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Effect of Improving Depression Care on Pain and Functional Outcomes Among Older Adults With Arthritis

A Randomized Controlled Trial

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OSTEoarthritis is the most common type of arthritis among older adults.¹ Its prevalence increases sharply with age. About one third of individuals older than 65 years experience symptomatic osteoarthritis of the knee, and almost 80% of persons have degenerative joint disease after age 70 years.²⁻⁴ Arthritis is a leading cause of disability for older persons, reduces quality of life, and accounts for one eighth of all restricted activity days.^{5,6} The combined medical and economic costs associated with arthritis are staggering, posing a significant public health problem.^{1,7}

Depression is also common among older persons, with a prevalence of

Context Depression and arthritis are disabling and common health problems in late life. Depression is also a risk factor for poor health outcomes among arthritis patients.

Objective To determine whether enhancing care for depression improves pain and functional outcomes in older adults with depression and arthritis.

Design, Setting, and Participants Preplanned subgroup analyses of Improving Mood-Promoting Access to Collaborative Treatment (IMPACT), a randomized controlled trial of 1801 depressed older adults (≥ 60 years), which was performed at 18 primary care clinics from 8 health care organizations in 5 states across the United States from July 1999 to August 2001. A total of 1001 (56%) reported coexisting arthritis at baseline.

Intervention Antidepressant medications and/or 6 to 8 sessions of psychotherapy (Problem-Solving Treatment in Primary Care).

Main Outcome Measures Depression, pain intensity (scale of 0 to 10), interference with daily activities due to arthritis (scale of 0 to 10), general health status, and overall quality-of-life outcomes assessed at baseline, 3, 6, and 12 months.

Results In addition to reduction in depressive symptoms, the intervention group compared with the usual care group at 12 months had lower mean (SE) scores for pain intensity (5.62 [0.16] vs 6.15 [0.16]; between-group difference, -0.53 ; 95% confidence interval [CI], -0.92 to -0.14 ; $P = .009$), interference with daily activities due to arthritis (4.40 [0.18] vs 4.99 [0.17]; between-group difference, -0.59 ; 95% CI, -1.00 to -0.19 ; $P = .004$), and interference with daily activities due to pain (2.92 [0.07] vs 3.17 [0.07]; between-group difference, -0.26 ; 95% CI, -0.41 to -0.10 ; $P = .002$). Overall health and quality of life were also enhanced among intervention patients relative to control patients at 12 months.

Conclusions In a large and diverse population of older adults with arthritis (mostly osteoarthritis) and comorbid depression, benefits of improved depression care extended beyond reduced depressive symptoms and included decreased pain as well as improved functional status and quality of life.

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about 16%.⁸ Depressive symptoms are consistently associated with functional disability.⁹⁻¹¹ Its impact on disability is comparable with heart disease and exceeds other medical conditions.^{9,12-14} Depression is often associated with heightened concern about physical symptoms, such as pain and increased functional impairment.¹⁵⁻¹⁸ Depression and pain are more robust predictors of disability than radiographic evidence of degenerative joint changes in patients with hip or knee arthritis.^{19,20}

Few studies have examined the effects of improving depression treatment in patients with comorbid arthritis. A small number of efficacy trials, conducted among rheumatoid arthritis patients with depression, demonstrated that antidepressant medicines reduced pain when compared with placebo. However, intervention effects on depression and functional outcomes were inconsistent, perhaps due to small sample sizes in some studies.²¹⁻²³ In a recent randomized trial that lacked a placebo comparison, rheumatoid arthritis patients with comorbid depression were treated with either paroxetine or amitriptyline. Both medicines showed similar effects on pain, depression, and disability.²⁴ Psychological interventions have also been found to improve pain, disability, and psychological status of arthritis patients, regardless of depression status.^{25,26}

To our knowledge, no randomized trial has been performed to assess the effects of improving depression treatment in primary care settings for patients with arthritis and concurrent depression. To address this question, we analyzed data from the Improving Mood-Promoting Access to Collaborative Treatment (IMPACT) trial of collaborative care management of depression.²⁷ The multisite trial included 1001 depressed older adults with coexisting arthritis. This article examines effects of this depression intervention on arthritis-related pain and functional outcomes among primary care patients with comorbid arthritis and depression.

