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Self-Efficacy and the Role of Non-pharmacologic Treatment Strategies to Improve Pain and Affect in Arthritis

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Abstract

Purpose of review There is increasing evidence that adjunctive, non-pharmacologic treatment programs are beneficial in the management of arthritis when added to traditional disease-modifying medications. This review focuses on non-pharmacologic management strategies that impact pain and affect, with a focus on self-efficacy, for those with osteoarthritis (OA) and rheumatoid arthritis (RA).

Recent findings We reviewed both office-based and internet-based self-management strategies, mindfulness-based interventions (MBIs), and cognitive behavioral therapies (CBTs) for patients with arthritis. These behavioral strategies have shown to improve pain, mood disturbance, and physical function in those with both osteoarthritis and rheumatoid arthritis. Improvements in self-efficacy and coping capacity are associated with improvements in patient-reported outcomes (PROs) related to pain and functioning.

Summary Self-management programs, MBIs, and CBTs are more effective at improving pain and mood disturbance compared to usual care for patients with arthritis although high-quality randomized controlled trials are lacking. Non-pharmacologic management programs are increasingly available via the Internet and mobile applications.

Introduction

Doctor-diagnosed arthritis, according to the National Health Interview Survey (2013–2015), is present in a large proportion of American adults (54.5 million individuals) of which 43.5% have arthritis-attributable activity limitations [1••]. Osteoarthritis (OA) is the most common of the arthritides, characterized by degenerative changes of the joints and affected by aging and obesity [2]. Rheumatoid arthritis (RA) is the most common inflammatory arthritis which is characterized by joint pain, stiffness, and articular damage; treatment most likely requires immunosuppression [3, 4].

Anxiety and depression are prevalent in those with both OA and RA [5, 6]. A large meta-analysis of those with OA (n = 15,855) noted that approximately 20% of individuals had anxiety and depression, respectively [7]. For those with RA, the levels of anxiety and depression appear to be similar and present in approximately 20% of individuals [8]. Unfortunately, arthritis coupled with anxiety and depression has considerable impacts on physical function and quality of life [9–11]. In RA, patients with anxiety and depression at baseline and 2-year follow-up had more disability and disease activity compared to those without anxiety and depression [12, 13•]. Likewise, OA patients with anxiety and depression had worse physical function and pain severity compared to those without mood disturbance [14, 15].

The detrimental impacts of anxiety on functionality and patient perception of disease activity may be exacerbated by low self-efficacy, or the inner belief in one's ability to succeed in specific situations and tasks [16, 17]. In RA patients, anxiety level has a strong inverse correlation with the degree of self-efficacy [18•, 19, 20] and low self-efficacy at baseline is a strong predictor for declining health outcomes up to 2 years later [21]. In patients with chronic pain, high degrees of self-efficacy had enhancing effects on the perception of quality of life and general health. [22] Self-efficacy was found to fully mediate pain catastrophizing and physical disability in obese individuals with osteoarthritis [23].

Importantly, arthritis patients with high levels of self-efficacy report lower levels of pain, fatigue, physical disability, and psychological distress [20, 24–26]. Self-efficacy appears closely related to coping capacity and in arthritis patients, this may protect against pain-related anxiety [27]. A recent systematic review of the role of self-efficacy in patients with RA similarly noted an association between high self-efficacy and positive affect, physical function, and ability to participate in social roles and activities [28•].

In recent years, several types of non-pharmacologic treatment strategies to improve self-efficacy have emerged including (1) self-management with a focus on exercise, (2) mindfulness-based interventions (MBIs), and (3) cognitive behavioral therapies (CBTs) (Table 1). Across modalities, use of the Internet and smartphone-based platforms for intervention delivery is on the rise.

