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Factors Associated with Disability in a Sample of Adults with Arthritis

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Abstract

Background: Arthritis is the most common cause of disability among US adults. Few studies have comprehensively examined factors associated with disability in this population.

Objective: To investigate the relationship between a number of disease and non-disease related factors and disability in sample of adults with self-reported doctor-diagnosed arthritis.

Methods: Participants (n=396) taking part in a randomized controlled trial of arthritis self-management completed a comprehensive survey assessing a number of demographic, arthritis-specific, health-related, behavioral, and psychological variables at baseline. Disability, as measured by the Health Assessment Questionnaire (HAQ), was also measured. Hierarchical regression models examined the independent associations between blocks of variables and disability.

Results: Demographic variables (R^2=0.13), arthritis-specific demographics (i.e. type, medication use; ΔR^2=0.16), physical health-related variables (ΔR^2=0.06), arthritis specific symptoms (ΔR^2=0.12), health behaviors (ΔR^2=0.00), and psychological variables (ΔR^2=0.03) explained 50% of the variance in disability score (R^2=0.50). With the exception of health behaviors, the addition of each block of variables significantly improved the model, explaining additional variance in HAQ scores (p<0.0001). In the final model, older age, less than a high school education, rheumatoid arthritis, greater arthritis duration, taking steroids, taking narcotics, greater pain, greater stiffness, greater depressive symptoms, and lower arthritis self-efficacy were associated with greater disability whereas male gender, fibromyalgia, and excellent/very good health were associated with less disability.

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Conflicts of Interest
The authors have no conflicts of interest to disclose.

Conclusions: A number of disease and non-disease related variables were associated with disability. These findings suggest that disability in adults with arthritis may be a complicated phenomenon; such complexity may make decreasing disability in this population challenging.

Keywords

arthritis; disability; health assessment questionnaire

Introduction

Arthritis and other rheumatic conditions are a major public health problem. During 2007–2009, an estimated 22.2% of adults in the United States (49.9 million) reported doctor-diagnosed arthritis [1]. The prevalence of arthritis is projected to increase to 25% of US adults (67 million) by the year 2030 [2]. The financial burden of arthritis is substantial and is expected to worsen due to the aging of the US population and concurrent increases in obesity and physical inactivity [3].

Arthritis remains the most common cause of disability among US adults [4], with 9.4% (21.1 million or 42.4% of those with arthritis) of US adults reporting arthritis-attributable activity limitations during 2007–2009 [1]. Arthritis frequently leads to limitations in work, recreational activities, and activities of daily living, and thus can be detrimental to the physical, psychological, and economic well being of those affected [5]. Arthritis can take away one's freedom and independence, and often disrupts the lives of family members or those providing care [5].

The Health Assessment Questionnaire Disability Index (HAQ) [6] has been widely used to measure disability in experimental and observational arthritis studies, as well as in clinical settings [7]. The HAQ reflects difficulties in performing activities of daily living (e.g., dressing and grooming, walking), and has been shown to be a good predictor of future disability [8], including work disability [9, 10], future costs [11, 12], and mortality [13, 14]. For example, in a study of adults with rheumatoid arthritis, Lajas and colleagues [12] found an average increase in total costs (including direct and indirect costs) of $11,184 per year per unit increase in HAQ score. In a sample of 10,319 adults with rheumatoid arthritis, Michaud and colleagues [14] found that baseline scores of the HAQ predicted death 7 years later. HAQ scores of 1.0, 1.5, 2.0 and 2.5 (scores can range from 0 to 3) were associated with an 1.8, 2.7, 4.0, and 5.5 times increased risk of dying (Hazard Ratios) [14].

Understanding which factors are associated with disability is important, as disability has been shown to predict important arthritis-related outcomes such as future disability, costs, and mortality [9–14]. Public health officials and clinicians could use such knowledge to develop effective programs and/or treatment modalities that target individuals who may be at greatest risk. Although some studies have examined the relationship between disability and particular health or arthritis-related factors (e.g., pain or physical activity), the existent literature lacks a comprehensive examination of the relationship between disability and various disease and non-disease related factors. This shortcoming makes it difficult to understand which factors may be most important, and thus which people are in most need of programs and/or interventions. The purpose of this study was to investigate the relationship

between demographic, health-related, behavioral, psychological, health-related, and arthritis-related variables and disability, as measured by the HAQ, in sample of adults with self-reported doctor-diagnosed arthritis.