METHODS

The IMPACT trial was conducted in 18 primary care clinics at 8 diverse health care organizations across the United States from 1999 to 2001.²⁷ Institutional review boards for each clinic approved the study procedures and all participants provided written informed consent. Detailed information on this trial is provided in other articles.^{27,28}

Inclusion criteria were age of 60 years or older, current major depression or dysthymia diagnosed by the Structured Clinical Interview for the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)*,²⁹ and plans to use one participating primary care clinic as the main source of general medical services for the coming year. Exclusions included history of bipolar disorder or psychosis, ongoing treatment by a psychiatrist, current alcohol use problems,³⁰ severe cognitive impairment,³¹ or acute risk of suicide. Individuals were recruited from July 1999 to August 2001. For the preplanned analyses reported in this article, we focus on the 1001 participants who reported a diagnosis or treatment for arthritis in the past 3 years.

Validation of Arthritis Self-report

A random 10% sample of individuals who reported receiving a diagnosis or treatment for arthritis in the past 3 years were selected at each site (n = 105). Medical records and clinical information systems containing radiological results and diagnostic and procedural codes were reviewed to identify arthritis diagnoses; specialty consultation or procedure for problems associated with arthritis; or radiographic evidence of degenerative joint changes.³² Review of clinical records confirmed self-reports of arthritis in 91.4% of individuals, which ranged from 80% to 100% across sites. Among these individuals with a confirmed diagnosis of arthritis, osteoarthritis was noted in 93.4% of medical records. Physician diagnoses accounted for 48% of the validated self-report, specialty consultation or procedures contributed 25% to the validation, and radiograph reports of os-

teoarthritis or degenerative joint changes confirmed 27% of the sample.

Intervention

The year-long IMPACT intervention used a collaborative care approach. Intervention patients received depression care management by a nurse or psychologist working collaboratively with the patient and primary care physician. This depression care manager conducted a psychosocial history, provided education and behavioral activation, and helped patients identify treatment preferences. Treatment options included antidepressant medicines prescribed by the patients' primary care clinicians, and a 6- to 8-session psychotherapy program designed for primary care known as Problem-Solving Treatment in Primary Care (P. Areal, unpublished data, 1999) delivered by the depression care manager.³³ A stepped-care pharmacotherapy algorithm²⁸ recommending routinely available antidepressant medications guided acute and follow-up phases of treatment over 12 months. The depression care manager met weekly with a supervising psychiatrist and an expert primary care physician to monitor clinical progress and adjust treatment plans accordingly. In-person or telephone follow-up visits occurred about every 2 weeks during acute-phase treatment, with subsequent monthly contact during continuation and maintenance phases. The intervention did not include routine assessment or treatment of arthritis, although patients could choose to address arthritis-related problems in Problem-Solving Treatment in Primary Care sessions. Patients assigned to the usual care group received routinely available depression treatments at the 8 diverse primary care settings. Routine primary care management of depression commonly included antidepressant medication and referrals to specialty mental health services as deemed necessary by the attending physician or patient.

Outcome Measures

Baseline, 3-, 6-, and 12-month follow-up data were collected and in-

cluded arthritis pain intensity rated from 0 (no pain) to 10 (most severe pain); arthritis-related interference with daily activities rated from 0 (no interference) to 10 (unable to perform any activities)³⁴; 2 items from the RAND 12-item Short Form³⁵ assessing how much pain interfered with work or other daily activities rated from 1 (not at all) to 5 (extremely); and general health status rated from 1 (excellent) to 5 (poor). Respondents also rated their overall quality of life in the past month on a scale from 0 to 10. Respondents were instructed to choose 0 (death) if they felt their situation was about as bad as dying. Functional status was also measured using the Sheehan Disability Scale, which rates work, family, and social functioning.³⁶ A 20-item depression severity scale adapted from the Hopkins Symptom Checklist was used to assess depression.³⁷

Statistical Analyses

For each dependent variable, we conducted a repeated measures intention-to-treat analysis. We fitted mixed-effects regression models for continuous variables or mixed-effects logistic regression models for dichotomous variables using baseline, 3-, 6-, and 12-month follow-up data with regression adjustment for recruitment method (screening or referral) and study site. We did not control for other demographic or clinical variables because they did not significantly differ between intervention and control groups. In the mixed-effects models, we treated time as a categorical variable and examined the fixed effects for time, intervention condition, and interactions. We specified the covariance structure within subjects using an unstructured model to account for the within-subject correlation over

time using SAS statistical software (PROC Mixed, Version 8.2; SAS Institute Inc, Cary, NC).³⁸ In mixed models, we also obtained adjusted group estimates for each treatment group and conducted pairwise 2-sided *t* tests comparing intervention with usual care at each time point.

