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Arthritis Self-Efficacy and Self-Efficacy for Resisting Eating: Relationships to Pain, Disability, and Eating Behavior in Overweight and Obese Individuals with Osteoarthritic Knee Pain

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Abstract

This study examined arthritis self-efficacy and self-efficacy for resisting eating as predictors of pain, disability, and eating behaviors in overweight or obese patients with osteoarthritis (OA) of the knee. Patients (N=174) with a body mass index between 25 and 42 completed measures of arthritis-related self-efficacy, weight-related self-efficacy, pain, physical disability, psychological disability, overeating, and demographic and medical information. Hierarchical linear regression analyses were conducted to examine whether arthritis self-efficacy (efficacy for pain control, physical function, and other symptoms) and self-efficacy for resisting eating accounted for significant variance in pain, disability, and eating behaviors after controlling for demographic and medical characteristics. Analyses also tested whether the contributions of self-efficacy were domain specific. Results showed that self-efficacy for pain accounted for 14% (p=.01) of the variance in pain, compared to only 3% accounted for by self-efficacy for physical function and other symptoms. Self-efficacy for physical function accounted for 10% (p=.001) of the variance in physical disability, while self-efficacy for pain and other symptoms accounted for 3%. Self-efficacy for other (emotional) symptoms and resisting eating accounted for 21% (p<.05) of the variance in psychological disability, while self-efficacy for pain control and physical function were not significant predictors. Self-efficacy for resisting eating accounted for 28% (p=.001) of the variance in eating behaviors. Findings indicate that self-efficacy is important in understanding pain and behavioral adjustment in overweight or obese OA patients. Moreover, the contributions of self-efficacy were domain specific. Interventions targeting both arthritis self-efficacy and self-efficacy for resisting eating may be helpful in this population.

For persons with osteoarthritis (OA), pain is a major concern that can significantly impact physical and psychological disability. Pain can be particularly problematic among OA patients who are overweight (Body Mass Index [BMI] = 25 to 29) or obese (BMI ≥ 30; Barofsky et al., 1997; Creamer et al., 2000). With increased body mass comes greater stress on affected joints and more pain associated with movement. To avoid pain, overweight and obese OA patients may decrease physical activity and adopt a more sedentary lifestyle, which contributes to further weight gain and increased pain (Bunning & Materson, 1991). Managing pain is not the only challenge experienced by overweight and obese OA patients. Another important challenge is weight control.

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Clinical observations suggest that some overweight and obese OA patients cope better with the challenges of controlling pain and resisting eating than others. Self-efficacy theory (Bandura, 1986) provides a theoretical model for understanding variations in abilities to cope with the challenges of OA. Self-efficacy refers to the belief that one can successfully perform a specific behavior to achieve a particular outcome (Bandura, 1977). Studies in chronic pain patients show that higher self-efficacy is associated with less pain and disability (Denison et al., 2004; Dohnke et al., 2005; Reid et al., 2003). Studies in obese populations have demonstrated that self-efficacy influences eating behaviors (Byrne, 2002; Linde et al., 2006; Prochaska et al., 1992; King et al., 1996). However, studies have not examined the role that self-efficacy may play in OA patients who are overweight or obese. Prior studies of self-efficacy in OA have combined data from normal weight patients and overweight patients (e.g., Lorig et al., 1989; Keefe et al., 2004; Turner et al., 2005; Maly et al., 2006). Self-efficacy for resisting eating has been studied in obese populations, but has not been investigated in OA patients.

In a review examining the relationship between self-efficacy and outcomes for arthritis patients, Marks (2001) concluded that strategies to enhance self-efficacy have a favorable impact on disability and overall health. For overweight and obese OA patients, there are multiple intervention targets including pain management and weight control. Self-efficacy theory suggests that self-efficacy is domain specific and represents the expectancy to succeed at a particular task rather than a general belief about one’s abilities (Bandura, 1977). Understanding the specificity versus generality of self-efficacy may enable clinicians to more effectively intervene with overweight and obese OA patients. For example, if self-efficacy is domain specific, including strategies that target self-efficacy in relevant domains may be most beneficial.

