Self-Management Strategies to Reduce Pain and Improve Function among Older Adults in Community Settings: A Review of the Evidence

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ABSTRACT

Context. Self-management strategies for pain hold substantial promise as a means of reducing pain and improving function among older adults with chronic pain, but their use in this age group has not been well defined.

Objective. To review the evidence regarding self-management interventions for pain due to musculoskeletal disorders among older adults.

Design. We searched the Medline and Cumulative Index to Nursing and Allied Health Literature databases to identify relevant articles for review and analyzed English-language articles that presented outcome data on pain, function, and/or other relevant endpoints and evaluated programs/strategies that could be feasibly implemented in the community. Abstracted information included study sample characteristics, estimates of treatment effect, and other relevant outcomes when present.

Results. Retained articles (N = 27) included those that evaluated programs sponsored by the Arthritis Foundation and other programs/strategies including yoga, massage therapy, Tai Chi, and music therapy. Positive outcomes were found in 96% of the studies. Proportionate change in pain scores ranged from an increase of 18% to a reduction of 85% (median = 23% reduction), whereas change in disability scores ranged from an increase of 2% to a reduction of 70% (median = 19% reduction). Generalizability issues identified included limited enrollment of ethnic minority elders, as well as non-ethnic elders aged 80 and above.

Conclusions. Our results suggest that a broad range of self-management programs may provide benefits for older adults with chronic pain. Research is needed to establish the efficacy of the programs in diverse age and ethnic groups of older adults and identify strategies that maximize program reach, retention, and methods to ensure continued use of the strategies over time.

Key Words. Chronic Non-Malignant Pain; Older Adults; Community Setting; Self-Management Programs; Arthritis

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Introduction

Among older persons, chronic non-malignant pain is a common, morbid, and costly disorder. As many as 50% of community-dwelling older adults report experiences of chronic pain [1]. In one study of approximately 18,000 adults [2], chronic pain was found to be more common than asthma, diabetes, or hypertension. Arthritis and arthritis-related diseases are the most common causes of chronic pain among persons aged 65 years and older [3], and include disorders such as osteoarthritis, back problems (e.g., spinal stenosis), fractures due to osteoporosis or trauma, as well as fibromyalgia [4].

Chronic pain causes substantial psychosocial and functional problems [5–9], a major, debilitating consequence of which is functional disability [10–12]. The economic burden associated with chronic pain is staggering [13,14]. Annual estimated costs due to arthritis and related diseases in the United States were $86bn dollars in 1997 [15] and do not include expenditures associated with other painful disorders that occur commonly in late life including myofascial and neuropathic pain.

Despite its prevalence and associated morbidity, available evidence indicates that chronic pain is often undertreated among older adults [16–19]. Advancing age, frailty, and belonging to an ethnic minority group increase risk for undertreatment [18,20]. The deleterious impact of chronic pain may be most pronounced among socioeconomically disadvantaged ethnic and racial minority populations [21–25].

A variety of self-management programs have been developed over the past three decades in an effort to reduce the burden of suffering due to pain. Factors contributing to their development include failure to identify cures for arthritis and other arthritis-related disorders and limited efficacy of standard therapies for chronic pain [26]. Although self-management programs can differ with respect to target audience, mode of delivery (group vs individual), as well as intervention components, shared features across programs include employing strategies to reduce pain by altering individuals’ behavioral, cognitive and/or emotional responses to pain and enhancing their self-efficacy for managing pain [27]. The programs typically include some combination of 1) education about pain and its consequences; 2) relaxation skills training (e.g., progressive muscle relaxation); 3) cognitive coping skills training; 4) problem solving (e.g., addressing problems with homework exercises or goals that are proposed to be met after each class); and 5) communication skills training (e.g., how to talk to physicians or health care providers about pain).

Self-management programs for pain have particular relevance for the field of geriatric pain management. The high cost and adverse side-effect profiles associated with many analgesic treatments [28–30], as well as the potential for drug-drug interactions [31,32], operate as significant barriers to the use of standard pharmacologic treatments in older adults. In addition, many pain medications cannot be prescribed because of co-occurring morbidity (e.g., congestive heart failure, peptic ulcer disease, cognitive impairment, disorders requiring anti-coagulant therapy, etc.), which is highly prevalent in seniors. In addition, older persons with chronic pain who use analgesic medications continue to report substantial pain despite the use of this treatment approach [33,34], suggesting the need for additional measures to combat pain.

Self-management programs for pain hold substantial promise as a means of decreasing pain and improving function in older adults with chronic pain. The programs are typically offered in community settings including churches/synagogues, schools and/or senior centers. Offering the programs in places proximate to where older adults reside could help to address transportation barriers that are commonly cited by seniors as a reason for not participating in these types of programs [35]. Senior centers represent a particularly ideal location for program implementation, as nearly 10 million older Americans currently receive services provided by the approximately 15,000 senior centers in the United States [36].

We sought to synthesize the scientific literature regarding self-management strategies for pain due to musculoskeletal disorders, with a particular emphasis on studies that examined program outcomes among older adults with chronic pain and on programs/strategies appropriate for use in the community setting.

Methods

We searched Medline and the Cumulative Index to Nursing and Allied Health Literature databases from 1980 through 2007 using the following Mesh terms: self-care, patient education, arthrits, osteoarthritis, and pain. We included yoga, massage, and Tai Chi as additional search terms, because these
particular therapies are widely proposed for the treatment of chronic pain, the techniques promote self-management of pain and pain-related symptoms, and their beneficial effects may be mediated by enhancement of self-efficacy, which is thought to be a necessary ingredient of successful self-management programs [37]. Pain programs/strategies selected for review were also informed by a recent survey conducted by the investigators that included 98 directors of senior centers located in New York City (unpublished data). This survey ascertained the prevalence and specific types of pain programs senior centers offered. This study revealed that the programs/strategies listed above (with the exception of music therapy) had been implemented in one or more of the centers, providing evidence of program dissemination at the local level and support for an appraisal of the evidence base regarding these particular interventions. Additional search terms were also employed including aged, chronic pain, self-management, and Arthritis Foundation. The latter search term was included because the Arthritis Foundation sponsors a wide range of self-management programs for use by adults with arthritis and arthritis-related diseases.