We used a multiple imputation technique to account for item- and unit-level nonresponse and uncertainty in imputed values.³⁹ We used a combination of a predictive mean matching method for item nonresponse⁴⁰ and the approximate Bayesian bootstrap method for unit nonresponse.^{41,42}

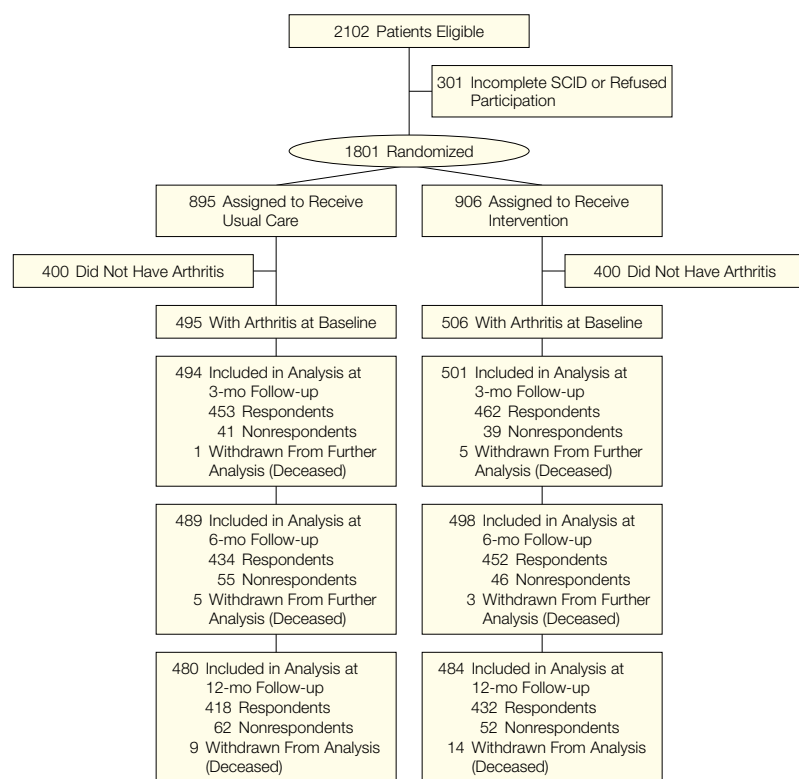
RESULTS

FIGURE 1 describes the enrollment process for the IMPACT trial. More than half of the 1801 participants with late-life depression reported a coexisting diagnosis or treatment for arthritis at baseline (55.6%). This primary care sample of 1001 older adults reflected a demographically diverse population (TABLE 1). Intervention and control group comparisons showed no significant difference in clinical or demographic characteristics at baseline ($P \geq .10$). The mean (SD) number of comorbid physical chronic diseases, which was selected from a list of 10 common medical conditions, was 4 (1.5) (data not shown). Depression commonly ran a chronic or recurrent course in these older adults, with more than 80% having dysthymia with or without major depression. At the baseline interview, about 57% in each group reported taking analgesic medications, about 21% reported taking narcotic or opiate analgesic agents, and almost half reported taking antidepressant medications.

Depression Treatment and Outcomes

Depression treatment (pharmacotherapy or psychotherapy) received by both intervention and usual care groups increased over the 12-month intervention. Antidepressant use increased from 43% at baseline to 66% at 12 months among the intervention patients compared with 47% at baseline and 52% at

Figure 1. Flow Diagram of IMPACT Trial



IMPACT indicates Improving Mood-Promoting Access to Collaborative Treatment; SCID, Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*. Analyses included all other participants after multiple imputation of unit-level missing data.

12 months in the usual care group ($t=3.4$; $P<.001$). Mental health service use or psychotherapy also increased among usual care patients from 7% at baseline to 16% at 12 months, but not as markedly as in intervention patients (8% to 47%) ($t=8.47$; $P<.001$).

