

# Workplace, Psychosocial Factors, and Depressive Symptoms Among Working People with Arthritis: A Longitudinal Study

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**ABSTRACT.** *Objective.* To examine the role of demographic, illness-related, workplace support, workplace activity limitations, arthritis-related work changes, and psychosocial factors in predicting subsequent depressive symptoms among employed people with arthritis.

*Methods.* In a prospective study, 366 employed individuals with arthritis were recruited from Toronto, Canada. Respondents completed a structured questionnaire assessing demographic, disease-related factors, workplace support, and employment-related transitions, as well as psychosocial variables at 2 timepoints 18 months apart. Depression was assessed using the Center for Epidemiologic Studies Depression Scale. Hierarchical multiple regression was used for analyses.

*Results.* Individuals with greater education reported significantly less depression. Lower workplace support and greater workplace activity limitations were significantly associated with future depressive symptoms. No relationship was found between work transitions and later depression, but more work changes were strongly associated with concurrent depressive symptoms. An association was also found between greater pain catastrophizing and future depressive symptoms.

*Conclusion.* Our results highlight the need to assess the influence of work-related changes, workplace support, and psychosocial variables on depressive symptoms among people with arthritis. These findings suggest that workplace interventions should address not only ways to reduce workplace activity limitations, but also ways to better manage emotional distress related to working with arthritis. (First Release Aug 1 2006; J Rheumatol 2006;33:1849–55)

## Key Indexing Terms:

ARTHRITIS

DEPRESSIVE SYMPTOMS

WORKPLACE

Depression has long been recognized as associated with arthritis<sup>1-3</sup>. Numerous studies have shown that depression is more prevalent among people with rheumatoid arthritis (RA) than among the general population<sup>1,3,4</sup>, and that people with a

combination of depression and arthritis report more work disability, higher health services utilization, and poorer health status than those with arthritis alone<sup>1,5-7</sup>. Because depression increases the burden of arthritis to the patient and society, it is important to identify potential factors that may influence the mental health of individuals with arthritis, and to develop interventions to ameliorate depression.

Previous literature has shown that women, younger individuals, individuals with lower education, unmarried individuals, and individuals with a longer duration of arthritis are more likely to develop depressive symptoms<sup>4,6,8-11</sup>. Moreover, there is an abundance of evidence to indicate that sociodemographic and clinical disease factors alone are not sufficient to predict depression, and that depression is better understood if we take psychosocial factors into account<sup>12-18</sup>. For example, both studies using cross-sectional data and those using longitudinal data have demonstrated that social support can be a better predictor of depressive symptoms than clinical variables<sup>12-14</sup>. Other studies find that personality variables, such as control/mastery, self-esteem, and self-efficacy, are also related to depressive symptoms. Specifically, people with greater control/mastery, higher self-esteem, and higher self-efficacy report less depression<sup>18-20</sup>.

Being employed is also related to fewer depressive symptoms. Studies find that people with arthritis who are able to remain working and who report fewer work changes (e.g.,

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going from full-time to part-time work) report less pain and fewer depressive symptoms than those who are work disabled, irrespective of disease severity<sup>6,21,22</sup>. Although this suggests the importance of remaining employed for people with arthritis, people with arthritis may face more job stress and difficulties with job tasks that may affect their productivity, their ability to remain working, and, ultimately, their reports of depression than those without a chronic health problem<sup>6,7,23-25</sup>.

Currently there are few studies investigating arthritis-related work factors that may contribute to exacerbating or alleviating depressive symptoms. We used longitudinal data to examine the role of workplace support, such as coworker support, managerial support, and organizational support; workplace activity limitations; work-related changes; and psychosocial factors like mastery, optimism, and pain catastrophizing to better understand people's future depressive symptoms. We drew on a biopsychosocial conceptual framework and previous research that found that depressive symptoms in chronic illness are related, not only to more severe disease, but also to environmental and personal factors<sup>26</sup>. Specifically, we hypothesized that younger individuals and those with longer disease duration would report more depressive symptoms. We also hypothesized that individuals who reported greater support at work, fewer workplace activity limitations, and fewer work changes or transitions would report fewer depressive symptoms over time. In addition, based on previous research, people's subjective perceptions should also contribute to future depression. Lower perceived control, less optimism, and greater magnification and rumination about pain symptoms should be associated with more depression.