Abstracts identified in the searches were reviewed in detail (by M. C. R. and M. P.) using the following eligibility criteria: 1) article published in English; 2) presentation of data on one or more self-management programs/strategies designed to reduce pain and/or improve function among persons with chronic non-cancer pain (or arthritis-related pain if duration of symptoms not provided); and 3) the program/strategy under investigation was judged by both reviewers to be feasible for implementation in a community setting. As most community-based agencies do not have the staff or financial resources to offer pain management programs on an individual basis, we restricted our search of the literature to programs that could be delivered in a group setting. The latter restriction was deemed appropriate given that the majority of self-management programs for pain are group-based interventions. Articles that evaluated pain-reduction protocols in subjects with either acute or cancer-related pain were excluded. The reference lists of retained articles were also reviewed to identify other potentially salient studies. Articles in the retained sample included both controlled and uncontrolled trials. Two investigators (M. C. R. and M. P.) independently abstracted information from each retained article to include 1) the type of the self-management program under investigation; 2) characteristics of the study sample (e.g., participants’ race/ethnicity status) and whether results were reported for pertinent subgroups such as those aged 65 years or above; 3) estimates of treatment effect; and 4) other relevant outcomes (e.g., program retention rates) when present. Discrepancies in the abstractions were resolved by discussion between the two investigators and by reevaluation of the material in question.

The results of the search are organized by type of intervention to include 1) a brief description of the program or specific self-management strategy; 2) evidence of efficacy; and 3) a summary of the findings along with questions that remain unanswered about each program/strategy.

Results
A total of 27 articles met eligibility criteria and were retained for analysis. Specific programs/strategies included those sponsored by the National Arthritis Foundation, as well as non-Foundation sponsored programs such as yoga, massage therapy, Tai Chi, and music therapy. Table 1 provides a summary of the principal findings from articles that provided primary data.

Arthritis Foundation Self-Help Program (AFSHP)
Program Description
This program was originally developed by Kate Lorig and colleagues at Stanford University [38] and consists of six weekly, 2-hour group sessions (total course time = 12 hours) led by health professionals or lay persons who receive training as a prerequisite to teaching the course. Key programmatic features include 1) skills training in the use of self-management strategies such as cognitive and exercise methods to reduce pain, improve function, and reduce negative emotions that are often associated with persistent pain; 2) chronic disease education; 3) training to enhance problem-solving ability; and 4) communication training with a focus on family and health care provider communication. Weekly goal-setting exercises are encouraged as a means of facilitating uptake and continued use of the skills taught in the weekly classes and as a way of enhancing participants’ self-efficacy.