This study examined the contributions of arthritis self-efficacy and self-efficacy for resisting eating to pain, disability, and eating behaviors. The primary aim was to test whether domain-specific self-efficacy would demonstrate associations with corresponding outcomes rather than being associated with outcomes in general. We hypothesized that the strongest associations would be found between self-efficacy for controlling pain and pain, self-efficacy for performing physical activities and physical disability, self-efficacy for managing OA-related emotional symptoms and psychological disability, and self-efficacy for restricting eating and eating behaviors.

Method

Participants

Participants were 174 individuals diagnosed as having osteoarthritis of the knees who reported knee pain persisting 6 months or longer, and were overweight or obese (BMI between 25 and 42). Patients were included if they met the American College of Rheumatology criteria for OA, had radiographic evidence of OA affecting one or both knees, and if OA of the knee(s) was the medical condition that contributed most to limitations in their daily function. Patients were excluded if they had a significant medical condition that increased their risk of a significant adverse health event during physical activity (e.g., myocardial infarction in the previous six months, an abnormal cardiac response to exercise such as exercise-induced BT or abnormal blood pressure response). Individuals with other arthritic disorders (e.g., rheumatoid arthritis) were also excluded. Table 1 presents demographic and medical characteristics of this sample.

Procedure

Participants in this study were recruited through the Rheumatology, Orthopaedic Surgery, and Pain Management clinics at Duke University Medical Center, through flyers posted throughout the community, and from advertisements in local newspapers. All participants in this study were volunteers for a treatment outcome study being conducted in our laboratory. Data presented in this paper were collected at the baseline evaluation prior to randomization to treatment conditions. Participants received bilateral knee x-rays, a medical evaluation, and completed a series of questionnaires to assess arthritis-related self-efficacy, weight-related self-efficacy, pain, physical disability, psychological disability, and overeating. Participants also provided demographic and medical information.

Measures

Osteoarthritis Diagnosis—The diagnosis of knee OA was based on the American College of Rheumatology clinical criteria for the classification of knee OA (Altman, Asch, Bloch, Bole, Borenstein, Brandt, et al., 1986). Radiographic assessment of both knees was used to confirm OA diagnosis. A fixed-flexion PA knee radiograph was taken with the SynaFlex™ x-ray positioning frame (Synarc, San Francisco, CA). With this platform, the feet were externally rotated 10, the knees and thighs touched the vertical platform anteriorly, and the x-ray beam was angulated 10 caudally. Skyline views of both patellae were taken with the participant in the seated position, knees bent, and the beam angled from the feet toward the knees. Study rheumatologists graded individual radiographic features of OA using a photographic standard atlas (Altman, Hochberg, Murphy, Wolfe, & Lequesne, 1995) that included joint space narrowing and osteophytes. One of the study rheumatologists (VBK or DSC) reviewed each x-ray and determined a score, based on Kellgren-Lawrence criteria (Kellgren & Lawrence, 1957). Kellgren-Lawrence scores for each knee were summed resulting in a total score (range 1 to 8), with higher scores indicating greater disease severity.

Comorbid Medical Conditions—A list of 43 comorbid medical conditions from the Older American Resources and Services (OARS) Physical Health Subscale (Fillenbaum, 1988; George & Fillenbaum, 1985) was used to assess whether participants had comorbid medical conditions. For medical conditions that participants did not endorse, the item was assigned a value of zero. Presence of the condition was assigned a value of one. A total score was obtained by summing the items. The possible range for total scores was 0 to 43, with higher scores indicating a greater number of comorbid medical conditions. As might be expected in an older sample, many patients had comorbid conditions (*Mean*=6, *SD*=4) with high blood pressure being the most common disorder (49% of sample) followed by sleep problems (43%), impaired hearing (17%), osteoporosis (12%), and diabetes (11%).

