GENDER DIFFERENCES IN COPING AND PHYSICAL AND MENTAL
HEALTH OUTCOMES AMONG OLDER ADULTS WITH
OSTEOARTHRITIS

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ABSTRACT OF THE THESIS

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by

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Osteoarthritis (OA), the most common arthritic disease, occurs as part of the normal aging process. Common symptoms of OA include pain, tenderness, stiffness, loss of flexibility, and reduced mobility. Additionally, people with OA experience higher incidences of depressive symptoms, mood disturbance, and lower health status than the general population. Women have OA more often than men, and there are known gender differences in the way in which men and women experience OA pain. Women have lower thresholds for pain and rate the same stimuli as more painful than men. The relationships among depression, mood disturbance, and pain may be different for women than for men. People with OA experience psychological distress, impairment in physical functioning, physical disability, and therefore lower levels of health status than the general population, and this disability may be more prominent for women. Findings regarding gender differences in coping with OA pain have been inconsistent. Self-efficacy, or a person’s belief that he or she can succeed in certain situations, is related to the type of coping an individual uses. There is evidence of gender differences in self-efficacy; however, no studies have examined whether these differences exist in older adults with OA. This thesis was designed to determine whether self-efficacy and coping mediate the relationship between OA and physical and psychological outcomes, and to determine whether the relationships among these variables differ as a function of gender. Additionally, the impact of perceived control as a moderator of coping was examined. It was hypothesized that 1) Participants with higher self-efficacy would engage in more problem-focused and less emotion-focused coping than individuals with lower self-efficacy. In turn, individuals who engaged in more problem-solving and meaning-focused coping and less emotion-focused coping would have higher levels of health status and lower levels of depression than those who engaged in less problem-focused coping and meaning-focused coping and more emotion-focused coping styles, 2) Individuals with high levels of perceived control would engage in more problem-focused coping and less emotion-focused coping than those with low levels of perceived control. Individuals with low levels of perceived control would engage in more emotion-focused coping and less problem-focused coping and 3) The hypothesized relationships would differ between males and females. Participants included 363 Health Maintenance Organization (HMO) members (233 women and 130 men) from a larger intervention study involving social support, education, or a combination of both. Coping was measured using the Ways of Coping Questionnaire (WOC). Self-efficacy was measured using Arthritis Self-Efficacy Scale. Control was measured using the helplessness subscale from the Arthritis Helplessness Index (AHI). Depression was measured using the Center for Epidemiological Studies Depression Scale.
Scale (CES-D). Mood disturbance was assessed using the Profile of Mood States (POMS). Global health status was measured using the Quality of Well-Being (QWB) scale; and arthritis-specific health status was measured using the Arthritis impact measurement scale (AIMS). To test the hypotheses, a multiple group path analysis was conducted. The results indicated that the overall model did not fit the whole sample well, nor did it fit well for women or men examined separately. The paths from problem-focused coping to depression and to health status were significant for men, but not women. This indicates that problem-focused coping may be beneficial for men but not for women.
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INTRODUCTION

Osteoarthritis (OA), the most common arthritic disease, occurs as part of the normal aging process (Lawrence et al., 2008). In addition, depressive symptoms, mood disturbance, and lower health status are more likely than in the general population (Axford et al., 2010; Mili, Helmick, Zach, & Moriarty, 1999; Robinson et al., 2009). Psychosocial factors, such as coping behaviors (Affleck et al., 1999; Sale, Gignac, & Hawker, 2011) and self-efficacy (Turner, Ersek, & Kemp, 2005) affect these physical and mental health outcomes. The experience of OA is different for men and women. The burden of suffering is thought to be greater for women than for men (Theis, Helmick, & Hootman, 2007); women and men experience pain differently (Dixon, Thorn, & Ward, 2004). In addition, there may be gender differences in the relationships among self-efficacy, coping behavior and health outcomes (Asghari & Nicholas, 2001; Denison, Asenlof, & Lindberg, 2004). Differences in self-efficacy (Arnstein, Caudill, Mandle, Norris, & Beasley, 1999) and coping (Lopez-Martinez, Esteve-Zarazaga, & Ramirez-Maestre; 2008) have also been linked to differences in pain and depression. Therefore, gender differences in these variables may help to explain differences in these health outcomes. Information regarding gender differences between self-efficacy and coping can inform interventions directed at reducing the pain and depressive symptoms associated with OA. The purpose of this study was to develop a better understanding of the relationship between self-efficacy, coping, and health outcomes among individuals with OA, and to determine whether a conceptual model (Figure 1) relating these variables differed as a function of gender.
Figure 1. Self-efficacy, coping and perceived control as predictors of physical health status and depression.
OSTEOARTHRITIS

