The Relationship Between Disease Symptoms, Life Events, Coping and Treatment, and Depression Among Older Adults with Osteoarthritis

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ABSTRACT. ***Objective.*** The intent of this cross-sectional study was to broaden the range of variables examined in relationship to depression in osteoarthritis (OA) to include comorbidity, stressful life events, and the ways people respond to their disease. We examined the relationship of coping behaviors and perceptions, and medical treatments received for OA and depressive symptoms.

Methods. In the fifth year of a prospective cohort study, 1227 individuals ≥ 62 years of age with hip/knee OA provided information about sociodemographics (age, sex, living circumstances, education), arthritis severity (WOMAC pain and function; ClinHAQ fatigue), comorbidity, life events, coping behavior, coping efficacy, treatment (pain management, treatment for depression), and depressed mood (Centre for Epidemiological Studies Depression scale, CES-D). Using hierarchical linear regression, variables were entered in blocks to predict CES-D scores. In the final block, the interaction of coping behavior and coping efficacy was tested.

Results. The response rate was 82.4% (n = 1227/1489). The mean CES-D score was 9.4, with 21.3% of individuals scoring ≥ 16 (supporting depressed mood). Higher level of depressed mood was independently and significantly associated with being female, experiencing greater pain and fatigue, experiencing stressful life events, more coping behaviors, receiving treatment for depression/mental illness, and a coping behavior by coping efficacy interaction, with 63.4% of the variance accounted for in the model.

Conclusion. Among older adults with OA, the prevalence of depressive symptoms is high. Longitudinal studies must consider OA management strategies, including both the amount of behavioral coping and its perceived efficacy, to elucidate potential interventions designed to reduce depression in patients with OA. (First Release Jan 15 2008; J Rheumatol 2008;35:335–42)

Key Indexing Terms:
OSTEOARTHRITIS DEPRESSION COPING MEDICAL TREATMENT

Depressive symptoms are common among people living with chronic arthritis pain[1-7], more so than with other medical conditions that occur in later life[8,9]. People with concomitant depression and osteoarthritis (OA) use more pain medication[10], have higher healthcare utilization[11], and may be less likely to adhere to treatment recommendations[12] than people with OA alone. Further, depressive symptoms may result in individuals with OA avoiding pain-related activities that, in turn, can lead to muscle deconditioning and increased pain[13].

Research has found that the influence of living with chronic pain and fatigue[3,14,15], and restriction of social and recreational activities leading to social isolation[14,16,17], can contribute to depression in arthritis. Reporting of concomitant chronic medical comorbidities[18] and stressful life events[19-21] is also related to depression. However, after accounting for these contextual variables, existing studies on depression in OA continue to report that much of the variance related to depression (e.g., 60%–76%)[22,23] is unexplained.

To a large extent, absent from OA and depression research are people's responses to living with OA in the form of self-management or behavioral coping efforts and receipt of various medical therapies, including pain medications and mood-modifying agents. In rheumatoid arthritis (RA), use of antidepressants[24,25] and coping strategies[26,27] has been significantly associated with lower depressive symptoms. However, it is not clear to what extent older adults with OA and depressive

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symptoms use antidepressants. Research on OA and medication finds that older adults are often reluctant to take medication in general, and pain medication for arthritis more specifically[28]. Coping research in arthritis has also relied largely on checklists that emphasize cognitive coping efforts, and less on the behaviors of older adults with arthritis to manage their disease. However, some research finds that older adults with OA report a wide range of behavioral efforts to manage their condition, including giving up or reducing some activities, modifying the performance of activities, planning, pacing, anticipating problems before they happen and making efforts to avoid them, and getting help from others[29,30]. A greater number of coping efforts used by older adults was associated with perceptions of reduced independence, greater helplessness, and more upset[29].