Evidence Base
Numerous studies have been conducted by Lorig and colleagues examining the efficacy of the AFSHP [39–41]. These investigations found
<table>
<thead>
<tr>
<th>Intervention</th>
<th>Study Ref.</th>
<th>Sample Size</th>
<th>Mean Age (Years)</th>
<th>Race/Ethnicity</th>
<th>Posttest Evaluation</th>
<th>Results*</th>
<th>Dropout Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthritis Foundation Self-Help Program (AFSHP)</td>
<td>[39]</td>
<td>251</td>
<td>65.5</td>
<td>87% non-Hispanic white</td>
<td>4 months, 1 year</td>
<td>Pain ↓ 12.1%, Disability ↓ 12.5%, Self-efficacy ↑ 11.4%</td>
<td>4.8%</td>
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<tr>
<td>(6 weekly sessions)</td>
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<td></td>
<td>[40]</td>
<td>600†</td>
<td>65.5</td>
<td>N/R</td>
<td>4, 8 &amp; 20 months</td>
<td>Pain ↓ 16%, Disability ↓ 10%†, Pain ↓ 23%, Disability ↓ 6%</td>
<td>15%</td>
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<td></td>
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<td>80.1</td>
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<tr>
<td></td>
<td>[42]</td>
<td>331</td>
<td>62</td>
<td>Hispanic</td>
<td>4 months</td>
<td>Pain ↓ 16%, Disability ↓ 10%, Self-efficacy ↑ 17%</td>
<td>14%</td>
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<tr>
<td></td>
<td>[43]</td>
<td>150</td>
<td>65</td>
<td>African American</td>
<td>6 weeks</td>
<td>Pain ↓, Self-efficacy ↑†</td>
<td>N/R</td>
</tr>
<tr>
<td></td>
<td>[44]</td>
<td>182</td>
<td>64.5</td>
<td>Asian (Hong Kong)</td>
<td>7 weeks, 22 weeks</td>
<td>Duration of light exercise ↑ 28%</td>
<td>34%</td>
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<tr>
<td></td>
<td>[45]</td>
<td>187</td>
<td>64.5</td>
<td>95% non-Hispanic white</td>
<td>6 weeks, 4 months</td>
<td>Duration of light exercise ↑ 28%</td>
<td>43%</td>
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<tr>
<td></td>
<td>[46]</td>
<td>109</td>
<td>77.2</td>
<td>85.3% non-Hispanic white</td>
<td>6 months</td>
<td>Emotional well-being ↑ 8%, Energy ↑ 9%, Fatigue ↓ 9%</td>
<td>7%</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>14.7% African American</td>
<td></td>
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<tr>
<td>[47]</td>
<td>4,114</td>
<td>61</td>
<td>Mostly non-Hispanic white</td>
<td>6 weeks</td>
<td></td>
<td>Pain ↓ 12%, Disability ↓ 7%</td>
<td>19%</td>
</tr>
<tr>
<td>Arthritis Foundation Exercise Program (AFEP)</td>
<td>[48]</td>
<td>43</td>
<td>76</td>
<td>97% non-Hispanic white</td>
<td>4 months</td>
<td>Pain ↓ 24%, Self-efficacy ↑ 20%</td>
<td>N/R</td>
</tr>
<tr>
<td>(1–3 sessions/week for 8 weeks)</td>
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<tr>
<td>[49]</td>
<td>176</td>
<td>68</td>
<td>95% non-Hispanic white</td>
<td>8 weeks, 4 months</td>
<td></td>
<td>Pain ↓, Depression ↓ 19%</td>
<td>N/R</td>
</tr>
<tr>
<td></td>
<td>[50]</td>
<td>551</td>
<td>N/R</td>
<td>52.5% African American</td>
<td>8 weeks†</td>
<td>Depression ↓ 14%, Pain ↓ 60%</td>
<td>17%</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>47.5% non-Hispanic white</td>
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<tr>
<td></td>
<td>[51]</td>
<td>32**</td>
<td>68</td>
<td>N/R</td>
<td>8 weeks</td>
<td>Self-efficacy ↑ 20%, Depression ↓ 14%</td>
<td>6%</td>
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<tr>
<td>Arthritis Foundation Aquatics Program (AFAP)</td>
<td>[54]</td>
<td>120</td>
<td>59</td>
<td>Non-Hispanic white</td>
<td>12 weeks, 9 months</td>
<td>Aerobic capacity ↑ 20%, Physical activity ↑ 23%</td>
<td>15%</td>
</tr>
<tr>
<td>(1–3 sessions/week for 6–10 weeks)</td>
<td></td>
<td></td>
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<tr>
<td>[55]</td>
<td>249</td>
<td>66</td>
<td>94% non-Hispanic white</td>
<td>16 weeks</td>
<td></td>
<td>Pain ↓ 12.5%, Depression ↓ 13.5%</td>
<td>9%</td>
</tr>
<tr>
<td>Method</td>
<td>N</td>
<td>Age</td>
<td>Race/Multiracial Identity</td>
<td>Duration</td>
<td>Pain Change</td>
<td>Disability Change</td>
<td>Physical Activity Change</td>
</tr>
<tr>
<td>---------------------------------------------</td>
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<tr>
<td>Yoga (weekly sessions of variable duration)</td>
<td>[56]</td>
<td>11</td>
<td>59</td>
<td>N/R</td>
<td>8 weeks</td>
<td>Pain ↓ 47%</td>
<td>Physical activity ↑ 36%</td>
</tr>
<tr>
<td></td>
<td>[57]</td>
<td>60</td>
<td>48</td>
<td>Non-Hispanic white</td>
<td>16 weeks, 7 months</td>
<td>Pain ↓ 70%</td>
<td>Physical activity ↑ 70%</td>
</tr>
<tr>
<td></td>
<td>[58]</td>
<td>101</td>
<td>44</td>
<td>Non-Hispanic white</td>
<td>6, 12, 26 weeks</td>
<td>Pain ↓ 60%</td>
<td>Physical activity ↑ 36%</td>
</tr>
<tr>
<td>Massage therapy (sessions of variable duration)</td>
<td>[60]</td>
<td>262</td>
<td>45</td>
<td>&gt;80% non-Hispanic white</td>
<td>10 weeks</td>
<td>Symptom bothersomeness ↓ 70%</td>
<td>Disability ↓ 47%</td>
</tr>
<tr>
<td></td>
<td>[61]</td>
<td>98</td>
<td>44</td>
<td>N/R</td>
<td>4 weeks</td>
<td>Pain ↓ 5%</td>
<td>Physical activity ↑ 70%</td>
</tr>
<tr>
<td></td>
<td>[62]</td>
<td>68</td>
<td>68</td>
<td>85% non-Hispanic white</td>
<td>8, 16 weeks</td>
<td>Pain ↓ 70%</td>
<td>Physical activity ↑ 36%</td>
</tr>
<tr>
<td></td>
<td>[63]</td>
<td>29</td>
<td>46</td>
<td>100% non-Hispanic white</td>
<td>5 weeks, 3 months</td>
<td>Pain ↓ 85%</td>
<td>Depression ↑ 83%</td>
</tr>
<tr>
<td></td>
<td>[64]</td>
<td>129</td>
<td>45</td>
<td>100% non-Hispanic white</td>
<td>5 weeks, 3 months</td>
<td>Pain ↓ 85%</td>
<td>Depression ↑ 38%</td>
</tr>
<tr>
<td></td>
<td>[65]</td>
<td>24</td>
<td>39</td>
<td>67% non-Hispanic white</td>
<td>5 weeks</td>
<td>Pain ↓ 85%</td>
<td>Depression ↑ 28%</td>
</tr>
<tr>
<td></td>
<td>[66]</td>
<td>30</td>
<td>46.5</td>
<td>N/R</td>
<td>8, 12 weeks</td>
<td>Pain unpleasantness ↓ 41%</td>
<td>Physical function ↑ 76%</td>
</tr>
<tr>
<td>Tai Chi therapy (1–2 sessions/week of variable duration)</td>
<td>[68]</td>
<td>206</td>
<td>48</td>
<td>N/R</td>
<td>10 weeks</td>
<td>Pain ↓ 35%</td>
<td>Joint stiffness ↓ 29%</td>
</tr>
<tr>
<td></td>
<td>[69]</td>
<td>72</td>
<td>64</td>
<td>Korean</td>
<td>12 weeks</td>
<td>Pain ↓ 35%</td>
<td>Joint stiffness ↓ 29%</td>
</tr>
</tbody>
</table>