OA affects the breakdown of cartilage in synovial joints (Kean, Kean, & Buchanan, 2004). Common symptoms of OA include pain, tenderness, stiffness, loss of flexibility, and reduced mobility (Theis et al., 2007). The joints most commonly affected by OA are the knees, hips, and hands (Lawrence et al., 2008). OA is diagnosed using symptom history, physical examination of joints, magnetic resonance imaging, and X-rays (Altman et al., 1990). There is no definitive cure, and holistic treatment is thought to be best. Although joint replacement surgery has lead to improved functional outcomes, it is typically only recommended for the most severe cases (Dieppe et al., 1999; Hamel, Toth, Legedza, & Rosen, 2008). Additionally, surgery is expensive, is not an option for patients with some comorbid health conditions, and involves risk; therefore, the symptoms of the disease are often treated through self-management (Breedlove, 2004). Management is directed at controlling pain and improving joint function via medications (e.g., Acetaminophen, non-steroidal anti-inflammatory drugs, narcotics and corticosteroids), reducing stress on joints, exercise, weight control, and other alternative therapies (e.g. massage, acupuncture, nutritional supplements, heat and cold). Lawrence et al. (2008) have estimated that approximately 27 million adults in the US meet the diagnostic criteria for OA. The incidence of OA increases with age, beginning around age 50 and leveling off around age 80 (Buckwalter, Saltzman, & Brown, 2004). This age-related risk is thought to be more pronounced in women because, on average, women live longer than men, and because differences in estrogen levels influence bone mineral density and bone turnover (Corti & Rigon, 2003).

OA is associated with high health care costs in the United States. In 2004, 14.3 billion dollars were spent on surgeries related to knee replacement and other arthritis-related conditions (Murphy et al., 2008). In 2004, the eleven million physician and outpatient visits, 632,000 joint replacement surgeries, and 662,000 hospitalizations for OA-related pain cost 128 billion dollars (United States Bone and Joint Decade, 2008). These costs are expected to rise as the number of older Americans continues to grow (Hootman & Helmick, 2006).
Among individuals who have not yet reached retirement age, OA causes extensive loss of productivity, making it costly for both employers and OA sufferers. Theis, Murphy, Hootman, Helmick, and Yelin (2007) report that 30% of those with OA are either not working or work less because of OA-related pain or impairments. The estimated job-related costs of OA are between 3.4 and 13.2 billion dollars annually (Buckwalter et al., 2004). This economic burden underscores the need for research informing effective treatments to reduce the long-term cost associated with the condition.
GENDER DIFFERENCES AMONG OA PATIENTS

There are known gender differences in the way men and women experience OA pain. The overall occurrence of OA is higher among women than men; however, when OA is diagnosed before age 45, prevalence is higher among men (Lawrence et al., 2008). This may indicate that the physiological mechanisms by which men and women develop OA are different. Several studies have indicated that women experience up to 72% more OA pain than men (Affleck et al., 1999). Affleck et al. found that women with OA reported more days of intense pain, whereas men experience a greater increase in negative mood following a day of intense pain, suggesting that men and women differ in the way they perceive and respond to OA pain. Studies using experimentally-induced pain, such as cold-pressure tasks (Dixon et al., 2004; Edwards, Haythornthwaite, Sullivan, & Fillingim, 2004), thermal testing procedures, and ischemic pain tasks (Edwards et al., 2004), indicate that women both have lower thresholds for pain and rate the same stimuli as more painful than men do (Berkley, 1997). Physiological markers, such as cortisol reactivity and blood pressure, confirm the behavioral findings (Dixon et al., 2004). The increased pain intensity reported by women with OA may be related to the fact that women are more likely than men to experience OA pain in multiple joints (Lawrence, Bremner, & Bier, 1966). Additionally, women are more likely to experience OA pain in hands, knees, ankles, and feet than men, who more commonly report pain of the hips, wrist, and spine (Davis, Ettinger, Neuhauas, & Hauck, 1988). There is also evidence that hormonal influences alter pain sensitivity for women more drastically than for men (Berkley, 1997; Fillingim & Ness, 2000). Taken together, the evidence indicates that there are multiple differences in the experience of pain between women and men and that these differences likely affect the relationship between psychosocial factors and health outcomes.
HEALTH OUTCOMES

DEPRESSION, MOOD DISTURBANCE AND THEIR RELATIONSHIP TO CHRONIC PAIN

Individuals who have a chronic pain condition experience higher levels of depression and mood disturbance than do people not experiencing chronic pain (Campbell, Clauw, & Keefe, 2003; Robinson et al. 2009). In OA populations, individuals are two to three times more likely than the general population to have depression, anxiety, or both (Axford et al., 2010). The rate of mood disturbance among people with arthritis-related pain ranges from 15 to 45 percent (Nicassio, 2010). Depression may cause increased sensitivity to pain and, conversely, pain conditions may predict the onset of depression (Robinson et al., 2009). It is difficult to determine which condition predisposes the other; however, in a longitudinal study, Land et al. (2010) found that arthritis predicts the onset of mood disorders rather than vice versa. Several explanations for this interrelationship have been proposed, including that they stem from shared biological pathways and psychosocial predictors (Bair, Robinson, Katon, & Kroenke, 2003; Robinson et al., 2009). Biological explanations include that mood and pain are associated with activation in shared brain structures such as the amygdala and the hypothalamus. Both mood and pain are also associated with deregulation of the hypothalamic-pituitary-adrenal (HPA) axis, increased inflammatory markers, serotonin and noradrenaline pathways, and neurotropic factors. Changes in these shared biological pathways and neurotransmitters as a result of pain can influence mood and vice versa (Bair et al., 2003; Robinson et al., 2009). Alternatively, psychosocial mechanisms such as self-efficacy (Turner et al., 2005), learned helplessness (Robinson et al., 2009), and coping (Keefe et al., 1987; Robinson et al., 2009) have been suggested to explain comorbidity between depression and pain. Learned helplessness refers to a condition in which an individual believes that a condition is outside of her or his control. Level of perceived helplessness may be related to depressive symptoms among chronic pain patients (Robinson, et al., 2009; Samwel, Evers, Crul, & Kraaimaat, 2006). Additionally, the use of coping strategies may predict depression among chronic pain populations (Keefe et al., 1987). Research specific to arthritis has suggested that predictors of depression include coping
(Zautra & Smith, 2001), in addition to other psychosocial factors such as functional status, number of painful or swollen joints (Parker et al., 1992), prior depressive tendencies (Filfield, Tennen, Reisine, & McQuillan, 1998), loss of valued activities (Keefe et al., 2002), inactivity because of OA (Sherman, 2003), and interpersonal stress (Zautra, Burleson, Matt, Roth, & Burrows, 1994). Overall, there are several likely predictors of depression among people with chronic pain; however, the relationships among these variables remain unknown.