In addition, much of the OA and depression research does not take into account whether people perceive that their coping efforts are efficacious and have helped them to deal with the various stressful aspects of living with painful OA[27]. In research on other health conditions, coping efficacy was related not only to different ways of coping, but also to people's well-being, such that those who perceived their coping efforts were helpful reported greater well-being compared to individuals using similar coping efforts but who did not perceive their coping strategies as helpful[31-34]. This suggests that coping efficacy may moderate the effect of coping behaviors, such that people who believe that their coping efforts are successful will report less depression than individuals who report that their coping efforts have not been successful in managing their arthritis.

The purpose of this study was to examine the relationship between OA and depression further, taking into consideration not only the broader health status and life events experienced by people with OA, but also treatments received for pain and for mood disorders, coping behaviors and perceived coping efficacy. The results of this study act as a first step to the design of a longitudinal cohort study that will include a broader conceptualization of the impact of OA on later depression than has been included in OA research to date.

MATERIALS AND METHODS

The study cohort. A previous 3-phase mail and telephone survey conducted between 1995 and 1997 established a population cohort of 2411 individuals 55 years of age and older with disabling hip/knee OA residing in 2 regions of Ontario, Canada, one urban and one rural[35-37]. Participants had at least moderately severe hip or knee complaints defined by: (1) difficulty in the past 3 months with each of arising from a chair, stair climbing, standing, and walking; (2) pain, stiffness, or swelling in any joint lasting ≥ 6 weeks in the past 3 months; and (3) indication on the homunculus that a hip and/or knee was "troublesome." Demographic data (including highest level of education attained and living circumstances), arthritis severity [by Western Ontario McMaster University OA Index [WOMAC] pain and function subscales and summary score][38,39], use of aids and devices, and comorbidity were assessed. Response rates for all questionnaires and interviews were 72% or higher. In 1999, the cohort was invited to participate in a 5-year prospective study: 2103 participants were alive and consented. Followup was by standardized telephone interview. There were no substantial differences (> 5%) in sociodemographic data between the original cohort and the 2103 who agreed to participate in the followup study. Response rates for annual telephone surveys, adjusted for deaths and unable to complete, were 78% or greater. The data for the present study are based on Year 5 telephone interviews with cohort members.

Measures. *Demographics*. Respondents provided information about their age, sex, living circumstances (living alone or with others, including in an institution), and education (≤ high school, > high school).

Arthritis severity. The severity of hip/knee pain and functional limitations was assessed using the WOMAC pain and function subscales[39-42]. Higher scores indicated greater pain and disability. The reliability of the WOMAC (and all other measures) in this sample was assessed using Cronbach's alpha. Cronbach's alpha for this scale was 0.80 for pain and 0.96 for functional limitations. Respondents also completed the Clinical Health Assessment Questionnaire (ClinHAQ) fatigue rating scale[43] assessing how problematic fatigue or tiredness had been in the past week. Responses on this 1-item scale ranged from 0 (Fatigue is no problem) to 10 (Fatigue is a major problem).

Comorbidity and life events. We asked respondents about concurrent health problems for which they had received treatment or had seen a physician in the past year (selected from a list of 17 health problems). Examples included high blood pressure, stomach ulcer, kidney disease, and cancer. The number of positive responses was totaled for a score of 0 to 17. Life events were assessed based on item endorsement on a modified Life Experiences Survey (LES)[44]. This instrument measures the number of both positive and negative stressful life events in the past year, has been used in individuals of all ages, and has been shown to negatively predict health outcomes[44]. We included only those items that had been endorsed at least once in the past 5 years by ≥ 10% of the cohort and omitted those that were not relevant to an older population (e.g., became pregnant); one additional item was added (death of a pet). We also created scores for both positive and negative life events that excluded items pertaining to major changes in eating and sleeping habits, as the latter may relate to mood disturbance and thus may confound the relationship between life events and depression.