Arthritis-related self-efficacy—The Arthritis Self-Efficacy Scale (ASES; Lorig, Chastain, Ung, Shoor, & Holman, 1989) was used to assess patients' perceived abilities to perform behaviors that would control arthritis pain and minimize disability. This measure is comprised of three subscales (i.e., pain control, other arthritis symptoms, physical function). The pain control self-efficacy subscale contains five items which measure patients' perceived abilities to decrease arthritis pain (e.g., "How certain are you that you can decrease your pain quite a bit?"). The physical function subscale contains nine items that assess patients' beliefs that they can perform specific daily activities without assistance (e.g., "How certain are you that you can get out of an armless chair quickly without using your hands for support?"). The other arthritis symptoms subscale consists of six items that measure patients' perceived abilities to control symptoms related to arthritis such as fatigue and depression (e.g., "How certain are you that you can deal with the frustration of arthritis?"). Patients are asked to indicate their responses on a 10–100 (10 = very uncertain; 100 = very certain) Likert-type scale. Subscale scores are obtained by averaging the responses to each item within a subscale, and subscale scores range from 10 to 100. The ASES has demonstrated reliability and validity in past research (Lorig et al., 1989; Schiaffino, Revenson, & Gibofsky, 1991). ASES subscales demonstrated adequate internal consistency in the current sample (Cronbach's alpha = .87 to .92).

Weight-related self-efficacy—The Weight Efficacy Life-style Questionnaire (WEL; Clark, Abrams, Niaura, Eaton, & Rossi, 1991) is a 20-item scale used to assess patients' perceived ability to control their weight by resisting eating in certain situations. The WEL assesses self-efficacy for resisting eating in five different types of situations: (1) Negative Emotions (e.g., "I can resist eating when I am depressed"), (2) Food Availability (e.g., "I can resist eating even when high-calorie foods are available"), (3) Social Pressure (e.g., "I can resist eating even when others are pressuring me to eat"), (4) Physical Discomfort (e.g., "I can resist eating when I feel physically run down"), and (5) Positive Activities (e.g., "I can resist eating when I am happy"). Patients are instructed to rate each item on a 0–9 point scale (0 = Not confident inability to resist desire to eat; 9 = Very confident in ability to resist desire to eat). The lowest possibly score is 0 and the highest is 180. The sum of the ratings for all items provides a global measure of self-efficacy with higher scores reflecting greater self-efficacy for resisting eating. Previous studies (Clark et al., 1991; Clark & King, 2000) support the reliability and validity of the WEL both in general populations of obese individuals and in minority populations (e.g., African-American women; Dutton, Martin, Rhode, & Brantley, 2004). The reliability of the WEL in this sample was supported by its high level of internal consistency (Cronbach's alpha = .95).

Pain, physical disability, and psychological disability—The Arthritis Impact Measurement Scales (AIMS; Meenan, Gertman, & Mason, 1980) is a widely-used 45-item self-report questionnaire designed to measure health status in arthritis patients. The AIMS provides three component summary scales (Pain, Physical Disability, and Psychological Disability) derived from eight subscales (Pain, Mobility, Impact, Dexterity, Household Activities, Activities of Daily Living, Depression, and Anxiety). Each of the subscales is comprised of four to seven items rated on a Likert-type scale that is then normalized to a 0–10 scale within each subscale. The component summary scales are created by averaging relevant normalized subscales: Pain (Pain), Physical Disability (Mobility, Impact, Dexterity, Household Activities, and Activities of Daily Living), and Psychological Disability (Depression and Anxiety). Component summary scales range from 0 to 10. Reliability and validity of the three summary scales of the AIMS have been demonstrated across a number of arthritis populations, including osteoarthritis, as well as across various settings (Meenan, Gertman, Mason, & Dunait, 1982; Kazis, Meenan, & Anderson, 1983). In this sample, subscales demonstrated high internal consistency (Cronbach's alpha): .76 for Pain, .80 for Physical Disability, and .92 for Psychological Disability.

Eating Behavior—Patients completed the Gormally Binge Eating Scale (BES), a 16-item self-report measure that assesses severity of binge eating by evaluating behaviors, thoughts, and feelings commonly associated with binge eating episodes (Gormally, Black, Daston, & Rardin, 1982). Each item of the BES contains 3 or 4 statements, for which participants are instructed to circle the statement that best describes their experience. For example, one item includes the statements "I eat three meals a day with only an occasional between meal snack," "I eat three meals a day, but I also normally snack between meals," "When I am snacking heavily, I get in the habit of skipping regular meals," and "There are regular periods when I seem to be continually eating, with no planned meals." Each statement is weighted (0–3), and the sum of the circled statements yields an overall binge eating score, with higher scores indicating greater severity (possible range = 0 – 47). The scale was developed using samples of overweight individuals and has demonstrated good psychometric properties (Gormally et al., 1982). The scale demonstrated high internal consistency in the current sample (Cronbach's alpha = .87).