Further, the relationship among depression, mood disturbance, and pain may differ between men and women (Gallagher, Miller, Cronan, & Groessl, 1997; Rollnik, Karst, Piepenbrock, Dengler, & Fink, 2003; Silverstein, 2002; Unruh, Ritchie, & Merskey, 1999). Silverstein (2002) found that pure depression, defined as depression without somatic symptoms, occurs at a similar rate in women and men, whereas depression occurring with somatic symptoms (e.g. pain) is approximately twice as prevalent among women than men. There is some evidence that the greater pain intensity experienced by women than men, can be explained by the disproportionate rates of depression among women and men. For example, Tsai (2007) found that the relationship between gender and pain intensity was mediated by depression. Similarly, Zatura and Smith (2001) found that, in addition to depression, stressful events and negative affect were linked to increased pain in female OA patients (Zatura & Smith, 2001). In a population-based study, Denton, Prus, and Walters (2004) concluded that chronic stressors such as financial stress, personal stress and environmental stress are more strongly associated with distress and poor functional health for women than for men. Combined, these findings indicate that the relationship between OA and psychological health differs as a function of gender.

**Health Status**

Individuals with OA experience psychological distress, impairment in physical functioning, physical disability, and therefore lower levels of health status, than the general population (Brown et al., 1984). According to Michaud et al. (2006), OA is the seventh leading cause of disability in women, the twelfth leading cause of disability in men, and the fifth leading cause of disability in people aged 65 to 74. People with OA struggle with everyday physical tasks such as dressing, shopping, and household chores; they also struggle with basic functional abilities such as walking, kneeling, and rising from a chair (Cooke &
Dwosh, 1986; Kaufman, Hughes, Morrey, Morrey, & An, 2001; Zeni Jr., & Higginson, 2009). The experience of chronic pain associated with OA often leads to a sedentary lifestyle and loss of muscle strength (Ekdahl, Andersson, & Svensson, 1989). Further, individuals with OA often report symptoms of fatigue (Fishbain et al., 2003; Wolfe, 1999). The number of quality-adjusted life years lost in the United States population aged 50 to 84 attributed to OA is approximately 10 million (Losina et al., 2011). The mortality rate among individuals with OA is higher than that of the general population (Cooper, 2011). This is likely because OA is often comorbid with other chronic conditions such as obesity, cardiovascular disease, peripheral vascular disease, congestive heart failure, renal function impairment, diabetes, and respiratory disease (Gabriel, Crowson, & O’Fallon, 1999; Marks & Allegrante, 2002). Additionally, OA is indirectly related to deaths from comorbid conditions attributable to OA (e.g. gastrointestinal bleeding because of pain medications; Sacks, Helmick, & Langmaid, 2004), and individuals with OA are older, on average, than the general population. Thus, overall, individuals with OA often experience poor health status, and research regarding the differences in factors related to health status could provide useful information on how to reduce the impact of OA on physical health and well being.

Differences in physiological pain experience, emotional reactions, attitudes, and behaviors between genders are likely to lead to differences in coping with OA pain. Multiple explanations have been suggested for this discrepancy, several of which indicate that women have lower pain related-self-efficacy than men and use different coping strategies in response to pain.
COPING AND CONTROL

Coping is defined as cognitive and behavioral efforts made in response to a perceived threat (Folkman & Lazaras, 1980). Coping is viewed as a dynamic process, changing across different time points, situations, and stressors. Literature pertaining to coping often classifies different coping strategies as either problem-focused or emotion-focused. Problem-focused coping is aimed at altering the perceived stressor, whereas emotion-focused coping is aimed at altering one’s response to the stressor. Folkman and Lazarus (1985) suggested that the usefulness of a coping strategy in reducing the impact of a stressor depends on the level of controllability of the stressor. In general, it is thought that the use of problem-focused coping is more adaptive when an individual believes that at stressor can be altered, and that the use emotion-focused coping is more adaptive when an individual believes that the stressor cannot be changed.