* Results are presented for maximal treatment effects regardless of when these effects occurred. For those studies with multiple posttest evaluations, the times of maximal effects are in bold; † Investigators reported results for "older" adults only including 155 who were 55–74 years of age and 45 who were 75–84 years of age; ‡ Pain scores declined on average by 16% in the 55–74 age group at the 4-month follow-up. Pain scores in the 75–96 year old age group declined on average by 20% at both the 4- and 8-month follow-up. A 10% relative reduction in disability levels was observed for the 55–74 age group at the 4- and 8-month follow-up. § Investigators reported results for older adults only including 155 who were 55–74 years of age and 45 who were 75–84 years of age; ‡ Pain scores declined on average by 16% in the 55–74 age group at the 4-month follow-up. Pain scores in the 75–96 year old age group declined on average by 20% at both the 4- and 8-month follow-up. A 10% relative reduction in disability levels was observed for the 55–74 age group at the 4- and 8-month follow-up. § Raw data were not reported in this study; The intervention consisted of 1 class/week for 8 weeks; however participation varied. Results are presented for participants who were adherent with the treatment; adherence was defined as attending a minimum of 5 sessions; ** Participants were randomized to AFEP, AFAP, and control groups. N/R = Not reported.
consistent reductions in pain, as well as improvements in disability and disease management knowledge among program participants relative to various comparison groups. Most of the studies enrolled middle-aged adults with arthritis and results were not presented by age group (e.g., persons aged 65 years or older).

One study [40] reported on results from over 30 individual AFSPHP programs, which were held in diverse community settings and offered to persons with arthritis aged 55 and above (total number of participants = 600). Results were stratified by age into two groups, i.e., individuals aged 55–74 (N = 155) and those aged 75–96 (N = 45). Compared with participants’ baseline scores, both age groups demonstrated significant gains in arthritis knowledge at the 4-, 8-, and 20-month follow-up assessments. The younger age group evidenced a small but statistically significant reduction in disability (relative reduction = 10%) at the 4- and 8-month follow-up that did not persist at the 20-month assessment. Disability levels did not change in the older age group. Pain intensity scores improved significantly for both age groups over pretreatment levels. At the 4-month follow-up, pain scores declined on average by 16% for those aged 55–74 and this difference was maintained at the 20-month assessment. For those aged 75–96, pain scores declined on average by 23% at the 4- and 8-month assessments, but the effect was no longer present at 20 months.

The AFSPHP has been translated into Spanish. We identified one study that evaluated the Spanish language version of the program [42] in a community-based setting. In this randomized controlled study of 331 Spanish-speaking adults (mean age = 62 years), participants who received the intervention (versus those who were wait-listed) were found to have statistically significant reductions in pain (relative reduction = 16%) and disability (11%) scores four months after enrollment. Level of self-efficacy for managing pain also improved significantly among persons receiving the intervention relative to the comparison group. After one year, the investigators conducted a telephone follow-up assessment of participants who received the intervention. Levels of pain, disability, and overall health status were significantly improved relative to participants’ pretreatment scores. Only one study [43] was identified that examined the effects of the AFSPHP among African Americans. Participants in this community-based study included adults aged 55 years and older with arthritis. Scores on standard measures of self-efficacy and pain showed significant improvements 6 weeks after study completion.

Yip et al. assessed the effectiveness of an adapted AFSPHP among patients with knee osteoarthritis [44]. The adaptation consisted of an exercise component that included both walking and stretching exercises. The study was conducted in a clinical setting in Hong Kong. Participants (N = 182) were assigned to an intervention group (N = 88, mean age = 65) or a control group (N = 94, mean age = 64) that received usual care. There was a 34% dropout rate. Both groups were evaluated at baseline and at weeks 1 and 16 after completion of the program. A significant reduction in arthritis pain and fatigue and increased duration of light exercise practice and knee flexion were noted in the intervention group, as compared with the control group at the 16-week assessment. The number of unplanned medical consultations related to arthritis decreased and the ability to perform daily activities improved significantly in the treatment group.

A randomized controlled trial studied the effectiveness of the AFSPHP in patients recruited from primary care practices [45]. The intervention group (N = 113, mean age = 68 years, 96% white people) was composed of randomly selected subjects with osteoarthritis or rheumatoid arthritis drawn from six primary care sites. Individuals in the control group (N = 74, mean age = 61 years, 93% white) consisted of randomly selected subjects from six different practice sites and received a copy of The Arthritis Helpbook and were asked to read it. No significant differences in pain, disability, self-efficacy, mental health, and vitality were found between treatment and control groups at the 4-month follow-up.

In a community-based, randomized controlled trial, 109 community-dwelling seniors with chronic low back pain of mechanical origin (mean age = 77) were recruited to evaluate the effectiveness of Stanford’s Chronic Disease Self-Management Program (CDSMP) [46]. This program is a 6-week community-based workshop carried out by trained laypersons and consists of weekly classes lasting 2.5 hours each. The study was conducted at 12 sites, including senior centers, senior residences, Young Men’s Christian Associations (YMCA) and Young Women’s Christian Associations, and a community center. Participants were required to be white or African American, aged 60 and over, and have chronic low back pain of at least three months duration. Sixty participants (81.6% white, 18.4% African American)
received the intervention and 49 subjects (89.8% white, 10.2% African American) were wait-listed. Pain and disability scores, days with disability, emotional well-being, general health, energy-fatigue, self-efficacy and self-care attitudes were measured at a 6-month follow-up. There were no significant group differences with respect to pain, general health, self-efficacy, and self-care attitude scores. However, participants who received the CDSMP versus wait-listed controls were found to have significantly improved scores on emotional well-being, fatigue, functional disability, and days with disability measures.

Finally, a recent study [47] examined the results from 17 studies involving arthritis self-management programs. Several of the trials examined the AFSP. This meta-analysis found that the programs reduced pain levels and disability scores, but the effects were modest. The effect size for pain was 0.12 (95% CI = 0.00–0.24) and for disability was 0.07 (95% CI = 0.00–0.15), reflecting small overall treatment effects.

Summary of Evidence/Unanswered Questions
The available literature suggests that the AFSP can lead to reductions in pain and disability, as well as improvements in self-efficacy for managing pain, but that the overall effects are modest. In a recent review of this program for pain [47], dropout rates varied from 0% to 53%, with an average dropout rate of 20%. Problems with retention are likely to be considerably increased in the community where incentives for participation are not provided. Information is needed regarding how best to retain older individuals (once enrolled) in programs. Moreover, the vast majority of studies conducted to date have included largely non-Hispanic white individuals. The extent to which the AFSP can be successfully delivered and produce positive effects in racially diverse groups is unclear.