Methods

STEPS to Health was a randomized, controlled trial with an attention control group, evaluating a 12-week, self-directed exercise program (First Step to Active Health®) for people with arthritis. Primary outcomes of the study were arthritis symptoms (pain, fatigue, stiffness), lower body strength, functional exercise capacity, flexibility, physical activity, and arthritis management self-efficacy. This study uses baseline data only (prior to randomization); therefore, a detailed description of the intervention is not included in this paper.

Participant Recruitment

A number of recruitment strategies were used, with the most common and most successful being emails to worksite listservs and newspaper advertisements. Interested participants contacted the study office and completed a phone screen to assess eligibility status. Participants were eligible to participate if they: (1) were told by a health care professional that they have some form of arthritis; (2) reported at least one symptom of arthritis (joint pain, stiffness, tenderness, decreased range of motion, redness and warmth, deformity, crackling or grating, fatigue); (3) were 18 years of age or older; (4) were the only one in their household participating in the study; (5) were not planning to move out of the area in the next 9 months; (6) were able to read and write in English; and (7) were not participating in another research study (unless it was an observational study without an intervention or medication).

Participants were ineligible if: (1) they had a fall in the past year that required medical assistance; (2) were pregnant, breastfeeding, or planning to become pregnant in the next year (women); (3) were a diabetic and taking insulin; (4) could not walk longer than 3 minutes without taking a rest; (5) could not stand without assistance for more than 2 minutes; (6) could not sit in chair without arms for more than 5 minutes; or (7) were already physically active (aerobic activities ≥3 days/week for ≥30 minutes/day or strength training ≥3 days/week for ≥20 minutes/day). The Physical Activity Readiness Questionnaire (PAR-Q) [15] was also administered and participants endorsing any items, with one exception, were excluded. Participants were not excluded if they took medication for hypertension; however, they were excluded if they had uncontrolled hypertension (≥160/100).

Procedure

Participants deemed eligible following the telephone screening were scheduled to take part in a measurement session at the University of South Carolina. A total of 24 baseline sessions were conducted from 3/27/2010 to 10/15/2011 to meet recruitment goals. The number of participants taking part in each session ranged from 6 to 30.

Prior to the scheduled measurement session, participants were mailed a survey that assessed sociodemographic characteristics; physical activity, dietary, and other health-related behaviors; and arthritis-related characteristics. Participants brought the completed survey with them to the session. At the baseline measurement session, written informed consent, approved by the Institutional Review Board at the University of South Carolina, was obtained. Upon providing consent to participate, staff administered physical measurements. Participants received a $20 cash incentive for taking part in the baseline measurement session.

Of the initial 1,112 phone inquiries, 923 participants completed a phone screen; 545 were eligible, interested, and scheduled for a baseline visit, 10 were eligible but no longer interested, and 368 were deemed ineligible for a variety of reasons. Of the 545 scheduled for a baseline visit, 401 completed the visit and were randomized, 135 did not attend the visit, and 9 were excluded at the baseline visit prior to randomization. Five participants did not have all data needed for this study (i.e. n=1 missing education, n=1 race, n=1 health status, n=2 chronic health condition(s)), and thus were not included in this analysis.

Measures

Sociodemographic/Health-Related.

Participants reported their age, gender, highest grade or years of education completed, race, smoking status, marital status, and rated their general health status (from poor to excellent). Participants reported the type(s) of arthritis they had and the number of years they have had arthritis. Self-reported presence of hypertension, high cholesterol, osteoporosis, stroke, and cancer were reported, and a sum score of the total number of chronic health conditions present was calculated (from 0–5). Height to the nearest quarter inch and weight to the nearest tenth kilogram were obtained. BMI was calculated as kg/m^2.

Medication.

Participants were asked to report if they were currently taking Tylenol or acetaminophen, non-steroidal anti-inflammatory drugs (NSAIDS), COX-2 inhibitors, oral steroids, narcotic pain relievers, or any other over-the-counter and prescription medications for their arthritis (open-ended question). Medications listed in the open-ended questions were coded and reclassified to the above mentioned categories if applicable. Given the common reporting of the use of disease-modifying antirheumatic drugs (DMARDS) in the open-ended question, an additional category of drugs was created. If participants reported current use or at least one day of use of any one or more of these six categories of drugs in the past 7 days, they were considered to be using arthritis medication.

Self-Reported Physical Activity.