Previous research has suggested that the effectiveness of a coping strategy is related to the perceived level of control one has over a given stressor connected with major life events (Forsythe & Compas, 1987), physical health problems (Vitaliano, DeWolfe, Maiuro, Russo, & Kanton, 1990) and adherence in hemodialysis (Christensen, Benotsch, Wiebe, & Lawton, 1995). Differences in the use of these coping strategies have been associated with differences in health outcomes, and gender may be a factor related to usage and effectiveness of a coping strategy (Tamres, Janicki, & Helgeson, 2002).

Findings regarding gender differences in coping with stress have been inconsistent. Stanton, Danoff-Burg, Cameron, and Ellis (1994) found that, in stressful situations that individuals perceive as uncontrollable, women who used emotion-focused strategies were less likely to be depressed, while these same strategies were associated with higher levels of depression in men. Ptacek, Smith, and Dodge (1994) conducted a study in which they induced an achievement-related stressor and found that women were more likely to seek social support and use more emotion-focused coping than men. To a lesser extent, men were more likely to use problem-focused coping than women. Tamres et al. (2002) conducted a meta-analytic review in which they concluded that, in general, women use more of each type
of coping strategy than men. Regarding problem-focused coping strategies, women were more likely than men to use active coping, seek social support, and engage in general problem-focused coping. Women were also more likely than men to use emotion-focused coping strategies, such as using avoidance, engaging in wishful thinking, and employing positive self-talk. In addition, venting was the only coping strategy that men were more likely to use than women. Among studies specific to health-related stressors (e.g. chronic illness), women were more likely to use active coping, planning, seeking social support for instrumental and emotional reasons, general problem-focused coping, avoidance, positive reappraisal, venting, rumination, wishful thinking, positive-self talk, and religion, than men. In sum, the effectiveness of coping strategies across genders has been examined and is largely dependent on the context in which they are employed; however, there is some indication that the strategies’ effectiveness may differ across genders.

Literature specific to individuals with chronic pain conditions has also indicated gender differences in the use of coping and health-related outcomes. Among individuals experiencing recurring pain, women appraised pain as more threatening and used more social support, palliative behaviors, positive self-statements, and problem solving to cope, than men (Unruh et al., 1999). Keefe et al. (2000) found that women experience higher levels of OA pain than men, and that the use of catastrophizing as a coping strategy mediated the relationship between gender and pain-related outcomes such as pain intensity, disability, and pain behavior. Although there is some suggestion that gender differences in coping might exist and be related to health-related outcomes, more research is needed to determine the relationship between gender, coping, and health outcomes for individuals with OA.
SELF-EFFICACY

Self-efficacy, or a person’s belief that she or he can succeed in certain situations (Bandura, 1977), is related to the type of coping used (Asghari, & Nicholas, 2001; Smith, Strachan, & Buchwald, 2009) in predicting health outcomes (Allegrante & Marks, 2003; Arnstein et al., 1999; Denison et al., 2004; Smith et al., 2009), and and differs as a function of gender (Jackson, Iezzi, Gunderson, Nahasaka, & Fritch, 2002; Miller & Newton, 2006). In a sample of chronic pain patients, Turner et al. (2005) examined the relationships among disability, depression, and pain as a function of self-efficacy and the use of active and passive pain coping strategies. Active pain coping strategies were defined as managing pain through one’s own resources, and were thought to be adaptive. Passive coping strategies were defined as those that reflect perceived helplessness and the reliance on others, and were considered to be maladaptive. Turner et al. (2005) found that increased self-efficacy was associated with increased use of active coping and lower pain and depression, while decreased self-efficacy was related to increased use of passive coping and increased pain and depression. In another sample of chronic pain patients, Asghari and Nicholas (2001) found that self-efficacy predicted pain avoidance behavior above and beyond pain intensity level, level of distress, and personality variables. Among patients with musculoskeletal pain, self-efficacy has also been shown to be related to lower levels of catastrophizing and be more predictive of pain-related disability than both fear avoidance and level of pain intensity (Denison et al., 2004).

Among adults with OA of the knee, level of functional self-efficacy was significantly positively correlated with hamstring and quadriceps strength, and significantly and negatively correlated with age, depression, pain, and stiffness (Maly, Costigan, & Olney, 2006). Similarly, in a sample of patients with widespread chronic pain, Smith et al. (2009) found that greater fatigue-related self-efficacy was related to less functional impairment. The authors suggest that pain-related self-efficacy may be an important variable to examine in relation to coping with chronic pain and physical impairment. Taken together, these studies
imply that self-efficacy may have a significant effect on physical and psychological health outcomes.

Some studies have indicated that men have greater self-efficacy than women, but that the magnitude of these differences may decrease with age (Gecas, 1989). Self-efficacy may explain gender differences in pain experiences. Using a cold-pressure task, Jackson et al. (2002) found that women reported lower physical self-efficacy, task specific self-efficacy, heightened pain sensitivity, and lower pain tolerance than men. The study indicated that self-efficacy mediated the relationship between gender and perceived pain intensity. These findings suggest that the genders differ in self-efficacy and that these differences may mediate the relationship between pain and health-related outcomes; however, no studies have examined whether these differences exist in adults with OA.
PURPOSE

Poor psychological and health outcomes, such as depression, mood disturbance, and low health status are often present in individuals with OA (Breedlove, 2004). Self-efficacy and coping strategies are related to differences in health and psychological outcomes among individuals with OA, and gender differences are related to these variables (Jackson et al., 2002; Tamres et al., 2002). As shown in Figure 1, the purpose of this thesis was to determine whether self-efficacy and coping mediate the relationships among these health outcomes and whether the relationships among these variables differ as a function of gender (Figures 2 & 3). Additionally, the impact of perceived control as a moderator of coping was examined.