Data Analysis

Descriptive data are provided for medical and demographic characteristics, self-efficacy scales, pain, disability, and eating behavior. Pearson correlations were used to examine associations between arthritis-related self-efficacy subscales, self-efficacy for resisting eating, pain, disability, and eating behavior. Self-efficacy variables that were significantly ($p \leq .05$) correlated with outcomes were then tested. The unique contribution of self-efficacy to outcomes (pain, disability, and eating behavior) was examined using hierarchical linear regression (HLR; Cohen & Cohen, 1975). In each HLR, self-efficacy variables were entered on the final step after controlling for demographic characteristics (age, sex, and education) entered on Step 1 and medical characteristics (BMI, OARS, and Kellgren-Lawrence Score) entered on Step 2. For physical and psychological disability, pain was entered as a control variable on Step 3. In the HLR for eating behavior, psychological disability was entered as control variable on Step 3.

Results

Descriptive Analyses

On average, patients rated their self-efficacy for pain control in the moderate range (M=60.1, SD=20.0, range 14 to 100), their self efficacy for control of other arthritis symptoms in the moderate range (M=63.5, SD=19.8, range 17 to 100), and their self-efficacy for function somewhat higher (M=75.3, SD=18.5, range 20 to 100). Interestingly, there were variations in each type of arthritis self-efficacy with some patients reporting much higher arthritis self-efficacy than others. A similar pattern was observed regarding weight-related self-efficacy. Although patients rated their self-efficacy for resisting eating in the moderate range (M=105.9, SD=36.1, range 18 to 180), considerable variability was noted with some patients reporting much higher levels of self-efficacy for resisting eating than others.

Correlational analyses were conducted to examine associations between arthritis self-efficacy subscales, self-efficacy for resisting eating, pain, disability, and eating behavior (see Table 2). Self-efficacy for resisting eating was moderately correlated with self-efficacy for pain control (r=.18, p=.02) and other arthritis-related symptoms (r = .25, p=.001); however, self-efficacy for resisting eating was not significantly correlated with self-efficacy for function (r= .13, p=.09). All arthritis self-efficacy subscales demonstrated significant, negative correlations with pain, physical disability and psychological disability (r = −.41 to −.59, all p values < .001), but these subscales were not associated with eating behaviors (r = −.13 to .04, all p values > .09). Self-efficacy for resisting eating demonstrated a strong association with eating behaviors (r= −.57, p<.001) and a moderate association with psychological disability (r=−.27, p<.001), but it was not associated with pain or physical disability.

Hierarchical Linear Regression (HLR) Analyses

Table 3 summarizes HLR results. HLR was conducted to test the association between self-efficacy variables and outcomes (pain, disability, and eating behavior) after controlling for demographic and medical characteristics. Importantly, all self-efficacy variables associated with outcomes in bivariate analyses were entered on the final step to examine the unique contribution of each self-efficacy variable to the outcome.

Pain—As shown in Table 3, demographic and medical characteristics accounted for 18% of the variance in AIMS pain scores. Arthritis self-efficacy subscales were entered on the final step and accounted for an additional 17% of the variance in pain. Of the arthritis self-efficacy subscales, self-efficacy for pain control was the only significant predictor of pain (β=−.28, t= − 2.74, p=.01) indicating that individuals with higher self-efficacy for pain control had lower

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AIMS pain scores. Self-efficacy for physical function and other symptoms of arthritis were not associated with pain (*p* values ≥ .17).

Physical disability—Demographic characteristics and medical variables accounted for 29% of the variance in AIMS physical disability. Of the medical variables, number of comorbid medical disorders showed the strongest association with physical disability (β=.33, *t*=5.53, *p*=.001). Pain was entered on the third step and accounted for an additional 9% of the variance in physical disability. As shown in Table 3, arthritis self-efficacy subscales were entered on the final step and accounted for 13% of the variance in physical disability. Of these, self-efficacy for physical function was the only significant predictor of physical disability (β=−.41, *t*=−5.63, *p*=.001) indicating that higher self-efficacy for physical function was associated with lower physical disability. Self-efficacy for pain control and other symptoms of arthritis were not associated with physical disability (*p* values ≥ .26).