## MATERIALS AND METHODS

**Participants.** A total of 366 participants were included in the analysis. All were diagnosed with arthritis, primarily osteoarthritis (OA) and RA. All participants resided in the greater Toronto area, Canada, and were recruited from 5 rheumatology clinics, the Arthritis Society, Ontario Division, rehabilitation clinics, recruitment posters in community hospitals, and community newspaper advertisements. Potential respondents were screened over the telephone to determine their eligibility for this study. Eligibility criteria included: (1) reporting having been diagnosed with either OA or inflammatory arthritis (IA), (2) having arthritis for at least one year, (3) paid employment, (4) no comorbid conditions causing physical disability, and (5) fluency in English. Of the 492 eligible individuals who agreed to participate, 422 (85.8%) completed 2 interviews. Among them, 366 (74.4%) were eligible for this study. Those not eligible for the study had incomplete data or were self-employed and did not complete the workplace support measure.

**Procedure.** Participants were interviewed at home or at a location of their choice using an in-depth, structured questionnaire. The research was a 5-year longitudinal study of the workplace coping and adaptation of people with arthritis with 4 interviews, each about 18-20 months apart, beginning in 2000. The first 2 interviews are currently available for analysis, and were designated as t1 (first interview) and t2 (second interview). On average, interviews lasted 2 hours. The questionnaire was pilot tested with 7 individuals. Only minor changes were made to the wording of some items to facilitate their use. Interviewers completed an in-depth, standardized training session and their data were monitored to reduce bias. Informed, written consent was obtained from all participants.

**Demographics.** Information was collected on age, sex, marital status, and education.

**Arthritis type and duration.** Participants were asked for the type(s) of arthritis their physician had diagnosed and the time since diagnosis. Arthritis type was coded in 3 categories: IA (RA, psoriatic arthritis); OA; or both IA and OA. In cases of multiple diagnoses, the longest duration was used in statistical analyses.

**Symptom severity.** Pain severity was measured on a 5-point scale from 1 = not at all severe to 5 = very severe<sup>27</sup>.

**Joints affected.** A joint homunculus displaying major joints affected by arthritis was used to calculate the total number of joints affected<sup>28</sup>.

**Self-reported health status.** Self-reported health was assessed with a single item asking people to rate their health on a 5-point scale from 1 = poor, 2 = fair, 3 = good, 4 = very good, 5 = excellent<sup>29</sup>.

**Occupation.** Participants were asked to provide information about their occupation. Occupation was classified using the Human Resources Development Canada National Occupational Classification Matrix 2001 (available at [www23.hrdc-dhrhc.gc.ca/2001/e/generic/welcome.shtml](http://www23.hrdc-dhrhc.gc.ca/2001/e/generic/welcome.shtml)). For the purpose of analyses, the occupations were collapsed into 4 groups: (1) business, finance, and administration; (2) health, science, art, and sport; (3) sales and service; and (4) trades, transportation, and equipment operators.

**Workplace support.** Drawing on previous research on job support<sup>30</sup>, 19 items were created to measure 3 aspects of workplace support: coworker support (8 items), managerial support (4 items), and organizational support (7 items)<sup>31</sup>. Items were responded to on a 5-point scale from 1 = strongly disagree to 5 = strongly agree. Sample items include "My manager does things to help employees balance their work and their personal life," "I have coworkers who go out of their way to help me at work," and "This organization tries to help employees make work arrangements that suit their personal needs." Cronbach's coefficient alphas, measures of the internal reliability of the scales, were 0.87 for the coworker subscale, 0.87 for the managerial subscale, and 0.92 for the organizational subscale.

**Workplace activity limitations scale (WALS).** An 11-item scale gauged physical functioning and arthritis-related activity limitations in the workplace<sup>22,25</sup>. The questions are similar to those used in workplace limitation questionnaires but are specific to arthritis<sup>32</sup>. Participants were asked to think about carrying out each activity "without any help from another person or without the help of a special gadget or piece of equipment." Items asked respondents how much difficulty they had: getting to and from work; getting around the workplace; sitting and standing for long periods of time at work; lifting; working with their hands; crouching, bending, or kneeling; reaching; with the schedule, hours, and pace of work; and meeting current job demands. Responses were on a 4-point Likert-type scale where 0 = no difficulty, 1 = some difficulty, 2 = a lot of difficulty, and 3 = not able to do. Participants indicating that an activity was not applicable to their job were given a score of 0 (no difficulty) for that activity. Cronbach's coefficient alpha for the scale was 0.78 at t1.