The conceptual model in Figure 1 specifies indirect relations between self-efficacy and health status and depression via the mediating variables of perceived control and coping style. Perceived control was hypothesized to moderate the effects of coping style on the outcomes. It was expected that the models for males and females would differ.
Figure 2. Self-efficacy, coping and perceived control as predictors of physical health status and depression among men.
Figure 3. Self-efficacy, coping and perceived control as predictors of physical health status and depression among women.
HYPOTHESES

The following hypotheses were tested:

1. Participants with higher self-efficacy would engage in more problem-focused and less emotion-focused coping than individuals with lower self-efficacy. In turn, those who engaged in more problem-focused coping and less emotion-focused coping would have higher levels of health status and lower levels of depression than those who engaged in less problem-focused coping and more emotion-focused coping.

2. Those with high levels of perceived control would engage in more problem-focused coping and less emotion-focused coping than those with low levels of perceived control. Individuals with low levels of perceived control would engage in more emotion-focused coping and less problem-focused coping.

3. The above-hypothesized relationship would differ for males and females.
METHOD

PARTICIPANTS

Participants included 363 Health Maintenance Organization (HMO) members (233 women and 130 men) from a larger intervention study involving social support, education, or a combination of both. The average age of participants was approximately 70 years (M = 69.21, SD = 5.63). Most participants were Caucasian (92.3 %), with Latinos/Hispanics second (2.8%). Most participants were married (77.7%) and had attended at least some college (68.9%).

PROCEDURE

Three thousand randomly selected individuals who belonged to an HMO and were 60 or older were sent a letter inviting them to participate in the 3-year longitudinal study. Of the 3,000 letters sent, approximately 1,500 had a diagnosis of OA. Participants were required to participate in a 90-minute intake interview, ten weekly sessions, ten monthly meetings, and six periodic assessments. Of the potential participants, 363 volunteered to participate. Participants were given a set of pen-and-paper questions at the intake interview assessing their physical and psychological well-being. Research assistants administered a medical history questionnaire. All measures come from the baseline assessment except for the coping measure; it was taken at the 2-year assessment.
MEASURES

COPING

The Ways of Coping Questionnaire (WOC) (Folkman & Lazarus, 1988) was used to measure coping. This measure is a self-report questionnaire containing 66 items describing coping responses, which participants rate on a 4-point Likert-type scale from 0 “does not apply/or not used” to 3 “used a great deal.” The WOC contains eight subscales: confrontive coping, seeking social support, accepting responsibility, planful problem solving, distancing, escape-avoidance, self-controlling, and positive reappraisal. In this thesis problem-focused coping and emotion-focused coping were calculated as recommended by Vitaliano et al. (1990). Specifically, problem-focused coping was calculated by dividing the mean reported use of “planful problem solving” by the mean of the entire coping score. Correspondingly, emotion-focused coping was calculated by diving the mean reported use of “distancing” by the mean of the entire coping score.

SELF-EFFICACY

Self-efficacy was assessed using the Arthritis Self-Efficacy Scale (ASES) (Lorig, Chastain, Ung, Shoor, & Holman, 1989). This scale contains 20 items assessing pain management and physical functioning. Participants were asked to indicate on a scale from 10 (very uncertain) to 100 (very certain) how certain they were that they could perform the task described in each item. For example, “How certain are you that you can make a large reduction in arthritis pain by methods other than taking extra medication?” Items were grouped into three subscales: pain, action, and other symptoms. The mean of the three subscales was used to measure self-efficacy in this thesis.

PERCEIVED CONTROL

Perceived control was measured using the helplessness subscale from the Arthritis Helplessness Index (AHI). This subscale includes five items asking participants to respond to statements by using a 6-point Likert-type scale ranging from 1 “strongly disagree” to 6 “strongly agree”. The helplessness subscale assesses perceived control over outcomes (Stein,
Wallston, & Nicassio, 1988). Items on this subscale include, “If I do all the right things, I can successfully manage my arthritis” and “It seems as though fate and other factors beyond my control affect my arthritis.” Higher scores indicate higher levels of helplessness, and therefore lower levels of control. The AHI was developed specifically for individuals with arthritis (Nicassio, Wallston, Callahan, Herbert, & Pincus, 1985). When tested with a sample of rheumatoid arthritis patients, the AHI had an internal consistency of .70 (Smith, Christensen, Peck, & Ward, 1994) and a test re-test reliability of .53 over a 12-month period (Nicassio et al., 1985).