Psychological disability—Demographic characteristics accounted for 12% of the variance in psychological disability. Age was the only demographic variable that demonstrated a significant association with the outcome indicating that younger patients reported greater psychological disability (β=−.20, *t*=−2.82, *p*=.01). Medical variables accounted for 11% of the variance in AIMS psychological disability, which can be attributed to the contribution of number of comorbid medical disorders (β=.19, *t*=2.88, *p*=.01). Pain did not demonstrate an association with psychological disability (*p*=.23). Arthritis self-efficacy subscales and self-efficacy for resisting eating were entered on the final step and accounted for 21% of the variance in psychological disability (see Table 3). Greater self-efficacy for other symptoms of arthritis (β=− .44, *t*=−4.44, *p*=.001) and resisting eating (β=−.13, *t*=−2.06, *p*=.04) were significantly associated with lower psychological disability. Self-efficacy for pain control and physical function were not significant predictors of psychological disability (*p* values ≥ .19).

Eating behavior—Demographic and medical characteristics accounted for 7% of the variance in eating behavior. Psychological disability was entered as a control variable on the third step of the HLR, but it did not demonstrate an association with eating behavior (*p*=.60). Self-efficacy for resisting eating was entered on the final step and accounted for an additional 28% of the variance in eating behavior. Results indicate that greater self-efficacy for resisting eating was associated with less overeating or binge eating (β=−.56, *t*=−8.63, *p*=.001).

Discussion

This study found that self-efficacy is important for understanding pain and behavioral adjustment in overweight and obese OA patients. Moreover, our analyses revealed that the contribution of self-efficacy was domain specific, as self-efficacy scales demonstrated significant associations with corresponding outcomes and not outcomes in general. Consistent with our hypotheses, associations were found between self-efficacy for controlling pain and pain, self-efficacy for performing physical activities and physical disability, self-efficacy for managing other (emotional) symptoms related to OA and psychological disability, and self-efficacy for restricting eating and eating behaviors. In addition, self-efficacy for restricting eating was associated with psychological disability. These results suggest that clinicians working to manage pain, disability, and eating behaviors in overweight OA patients need to assess patients' perceptions of their self-efficacy for each domain.

One of the most interesting findings of this study was that the self-efficacy variables explained as much or more variance in pain, disability, and eating behaviors than demographic and medical variables (with the exception of the association between the impact of number of comorbid medical disorders and physical disability). Traditionally, medical variables such as BMI and disease severity, and demographic factors, such as age and sex, have been considered important in understanding pain and disability in this population (Jordan et al., 1996; Larsson & Mattsson, 2001). Indeed, in the present study, several of these factors did emerge as significant predictors. However, what is striking about our findings is that self-efficacy variables explained a significant proportion of the variance in outcomes even after statistically controlling for demographic and medical variables. These findings suggest that analysis of pain, disability, and eating behaviors in overweight and obese OA patients should not only examine medical and demographic factors, but also self-efficacy variables.

For overweight and obese OA patients, weight control is important for managing pain and reducing disability (Barofsky et al., 1997; Bunning & Materson, 1991; Creamer et al., 2000). Thus, it is important for these patients to manage their eating and increase physical activity. This study found that self-efficacy for physical function explained a significant portion of variance in physical disability. Prior studies have found that self-efficacy for function is related to physical disability in arthritis patients (Harrison, 2004; Maly, Costigan, & Olney, 2005), but to our knowledge this study is the first to examine the associations of self-efficacy to physical function in a sample of overweight and obese OA patients. Interestingly, the effects of self-efficacy for physical function were apparent even after controlling for BMI and pain. BMI was not associated with physical disability suggesting that physical disability in overweight and obese OA patients may depend more on self-efficacy beliefs than on patients' body weight. In other words, OA patients may be overweight, yet if they retain a sense of self-efficacy for function, they may be less physically disabled by their arthritis. Therefore, maintaining confidence in one's ability to engage in daily functional activities may be quite important for overweight and obese OA patients. Those patients who are able to maintain a high level of self-efficacy in the face of obesity may be much more likely to maintain their involvement in daily activities, which in turn can potentially contribute to increased strength, muscle conditioning, pleasant activities, and positive affect, all of which are important factors in adjustment to OA (Keefe et al., 1990, 2004; Ikeda, Tsumura, Torisu, 2005).