Arthritis Foundation Exercise Program (AFEP)
Program Description
Formerly referred to as People with Arthritis Can Exercise or PACE, this Arthritis Foundation-sponsored program is delivered in a group format, and classes are held from 1–3 times a week over an 8-week period depending upon the preference of the group (total course time = 8–24 hours). AFEP groups are led by health or fitness trainers (e.g., exercise therapists) who receive training as a prerequisite to teaching the program. Although the primary focus of this program is on training participants in the use of specific exercises appropriate for persons with arthritis, other key program components include chronic disease education, training in the use of relaxation techniques, and use of self-efficacy enhancing strategies such as goal setting.

Evidence Base
We found few published studies that examined the efficacy of the AFEP. In one study [48] that did not include a comparison group, 43 participants (mean age = 76) with osteoarthritis or rheumatoid arthritis who completed the 8-week program were found to have a 24% reduction in pain levels at the 4-month posttest evaluation, while perceived self-efficacy for managing pain increased by approximately 20%. Participants in the above-mentioned study were almost exclusively white (97%).

In another study of 176 adults with osteoarthritis or rheumatoid arthritis [49], participants (mean age = 68) were found to have significant improvements in self-efficacy and quality of life (as well as significantly reduced depressive symptom scores) following 8 weeks of classes held in the community. Participants in this study were also mostly non-Hispanic whites. In a study of over 500 individuals who received AFEP in a managed care setting [50], participants who attended at least 5 weeks of classes, as compared with individuals who were wait-listed to receive the intervention, were found to have significantly reduced arthritis symptoms, as well as improved knowledge of arthritis care, levels of depression, self-efficacy, and overall functioning at follow-up. Results for those who attended the classes less regularly (non-adherers) were not reported. A majority of participants (53%) randomized to active treatment were African American, whereas 35% of subjects in the control arm were African American. Finally, one investigation [51] randomized 32 men and women with physician-diagnosed osteoarthritis or rheumatoid arthritis to either 1) the AFEP (mean age = 68); 2) the Arthritis Foundation Aquatic Program (AFAP), which was offered at a local pool and is described below (mean age = 68); or 3) a control group (mean age = 64) consisting of usual care and a request to refrain from participating in any organized physical activity program during the study. Both the AFEP and the AFAP were offered as 8-week programs and outcomes were assessed shortly after program completion. Participants randomized to the AFEP and aquatic exercise program (versus control subjects) demonstrated significant improvements on measures of flexibil-
ity and strength, and evidenced significant reduction in both pain levels and perceived difficulty performing activities of daily living [51].

Summary of Evidence/Unanswered Questions
Little published information is available regarding the AFEP. Despite the lack of published evidence supporting this particular exercise intervention, the evidence base for exercise interventions targeting individuals with chronic pain in clinical settings is promising [52,53]. Available data support continued efforts to evaluate the AFEP in diverse community settings. Information is needed regarding strategies that can maximize program engagement and retention, as well as promote continued use of the exercise skills once the program is over.

Arthritis Foundation Aquatic Program
Program Description
This exercise-based (and Arthritis Foundation sponsored) program was developed in conjunction with the YMCA. Instructors receive an 11-hour training program to become credentialed to deliver the intervention, which can take place in any community pool. Classes are held in a warm pool, last approximately 60 minutes each, and are held from one to three times a week over a 6- to 10-week period. Class size can vary depending upon the size of the pool, but typically ranges from 6–40. Participants do not need to know how to swim to participate. The classes include specific instruction in range of motion, stretching, and strengthening exercises. Aerobic exercises of moderate intensity are also included to help build endurance.

Evidence Base
Little published information is available regarding the AFAP. In one randomized controlled trial [54], 120 individuals with osteoarthritis or rheumatoid arthritis were assigned randomly to receive 1) an aerobic exercise program (mostly walking); 2) the AFAP (classes were offered at a local pool); or 3) a program that provided instruction in the use of range of motion exercises only (control group). Participants in this study were almost exclusively white and those with rheumatoid arthritis had a mean age of 54 years, whereas those with osteoarthritis had a mean age of 64 years. Overall retention in the aquatic program was high (85%). At the 12-week follow-up assessment, individuals who received aerobic exercise or the aquatic exercise demonstrated significant improvements in aerobic capacity and overall physical activity levels with corresponding decreases in depressive symptom scores relative to controls. Belza et al. [55] conducted a community-based study of 249 adults with osteoarthritis who were randomized to either the AFAP or a wait-list control group. Participants had a mean age of 66 and were mostly white (94%). Results were presented based on level of adherence with the program. Individuals who attended at least two aquatic classes per week for a period of 16 weeks (versus non-adherers) were found to have significant improvements on measures of well-being, physical function, and quality of life.

Summary of Evidence/Unanswered Questions
Available evidence suggests that individuals who attend classes regularly may benefit from AFAP and that retention rates are high. A clear barrier to offering this program is having access to a community pool. Unanswered questions include program effectiveness over longer periods of time (i.e., more than 12 weeks) and whether the AFAP is a feasible and efficacious program for ethnic minority elders. Like the other Arthritis Foundation sponsored programs, issues related to program sustainability remain undefined.

Yoga
Program Description
A variety of yoga programs have been developed and implemented in both diverse community and clinical settings. Although the specific techniques vary across programs, elements common to all programs include specific stretching, breathing, and relaxation exercises. Some programs include specific attention to alignment of body structures to promote “optimal” posture. Program goals typically include building strength, enhancing flexibility, and relaxation through the use of exercises performed on a regular basis. The programs are delivered by qualified instructors and can be administered to an individual or to groups. The amount of time necessary to become qualified to teach yoga varies by program. Group-based programs generally meet 1–2 times a week for up to 12 weeks.