These increases in pharmacotherapy and psychotherapy were similar to findings in the larger sample including older adults reporting no arthritis.²⁷ Intervention patients (41%) were more than twice as likely as those receiving usual care (18%) to experience a 50% reduction in Hopkins Symptom Checklist scores³⁷ at 12 months (odds ratio, 3.28; 95% confidence interval [CI], 2.4-4.5; $t=7.4$; $P<.001$). Among patients with a 50% reduction in depressive symptoms, 90% no longer met criteria for major depression at 6 months. At baseline, 74% of intervention and 69% of usual care patients met DSM-IV criteria for major depression while at 6 months, 24% of intervention and 38% of usual care patients had major depression ($t=-4.6$; $P<.001$).

Arthritis-Related Disability and Pain Outcomes

Arthritis-related outcomes were more favorable among intervention patients compared with usual care patients (TABLE 2). Intervention patients reported less interference in daily activities due to arthritis than usual care patients did. Improved function was significant at every follow-up assessment. Pain intensity also decreased significantly for the intervention group at 3- and 12-month interviews. Enhanced depression care also reduced pain-associated functional impairment among intervention patients at each follow-up assessment.

Relationship Between Depression and Arthritis Pain Outcomes

Improvements in mean Hopkins Symptom Checklist depression score were relatively synchronous with improvements in the mean arthritis pain interference score over time (FIGURE 2). Improvements in arthritis pain intensity and functional impairment from pain

also showed similar synchronous change with depression score decreases.

Functional Impairment and Quality of Life

At all follow-up assessments, intervention patients also reported less health-related functional impairment, better health status, and higher overall quality of life in the preceding month compared with usual care. At 12 months, the mean (SE) Sheehan disability score was 3.9 (0.15) in intervention group vs 4.7 (0.15) in usual care group (between-group difference, -0.82 ; 95% CI, -1.17 to -0.47 ; $P<.001$). For general health status, the mean rating for intervention patients at 12 months was 3.3 (0.05) vs

3.6 (0.05) for control patients (between-group difference, -0.3 ; 95% CI, -0.42 to -0.17 ; $P<.001$). Overall quality of life also improved. The mean for the intervention patients at 12 months was 6.4 (0.13) compared with 6.0 (0.13) for control patients (between-group difference, 0.42 ; 95% CI, $0.13-0.71$; $P=.005$).

COMMENT

To our knowledge, this is the first randomized trial testing the effects of improving primary care treatment of depression in persons with comorbid arthritis (mostly osteoarthritis). Intervention patients with depression and arthritis who received enhanced depression care management in primary care

Table 1. Baseline Characteristics of Older Adults With Arthritis and Depression*

Characteristic	No. (%) of Participants			P Value‡
	Usual Care Group (n = 495)	Intervention Group (n = 506)	Total (N = 1001)†	
Demographic				
Women	346 (70)	338 (67)	684 (68)	.30
Age, mean (SD), y	72.1 (7.5)	71.9 (7.3)	72 (7.4)	.76
Married or living with partner	232 (47)	210 (42)	442 (44)	.10
Race/ethnicity				
White	373 (75)	389 (77)	762 (76)	.40
Black	63 (13)	67 (13)	130 (13)	
Hispanic	48 (10)	35 (7)	84 (8)	
Other§	11 (2)	15 (3)	26 (3)	
High school graduate	392 (79)	396 (78)	788 (79)	.74
Clinical				
Depression status				
Major depression	75 (15)	84 (17)	159 (16)	.21
Dysthymia	155 (31)	133 (26)	288 (29)	
Both	265 (54)	289 (57)	554 (55)	
≥2 Prior episodes of depression	352 (71)	357 (70)	708 (71)	.86
Positive result on cognitive impairment screening	184 (37)	185 (36)	369 (37)	.83
Arthritis, mean (SD)¶				
Pain intensity	6.3 (2.7)	6.0 (2.7)	6.1 (2.7)	.13
Interference	5.0 (3.2)	4.9 (3.1)	4.9 (3.2)	.34
Pain interference, mean (SD)#	3.2 (1.1)	3.2 (1.1)	3.2 (1.1)	.37
Prior use				
Antidepressant (past 3 mo)	231 (47)	219 (43)	450 (45)	.29
Analgesic (pain)	278 (56)	293 (58)	571 (57)	.57
Narcotic/opiate	105 (21)	107 (21)	212 (21)	.98

*Baseline means in this table are not identical to baseline means in Table 2 because this table is unadjusted and Table 2 is adjusted for recruitment method and study site.

†Due to multiple imputations, values were averaged and rounded.