**Work transitions.** Seven items falling into 3 broad classes assessed changes to work related to arthritis<sup>22</sup>. Items were drawn from a review of employment research<sup>30</sup>. Respondents were asked whether in the last 6 months their arthritis had resulted in: (1) occasional lost work hours due to work interruptions of 20 minutes or more, taking sick or vacation days to deal with arthritis; (2) permanent changes to work hours like reducing the number of hours worked in a week; and (3) changes to the type or nature of their work like being unable to take on extra projects or responsibilities or being unable to seek or accept a promotion or job transfer. They were also asked if at any time they had changed the type of work they performed. In addition to examining each item separately, a total work transition score was calculated for each respondent, summing the total number of work transitions. Scores ranged from 0 (no work transitions) to 7 (use of at least one of each work transition behavior).

**Mastery.** This 7-item measure assessed respondents' perceptions of control over life events<sup>33</sup>. Sample items include "I have control over the things that happen to me" and "I can do just about anything I really set my mind to do." Responses were scored on a 5-point Likert-type scale from 1 = strongly dis-

agree to 5 = strongly agree. Cronbach's coefficient alpha for the scale was 0.78 at t1.

**Optimism.** The 8-item Life Orientation Test was used to measure dispositional optimism<sup>34</sup>. Respondents were asked to evaluate statements such as "In uncertain times, I usually expect the best," "I always look on the bright side of things," "Things work out the way I want them to," etc. Responses were scored on a 7-point Likert-type scale from 1 = strongly disagree to 7 = strongly agree. Cronbach's coefficient alpha for the scale was 0.82 at t1.

**Pain catastrophizing.** A 13-item scale measured perceptions of pain including pain rumination, magnification, and helplessness<sup>35,36</sup>. Sample items include "I worry all the time about whether the pain will end," "I feel I can't stand it any more," and "I keep thinking about how much it hurts." Responses were on a 5-point scale from 0 = not at all to 4 = all the time. Cronbach's coefficient alpha for the scale at t1 was 0.94.

**Depression.** The Center for Epidemiologic Studies Depression Scale (CES-D) measures depressive symptomatology<sup>37</sup>. The CES-D is a 20-item scale assessing the major components of depression identified in the literature. Respondents reported on the frequency of symptoms experienced during the past week on a scale from 0 (rarely or none of the time; less than 1 day) to 3 (most or all of the time; 5-7 days). Scores of 16 or more are taken as evidence of depression. The CES-D has shown excellent reliability and construct validity in arthritis populations<sup>38</sup>. In this study, Cronbach's coefficient alphas for the scale were 0.91 at t1 and 0.90 at t2.

**Statistical analysis.** We considered t1 as the baseline evaluation and t2 as the followup evaluation. We defined change in the CES-D score as the difference between the scores for t1 and t2. The relationship between work context and psychosocial variables with CES-D scores at t1 was tested by the Spearman's rank correlation coefficient because of the skewed distribution of CES-D scores. The relationship between the above variables and CES-D scores at t2 was tested by Spearman partial correlation analysis, adjusted for baseline CES-D scores.

Hierarchical multiple regression analyses were used to examine the relationships of the change in CES-D scores with the predictor variables at t1. Sociodemographic variables were entered first, followed by disease-related variables. Work-related variables were entered in the third step, and psychosocial variables in the fourth step. The analysis was adjusted for the baseline CES-D scores and all other independent variables were from baseline t1 as well. Interaction terms between work-related limitations and psychosocial factors were also tested in the model. Specifically, we tested the possible interactions between workplace support and workplace activity limitations (WALS), and between mastery and WALS. To avoid the problem of multicollinearity when using interaction terms, deviation scores<sup>39</sup> were created for the predictor variables by subtracting the mean score from the corresponding raw scores, respectively.

Statistical analyses were performed using the SAS 8.2 software program (SAS Institute, Inc., Cary, NC, USA).