Coping behavior. Coping behavior was assessed using a 4-item scale that measures the extent to which individuals use distinct types of behavioral coping. The measure was developed drawing on psychosocial development theory[45] and using the detailed responses of people with different types of arthritis, for example OA and inflammatory arthritis, across different ages to manage their condition[29,30,46]. Responses were grouped into 4 behavioral categories that reflected selection, optimization, compensation, and help-seeking processes[29,45,47]. Selection included giving up or reducing time spent on activities; optimization processes included anticipatory coping, pacing, and planning to avoid problems; compensation included modification of activities and use of assistive devices; help-seeking processes included reports of help from informal (e.g., family, friends) and formal (e.g., paid help, community services) resources. Item responses were on a 5-point scale from 1 (Not at all) to 5 (A great deal) and were normally distributed. Higher scores indicated a greater frequency of use of different coping behaviors. Cronbach's alpha for the scale was 0.85. Convergent validity has been assessed for the Coping Behavior scale with both Vanderbilt's Passive and Active coping scales, where Pearson correlations are > 0.6 ($p < 0.0001$).

Coping efficacy. Coping efficacy was assessed using a 4-item scale that measured respondents' appraisal of their perceived success in their coping efforts[29,48]. Example items included: "I am successfully coping with the pain of my arthritis" and "I am successfully coping with the emotional aspects of my arthritis." Item responses were on a 5-point scale from 1 (Strongly disagree) to 5 (Strongly agree). Cronbach's alpha for the scale was 0.89.

Treatment. Respondents were asked about current use of medications for their arthritis pain, including any of: acetaminophen with or without codeine, nonsteroidal antiinflammatory drugs, or aspirin (Yes/No). They were also asked if they had ever been treated for depression or another major mental illness or mood disorder (Yes/No).

Depressive symptoms. Respondents completed the Centre for Epidemiologic Studies Depression scale (CES-D)[49], a 20-item measure rating the frequency

of particular depressive symptoms during the past week. Responses were 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). The CES-D has been used successfully in community settings to identify depression in the elderly as well as in individuals with significant comorbid medical illnesses[50,51] and appears to be more appropriate than other depression measures (e.g., Beck) for patients with rheumatological disorders[52]. Scores ≥ 16 are generally taken as evidence of significant depression[53]. Reliability for the scale was 0.90.

Statistical analysis. SPSS (v 11.0) was used for all analyses. Our dependent variable was depressive symptoms (CES-D score) and our key independent variables were coping behavior, coping efficacy, and treatments received. We controlled for demographics (see below), arthritis severity (WOMAC pain and function and fatigue), comorbidity, and stressful life events. We examined the descriptive statistics for each variable, the correlations among all independent continuous variables to assess multicollinearity, and the correlations between the dependent variable and each independent variable. Mean CES-D scores for the categorical variables were compared using Student t-tests. The proportion of those who had CES-D scores ≥ 16 (indicative of depression) and were ever treated for depression or other major mental illness or mood disorder was determined. Only those independent variables that were statistically related to the CES-D scores in bivariate analyses at $p \leq 0.10$[54] were considered in the multiple linear regression model. Variables that met this criterion were grouped into blocks. As suggested in the introduction, comorbidity and life events were considered a separate block as were people's responses to their arthritis (coping and treatment). The blocks represented demographic data (age, sex, education, living alone vs with others), arthritis severity (pain, function, fatigue), comorbidity and life events (negative/positive life events), and coping and treatment (coping behavior, coping efficacy, current use of acetaminophen or pain-killers with codeine, ever treated for depression or other major mental illness) and were entered hierarchically (blockwise entry) into the model with an F-to-enter of 0.05 and F-to-remove of 0.1. In the final step of the hierarchical regression, we tested an interaction between coping behavior and coping efficacy. With 18 independent variables potentially considered in the model, the minimum sample size of 180 was adequately met[55].

The number of negative life events was categorized as 0, 1–2, 3–4, and 5+ to correspond to quartiles in the responses and the number of positive life events was categorized as 0 versus 1+ as the majority of respondents (86%) reported no positive events. A sensitivity analysis was performed using the revised life-events scores, after removing those items pertaining to eating and sleeping. The sum of comorbid conditions was categorized as 0, 1, and 2+, as these data were not normally distributed.