**DEPRESSION**

Depression was measured using the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977). The CES-D is a self-report questionnaire that assesses symptoms of depression over the past week. This scale contains 20 items on a 4-point Likert-type scale ranging from 0 “rarely or none of the time” to 3 “most or all of the time for the past week.” Examples of questions include “I felt everything I did was an effort” and “My sleep was restless.” A score of 16 is the cut-off point, at which an individual is considered to be depressed. (Radloff, 1977). The CES-D has demonstrated high internal consistency in both the general population (.85) and a psychiatric patient population (.90; Radloff, 1977). Additionally, this measure has moderate test-retest reliability over a 12-month period (ranging from .32 to .49). The CES-D has high concurrent and construct validity and was consistent across sex, age, and socioeconomic status, as well as across other demographic variables (Radloff, 1977).

**HEALTH STATUS**

Arthritis-specific health status was measured using the Arthritis Impact Measurement Scale (AIMS). This scale is comprised of 45 items; participants were asked to answer either “yes” or “no” to questions pertaining to six subscales related to physical health status: mobility, physical activity, dexterity, household activities, daily living activities, and pain. Higher scores on the AIMS indicate lower functioning. The construct validity of this scale ranged from 0.61 to 0.84 (Meenan, Gertman, Mason, & Dunalf, 1982).
RESULTS

DESCRIPTIVE STATISTICS

Table 1 displays the means and standard deviations for the measures used in the study. Table 2 shows the Cronbach alpha values for the overall coping scale and that for the problem- and emotion-focused subscales used in this study. The problem-focused subscale (planful problem solving) had acceptable internal consistency; however, emotion-focused subscale (distancing) had low internal consistency. Table 3 presents the Cronbach alphas for the overall self-efficacy scale and for the three subscales that make up the overall scale. The overall and the three subscales had moderate to high internal consistency. Tables 4 and 5 display the correlations among predictor variables for women and men, respectively. For women the self-efficacy subscales were all significantly correlated; however, for men the pain self-efficacy and action self-efficacy subscales were not significantly correlated. Problem-focused and emotion-focused coping were significantly negatively correlated for both women and men. This suggests that high use of either of these coping styles is associated with lower use of the other coping style.

TEST OF HYPOTHESES

All data were transformed to z-scores to standardize variance across all measures. A path-analytic model was tested using Mplus (Muthén & Muthén, 2010) to explore the relations among self-efficacy, perceived control, coping style, health status, and depression, and to determine whether gender moderated these relationships. Fit statistics were used to evaluate model fit, including Comparative Fit Index (CFI) (Bentler, 1990) with values greater than .90, the Root Mean Square Error of Approximation (RMSEA) (Steiger, 1990) with values less than .08, and a non-significant chi-square likelihood ratio test (Tanaka, 1993). A significance level of .05 was employed for individual model parameters (e.g., path coefficients).
Table 1. Means and Standard Deviations (SD) for Self-Efficacy, Coping Style, Perceived Control, Physical Health Status, and Depression by Gender

<table>
<thead>
<tr>
<th>Variable</th>
<th>Overall M (SD)</th>
<th>Women M (SD)</th>
<th>Men M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self Efficacy</td>
<td>72.87 (16.12)</td>
<td>71.23 (16.81)</td>
<td>75.81 (14.42)</td>
</tr>
<tr>
<td>Pain</td>
<td>56.81 (21.60)</td>
<td>57.97 (22.24)</td>
<td>54.74 (20.32)</td>
</tr>
<tr>
<td>Action</td>
<td>79.00 (20.34)</td>
<td>75.79 (20.07)</td>
<td>84.78 (19.61)</td>
</tr>
<tr>
<td>Other Symptoms</td>
<td>74.06 (18.63)</td>
<td>72.90 (18.97)</td>
<td>76.14 (17.95)</td>
</tr>
<tr>
<td>Problem Focused Coping</td>
<td>0.22 (0.06)</td>
<td>0.21 (0.06)</td>
<td>0.23 (0.49)</td>
</tr>
<tr>
<td>Emotion Focused Coping</td>
<td>0.15 (0.06)</td>
<td>0.15 (0.06)</td>
<td>0.15 (0.07)</td>
</tr>
<tr>
<td>Total Coping</td>
<td>9.75 (2.94)</td>
<td>9.84 (2.91)</td>
<td>9.59 (2.99)</td>
</tr>
<tr>
<td>Painful Problem Solving</td>
<td>9.81 (3.39)</td>
<td>9.63 (3.35)</td>
<td>10.12 (3.47)</td>
</tr>
<tr>
<td>Distancing</td>
<td>6.62 (2.82)</td>
<td>6.68 (2.99)</td>
<td>6.52 (2.50)</td>
</tr>
<tr>
<td>Perceived Control</td>
<td>20.10 (4.06)</td>
<td>19.98 (4.13)</td>
<td>20.30 (3.94)</td>
</tr>
<tr>
<td>Physical Health Status</td>
<td>40.69 (6.68)</td>
<td>41.33 (6.96)</td>
<td>39.55 (6.01)</td>
</tr>
<tr>
<td>Depression</td>
<td>8.61 (7.56)</td>
<td>9.36 (7.95)</td>
<td>7.28 (6.71)</td>
</tr>
</tbody>
</table>