‡Bivariate analyses compare differences across intervention conditions from multiple imputed data.

§Includes Asian Americans, Native Americans, and Pacific Islanders.

||Determined by diagnosis after Structured Clinical Interview of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*.

¶Possible scores range from 0 to 10.

#Possible scores range from 1 to 5.

Table 2. Health Outcomes in Older Adults With Arthritis and Depression*

Effect of Arthritis	Mean (SE) Estimates		Intervention vs Usual Care†		
	Usual Care (n = 495)	Intervention (n = 506)	Between-Group Difference (95% CI)	t _{df}	P Value
Pain intensity‡					
Baseline	6.32 (0.29)	6.04 (0.29)	-0.28 (-0.6 to 0.04)	-1.73 ₉₉₁	.08
Follow-up, mo					
3	6.24 (0.15)	5.65 (0.14)	-0.58 (-0.9 to -0.25)	-3.48 ₈₈₀	<.001
6	5.69 (0.15)	5.48 (0.16)	-0.21 (-0.55 to 0.13)	-1.23 ₄₄₉	.22
12	6.15 (0.16)	5.62 (0.16)	-0.53 (-0.92 to -0.14)	-2.72 ₅₀	.009
Interferes with daily activities‡					
Baseline	5.38 (0.37)	5.17 (0.36)	-0.21 (-0.6 to 0.19)	-1.03 ₉₉₁	.30
Follow-up, mo					
3	5.03 (0.18)	4.36 (0.18)	-0.67 (-1.06 to -0.27)	-3.35 ₁₉₈	.001
6	4.65 (0.17)	4.08 (0.20)	-0.56 (-0.96 to -0.16)	-2.79 ₁₃₁	.006
12	4.99 (0.17)	4.40 (0.18)	-0.59 (-1.00 to -0.19)	-2.91 ₁₆₄	.004
Pain interferes with daily activities§					
Baseline	3.24 (0.12)	3.17 (0.12)	-0.07 (-0.21 to 0.06)	-1.06 ₉₉₁	.29
Follow-up, mo					
3	3.15 (0.07)	2.92 (0.07)	-0.24 (-0.39 to -0.09)	-3.15 ₄₉₁	.002
6	3.11 (0.07)	2.88 (0.07)	-0.22 (-0.36 to -0.09)	-2.83 ₁₈₉	.005
12	3.17 (0.07)	2.92 (0.07)	-0.26 (-0.41 to -0.10)	-3.24 ₁₇₀	.002

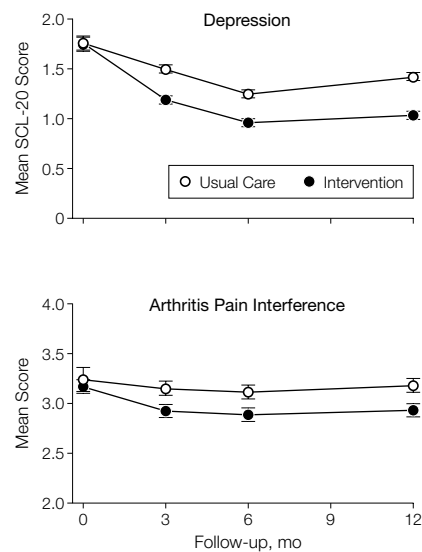
Abbreviation: CI, confidence interval.

*Baseline means in this table are not identical to baseline means in Table 1 because this table is adjusted for recruitment method and study site and Table 1 is not adjusted.

†Mixed-effects regression adjusted for recruitment method and study site. Inferences and degrees of freedom were calculated by the multiple imputation inference technique.

‡On a scale of 0 to 10.

§On a scale of 1 to 5.

Figure 2. Depression and Pain Interference

SCL-20 indicates a 20-item depression severity scale adapted from the Hopkins Symptom Checklist. For depression, $P < .001$ for the comparisons between usual care and intervention groups at 3-, 6-, and 12-month follow-up; $P = .76$ at 0 months. For arthritis pain interference, $P < .01$ for the comparisons between usual care and intervention groups at 3-, 6-, and 12-month follow-up; $P = .29$ at 0 months. Error bars indicate SEs.

showed improved arthritis-related pain and functional outcomes, fewer depressive symptoms, and better general health status and overall quality of life at 12 months compared with patients receiving usual care. The high prevalence of comorbid arthritis with depression was also found in a large population-based study of elderly individuals.⁴³ Such comorbidity accompanied by substantial pain-related functional limitations and compromised quality of life is the rule rather than the exception among depressed elderly patients.