Current treatment options

Self-management strategies

Non-pharmacologic treatment strategies that positively impact mood disturbance and pain via improvements in self-efficacy have been explored for several decades [24]. Beginning in the late 1980s, arthritis self-management strategies such as the Arthritis Self-Management Program (ASMP) and a tailored print intervention (SMART) were found to improve self-efficacy and positively impact health outcomes including pain, anxiety, and depression [29–31]. The ASMP was a 6-week, community-based program that focused on education, improving function through cognitive restructuring techniques, and problem-solving for health-related problems. The mailed intervention, SMART, included a tailored action plan by a physician, two arthritis self-help books, and relaxation tape. Compared to the ASMP, SMART had greater improvements in disability and self-efficacy after 1 year [31].

Table 1. Current management strategies to improve self-efficacy

Management category	General description	Select programs	Effect on self-efficacy
Self-management	Group or online-based programs that encourage understanding of disease, centralize the role of the individual in managing symptoms, emotions, and medications, and promote healthy lifestyle behaviors such as diet and exercise.	Arthritis Self-Management Program, First Step to Active Health, PLE^{2}NO	Self-management strategies may mediate the association of self-efficacy with physical activity.
Mindfulness-based interventions	Group-based therapies that are usually 8-weeks or longer in length designed to train individuals to cultivate mindfulness through present-moment awareness and without judgment. Programs typically include traditional seated meditations, whole-body scans, gentle yoga, and various exercises to cope with pain, bodily sensations, and emotions.	Mindfulness-Based Stress Reduction, Mindfulness-Based Cognitive Therapy (office), Vitality Training Programme, Internal Family Systems, Mindfulness Attention and Awareness Training	Mindfulness may improve self-efficacy via emotion regulation and positive reappraisal.
Cognitive behavioral therapy	Individualized psychotherapy that may be online or in-person; focuses on the relationship between thoughts, physical signs/symptoms, and behaviors.	(Traditional) Cognitive Behavioral Therapy, Pain Coping Skills Training	CBT may improve self-efficacy through restructuring of maladaptive thoughts and behaviors with a focus on symptom prediction and symptom control.

The popularity of self-management strategies to improve self-efficacy grew throughout the early 2000s into present day and now additionally has focused on exercise. Self-management strategies may mediate the association of self-efficacy with physical activity [32]. A recent qualitative study evaluating patients with physician-diagnosed arthritis ($n = 197$), found that the exercise, self-management program, First Step to Active Health™ (FSAH), was well-received by participants and improved motivation, accountability, and quality of life [33]. Similarly, the PLE^{2}NO program, a self-management and exercise group for older individuals with knee osteoarthritis, found improvements in physical function, pain, and symptoms compared to an education group [34••].

For patients with RA, a 5-week targeted motivation and self-regulation program was found to increase physical activity, self-efficacy, and autonomous motivation compared to group-based education [35]. For those in the self-

regulation group, the percentage of RA patients meeting the daily physical activity recommendation (30 min × 5 days per week) was 67% compared to 23% of controls ($p < 0.001$). Self-management strategies tailored to the individual were also noted to improve pain, symptoms, affect (Arthritis Impact Measurement Scale), and self-efficacy (Arthritis Self-Efficacy Scale) for those with RA compared to a generalized education program [36].

In more recent years, self-management programs have shifted to include Internet and smartphone-based delivery systems [37]. A recent observational study of 200 patients with chronic pain, including those with arthritis, found moderate improvements in pain, anxiety, depression, and quality life after participating in an Internet-based self-management program for 6 months [38]. The self-management program consisted of visiting two websites for 15 min per day and perusing information on exercise, nutrition, mindfulness, relaxation, and educational postings. Similarly, a qualitative study of a mobile Internet service to increase physical activity in patients with RA found the Internet-based program improved goal-setting, self-regulation, and self-efficacy after 6 weeks of use [39•]. Social media may be used to effectively disseminate self-management strategies for patients with arthritis via healthcare professionals [40].