The 42-item Community Health Activities Model Program for Seniors (CHAMPS) questionnaire measured the frequency and duration of various physical activities completed “in a typical week during the past 4 weeks” [16]. Participants reported whether or not they had engaged in each activity, the number of times per week, and the total number of hours per week (in 6 categories ranging from “less than 1 hour a week” to “9 or more hours per

week"). Total hours per week of moderate to vigorous physical activity (≥ 3.0 METs) was calculated. This measure has been shown to be valid [17], have acceptable test-retest reliability [17], and be sensitive to change [16, 18–21].

Fruit and Vegetable Consumption.

Fruit and vegetable consumption was measured using the National Cancer Institute (NCI) fruit and vegetable all-day screener [22]. We used nine of the original ten items (French fry consumption was excluded). Participants were asked about the different types of fruit and vegetables they eat, and how much they ate of each food in the past month. Mean cups of fruit and vegetables per day was calculated. This instrument has been shown to correlate moderately with 24-hour recall measures of fruit and vegetable consumption (Men: r = 0.66; Women: r = 0.51) [23]

Depressive Symptoms.

The 10-item Center for Epidemiological Studies Depression Scale (CES-D) [24–26] was used to measure symptoms of depression. On a scale of 0 (rarely or none of the time) to 3 (most or all of the time), participants rated the frequency with which they experienced 10 symptoms of depression during the past week. Responses were summed to yield a score ranging from 0 to 30, with a higher score indicating greater depressive symptoms. This measure has been shown to be reliable and valid [25, 27, 28].

Symptoms of Arthritis: pain, fatigue, stiffness.

Using a Visual Numeric Scale [29], participants rated their arthritis symptoms in the past 2 weeks on a numeric scale from 0 (no symptoms) to 10 (severe symptoms). Shaded height bars associated with each number appeared above each number. Separate items were used to evaluate generalized pain, stiffness, and fatigue. This measure has been shown to be sensitive to detecting reduction in pain after the completion of an arthritis self-management course [30, 31].

Arthritis Management Self-Efficacy.

An 8-item version of the Arthritis Self-Efficacy Scale [32] was used to assess participants' confidence in their ability to manage symptoms of arthritis. On a scale of 1 (very uncertain) to 10 (very certain) participants rated how certain they were that they could do tasks such as decrease their pain quite a bit, keep their arthritis or fibromyalgia pain from interfering with their sleep, or keep their arthritis or fibromyalgia pain from interfering with the things they want to do, at the present time. This scale has been shown to have acceptable levels of construct and concurrent validity as well as reliability [32], and has been shown to be sensitive to change [30]. Responses were summed to yield a score ranging from 8 to 80, with a higher score indicating greater confidence in their ability to manage arthritis symptoms.

Disability.

The 20-item HAQ Disability Index was used to measure self-reported disability in eight categories of daily activities (i.e., dressing, arising, eating, walking, hygiene, reach, grip, and common activities). On a scale of 0 (without any difficulty) to 3 (unable to do), participants

reported the amount of difficulty they had in performing two or three specific activities (in each category) over the past week. Each of the eight categories was assigned a score based on the highest score of any activity within the category. If the category score was lower than a 2 but a participant reported usually using a device or aid to perform the activity, the score was increased to a 2. The total score was the mean of the eight categories. Scores ranged from 0 to 3, with a higher score indicating higher impairment. This measure has been shown to correlate with other self-report health status measures [33, 34] and task performance [35].

Statistical Analyses

Basic descriptive statistics included frequencies and means of key survey, selected demographic, and health-related variables. A series of hierarchical multiple linear regression analyses were conducted to examine the relationship between demographic variables, arthritis-specific demographics (i.e. type of arthritis, medication use), physical health variables, arthritis-symptoms, health behaviors, and psychological variables and HAQ. Blocks of variables were organized and entered in terms of causal priority, starting with inherent characteristics of the individual, followed by groups of modifiable factors. The predictor variables were entered in the following order: Block 1: age, gender, education, race, smoking status, marital status; Block 2: type of arthritis, medication use; Block 3: health status, number of chronic health conditions, BMI; Block 4: pain, stiffness, fatigue; Block 5: physical activity, fruit and vegetable consumption; and Block 6: depression, arthritis self-efficacy. Variance explained by each block (R^2) and the difference in the variance explained between blocks (incremental R^2 or R^2 change) were calculated.