To our knowledge, the present study is one of the first to examine the degree to which self-efficacy for resisting eating is related to eating behaviors and psychological disability in overweight and obese OA patients. Our results indicated substantial variability in self-efficacy for resisting eating, suggesting that not all overweight and obese OA patients report difficulties controlling their eating. This is consistent with results showing that overweight and obese individuals, regardless of OA status, vary in their reports of self-efficacy for resisting eating (Clark et al., 1991). Interestingly, those patients who reported higher self-efficacy for resisting eating had lower levels of psychological disability. There may be several reasons why self-efficacy for resisting eating is a significant predictor of psychological disability in this population. First, overweight and obese OA patients may feel that they should be able to resist eating, and those who feel they fail in this regard (i.e., who experience lower self-efficacy for resisting eating) may suffer greater psychological distress and negative affect compared to those with greater self-efficacy for resisting eating. Alternatively, patients who experience higher levels of psychological disability may have more difficulty controlling their eating because eating represents a way to cope with negative affect (Linde et al., 2004). However, after statistically controlling for demographic and medical characteristics, there was no association between psychological disability and eating behaviors in this sample.

A limitation of the present study is that it utilizes a correlational design, which prevents us from drawing causal attributions about the effects of self-efficacy on pain, disability, and eating behaviors. Future studies employing longitudinal designs need to be conducted to examine causal relationships between changes in domain specific self-efficacy and changes in corresponding outcomes for overweight and obese OA patients. In addition, generalizability of our findings to the broader population of overweight OA patients may be limited because we included only those patients who had a body mass index between 25 and 42. There is an increasing number of OA patients who have a BMI greater than 42 (Must et al., 1999), and this group of extremely obese patients may be different from less obese patients in important ways. Finally, our findings may be less generalizable because data were obtained from OA patients voluntarily seeking participation in a treatment study that targets weight loss and pain reduction. It would be interesting to determine whether a general population study of overweight OA patients would yield similar findings.

The design of this study allowed us to examine the relative importance of self-efficacy in explaining pain, disability, and eating behaviors in overweight and obese OA patients. We found that self-efficacy was domain specific, as self-efficacy scales significantly contributed to variance in corresponding outcomes and not outcomes in general. These findings suggest that strategies for enhancing domain specific self-efficacy are important for managing pain, disability, and food intake. Self-efficacy can be enhanced through a variety of sources, including accomplishments, verbal persuasion, observation of others, and development and practice of relevant skills (Bandura, 1977, 1986). Intervention protocols for overweight and obese OA patients could benefit from including strategies designed to enhance self-efficacy for pain, physical function, emotional symptoms, and resisting eating (e.g., goal setting with self-monitoring of achieved goals, group-based behavioral rehearsal of pain coping skills, guided treatment- and home-based practice sessions). It may not be adequate to focus on general feelings of efficacy or to focus solely on one domain of self-efficacy in this population. For example, overweight and obese OA patients receiving only a weight management intervention may drop out prematurely or fail to maintain exercise behaviors due to perceived inability to control pain or perform physical activities. Combining pain coping skills training with behavioral weight management techniques may be more beneficial than either intervention alone for this population. We are currently evaluating this in a randomized clinical trial.

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Table 1

Descriptive statistics for demographic and medical characteristics (N=174).

	% (n)	Mean (Standard Deviation)
Female	81.6 (142)	
Education		
High school	12.1 (21)	
Some college	25.3 (44)	
College graduate	34.5 (60)	
Professional/graduate school	28.2 (49)	
Race		
African American	36.2 (63)	
White	61.5 (107)	
Hispanic	0.6 (1)	
Asian/Pacific Islander	1.7 (3)	
Age		57.72 (9.83)
Body Mass Index		34.09 (4.24)
Comorbid medical disorders (number)		5.51 (3.77)
Disease Severity (Kellgren-Lawrence Score)		
Right knee		2.47 (1.13)
Left knee		2.44 (1.15)

Table 2

Correlations between self-efficacy and outcomes (N=174).