Mindfulness-based interventions

Mindfulness is a mental state that is defined as non-judgmental awareness of the present moment and involves self-regulation of attention guided by curiosity, openness, and acceptance [41]. There are several traditional office-based mindfulness programs including Mindfulness-Based Stress Reduction (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT) [42, 43]. MBSR and MBCT typically follow an 8-week format; participants meet once weekly for approximately 2.5 h [41]. Other mindfulness-based interventions (MBIs) that have shown benefit in health-related quality of life (HRQOL) in those with RA include the Vitality Training Programme (VTP), Mindful Awareness and Acceptance Therapy (MAAT), and Internal Family Systems (IFS) [44•].

MBSR is the most well-known of the MBIs that focuses on learning how to mindfully respond to bodily sensations and emotions through guided meditative practices including sitting meditation, body scans, stretching, and gentle Hatha yoga [42]. The MBSR program strongly encourages daily home practice to solidify techniques learned during the weekly sessions. Patients receive printed materials and audiovisuals to aid their home practice; a portion of the MBSR clinic session is spent reviewing progress [45]. MBSR is an effective non-pharmacologic treatment strategy for anxiety and depression in the general population and provides benefit to those with RA through improvements in self-efficacy via emotion regulation and positive reappraisal [41, 46–51]. Similarly, RA patients who completed the VTP and MAAT programs, which focus on symptom and emotion management, noted significant improvements in self-efficacy (pain, symptoms) after course completion [52, 53]. A trial evaluating the effectiveness of MBSR for those with OA is currently ongoing (NCT03527849). While no trials have specifically evaluated the efficacy of MBIs for those with OA, patients who had higher total mindfulness scores (according to Five Facet Mindfulness Questionnaire) after a tai chi program were 38% more likely to meet Osteoarthritis Research Society International response criteria than those treated with physical therapy [54•].

Internet and smartphone mindfulness interventions are also gaining traction for use in research and clinical practice. Preliminary evidence demonstrates improvements in psychological well-being, perceived stress, and pain severity for those with chronic disease; lasting effects have not been well-established [55, 56]. Internet and smartphone mindfulness interventions characteristically are much shorter in length per session and can be utilized anywhere by the participant [57].

Cognitive behavioral therapy

Cognitive behavioral therapy (CBT) is a well-established treatment for anxiety and depression in patients with chronic pain and has been implemented in multi-modal management strategies [58, 59]. In patients with chronic pain who were treated with CBT, improvements in self-efficacy for managing symptoms were noted [58, 60]. A randomized controlled trial (RCT) for Pain Coping Skills Training (PCST), a form of CBT implemented in those with chronic hip and knee OA ($n = 256$), found that those with moderate to high expectations of benefit, moderate to high osteoarthritis disease severity, advanced age, and who were highly educated benefited the most from the intervention [61]. Likewise, in patients with early RA, defined as disease duration less than 8 years, tailored CBT programs have been effective in improving fatigue, depression, helplessness, coping with stress, and medication compliance [62].

A recent meta-analysis found improvements in physical function, pain intensity, and depression for patients with chronic pain treated with CBT, but no evidence of a significant difference compared to those treated with MBSR [63••]. In a RCT that compared CBT, relaxation response training, and arthritis education in those with RA, significant improvements in symptoms, but not in pain, were noted at 12-month follow-up [64]. There was not a significant change in levels of anxiety and depression as measured by the Rand Mental Health Inventory (MHI) in the CBT group.

Like MBIs, CBT programs implemented via Internet-based platforms are being utilized at increased frequency with beneficial effects on anxiety and depression [65]. More specifically, a RCT of RA patients ($n = 133$) found significant improvements in depressed mood, anxiety, and fatigue in those who completed an Internet-based CBT program with an average course duration of 17 weeks [66•]. For older adults with knee OA, Internet-based CBT was superior to usual care in improving depression (measured via Patient Health Questionnaire-9 (PHQ-9)) [67]. Patients with hip and knee OA treated with an Internet-based PCST noted improvements in pain, self-efficacy, pain-related anxiety, pain-related interference with physical function, and negative and positive affect [68, 69]. Similarly, an Internet-delivered multimodal program including exercise, education, and PCST for patients with knee OA, found significant improvements in pain at 3 months compared to internet education alone [70]. Participants who were employed and had higher baseline levels of self-efficacy were noted to have the greatest improvements.

