**

## **Email sent to possible contacts**

My name is Sara Hillard and I am a graduate student at Kansas State University pursuing a Master's Degree in Kinesiology. I am presently working on my thesis project which examines barriers to moderate physical activity in women with arthritis. After a group focus study, my colleagues and I created a 41 question survey that, we hope, will help identify the broad range of barriers to physical activity in women with arthritis. In order to do this study, I will be conducting this survey on-line. I am wondering if you would be willing to send the survey out to your listserv, or post the survey on your website. I have attached the information regarding the study as well as a web link to access and take the survey. If you have any questions, please don't hesitate to contact me.

Here is the link to the survey:

<https://surveys.ksu.edu/Survey/take/takeSurvey.do?offeringId=49017>

Thank you for your time and help,

Sara

**APPENDIX D**  
**INFORMATIONAL FLYER**

## **Informational Flyer**

Hi my name is Sara Hillard and I am a graduate student at Kansas State University. I am looking for participants for my graduate research on barriers to physical activity in women with arthritis. In order to complete this study, I am conducting a survey and I NEED YOUR HELP – PLEASE

### **How will the information from the survey be used?**

To further the research in the field of arthritis, in particular to assist public health advocates understanding of the obstacles to physical activity faced by women with arthritis.

### **Who can participate?**

You can participate if you are female, aged 18 or older, and have arthritis. Arthritis can be either diagnosed by your doctor or, if not diagnosed, we would say a person has arthritis if she had pain, aching, stiffness, and/or swelling in or around a joint on most days in the last month.

### **How do I get involved?**

To participate, you will need to complete a survey. The survey will ask you a number of questions about what keeps or doesn't keep you from being physically active. ALL PARTICIPANT ANSWERS WILL BE ANONYMOUS.

### **How can I do the survey?**

To do the survey: select one of the following:

1. Do the survey on the web using a Browser (i.e., Netscape or Internet Explorer) by typing: <https://surveys.ksu.edu/Survey/take/takeSurvey.do?offeringId=49017>
2. Contact me for a survey that I can mail you. You can contact me by calling 785-532-3484, or emailing [shillard@ksu.edu](mailto:shillard@ksu.edu)

### **How long will it take to fill out the survey?**

About 15-20 minutes.

## **APPENDIX E**

### **WEBSITES IDENTIFIED FOR CONTACT**

## Websites Identified for Contact

<http://www.arthritissupport.com>

<http://www.arthritis.org/>

<http://www.allaboutarthritis.com>

<http://www.chronicdisease.org>

<http://www.niams.nih.gov/>

<http://www.hopkins-arthritis.com/index.html>

<http://www.odh.ohio.gov/odhPrograms/hpr/arthr/arthr1.aspx>

<http://www.kdheks.gov/arthritis/index.html>

[http://www.cdc.gov/arthritis/state\\_programs/contacts.htm](http://www.cdc.gov/arthritis/state_programs/contacts.htm)

<http://www.cdc.gov/nchs/products/elecannounc/nchslists.htm>

The International Classification of Functioning, Disability and Health (ICF)

<http://groups.yahoo.com/>

Arthritis

RA-SUPPORT

Psoriatic Arthritis

<http://www.arthritis.org/communities/Chapters/ChapDirectory.asp>

Chapter contacts for each chapter were emailed, approximately 45 contacts