Results

As shown in Table 1, there were 396 participants included in this study. The mean age was 56.4±10.7 years and the mean BMI was 33.0±8.2 kg/m^2. A majority of participants were white (64.4%), female (85.9%), had at least some college education (87.1%), were married (60.6%), and overweight or obese (85.4%). On average, participants reported having arthritis for 124.2±115.2 months (10.3±9.6 years); osteoarthritis was the most common type of arthritis reported (50.8%). A majority (84.9%) of participants were taking some sort of medication for their arthritis, with NSAIDS being the most common (62.9%). Mean disability as measured by the HAQ was 0.6±0.5, which represents mild to moderate difficulty [36].

Results from the hierarchical regression analyses are shown in Table 2. The demographic-related variables entered in Block 1 accounted for 13% of the variance in HAQ score (R^2=0.13, p<0.0001), the addition of the arthritis-specific demographics in Block 2 explained an additional 16% of the variance (ΔR^2=0.16, p<0.0001), the addition of the physical health-related variables in Block 3 explained an additional 6% of the variance (ΔR^2=0.06, p<0.0001), the addition of the arthritis-specific symptoms variables in Block 4 explained an additional 12% of the variance (ΔR^2=0.12, p<0.0001), the addition of the health behavior variables in Block 5 explained no additional variance (ΔR^2=0.00, p=0.41), and the addition of psychological variables in Block 6 explained an additional 3% of the

variance in HAQ score (ΔR^2=0.03, p=<0.0001). The full set of predictor variables accounted for 50% of the variance in HAQ scores (R^2=0.50, p<0.0001).

Table 2 shows the individual variables significantly associated with HAQ for each block of variables entered. When all blocks were entered simultaneously into the model, older age (β=0.01, p<0.01), less than a high school education (β=0.59, p=0.001), self-reported rheumatoid arthritis (β=0.12, p=0.03), greater arthritis duration (β=0.00, p=0.02), taking steroids (β=0.17, p=0.04) or narcotics (β=0.15, p=0.01), greater pain (β=0.03, p=0.0497), greater stiffness (β=0.04, p=0.001), greater depressive symptoms (β=0.01, p=0.002), and lower arthritis self-efficacy (β=−0.03, p=0.01) were associated with higher HAQ scores (i.e., greater disability). Male gender (β=−0.13, p=0.04), self-reported fibromyalgia (β=−0.13, p=0.03), and excellent/very good self-rated health (β=−0.15, p=0.04) were associated with lower HAQ scores (i.e., less disability).

Discussion

Disability as measured by the HAQ is a strong predictor of mortality [14], however, very few studies have comprehensively examined what factors are associated with disability (i.e., higher HAQ). This study found that a number of demographics, arthritis-specific demographics, physical health characteristics, arthritis symptoms, and psychological variables were associated with disability in a sample of adults with arthritis. When combined, the variables examined in this study explained 50% of the variance in HAQ scores.

Arthritis-specific variables explained the most variance (16%), followed by general demographics (13%), arthritis symptoms (12%), physical health characteristics (6%), and psychological variables (3%); health behaviors did not explain any unique variance in HAQ score. The addition of each block of variables, with the exception of health behaviors, significantly improved the model, each explaining additional variation in HAQ scores. These findings suggest that disability in adults with arthritis may be a complicated phenomenon; a number of factors, both arthritis- and non-arthritis related, appear to have an influence. Such complexity may make decreasing disability in this population challenging. Further, it is possible that some of these factors have multiplicative or bidirectional effects. For example, depressive symptoms could affect pain, which in turn may affect depressive symptoms. Thus, it may be very difficult to isolate and target a select number of risk factors.

A number of individual factors were significantly associated with disability in the final model including, age, gender, education, certain types of arthritis, duration of arthritis, certain types of medication use, self rated health, pain, stiffness, depressive symptoms, and arthritis self-efficacy. A majority of studies examining correlates of disability have examined the association between individual variables (typically a limited number) and HAQ [37–42]. Few studies have examined the association between HAQ and a variety of variables in a multivariate model (i.e., examining unique variance) [43–45], and those studies were far less comprehensive than the current study. For example, in a sample of Hispanic adults with rheumatoid arthritis [45], multivariate analyses showed that, similar to our findings, HAQ scores were higher in older individuals and those with higher pain and depressive symptoms.

Unlike our findings, disease duration and gender were not associated with HAQ. Further, having fibromyalgia was associated with lower HAQ score in our study, whereas fibromyalgia was associated with a higher HAQ score in this study by Karpouzas and colleagues [45]. Due to the differences in the target population, the statistical methods used, and the variables examined (or not examined) in the model, it is very difficult to make comparisons across studies in the existent literature.