RESULTS

At Year 5, 1227 individuals in the cohort were alive and completed the questionnaire (82.4% response rate adjusted for deaths and unable to complete). Nonresponders were those who were unable to complete the questionnaire due to illness (n = 193), deceased (n = 421), or lost to followup (n = 42), or who refused to participate (n = 220). Compared with the original Phase II cohort of 2411, Year 5 responders were younger (mean age 75.1 vs 82.4 yrs), had higher education (post-secondary education 18.9% vs 17.7%), and were more likely to be female (75.6% vs 70.1%).

Cohort characteristics. The characteristics of respondents are shown in Table 1. On average, the sample was 75 years of age, was mostly female, reported a high school education or less, and lived with others. Pain, physical function, and fatigue indices indicated that, in general, participants experienced moderate levels of pain, physical restrictions to activities, and fatigue. Most participants reported at least one other chronic health condition in addition to OA (59.9%). In addition to other types of arthritis and persistent back or neck problems, the top 3 conditions reported were high blood pressure (55.3%), heart problems (33%), and lung problems (21.9%). Most respondents (72.2%) reported experiencing at least one major negative event in the past year, but only 14.3% reported a major positive event. Excluding life events related to sleeping or eating, 58.2% reported at least one negative life event and 12.4% a positive life event. Negative life events included a major personal illness or injury (25.9%), serious illness/death of a close friend (18.3%), serious illness/death of a family member (16.6%), and serious illness/death of a spouse (11.3%). Positive life events included an outstanding personal achievement (7.0%) and a change in household living conditions (4.7%). Perceived coping efficacy was relatively high, with a mean score of 3.9 out of 5 (SD 0.95). The majority of respondents (94.1%) reported taking medications for their OA. The mean CES-D depression score was 9.4, with

Table 1. Characteristics of respondents (n = 1227*).

Characteristic	
Age, yrs, mean ± SD	75.1 ± 7.8
Female, n (%)	928 (75.6)
Living circumstances, n = 1226 (%)	
Alone	430 (35.1)
With others	796 (64.9)
Level of education, n = 1209 (%)	
≤ High school	995 (82.3)
> High school	214 (17.7)
WOMAC pain score, mean ± SD (scale 0–20)	7.7 ± 3.2
WOMAC physical function score, mean ± SD (scale 0–68)	29.8 ± 12.1
ClinHAQ fatigue score, mean ± SD (scale 0-10)	5.45 ± 2.3
Comorbid conditions, n (%)	
0	493 (40.1)
1	406 (33.1)
2+	328 (26.8)
Life-events score (positive)**, n (%)	
0	1051 (86.7)
1+	176 (14.3)
Life-events score (negative)***, n (%)	
0	341 (27.8)
1–2	267 (21.8)
3–4	264 (21.5)
5+	355 (28.9)
Coping behavior, mean ± SD (scale 0–5)	2.9 ± 0.85
Coping efficacy, mean ± SD (scale 0–5)	3.9 ± 0.95
Using acetaminophen or pain-killers with codeine, n (%)	1154 (94.1)
Ever treated for depression or other major mental illness, n (%)	177 (14.4)
CES-D score, mean ± SD (scale 0–60)	9.4 ± 8.0

* Denominator is shown when less than 1227. ** When positive life-events scores were modified to remove positive events related to eating and sleeping, 1075 (87.6%) had 0 positive life events and 152 (12.4%) had 1 or more positive life events. *** When negative life-events scores were modified to remove negative events related to eating and sleeping, 513 (41.8%) had 0 negative events, 233 (19.0%) had 1–2 negative events, 289 (23.6%) had 3–4 negative events, and 192 (15.6%) had 5+ negative events. WOMAC: Western Ontario and McMaster University Osteoarthritis Index; ClinHAQ: Clinical Health Assessment Questionnaire; CES-D: Center for Epidemiologic Studies Depression scale.

21.3% of individuals scoring ≥ 16 (indicative of depressed mood). However, only 14.4% of all respondents reported being ever treated for depression or any other major mental illness (7.6% of respondents reported being treated in the past year).