Table 2. Coefficient Alpha Estimates for Coping Subscales

<table>
<thead>
<tr>
<th></th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Coping Scale</td>
<td>.850</td>
</tr>
<tr>
<td>Planful Problem Solving</td>
<td>.743</td>
</tr>
<tr>
<td>Distancing</td>
<td>.586</td>
</tr>
</tbody>
</table>

Table 3. Coefficient Alpha Estimates for Self-Efficacy Subscales

<table>
<thead>
<tr>
<th></th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Self-Efficacy Scale</td>
<td>.704</td>
</tr>
<tr>
<td>Self-Efficacy for Pain</td>
<td>.796</td>
</tr>
<tr>
<td>Self-Efficacy for Action</td>
<td>.899</td>
</tr>
<tr>
<td>Self-Efficacy for Other Symptoms</td>
<td>.893</td>
</tr>
</tbody>
</table>
Table 4. Correlations Among Predictor Variables for Women

<table>
<thead>
<tr>
<th></th>
<th>Self-Efficacy</th>
<th>Pain Self-Efficacy</th>
<th>Action Self-Efficacy</th>
<th>Other Symptom Self-Efficacy</th>
<th>Problem-Focused Coping</th>
<th>Emotion-Focused Coping</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain Self-Efficacy</td>
<td>.670**</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action Self-Efficacy</td>
<td>.871**</td>
<td>.309**</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Symptom Self-Efficacy</td>
<td>.899**</td>
<td>.610**</td>
<td>.641**</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem-Focused Coping</td>
<td>.024</td>
<td>.080</td>
<td>.037</td>
<td>-.041</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotion-Focused Coping</td>
<td>-.074</td>
<td>-.072</td>
<td>-.108</td>
<td>-.007</td>
<td>-.406**</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>.326**</td>
<td>.157</td>
<td>.254**</td>
<td>.374**</td>
<td>-.008</td>
<td>.026</td>
<td>—</td>
</tr>
</tbody>
</table>

Note: * p < .05; ** p < .01;

The target model specified indirect relations from self-efficacy to health status and depression via problem-focused and emotion-focused mediating variables. Direct paths from perceived control to problem-focused coping and to emotion-focused coping were specified. The proposed target model did not fit well statistically [$\chi^2 (14) = 307.464, p < 0.001$] or descriptively (CFI = 0.160, RMSEA = 0.374). Figure 1 shows the path coefficients for this model. The path from self-efficacy to problem-focused coping was significant. Participants with higher self-efficacy scores reported higher use of problem-focused coping. The path from problem-focused coping to physical health status was significant. Participants who reported using more problem-focused coping had better physical health status. The path from problem-focused coping to depression was significant. Participants who reported using
Table 5. Correlations Among Predictor Variables for Men

<table>
<thead>
<tr>
<th></th>
<th>Self-Efficacy</th>
<th>Pain Self-Efficacy</th>
<th>Action Self-Efficacy</th>
<th>Other Symptom Self-Efficacy</th>
<th>Problem-Focused Coping</th>
<th>Emotion-Focused Coping</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain Self-Efficacy</td>
<td>.577**</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action Self-Efficacy</td>
<td>.815**</td>
<td>.170</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Symptom Self-Efficacy</td>
<td>.814**</td>
<td>.449**</td>
<td>.430**</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem-Focused Coping</td>
<td>.249*</td>
<td>.035</td>
<td>.270**</td>
<td>.182</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotion-Focused Coping</td>
<td>-.101</td>
<td>-.094</td>
<td>-.091</td>
<td>-.053</td>
<td>-.273**</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>.362**</td>
<td>.153</td>
<td>.259**</td>
<td>.406**</td>
<td>.285**</td>
<td>.056</td>
<td>—</td>
</tr>
</tbody>
</table>

*Note.* *p < .05; **p < .01; more problem-focused coping had lower depression scores. Additionally, depression was significantly related to physical health status.

A second model (Figure 2) including a gender moderator variable was tested. Paths were constrained to determine whether gender moderated the overall model paths. The constrained model did not fit well statically \( \chi^2 (18) = 265.188, p < 0.001 \) or descriptively (CFI = 0.138, RMSEA = 0.278). Although the model was not significant, paths were examined individually. Coefficients for men and women are displayed in Figures 2 and 3, respectively. For men, the path from self-efficacy to problem-focused coping was significant. Men with higher self-efficacy scores reported greater use of problem-focused coping. Further, the paths from problem-focused coping to physical health status and depression were significant. Men who reported higher use of problem-focused coping had higher physical
health status scores and lower depression scores. In addition, depression and physical health status were significantly correlated. For women with higher self-efficacy scores reported more use of problem-focused coping. Further, the paths from problem-focused coping to physical health status and depression were significant. Women who reported higher use of problem-focused coping had higher physical health status scores and lower depression scores. In addition, depression and physical health status were significantly correlated.