Evidence Base
In a pilot study of adults (mean age = 59 years) with osteoarthritis of the knee where all participants received the intervention, Kolasinski and colleagues [56] found statistically significant reductions in pain, as well as corresponding improvements in physical function and affect scores. The clinic-based intervention consisted of 90-minute sessions delivered weekly over an
8-week period. Of the 11 subjects enrolled, seven (64%) completed at least five of the eight classes and underwent both pre- and post-intervention assessments. In a recent randomized controlled trial, Williams et al. [57] randomized 60 adults with chronic low back pain to weekly yoga classes (1.5 hours/week) over 16 weeks or an education-control group. Participants in this clinic-based study had a mean age of 48 years and were almost exclusively white. Forty-two (70%) subjects completed the study. Significant reductions in pain and disability scores were found for those individuals who completed the yoga classes relative to the educational control group.

Sherman et al. [58] enrolled 101 primary care patients with chronic back pain and randomized them to receive either 12 weeks of yoga, 12 weeks of a structured exercise class, or an education only group (participants were given a book on self-care for back pain). Participants in this clinic-based study were younger (mean age = 44 years) and predominantly white. Individuals in the yoga group were found to have statistically significant reductions in disability scores at 26 weeks when compared with both the exercise and self-care groups. The yoga group was also found to have significantly lower pain scores relative to the self-care control group, but not the exercise group. All three of the investigations reviewed above were conducted in clinical settings and none targeted older adults. No injuries occurred when delivering the intervention.

Summary of Evidence/Unanswered Questions
To date, few studies have examined the efficacy of yoga for the treatment of arthritis and other musculoskeletal pain. Two randomized controlled trials suggest that the yoga programs are safe for use, can be feasibly delivered to young and middle-aged adults with osteoarthritis, and may have beneficial short-term effects. We did not identify any study that examined the efficacy of this self-management strategy for pain in a community setting or specifically targeted older adults with chronic pain. No evidence was found regarding the efficacy of this pain management strategy among minority elders with chronic pain, how best to engage and retain older adults in the programs, or how to promote continued use of the yoga exercises over time.

Massage Therapy
Program Description
A wide array of therapeutic massage techniques has been developed including deep-tissue, Swedish, and neuromuscular massage. One review listed over 80 distinct types of massage therapy [59]. While the techniques often vary (e.g., use of palm of hand versus fingers only as the means for delivering the massage), elements common to all include direct physical contact and targeting of tender muscle groups as well as those judged to be in spasm. Certain massage techniques also focus on balancing energy fields by compression of specific “meridians.” Theories regarding how this particular therapy may benefit individuals include relief of deep muscle tension and muscle spasm, improvement of circulation to muscles, and release of endorphins.

Evidence Base
Cherkin et al. [60] randomized 262 primary care patients with chronic low back pain to either 1) acupuncture; 2) therapeutic massage; or 3) self-care educational materials. The mean age of the study sample was 45 years and participants were mostly (>80%) white. The massage therapy intervention was delivered by licensed massage therapists and types of massage administered during the clinical-based study varied at the discretion of the therapists. Of those randomized to massage therapy, 95% successfully received the intervention. After 10 weeks, massage therapy was found to be superior to both self-care and acupuncture in terms of reductions in pain-related disability. Pain bothersomeness scores were significantly reduced in the massage group relative to the self-care group at 10 weeks (but not at 1 year), whereas significant reductions in pain bothersomeness were found for the massage group relative to the acupuncture group at one-year follow-up.

In another randomized controlled trial conducted in a clinical setting, Preyde [61] randomized adults (N = 98) with low back pain to one of four groups: 1) massage therapy; 2) soft-tissue manipulation only; 3) exercise and posture education; and 4) sham laser therapy. Participants were recruited from a Health and Performance Center and the mean age of the sample was 44 years. (Race/ethnicity data were not reported.) Massage therapy subjects received six treatments over a 4-week period. All persons receiving massage therapy completed the course of therapy. Compared with the other three groups, participants in the massage therapy group demonstrated statistically significant reductions in disability and pain scores at the 4-week follow-up assessment.

Perlman et al. [62] enrolled 68 adults with established knee osteoarthritis and randomly
assigned them to either an 8-week Swedish massage therapy intervention group or a wait-list, control group that received usual care for 8 weeks. The study sample consisted of 85% non-Hispanic whites and had a mean age of 68 years. The intervention group received massage therapy twice weekly for the first 4 weeks and then once weekly for the following 4 weeks. The study was conducted in a clinical setting. Assessments were conducted at baseline and at 8 and 16 weeks from baseline. Improvements in pain, stiffness, physical function, and range of motion were observed in the intervention group at the 8-week assessment, and persisted at the 16-week assessment. Moreover, a comparison between the outcomes observed in the intervention group at week 16 with the control at week 8 revealed considerable residual treatment effects in pain and physical function.

A randomized controlled trial conducted in Germany [63] assigned 29 adults with chronic pain due to diverse conditions to either a massage therapy or a standard medical care (SMC) group. The mean age for the massage group (N = 19) was 39 years and 53 years for the SMC group (N = 10); all participants were white. The massage group received a 5-week course of massage therapy, which consisted of 20-minute sessions twice a week. Outcomes were assessed at baseline, immediately after completion of treatment and at a 3-month follow-up evaluation. Pain, depression and anxiety scores improved at posttreatment for both groups, however, only the massage group maintained these improvements at the 3-month follow-up.

A randomized clinical trial that compared the effects of massage therapy versus mental relaxation on long-term pain was conducted by Hasson et al. [64]. A total of 129 primary care patients (100% white; mean age = 45 years) with long-term musculoskeletal pain enrolled in the study. The participants in the massage group received an average of seven 30-minute sessions which were conducted 1–3 times a week. The relaxation group was instructed to listen to a progressive relaxation audiotape twice a week for 5 weeks. The investigators reported significant improvements in muscle pain, self-rated health and mental energy in the massage group as compared with the relaxation group.