All variables of interest were statistically associated with the depression score, at $p < 0.10$ in the bivariate analyses, and therefore were considered in the linear regression model. Specifically, depression scores were higher for women than men (mean 10.4 vs 6.3; $p < 0.001$), those currently using acetaminophen or pain-killers with codeine compared with those who were not (mean 10.3 vs 6.9; $p < 0.001$), those with ≤ high school education compared with those with > high school education (mean 9.75 vs 7.76; $p = 0.001$), those living alone compared with those living with others (mean 10.6 vs 8.8; $p < 0.001$), and those ever treated for depression or other major mental illness compared with those who were not (mean 11.9 vs 9.0; $p < 0.001$). Negative and positive stressful life events were both associated with depression at moderate or low levels, but were in opposite directions (negative events, $r = 0.50$, $p < 0.001$; positive events, $r = –0.11$, $p < 0.001$). Because WOMAC function and pain scores were highly correlated ($r = 0.89$, $p < 0.001$), only the pain score was included in the model.

Multivariate model: correlates of higher CES-D scores. In the hierarchical multiple linear regression model, groups of variables were entered in blocks to examine the significance and proportion of variance accounted for by conceptually similar variables. The blocks included demographic variables, arthritis severity, comorbidity and life events, coping and treatment, and the interaction of coping behavior with perceived coping efficacy. Women were more likely to report depressive affect, but demographic variables accounted for only about 8% of the variance explaining depression. Arthritis severity accounted for the greatest percentage of the variance (38.5%), with both greater pain and greater fatigue being associated with depression. Report of 2 or more comorbid conditions was also associated with higher depression scores, as was having experienced a greater number of negative stressful life events in the previous year. This block accounted for 6% of the variance (3% when events related to eating or sleeping were excluded). Coping and treatment accounted for a further 11% of the variance, with a greater number of coping behaviors to manage OA and being treated for depression or another mental health disorder in the past both being significantly associated with current depressive symptoms (Table 2). The main effect of coping and depression was qualified by a coping behavior and coping efficacy interaction (Figure 1). Specifically, depressive symptoms were highest among individuals who reported a greater amount of coping behaviors and who perceived their coping efforts to be unsuccessful. The lowest depression scores were found in those individuals who reported fewer coping efforts and who felt that these efforts helped them to successfully manage their condition. In total, the final model accounted for 63.4% of the variance in depression scores. In a separate analysis, in which scores for positive and negative life events were revised to exclude events related to eating or sleeping, our results were not significantly different; the final model accounted for 62.4% of the variance in CES-D scores. We also recalculated the analysis replacing "*ever* treated" for depression or another major mental illness or mood disorder with treatment "in the *past year*" and the resulting model was similar, accounting for 63.4% of the variance in depression scores. Finally, because some of the CES-D items are associated with sleep, we removed the somatic items (some of which assess sleep) and recalculated the analysis. The results were similar, with both pain and fatigue remaining significant in the model.

DISCUSSION

Our study demonstrated that among older adults with OA, the prevalence of depressive symptoms was high, with over 21% of individuals meeting CES-D criteria for depression. This value is higher than that found in previous studies that have defined depression based on the CES-D in elderly OA populations[22] and in older adults in general[2,56-58]. Only 14.4% of all respondents (18.4% of those with CES-D scores ≥ 16) reported having ever been treated for depression or another major mental illness, consistent with reports that suggest depression is often not diagnosed in people with OA[59] and that few arthritis patients receive help for dealing with emotional problems such as depression[11].

Our study was cross-sectional, intended to inform the design of a longitudinal cohort study in OA examining the interplay among pain, fatigue, and mood in this common condition. Thus, while our results cannot elucidate the temporal relationships among the factors examined, they are useful in identifying factors that may mediate the relationship between depressed mood and OA symptoms and disability among older adults. Inclusion of comorbidity, life events, coping behaviors, coping efficacy, and treatment of OA and depression to disease and activity limitation variables that have been previously postulated to explain the high prevalence of depression in OA added significantly to the explanatory power of our model, improving on that of previous studies[22,23].