Modification indices were used to determine whether moderation occurred for any of the model paths. A critical chi-square statistic of 3.24 (df = 1) was used. For females, there was indication that gender moderated the paths from problem-focused coping to physical health status (M.I. = 30.43) and from problem-focused coping to depression (M.I. = 15.75). A follow-up analysis was used to further examine the gender moderator, allowing these parameters to be freely estimated for females. This allowed for the comparison across genders to see where the differences lay. However, follow-up analyses showed that for females the unconstrained model did not fit well statistically [$\chi^2 (16) = 261.441, p < 0.001$] or descriptively (CFI = 0.145, RMSEA = 0.294). Thus, the paths from problem-focused coping to physical health status $\beta = -.064, p = .507$; and problem-focused coping to depression ($\beta = -0.139, p = 0.098$) were not significant for women but were for men ($\beta = -0.237, p = .031; \beta = -0.303, p = .002$).
DISCUSSION

The purpose of the present study was to examine whether the relationships among self-efficacy, coping, perceived control, and physical and mental health outcomes differed among women and men. Although gender did not moderate the predicted relationships there were significant gender differences for individual paths.

It was hypothesized that participants with higher self-efficacy would engage in more problem-focused and less emotion-focused coping than individuals with lower self-efficacy. In turn, those who engaged in more problem-focused coping and less emotion-focused coping would have higher levels of health status and lower levels of depression than those who engaged in less problem-focused coping and more emotion-focused coping. The results indicated that those with higher levels of self-efficacy did engage in more problem-focused coping and had higher health status and lower levels of depression. However, these results should be interpreted with caution because the overall path model did not fit the data well. Conversely, hypotheses regarding conditions under which emotion-focused coping should be effective were not supported. One possible reason for the lack of gender differences in emotion-focused coping was that the internal consistency of the subscale was low and did not meet the criteria for acceptable internal consistency traditionally employed.

It was hypothesized that those with high levels of perceived control would engage in more problem-focused coping and less emotion-focused coping than those with low levels of perceived control. The results indicated that perceived control was not related to use of either problem-focused or emotion-focused coping. This finding is contrary to previous findings that indicated that higher levels of perceived control were related to the use of coping strategies (Compas, Malarne, & Fondacaro, 1988; Conway & Terry, 1992; Forsythe & Compas, 1987; Masel, Terry, & Gribble, 1996; Osowiecki & Compas, 1999; Park, Folkman, & Bostrom, 2001; Plante, 2000; Roberts, 1995; Vitaliano et al., 1990; Zakowski, Hall, Klein, & Baum, 2001). The results from this study may differ from those of previous research because the population included older adults, and the participants may have attributed their symptoms to aging rather than to their OA.
Participants with higher self-efficacy also used more problem-focused coping. Previous studies have shown that higher self-efficacy is related to better health outcomes (Jackson et al., 2002) and that lower self-efficacy is related to poorer health outcomes (Arnstien et al., 1999; Harrison, 2004; Porter, Keefe, Garst, McBride, & Baucom, 2008). It is possible that participants who believed they were capable of performing tasks related to the management of arthritis pain employed more problem-focused strategies and reduced their symptoms. This is consistent with research by Turner et al. (2005), who found that higher self-efficacy was related to use of more adaptive coping.

The findings from this study also indicated that participants who used more problem-focused coping also had better health status. This finding is consistent with those of several other studies indicating that problem-focused coping was related to better health outcomes among individuals with chronic conditions (Ax, Gregg, & Jones, 2001; Kvam & Lyons, 1991; Scrignaro, Barni, & Magrin, 2010; Vitaliano, Russo, Carr, Maiuro, & Becker, 1985). Additionally, participants in this study who used more problem-focused coping were less depressed. This finding is consistent with research by McCracken & Semenchuk (1995), who found that greater use of problem-focused coping was related to lower levels of depression among individuals with systemic lupus erythematosus. In the present study, men who used more problem-focused coping had higher physical health status and lower depression, but this was not true for women. This may suggest that problem-focused coping is less beneficial for women with osteoarthritis. A previous study by Drossman et al. (2000) examined the relationship between problem-solving coping and health outcomes among women with gastrointestinal disorders. They found that more problem-solving coping was related to poorer health outcomes. More studies need to assess gender differences to determine when and under which conditions men and women are best able to to manage their chronic conditions.

The poor fit of the model tested suggests that the relationships differ from those proposed. For instance, it is possible that coping affects self-efficacy, rather than self-efficacy affecting coping and control. It is also possible that variables not measured in the present study are responsible for health status and depression. Other factors contributing to health outcomes should also be considered in future research. For example, other types of coping, such as meaning-focused coping (Burke & Flaherty, 1993; Park et al., 2001), may
explain individual differences in depression and physical health status. Another possible reason may be that the type of model tested in this study may not have been optimal. It is possible that a main effects model where self-efficacy, coping, and perceived control predicted health outcomes would have better explained differences in gender. Other models should be tested in the future.

Examining changes in coping, self-efficacy, and perceived control may provide important information about the nature of the relationships among these variables. Additionally, it is possible the relationships explored are bidirectional and that self-efficacy affects coping, which in turn affects self-efficacy. It is also possible that individuals who used more problem-focused coping had higher levels of physical health status; however, people with higher health status may tend to use more problem-focused strategies.

More studies are needed to identify the variables involved in successfully coping with OA and to determine whether the nature of the relationships differ for men and women. As the mean age of the population increases the need for studies to both increase health status and to decrease depression are increasingly important, because both physical health status and depression are related to higher health care costs.
REFERENCES