This collaborative care intervention focused on improving care for depression and did not systematically focus on arthritis pain or functional disability. There was a robust intervention effect for depressive symptoms at 12 months (standardized effect size=0.60), which was similar to those for older adults without comorbid arthritis.²⁷ Interestingly, this intervention also demonstrated better outcomes in arthritis-related pain and disability as well as quality of life. Intervention effect sizes on these latter outcomes were more

modest in size—ranging from 0.20 to 0.31. However, the magnitudes of these intervention effects are similar to those observed in a trial of a home-based exercise program designed to decrease pain (effect size=0.20) and improve physical functioning (effect size=0.25) among arthritis patients.⁴⁴ At baseline, the mean rating of pain severity was 6 of 10, yet only a little over half of these older adults reported taking any analgesic medications, including over-the-counter preparations. These findings suggest room for improvement in the management of pain. Future research is needed to test whether a care management approach integrating both arthritis and depression treatments can produce additional health gains for older adults with comorbid arthritis and depression.

Our findings of improved arthritis pain outcomes associated with decreased depression are consistent with a wider literature demonstrating the substantial co-occurrence of depression and other painful conditions, their additive impact on morbidity, and the efficacy of antidepressants and other psychological treatments in improving somatic and functional outcomes.⁴⁵⁻⁴⁹ The pattern of concurrent improvement in depression and arthritis pain outcomes further supports the close interplay between depression and pain. Recent biological pain research provides a better understanding of how the improved affect observed with antidepressant medicines or evidence-based brief psychotherapy may be related to pain reduction.⁵⁰ Neurotransmitters such as serotonin and noradrenaline can dampen peripheral pain signals by mediating a bidirectional feedback between a central pain modulation system and a peripheral nociceptive stimulus (eg, arthritis pain).^{51,52} Moreover, the psychotherapy provided in this study may also have helped patients identify steps to cope more effectively with problems associated with pain.³³ Although antidepressant medications were used in more than half of the usual care patients,²⁷ intervention participants were significantly more likely than those in the usual care group to receive antide-

pressant medications or psychotherapy. Both pharmacological modulation of pain and/or identification of behavioral strategies to better manage pain and increase function may have contributed to the enhanced pain and functional outcomes observed.

This study was not designed to identify mechanisms of action and we cannot assess the efficacy of particular treatment components on clinical outcomes (eg, medication vs problem-solving treatment). Another limitation is that we did not have detailed arthritis treatment data. However, intervention and control groups used analgesics and/or opiates at similar rates at baseline. There was no significant interaction ($P < .10$) between analgesic use at baseline and intervention status for arthritis-related pain and activity limitation, disability, general health status, quality of life, and depression at any follow-up time points. Lack of information on analgesic medication use at follow-up limits interpretation of our findings because we cannot preclude the possibility that intervention patients received more aggressive analgesic treatment. Mild cognitive impairment may affect accuracy of long-term recall such as diagnosis or treatment in the prior 3 years, as well as the accuracy of reported intervention effects. Sensitivity analyses demonstrated that participants without cognitive impairment at baseline showed similar outcomes as the entire arthritis sample. Analyses of a potential interactive effect between baseline cognitive impairment and intervention status on outcomes showed that the intervention was similarly effective for patients with or without mild cognitive impairment.

Results from this study can help guide future research on efficacious treatment for older adults with arthritis and comorbid depression. From a health services perspective, primary care settings provide the initial points of service for the majority of older adults seeking medical care. Seeking care for arthritis-related pain and depression-related symptoms are no exception. Persons who seek care from physicians for osteoarthritis are significantly more depressed

than persons with osteoarthritis who do not seek care.⁵³ This is consistent with research demonstrating that depressed patients use more health care services than nondepressed patients.^{54,55} In a British study, general practitioners underestimated disability associated with osteoarthritis compared with patient self-report. Moreover, depression and anxiety were often missed in these patients.⁵⁶ Therefore, primary care can be an appropriate setting for efficacious treatment of patients with arthritis and concurrent late-life depression.