Although the mean HAQ score in our sample was quite low indicating low levels of disability, HAQ scores (i.e. disability) among individuals with arthritis increase over time [46]. Therefore, early efforts aimed at preventing increases in disability should be given attention. Fortunately, a large number of the factors associated with disability are modifiable (e.g., stiffness, depressive symptoms, arthritis self-efficacy). A number of self-management education programs [47] and psychological interventions [48] among individuals with arthritis have been shown to improve many of these factors. Although physical activity was not directly associated with disability in this study, it has also been shown to improve many of the modifiable factors examined in this study [49–53]. Although some factors (e.g., gender, age, arthritis type and duration) are not modifiable, knowing that these variables are associated with disability is useful, as researchers and clinicians can give special attention to these individuals, perhaps creating additional and/or more intense, targeted interventions for them.

This study was unique in that it examined the association between demographic, arthritis-related demographic, physical health characteristics, arthritis symptoms, health behaviors, and psychological variables and disability simultaneously. Doing so allowed us to gain a better understanding of which types of variables (both individual and blocks) may be most important in predicting HAQ scores. This methodology also allowed us to examine the magnitude of the relationships (R^2) and whether adding additional variables to the model significantly improved its predictive ability (ΔR^2). Although we were able to explain a significant portion (i.e. 50%) of the variance in HAQ scores, half of the variance is still not accounted for. Other, unmeasured, variables such as joint tenderness or damage, inflammation, or social support [42–44, 54] may in part explain some of that missing variance. Unfortunately, in trying to keep participant burden to a minimum, we were unable to measure these variables. Future studies should attempt to identify the remaining factors that have a significant influence on HAQ, as it may assist in developing more successful and targeted approaches for reducing disability in this population.

Although the comprehensive findings of this study are valuable in understanding disability among adults with arthritis, we also recognize study limitations. First and probably most important is the cross-sectional nature of the study, as it limits our ability to make causal inferences. Some of the independent variables, particularly medication use and symptoms of arthritis, might overlap considerably with the construct of disability. Nonetheless, we believed that it was important to include these variables to provide a more complete picture of disability and to allow us to examine *independent* (i.e., adjusted for all other variables) associations between our independent variables and disability. Second, this study relied on self-reported as opposed to physician-confirmed diagnoses of arthritis. Third, although validated measures were used, with the exception of objectively measured height and

weight, this study relied on self-report measures which are inherently subject to biases. Fourth, findings from this study may not generalize to those with major medical conditions, physical limitations, or those with more severe arthritis symptoms.

Conclusion

Arthritis is a large and growing public health problem, both in terms of economic cost and disability, and remains the most common cause of disability among US adults. Because disability has been shown to be such a strong predictor of mortality among individuals with arthritis, it is of interest and valuable to understand which factors are associated with it. This comprehensive study was able to explain a large percentage (i.e. 50%) of the variance in HAQ (i.e., disability) scores. Blocks of general demographics, arthritis-related demographics, physical health characteristics, arthritis symptoms, and psychological variables explained significant and unique variance. Although these findings need to be confirmed in longitudinal studies, they point to the complexity of disability among adults with arthritis and provide insight into which factors should be targeted in efforts aimed at improving disability in this vulnerable population.

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Table 1.

Demographic and Health-related Characteristics of Participants (n=396)

	N	Mean (SD) or %
Age, years	396	56.4 (10.7)
Gender		
Male	56	14.1
Female	340	85.9
Race		
White	255	64.4
Non-white*	141	35.6
Marital status		
Married/member of unmarried couple	240	60.6
Not married	156	39.4
Education		
Less than high school grad	6	1.5
High school grad or GED	45	11.4
Some college	105	26.5
College graduate	240	60.6
Self-rated health		
Excellent or very good	113	28.5
Good	198	50.0
Fair or poor	85	21.5
Smoker		
Yes	23	5.8
No	373	94.2
BMI, kg/m^2	396	33.0 (8.2)
Weight status†		
Normal weight (BMI<25)	58	14.6
Overweight (25≥BMI<30)	114	28.8
Obese (BMI≥30)	224	56.6
Arthritis Type, % with		
Osteoarthritis	201	50.8
Rheumatoid arthritis	87	22.0
Fibromyalgia	72	18.2
Gout	31	7.8
Lupus	13	3.3
Sjogren's disease	9	2.3