## RESULTS

Table 1 presents sample characteristics. At baseline (t1), on average, participants were 51 years old and over 75% were women. Of the respondents, 61.5% were married and 83.5% were educated beyond high school. Of the 366 participants, 133 (36%) reported IA, mainly RA (86%). One hundred ninety-eight (54%) reported having OA, and 35 (10%) reported having both OA and IA. On average, the number of painful joints was 8.4 and respondents had arthritis for 9 years. In general, the majority of respondents (77.9%) rated their health status as good or better. On average, depression scores were 10.8 at t1 and 11.6 at t2, which were below the cutoff value of 16. However, about 24% and 28% of the sample reported scores of 16 or greater at t1 and t2, respectively.

Table 2 shows the correlations between CES-D scores and work-related and psychosocial variables. CES-D scores at baseline were significantly correlated with both work-related and psychosocial variables at baseline. With the exception of work transitions, managerial support, and organizational variables, these same variables were predictive of future depressive symptoms in the expected directions, after controlling for baseline CES-D scores.

To examine potential collinearity among psychosocial variables, we performed collinearity analysis using the SAS PROC REG (option COLLIN) procedure for the multivariate linear regression. This analysis did not detect collinearity problems.

The results of the hierarchical multiple regression analysis are presented in Table 3. Results showed that after adjusting for baseline CES-D scores, entering the demographic variables into the model accounted for an additional 1% of the variance. The addition of illness-related variables accounted for another 1% of the variance, although none of the variables reached significance. Work context variables were included in the analysis next. Occupation, especially jobs in the health, science, art, and sport area, was predictive of a decrease in CES-D scores ( $\beta = -2.18$ ,  $p < 0.05$ ). Participants who reported greater coworker support at t1 reported fewer symptoms of depression at t2 ( $\beta = -1.36$ ,  $p < 0.05$ ). However, neither managerial support nor organizational support at t1 predicted depressive symptoms at t2. Higher scores on the WALS at t1 were significantly associated with an increase in CES-D scores ( $\beta = 0.38$ ,  $p < 0.05$ ). Work-related transitions such as going from full- to part-time work or changing the type or nature of one's job at t1 did not predict depressive symptoms at t2. Work context variables accounted for 4% of the variance after demographic and illness-related factors. Finally, we included psychosocial variables like perceived mastery or control, optimism, and pain catastrophizing. Only pain catastrophizing was a significant predictor of an increase in CES-D scores ( $\beta = 2.46$ ,  $p < 0.001$ ). Finally, we tested 2 possible interactions: between workplace support and WALS, and between mastery and WALS. Neither interaction was significant.

## DISCUSSION

Our study focused on the influence of workplace support, arthritis-related work changes, workplace activity limitations, and psychosocial factors on future depressive symptoms among employed individuals with arthritis. Previous studies have focused on demographic and disease-related factors and not on the workplace. Our results highlight the importance of the workplace, particularly the lack of support from coworkers at work, as well as activity limitations with job tasks in contributing to subsequent reports of depression. In addition, the results suggest that, rather than symptoms of pain, people's interpretation of their symptoms in terms of feelings of helplessness, rumination, and magnifying the pain may be

Table 1. Descriptive characteristics of study sample (n = 366).

Characteristic	N	Percent (SD)	Range (min-max)
Age (mean, SD)	50.6	(9.0)	23–67
Sex			
Male	77	21.0	
Female	289	79.0	
Education			
≤ High school	60	16.5	
≤ University or community college	229	62.9	
Post-graduate education	75	20.6	
Marital status			
Single	55	15.0	
Married/living as married	225	61.5	
Separated/divorced/widowed	86	23.5	
Physician diagnosis			
Inflammatory	133	36.3	
Osteoarthritis (OA)	198	54.1	
Both	35	9.6	
Duration (mean, SD)	9.2	(8.8)	0.1–43.0
Painful joints (mean, SD)	8.4	(4.7)	1–22
Health status			
Good	285	77.9	
Poor	81	22.1	
Occupation			
Business, finance, administration	131	35.9	
Health, science, art, sport	133	36.4	
Sales and service	65	17.8	
Trades, transportation, equipment	36	9.9	
Overall workplace support* (mean, SD)	66.6	(12.6)	28–95
Coworker support (mean, SD)	30.9	(5.6)	9–40
Managerial support (mean, SD)	14.0	(4.1)	4–20
Organizational support (mean, SD)	22.0	(6.4)	7–35
Mastery* (mean, SD)	26.7	(4.6)	14–35
Optimism* (mean, SD)	42.5	(7.9)	13–56
Pain catastrophizing** (mean, SD)	17.0	(12.6)	0–52
CES-D at t1 (mean, SD)	10.8	(9.5)	0–46
CES-D at t2 (mean, SD)	11.6	(9.6)	0–52

\* The higher the score, the higher the workplace support, the mastery scale, and the optimism scale. \*\* The higher the score, the worse the perception of pain.