Healthcare utilization

The economic burden of arthritis (medical expenditures and earning losses) in the USA is considerable, totaling $303.5 billion in 2013 [71]. The average OA

patient has a mean (SD) incremental total expenditure of $2046 ($862), and the average RA patient prescribed both traditional and biologic disease-modifying agents has a mean (SD) annual expenditure of $23,185 ($1295) [72, 73].

For patients with rheumatic disease, pain reduction and improved physical function via strategies that strengthen self-efficacy and lessen mood disturbance may improve healthcare expenditures in high-risk individuals. Generally, patients with chronic disease using self-management mobile/Internet-based interventions felt better cared for and perceived a more active role in their disease management compared to those treated traditionally [74].

Improved emotion regulation and mindfulness of bodily symptoms may serve to decrease healthcare utilization over time (telephone encounters, EMR secured messaging, urgent appointments, and emergency room visits) [75]. In a small study of patients with chronic disease ($n = 38$; defined as chronic pain, chronic illness, or stress-related problems), an office-based mindfulness program was found to reduce primary care visits, specialty care visits, ER visits, and hospitalizations at 1 year [75]. Furthermore, a Canadian population–based study of patients who had high healthcare utilization found that those treated with MBCT versus other non-mindfulness group-based therapies had reductions in utilization at 1 year [76]. Similar stress-reducing strategies, such as Relaxation Response and Resiliency training (3RP), have shown a large reduction in healthcare utilization [77]. The mechanism by which MBIs compared to other group-based therapies facilitates the reduction in healthcare utilization is unknown.

Personal insights and observations

We believe that using a multi-disciplinary approach that seeks to promote self-efficacy, mental health, and well-being are necessary to successfully treat the patient with arthritis. Mood disturbance is intimately tied to pain and patient perception of disease activity and if left untreated, may lead to worse clinical outcomes and increased healthcare expenditures [6, 78–80]. Conversely, patients who are able to generate and maintain positive emotions tend to evidence improved pain-related outcomes [81]. Our clinical experience has shown that patients who lack psychological resources (e.g., self-efficacy) and demonstrate hypervigilance to pain and disease activity often have poor long-term outcomes and may endure escalation of potent disease-modifying agents in RA and analgesics in OA in an effort to control symptoms. A similar, yet opposite clinical challenge may be found in the RA patient who avoids use of biologic disease-modifying agents due to fear of the immediate and long-term adverse effects.

While office-based interventions offer the opportunity for a patient-provider connection to contribute to more enduring and robust treatment effects, they come with the cost of increased patient burden in time and money. Internet-based platforms may improve program recruitment and adherence and are typically low-cost. Currently, there is a paucity of clinical trials evaluating whether treatment of anxiety and depression, especially early in the disease course, improves long-term clinical and patient-reported outcomes [82]. This is especially important in RA in which highly expensive pharmaceuticals are

commonly utilized. Multi-disciplinary approaches addressing both the mental and physical needs of the patient should be considered in order to optimize clinical outcomes and reduce healthcare spending.

Summary

Despite advances in the pharmacologic and interventional management of arthritis, there still remains a large role for adjunctive, behavioral strategies to improve self-efficacy, physical function, and HRQOL [83]. Self-management strategies, MBIs, and CBTs are evidenced-based treatments that may be implemented in those with arthritis and are offered in a variety of formats including office- and Internet-based settings.

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Compliance with Ethical Standards

Conflict of Interest
Dana DiRenzo declares that she has no conflict of interest. Patrick Finan declares that he has no conflict of interest.

Human and Animal Rights and Informed Consent
This article does not contain any studies with human or animal subjects performed by any of the authors.

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- • Of importance
- •• Of major importance

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