	N	Mean (SD) or %
Psoriatic arthritis	7	1.8
Arthritis Duration, months	396	124.2 (115.2)
Arthritis Medication Use, % using		
NSAIDS	249	62.9
Acetaminophen	137	34.6
Narcotics	67	16.9
DMARDS	45	11.4
Steroids	32	8.1
HAQ score‡	396	0.6 (0.5)
Pain††	396	4.7 (2.3)
Stiffness††	396	5.3 (2.5)
Fatigue††	396	5.0 (2.6)
Arthritis self-efficacy‡‡	396	6.3 (2.1)
Depressive symptomsΩ	396	6.5 (5.1)
Chronic conditions, #§	396	1.2 (1.0)
Moderate to vigorous physical activity, hours/week	396	3.4 (3.8)
Fruit and vegetable consumption, cups/day	396	3.0 (2.4)

*n=138 African American

†Includes 1 underweight participant

‡Scores range from 0 to 3, with a higher score indicating higher impairment

††Scores range from 0 to 10 with higher scores indicating more severe symptoms

‡‡Scores range from 1 to 10 with a higher score indicating greater self efficacy

ΩScores range from 0 to 30 with a higher score indicating greater depressive symptoms

§Sum of hypertension, high cholesterol, osteoporosis, stroke, and cancer

Table 2.

Hierarchical Regression Models Predicting HAQ Score

	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6		
	β	β	β	β	β	β	R^2	$R^2\Delta$
Block 1: Demographic Variables							0.13	
Age	0.00	0.00	**0.01** *	**0.01** *	**0.00** *	**0.01** *		
Gender, male	**−0.21** **	**−0.21** **	**−0.21** **	**−0.13** *	−0.12	**−0.13** *		
Education, less than high school grad	**1.09** **	**1.11** **	**0.93** **	**0.71** **	**0.70** **	**0.59** **		
Education, high school grad or GED	0.14	0.08	0.04	0.02	0.01	−0.01		
Education, some college	**0.19** **	**0.15** **	**0.14** *	0.08	0.08	0.07		
Race, non-white	−0.01	−0.04	−0.07	−0.09	**−0.10** *	−0.07		
Smoking status, non	−0.14	−0.16	−0.17	−0.10	−0.09	−0.06		
Marital status, married	−0.09	**−0.11** *	−0.08	−0.07	−0.08	−0.05		
Block 2: Arthritis-specific Demographics							0.29	**0.16** **
Osteoporosis, yes		−0.01	−0.02	−0.05	−0.06	−0.05		
Fibromyalgia, yes		0.03	−0.02	−0.10	−0.10	**−0.13** *		
Rheumatoid, yes		**0.19** **	**0.18** **	**0.15** **	**0.15** **	**0.12** *		
Gout, yes		−0.06	−0.10	−0.06	−0.06	−0.08		
Arthritis duration		**0.00** **	**0.00** **	**0.00** *	**0.00** *	**0.00** *		
Acetaminophen, yes		−0.01	−0.02	−0.05	−0.04	−0.06		
NSAIDS, yes		0.02	0.02	−0.04	−0.04	−0.03		
Steroids, yes		**0.31** **	**0.27** **	**0.20** *	**0.20** *	**0.17** *		
Narcotics, yes		**0.38** **	**0.29** **	**0.19** **	**0.19** **	**0.15** *		
DMARDS, yes		−0.04	−0.03	0.03	0.03	0.07		
Block 3: Physical Health Variables							0.35	**0.06** **
Health, excellent/very good			**−0.34** **	**−0.19** **	**−0.19** **	**−0.15** *		
Health, good			**−0.17** **	**−0.13** *	**−0.12** *	−0.09		

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	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6		
	β	β	β	β	β	β	R^2	$R^2Δ$
BMI			0.00	0.00	0.00	0.00		
Chronic health conditions§			−0.00	−0.01	−0.01	−0.01		
Block 4: Arthritis Symptoms							0.47	**0.12** **
Pain				0.03	0.03	**0.03** *		
Stiffness				**0.05** **	**0.05** **	**0.04** **		
Fatigue				**0.02** **	**0.02** *	0.01		
Block 5: Health Behaviors							0.47	0.00
Physical activity					−0.01	−0.00		
Fruit and vegetable consumption					0.01	0.01		
Block 6: Psychological Variables							0.50	**0.03** **
Depressive symptoms						**0.01** **		
Arthritis self-efficacy						**−0.03** **		

§ Sum of hypertension, high cholesterol, osteoporosis, stroke, and cancer

* $p<.05$

** $p<.01$