Table 2. Correlations between CES-D scores and work-related and psychosocial variables.

Independent Variables*	CES-D Scores at t1**	CES-D Scores at t2***	CES-D Scores at t2§
WALS	0.44	0.35	0.16 <sup>†</sup>
Coworker support	–0.11	–0.16	–0.12 <sup>‡</sup>
Managerial support	–0.17	–0.17	–0.09
Organizational support	–0.17	–0.14	–0.04
Work transition	0.38	0.26	0.08
Mastery	–0.44	–0.34	–0.11 <sup>‡</sup>
Optimism	–0.46	–0.38	–0.17 <sup>†</sup>
Pain catastrophizing	0.61	0.45	0.17 <sup>†</sup>

CES-D: Center for Epidemiologic Studies Depression Scale. WALS: Workplace activity limitations scale. \* The independent variables were from baseline (t1). \*\* Spearman's correlation coefficients between CES-D scores at baseline (t1) and work-related and psychosocial variables. All coefficients were significant at  $p = 0.001$ , except coworker support ( $p < 0.05$ ). \*\*\* Spearman's partial correlation coefficients between CES-D scores at t2 and work-related and psychosocial variables, unadjusted for CES-D scores at t1. All coefficients were significant at  $p = 0.005$ , except organizational support ( $p < 0.01$ ). § Spearman's partial correlation coefficients between CES-D scores at t2 and work-related and psychosocial variables, adjusted for CES-D scores at t1. <sup>†</sup>  $p < 0.005$ . <sup>‡</sup>  $p < 0.05$ .



Table 3. Hierarchical multiple regression analysis: influence of work-related variables and psychosocial variables on change of depressive symptoms<sup>†</sup>.

Step	Independent Variables <sup>‡</sup>	$\beta$	F	R <sup>2</sup>	$\Delta R^2$
1	Baseline CES-D	0.66**	36.28**	0.22	
2	Demographic variables		19.67**	0.23	0.01
	Age	-0.01			
	Sex	1.10			
	Single	1.57			
	Divorced	0.40			
3	Disease-related variables		9.54**	0.24	0.01
	OA	0.75			
	Both	-1.85			
	Disease duration	0.09			
	Painful joints	0.10			
	Severity	-0.13			
	Health status	-0.78			
4	Work-related variables		6.42**	0.28	0.04
	Health, science, art, sport	-2.18*			
	Sales and service	0.63			
	Trades, transportation, equipment	-0.75			
	WALS	0.38*			
	Coworker support	-1.36*			
	Managerial support	0.90			
	Organizational support	0.31			
	Work transition	0.41			
5	Psychosocial variables		6.11**	0.30	0.02
	Mastery	-0.21			
	Optimism	-0.68			
	Pain catastrophizing	2.46**			

<sup>†</sup> Beta estimates were taken from the final model; F values and R<sup>2</sup> were taken from each step of the model; Adjusted for CES-D scores at t1. <sup>‡</sup> The reference category for Sex is male; for Occupation is business, finance, administration; for Marital status is married/living as married; for Physician diagnosis is inflammatory arthritis; for Health status is poor. \*\* p < 0.001; \* p < 0.05.

particularly important in understanding depression. These results have research and clinical implications.

High levels of social support at work have been found to be predictive of better mental health in employees in other studies with people who don't have arthritis<sup>40,41</sup>. Our results with people who have IA or OA provide additional evidence that workplace support is important in understanding future depressive symptoms. More specifically, we found that among 3 types of workplace support, a lack of coworker support played a significant role in predicting future depressive symptoms. Our finding differs from the findings of another study looking at the general population, which showed that supervisor support was more predictive of subsequent psychiatric disorder than coworker support<sup>41</sup>. The discrepancy might be due to the different samples used in the 2 studies. People with arthritis can experience symptoms and workplace activity limitations that may make them more likely to rely on coworkers for both emotional and practical support than the general population. The absence of this support may be particularly detrimental to people's well-being. Our results suggest the importance of additional research examining workplace support of different types and from different sources. For example, emotional support from coworkers may be relat-

ed to reduced psychological distress, whereas practical support from coworkers and supervisors may be important in making job modifications and remaining employed<sup>42</sup>.