Of the demographic variables considered, only sex was significantly associated with depressed mood, with women being more likely than men to be depressed. Nolen-Hoeksema and colleagues[60] have proposed that women are more susceptible to depression because they experience more negative life events and have less control over these life events (e.g., less financial resources and lack of social power). This study controlled for negative events and continued to find sex differences, suggesting that other factors contribute to higher depression among older women with OA. These factors may include a greater tendency to ruminate and a lower sense of mastery[60]. However, the pathways to depression in men and women are complex and varied[61,62] and are beyond the scope of this study.

Table 2. Results of the multivariate model (n = 1106).

Independent Variables	Dependent Variable = CES-D Score b*	B*	p	ΔR_2
Demographics				
Age	0.02	0.02	0.238	
Sex	–0.82	–0.04	0.027	
Living circumstances	–0.50	–0.03	0.120	
Education	0.02	0.001	0.949	
				0.077
Arthritis severity				
Pain	0.39	0.16	< 0.001	
Fatigue	0.52	0.15	< 0.001	
				0.385
Comorbidity and life events				
Comorbidity: 1 vs 0	0.50	0.03	0.144	
Comorbidity: 2+ vs 0	0.73	0.04	0.056	
Negative life events: 1–2 vs 0	1.19	0.06	0.005	
Negative life events: 3–4 vs 0	3.19	0.17	< 0.001	
Negative life events: 5+ vs 0	3.73	0.21	< 0.001	
Positive life events: 0 vs 1+	0.79	0.04	0.072	
				0.056
Coping and treatment				
Coping behavior	5.77	0.61	< 0.001	
Coping efficacy	0.30	0.04	0.690	
Current use of pain-killers	–0.61	–0.03	0.081	
Ever treated for depression	–2.57	–0.12	< 0.001	
				0.112
Interaction				
Coping behavior × coping efficacy	–1.17	–0.51	< 0.001	
				0.010
Adjusted R_2				0.634

* Unstandardized (b) and standardized (B) regression coefficients.

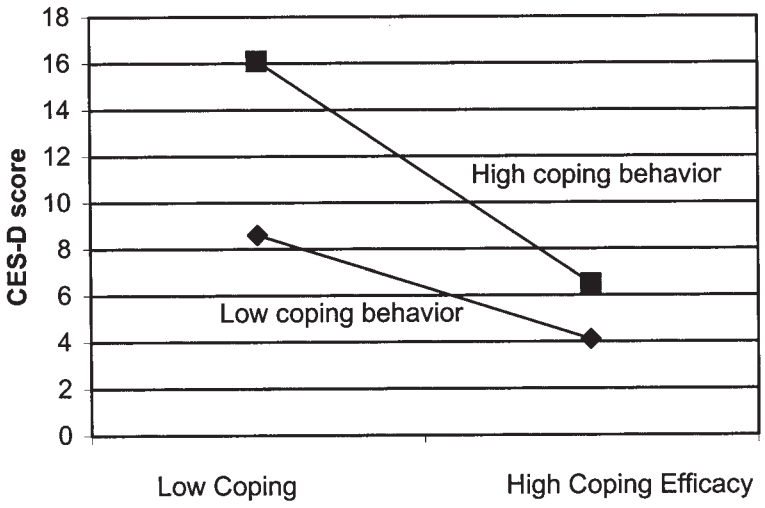

Figure 1. Interaction between coping efficacy and coping behavior.

As found in previous studies, after accounting for the demographic variables, both pain and fatigue were significantly, positively associated with depressive symptoms. One potential explanation is that the symptoms of OA overlap substantially with those of depression, resulting in a misclassification of some people reporting greater symptoms of OA as

depressed. A more comprehensive examination of the CES-D items that potentially overlap with OA symptoms, in particular CES-D items regarding sleep, activity levels, and concentration difficulties, is warranted to address this concern. Alternatively, depression may reduce individuals' tolerance of pain or result in pain catastrophizing. To address these possibilities, longitudinal studies using sensitive and specific measures are warranted.