Another study [65] randomized 24 adults with chronic pain (mean age = 59 years) to either massage therapy or progressive muscle relaxation. The study sample consisted of chronic low back pain sufferers and was 67% non-Hispanic white, 17% African American, 8% Hispanic and 8% Asian. Massage therapy subjects received two 30-minute sessions weekly for 5 weeks, while relaxation group participants received training in and were instructed to perform progressive muscle relaxation exercises at home (two times a week for 30 minutes) over a 5-week period. A post-intervention evaluation indicated decreased pain, depression and anxiety scores, as well as improved range of motion and sleep in the massage (versus relaxation) group.

Finally, a randomized trial [66] compared the effect of massage or mindfulness-based stress reduction (MBSR) with standard care on chronic musculoskeletal pain. The study sample consisted of 30 adults with a mean age of 46.5 years. (Race/ethnicity data were not reported). Subjects assigned to the massage group participated in 1-hour weekly massage sessions for 8 weeks, while the subjects of the MBSR group practiced meditation and yoga techniques during 2.5-hour weekly sessions for 8 weeks. The massage group exhibited decreased pain unpleasantness and improved mental health status at the 8-week assessment compared with the standard care group. However, these outcomes did not persist at week 12. Mental health status changes for the MBSR group were not significant at week 8 as compared with the standard care group, but reached statistical significance by week 12. The dropout rate was 24%.

Summary of Evidence/Unanswered Questions

Few studies have been published regarding the effects of massage on chronic musculoskeletal and other types of chronic pain. Available evidence (although limited) suggests that massage therapy can be safely and feasibly administered to young and middle-aged adults with chronic pain and probably has short-term benefits. No study has examined the long-term benefits of this particular therapy. We did not identify any study that examined the efficacy of massage therapy for pain in a community setting or specifically targeted older adults with chronic pain. The efficacy of this therapy among minority elders with chronic pain is unknown. No evidence is available regarding how best to engage older adults in massage therapy.

Tai Chi

Program Description

This Chinese mind-body relaxation exercise combines movement, meditation, and breath regulation. Tai Chi is widely recognized as an increasingly popular form of exercise/meditation
and can be readily taught in a group-based format. Classes are now routinely offered in diverse community settings including YMCAs, churches/synagogues, community centers, karate schools and even some health maintenance organizations. The National Arthritis Foundation has recently begun to promote a Tai Chi from the Arthritis Foundation program [67]. This group-based program is designed to improve the quality of life for people with arthritis using Sun style Tai Chi, one of the four major recognized styles of Tai Chi. Tai Chi classes usually last about one hour, and may be held once or twice a week. They begin with gentle warm-up and breathing exercises or a meditation. Putative benefits of Tai Chi include increased flexibility and muscle strength, both of which are often compromised in older adults with chronic musculoskeletal pain. The therapy may also relieve stress, which can modulate the pain response.

### Evidence Base

A recent Cochrane Review [68] that included four controlled trials of Tai Chi for patients with rheumatoid arthritis (total N for all four trials = 206) found that lower extremity range of motion improved significantly among treated (versus control) patients, but that ability to conduct activities of daily living, pain, and subjective global assessment of health were not significantly different between treatment and control groups. The age of participants ranged from 16 to 80 years and participants performed Tai Chi exercises once or twice a week for up to 10 weeks. The authors concluded that this form of exercise did not exacerbate pain symptoms.

Another study randomized Korean adults (mean age = 64 years) with osteoarthritis of the knee (N = 72) to either Tai Chi or usual care [69]. The Tai Chi group met three times a week for 12 weeks in a clinic. At a 12-week follow-up assessment, individuals receiving Tai Chi were found to have significant improvements in balance and less perceived pain and stiffness, when compared with controls. A 43% dropout rate was reported and did not vary between treatment and control groups.

Finally, Hartman et al. [70] recruited 33 community-dwelling older adults with lower extremity osteoarthritis (mean age = 68 years) and randomly assigned them to either Tai Chi training classes (N = 18) or a control group (N = 15). Tai Chi training consisted of 1-hour classes held twice weekly for 12 weeks in a clinical setting, whereas the control group continued to receive usual medical care but participated in both group meetings and telephone discussions. The sample consisted of 31 non-Hispanic whites and two African Americans. Improvements in overall arthritis self-efficacy and satisfaction with general health status, as well as decreased levels of tension, were reported for the Tai Chi group at the posttest evaluation as compared with the control group. Pain and functional mobility trended in the expected directions, but did not reach statistical significance.

### Summary of Evidence/Unanswered Questions

Available evidence suggests that Tai Chi can be safely and feasibly administered to older adults with arthritis-related pain. No study has examined the long-term benefits of this particular therapy among older adults with chronic pain. We did not identify studies that examined the efficacy of Tai Chi for pain by offering the program in a community setting. No evidence is available regarding how best to engage older adults in Tai Chi. Information is also needed as to the feasibility of training older adults (or interested community practitioners) to become qualified instructors and serve as group leaders for Tai Chi classes.

### Other Self-Management Programs

We identified one study that evaluated music therapy for use by adults with rheumatoid arthritis [71]. Thirty women, all of whom had rheumatoid arthritis for a minimum of six months, were asked to listen to their favorite music for a period of 20 minutes. Participants were predominantly middle-aged or older (93% were aged 51 years or greater) and white (90%). In this uncontrolled study, measures of pain and the total number of words chosen to describe participants’ pain (from the McGill Pain Questionnaire) were administered at baseline and at one and two hours after the intervention. Pain intensity and the total number of words chosen to describe their pain declined significantly from baseline at both the 1- and 2-hour assessments. These preliminary data support efforts to examine the use of music therapy for persons with chronic non-cancer pain.