Not surprisingly, the more difficulty respondents reported with workplace activities, the more depressive symptoms they reported in the future. This finding pointed to the importance of looking at the fit between a person's job demands and physical capacity as a result of arthritis, in order to understand depression. The importance of job fit has been discussed in other theories of work behavior and also highlights the importance of individual characteristics in understanding job retention and job stress. By asking respondents about the amount of difficulty they experienced with specific job tasks like reaching, standing, sitting for long periods, scheduling demands, and the pace of work, we gained insight into the fit of the job and the individual.

We did not find a significant relationship between work transitions and later depressive symptoms in our analysis. However, as we investigated the relationship between these 2 variables at the same time (t1), we found that work transitions were significantly associated with depressive symptoms ( $\beta = 0.750$ ,  $p < 0.01$ ; data not shown), after controlling for other covariates. This result was in accordance with Gignac, *et al*,

who also found an association between work changes and depression at a single timepoint<sup>22</sup>. This finding suggests that the impact of making one or more work transitions is relatively transient and affects depressive mood in the short term. However, these findings need to be replicated with additional data. It may be that some transitions, like giving up employment, that were not examined in this study, have more long-lasting implications for depression. The lack of a longterm effect of work transitions may also reflect our measure of depression. While the CES-D has been used in numerous community-based samples to assess depressive symptomatology, it is not a substitute for more in-depth clinical diagnosis of depression. As a result, the CES-D may have captured more transient depressive mood states.

In addition to the work-related variables, we also investigated the effects of other psychological measures of well-being on future depressive symptoms. These included perceptions of control or mastery, optimism, and pain catastrophizing. The results suggested that people's interpretation of their pain, more than the symptoms of pain itself or other psychosocial variables, was important in understanding later depression among employed individuals. Specifically, interpreting pain in ways that make one feel helpless, magnifying the pain's importance, or ruminating about pain was related to depression scores 18 months later. With few exceptions<sup>43-45</sup>, previous research has focused almost exclusively on assessing symptoms of pain and not the pain's meaning. These results have implications for both research and intervention studies. They suggest that interventions with people who have arthritis and are depressed focus on reducing negative thoughts about pain by using methods like cognitive-behavior therapy (CBT)<sup>46</sup>. CBT teaches patients to recognize and reframe dysfunctional thoughts such as catastrophizing and to integrate more effective coping behaviors into daily life, thereby improving well-being.

The following limitations merit discussion. First, although our recruitment strategy enabled us to generalize beyond a clinical sample and was comparable to other samples in terms of age, education, marital status, and income, the sample was a purposive one. Second, similar to many population studies, there were no data available from medical charts or physical examination and the diagnosis of arthritis was based on self-report. Third, diagnosing depression in individuals with arthritis is complicated, as there is an overlap of the symptoms of depression and arthritis. Several well-known and widely used measures of depression, including CES-D, are sensitive to the somatic aspects of arthritis, and consequently, may overestimate the prevalence of depression<sup>47</sup>. However, in our study, we did not specify whether an individual was depressed or not by using a cutpoint for the CES-D score. Instead, we used this score as a continuous measure of degree of depressive symptoms: the higher the score, the worse the depressive symptoms. By doing so, we avoided the potential misclassification of individuals due to somatic symptoms of arthritis.

Our study extends research on arthritis and associated depression by examining work-related and psychosocial factors that may be associated with future depressive symptoms among working people with arthritis. Our findings highlight the dynamic interplay among workplace support, the arthritis limitations people report, the work changes they make, their psychosocial well-being, and their resulting depressive symptoms. And our results suggest that in addition to social support, any intervention to decrease arthritis-related work changes, provide workplace support, and improve individuals' well-being may also have significant effects on preventing or alleviating depressive symptoms in both short-term and longterm. Therefore it may help to decrease the productivity loss and work disability among people with arthritis.

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