Consistent with previous research[19-21], a greater number of negative stressful life events was significantly associated with higher depressive symptoms. This relationship remained even after excluding those items related to eating and sleeping from the life-events scores. Little is known about the relationship between depression in OA and life events. There was also a trend for those respondents with 2 or more comorbid chronic conditions to report greater depression. Previous OA research often omitted the broader context of people's health and life experiences when studying depression and focused instead on disease symptoms and their influence. Our findings support the need for the inclusion of the broader context of people's lives when studying depression in OA.

Related to this broader context are the ways that individuals treat and adapt to their OA and its potential association with depression. Contrary to our expectations, in this study the use of pain-killers was not significantly associated with depressive symptoms, although there was a trend for those reporting the use of pain-killers to be more likely to report depression. The lack of findings may be due in part to the relatively simple way that medication use was assessed in this study. We used only a single item asking about pain medication for OA. However, recent research findings suggest that older adults' use of pain medication to treat OA is complex. Many older adults were reluctant to take their pain medication for their OA and, when they did, generally took it at a lower dose or frequency than prescribed[28]. Currently we lack information about whether those less adherent to pain prescription instructions are more likely to be those with depressive symptoms. Additional research examining depression and use of pain medication is needed.

Individuals with higher depressive symptoms were more likely than those with lower scores to report prior treatment for depression or another major mental illness. While recall bias cannot be excluded as a possible explanation, this finding more than likely reflects the chronic state of mental health disorders like depression, and suggests that physicians treating people with painful arthritis should consider the possibility of concomitant depression — both conditions (OA and depression) being relatively common among older individuals — and explicitly ask about prior diagnoses. This is particularly important, as treatment for depression may also alleviate other symptoms of arthritis, such as pain and functional impairment[63]. In a randomized controlled trial of older adults with depression and arthritis, those in an enhanced depression care management group reported less pain and functional impairment at 3 and 12 months compared with those who received usual depression care[63]. Further, the use of antidepressants alone may be effective in chronic pain management. One review of 95 placebo-controlled studies (of which 13 were for pain of OA or RA) revealed that antidepressants may have an antinociceptive effect on chronic pain and that these drugs may be effective for neuropathic pain[64].

Finally, our results shed light on the interrelationships of coping behaviors, perceived coping efficacy, and depression. They suggest that coping behavior and coping efficacy both need to be considered when examining the relationship between depression and OA. Specifically, it is not enough to look only at *how* people with OA are managing their disease or how well they believe they *can* manage their disease (i.e., their self-efficacy for disease management), it is necessary to understand their perceptions of how well their efforts *are working* to alleviate difficulties. In our study, depressive symptoms were highest among individuals who reported more coping behaviors but who also perceived these efforts to be unsuccessful in helping them to manage their arthritis. These individuals may be struggling to find ways of adapting to their OA, hence the high degree of frequency of different types of coping behavior efforts. Depression scores were lowest among those who reported relatively few coping efforts, but who perceived them as helpful. These findings are similar to other studies that found that no single way of coping was helpful for all people across situations, and that whether a coping effort enhanced well-being depended both on the type of coping used and on the individual's perception of its effectiveness[31,32,34,65]. At the same time, it is important to recognize that symptoms of depression may have shaped participants' coping behaviors and their perceived success. Future research is needed to separate the role of coping behaviors and perceived coping efficacy in contributing to depression, and to identify whether those who are depressed evaluate their efforts differently.

Several limitations need to be recognized with this research. First, as noted, since the study was cross-sectional, we were not able to determine the direction of effects or establish a causal relationship among depressive symptoms and the other variables studied. Also, the relationship between depressive symptoms and other variables in our model (for example, pain) may be bidirectional, as studies show that the pain experience in OA can be amplified by depressed mood[4,5,7].

Despite these limitations, our research demonstrates that older adults with OA may be at high risk for developing clinical depression and that pain, fatigue, and negative stressful life events may all contribute to the risk. Longitudinal studies are needed to evaluate the mechanisms by which coping factors influence disease and mood and their relationship to one another.

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