	Mean (SD)	1	2	3	4	5	6	7	8
1. Self-Efficacy for Pain Control (ASES)	60.1 (20.0)	1.00							
2. Self-Efficacy for Physical Function (ASES)	75.3 (18.5)	.53**	1.00						
3. Self-Efficacy for Other Symptoms (ASES)	63.5 (19.8)	.76**	.55**	1.00					
4. Weight-Related Self-Efficacy (WEL)	105.9 (36.1)	.18*	.13	.25**	1.00				
5. Pain Scale (AIMS)	5.5 (1.9)	−.50**	−.42**	−.47**	.01	1.00			
6. Physical Disability (AIMS)	1.6 (1.0)	−.46**	−.59**	−.42**	−.08	.41**	1.00		
7. Psychological Disability (AIMS)	3.0 (1.6)	−.45**	−.41**	−.59**	−.27**	.24**	.32**	1.00	
8. Eating behaviors (BES)	12.6 (6.4)	−.04	.04	−.13	−.57**	−.08	.01	.20*	1.00

* $p \leq .05$

** $p \leq .01$

Table 3

Hierarchical Linear Regression Analyses for pain, disability, and eating behaviors (N=174).

	Statistics by step		Statistics by variable		
Step and variables	**Total R^2**	**R^2 change**	**Final Std. Beta**	***t***	***p***
Outcome: Pain Scale (AIMS)					
1. Age			−.14	−1.85	.07
Sex[a]			.05	0.72	.48
Education	.14	.14	−.18	−2.65	.01
2. Body Mass Index			.12	1.84	.07
Comorbid Medical Disorders (number)			.02	0.23	.81
Disease Severity (Kellgren-Lawrence Score)	.18	.04	.01	0.10	.92
3. Self-Efficacy for Physical Function (ASES)			−.11	−1.38	.17
Self-Efficacy for Other Symptoms (ASES)			−.14	−1.31	.19
Self-Efficacy for Pain Control (ASES)	.35	.17	−.28	−2.74	.01
Outcome: Physical Disability (AIMS)					
1. Age			.06	0.83	.41
Sex			−.03	−0.56	.58
Education	.04	.04	.01	0.01	.99
2. Body Mass Index			−.05	−0.85	.39
Comorbid Medical Disorders (number)			.33	5.53	.001
Disease Severity (Kellgren-Lawrence Score)	.29	.25	−.06	−0.89	.38
3. Pain Scale (AIMS)	.38	.09	.18	2.66	.01
4. Self-Efficacy for Physical Function (ASES)			−.41	−5.63	.001
Self-Efficacy for Other Symptoms (ASES)			.05	0.55	.58
Self-Efficacy for Pain Control (ASES)	.51	.13	−.10	−1.12	.26
Outcome: Psychological Disability (AIMS)					
1. Age			−.20	−2.82	.01
Sex			.01	0.09	.93
Education	.12	.12	−.05	−0.81	.42
2. Body Mass Index			.01	0.01	.99
Comorbid medical disorders (number)			.19	2.88	.01
Disease Severity (Kellgren-Lawrence Score)	.23	.11	−.07	−1.10	.27
3. Pain Scale (AIMS)	.24	.01	−.09	−1.21	.23
4. Self-Efficacy for Physical Function (ASES)			−.10	−1.32	.19
Self-Efficacy for Other Symptoms (ASES)			−.44	−4.44	.001
Self-Efficacy for Pain Control (ASES)			.01	0.06	.95
Weight-Related Self-Efficacy (WEL)	.45	.21	−.13	−2.06	.04
Outcome: Eating Behaviors (Binge Eating Scale)					
1. Age			−.11	−1.45	.15
Sex			−.07	−1.04	.30
Education	.03	.03	.19	2.86	.01
2. Body Mass Index			.11	1.66	.10
Comorbid medical disorders (number)			.05	0.79	.43
Disease Severity (Kellgren-Lawrence Score)	.07	.04	.11	1.62	.11
3. Psychological Disability (AIMS)	.10	.03	.04	0.53	.60
4. Weight-Related Self-Efficacy (WEL)	.38	.28	−.56	−8.63	.001

[a] Sex is coded as 0=female and 1=male.