From a clinical perspective, current medical treatments cannot cure osteoarthritis or eliminate arthritis-related pain and disability entirely. Therefore, arthritis management needs to be aimed at decreasing pain, improving function, and enhancing quality of life.⁵⁷ In addition to medical management of arthritis, randomized trials over the last decade have demonstrated benefits of many nonpharmacological arthritis therapies such as arthritis self-management programs that increased patient self-efficacy in managing various aspects of arthritis⁵⁸; regular telephone contacts for arthritis management, education, and activation⁵⁹; or participation in exercise programs.^{60,61} The current study supports including effective treatment of depression to enhance function of patients with arthritis. A biopsychosocial approach is consistent with recent emphasis on better management of pain recommended by the Joint Commission on Accreditation of Healthcare Organizations and the American College of Rheumatology for medical management of osteoarthritis.⁶² This approach should include depression screening in a systematic assessment of pain among older patients with symptomatic osteoarthritis. Medical management of arthritis can integrate evidence-based depression treatment⁶³ with patient education and support for self-management (eg, exercise) to maximize functional status and quality of life.

Across diverse general health care settings, we found high comorbidity of arthritis and late-life depression. Benefits from increased recognition and

improved treatment of depression in patients with comorbid arthritis and depression extended beyond reduced depressive symptoms to include improved pain and functional outcomes. We conclude that recognition and treatment of depression has the potential to lessen the public health burden of comorbid arthritis and late-life depression.

Author Contributions: Dr Lin, as principal investigator, had full access to all of the data in this study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Lin, Katon, Hunkeler, Harpole, Hegel, Langston, Unützer.

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Analysis and interpretation of data: Lin, Katon, Von Korff, Tang, Kroenke, Hunkeler, Unützer.

Drafting of the manuscript: Lin, Katon, Tang, Hegel, Areal.

Critical revision of the manuscript for important intellectual content: Lin, Katon, Von Korff, Tang, Williams, Kroenke, Hunkeler, Harpole, Hegel, Hoffing, Della Penna, Langston, Unützer.

Statistical expertise: Lin, Tang.

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Weight Lifting and Rupture of Silent Aortic Aneurysms

To the Editor: It is unclear whether aortic dissection is associated with high-intensity strength training.

Methods. From our Yale University aortic database,¹ and from outside cases brought to our attention after lay press reports of our aortic research,^{2,3} we identified and reviewed case materials of 5 patients who experienced acute dissection of the ascending aorta in the setting of high-intensity weight training or other strenuous exercise.

Results. The 5 patients ranged in age between 19 and 53 years. None had previously diagnosed aneurysm or personal history of hypertension or collagen vascular disease. Only 1 patient had a family history of aortic disease. None had signs of Marfan syndrome.

All patients were involved in strenuous strength training at the instant that their dissection pain occurred. Two patients were weight training, a third was attempting to move a heavy granite structure, and the other 2 were doing push-ups.

All patients manifested acute ascending aortic dissection. Diagnosis was made by computed tomography scan in 3 patients, by echocardiography in 1, and by autopsy in the fifth. The diameter of the aorta on the imaging studies performed immediately after dissection ranged from 4.0 to 5.2 cm, indicating underlying enlargement, but not to a level expected to present a high risk of dissection.¹

Three patients underwent successful urgent surgical repair of the acute dissection. These patients survived and are without sequelae at 4, 20, and 48 months. One patient died shortly after diagnosis and before transfer to another facility could be made, and the fifth died before a diagnosis was made. Pathological analysis, available in 4 patients, showed underlying cystic medial necrosis, which was of mild to moderate severity in 2 patients.

Comment. The risk of weight lifting as a cause of aortic dissection has generally been underappreciated.⁴

We recommend caution in patients with known aneurysms or connective tissue diseases, a family history of aneurysm or dissection, or underlying hypertension, as well those at or beyond middle age, because aneurysm, connective-tissue disease, family history, and hypertension predispose to aortic dissection and because aortic stiffness increases with age.⁵ None

of the patients in this series, however, had these known risk factors. Furthermore, because limiting maximal effort prevents extreme (>200 mm Hg) elevations in blood pressure,⁶ it also seems reasonable to limit weight lifting in individuals at risk.

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CORRECTIONS

Incorrect Author Initial: In the Editorial entitled "Reinventing American Tobacco Policy: Sounding the Medical Community's Voice," published in the February 18, 1998, issue of THE JOURNAL (1998;279:550-552), an error occurred in Dr Kessler's name in the signature on page 552. The name should read David A. Kessler, MD (not David C. Kessler, MD).

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