### Summary of Efficacy Results for All Studies

Outcomes used to appraise the efficacy of the interventions varied across the studies, but most employed measures of pain intensity and disability, whereas fewer studies examined other relevant outcomes including affect/mood and self-efficacy for managing pain. Positive outcomes were found in 26 out of 27 (96%) of the studies. Proportionate
changes in pain intensity scores ranged from an increase of 18% to a reduction of 85% (median = 23% reduction), and corresponding changes in disability scores ranged from an increase of 2% to a reduction in disability of 70% (median = 19% reduction). Seven studies assessed for change in participants’ depressive symptom scores, and relative reductions ranged from 14 to 83% (median = 24%). Four studies assessed participants’ level of self-efficacy and all four reported significant improvements with relative increases ranging from 10% to 20%. Finally, no differences were found when analyzing study outcomes as a function of research design, i.e., randomized controlled trial vs other.

Discussion

Self-management programs for pain have received increasing attention over the past decade [72,73], and appear to be particularly salient strategies in the field of geriatric pain management for several reasons. First, there are formidable barriers to the use of conventional analgesic treatments among older adults including the high prevalence of polypharmacy and competing comorbidities, increasing incidence of medication-related side effects with aging [74], as well as the reluctance of many older adults to take pain medicines [75]. Second, the costs of administering the programs are low [76] and regular use of the techniques is not associated with adverse side effects. Finally, acquisition and routine use of self-management skills for pain may translate into improved self-management of other common chronic and often debilitating conditions in later life including diabetes [77], macular degeneration [78], and congestive heart failure [79].

Given the paucity of self-management pain programs in clinical settings, clinicians are encouraged to contact local community senior centers as well as other community-based agencies that provide services to older adults and inquire about the specific types of programs offered and to refer patients when appropriate. Agencies/organizations (and their corresponding Websites) that can help to identify local community-based programs that may be relevant for seniors with pain are shown in Table 2. For example, the National Council on Aging Website contains a directory of contacts for senior centers in most states and can be located directly by going to http://www.ncoa.org/content.cfm?sectionID=44&detail=1688. In addition, most states have Departments of Aging that can also be contacted to learn more about pain-relevant programs offered at local senior centers and other senior service organizations.

Our review documented positive outcomes associated with participating in a self-management program for pain that appeared independent of program type. The median relative reduction in pain intensity score was 23% across the studies, whereas the corresponding median reduction in disability score was 19%. Although less frequently assessed, depressive symptom and self-efficacy scores were also found to improve in the expected directions. These results provide support for continued efforts to establish the effectiveness of these interventions among diverse populations of older adults with chronic pain, as well as optimal methods for program implementation in community settings. One previously untested (but promising) approach to addressing these issues at the community level involves the use of community-based participatory research or CBPR [80]. CBPR represents a collaborative process between researchers and community partners; builds on the unique strengths, knowledge and resources within a given community by employing local knowledge in the understanding of health problems and their potential solutions, and facilitates co-learning throughout all phases of the research [80]. Community-based research partnerships have been successfully used to improve self-management program implementation methodologies and associated health outcomes for other common, chronic conditions including diabetes mellitus [81] and asthma [82].

Despite the positive findings described in our systematic review, there are a number of important limitations of the data. With few exceptions, the studies reported only short-term outcomes. Thus,
the long-term effects of the interventions on pain and disability, as well as other relevant outcomes remain to be defined. Although some research suggests that the positive effects of Lorig’s arthritis self-management program (i.e., the AFSPHP) persist over extended periods [83], other research involving self-management programs for pain suggests that improvements in pain and disability scores often return to pretreatment levels over time [84–86]. In addition, our review found that few studies have examined the efficacy of self-management programs among ethnic minority elders. Studies targeting these populations are particularly needed because prior research has documented significant racial disparities in the management of pain [87–91].

Another limitation is that few studies enrolled adults aged 80 and above or reported age-appropriate comparisons. This limitation is particularly concerning given the substantial prevalence of chronic pain in this rapidly expanding age group [1,2]. Efforts are therefore needed to establish the efficacy of these programs in persons with chronic pain aged 80 and above. In addition, while all of the programs/strategies were deemed appropriate for implementation in the community setting, studies of yoga, massage therapy and Tai Chi were all conducted in clinical settings. Thus, important unanswered questions include whether implementation site may affect treatment outcomes or possibly influence older adults’ willingness to engage in these types of programs.

Limitations of the current study also merit attention. Despite using a broad array of search terms, it is possible that our search strategy did not identify all relevant citations. Second, while we reviewed a broad range of potentially effective self-management programs deemed appropriate for use in the community setting, other group-based approaches that may have merit including meditation, Pilates, and support groups were not included. Third, programs that were judged too costly or labor intensive for implementation in the community (e.g., telephone-based interventions) were not reviewed. Fourth, the vast majority of retained studies generated positive results, raising the possibility of publication bias. Finally, we did not employ formal strategies [92] to rate the quality of the assembled evidence. Despite these limitations, our study extends the current literature in this area by providing important descriptive and quantitative data on a broad range of self-management programs/strategies that are potentially appropriate for use by older adults with chronic pain.

The literature reviewed herein supports the need for more research on the relation between self-management strategies and health in older persons with chronic pain. The following conclusions and future research needs are offered. Studies are needed that best define the types of self-management strategies and specific modes of delivery most effective for seniors with different sets of characteristics (e.g., high vs low functional status). Furthermore, most chronic pain research has focused on the relationship between stress, pain, and negative affectivity [93–95]. Little empirical attention has been given to the role of resilience resources that may aid in the recovery from pain or stress for elders with chronic pain. Positive emotions may play an important role in fostering recovery after episodes of severe pain and/or moderate adverse outcomes among those with persistent pain syndromes. Future research should examine the role of positive affect in blunting the impact of exacerbation of pain on negative affective states among older adults with chronic pain. Finally, although our review documents the paucity of data showing patterns of racial-ethnic disparities in the treatment of pain, we strongly advocate for the need to identify psychological mechanisms underlying racial-ethnic disparities in the efficacy of self-management pain strategies. From the patient side, there may be distrust of medical providers. From the provider side, symptoms reported by minorities may be discounted relative to those reported by whites. Studies designed to explicitly target these and other moderating and/or mediating constructs underlying self-management pain strategies are also needed.

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