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Osteoarthritis in Older Adults: Is More Emphasis on Managing and Mitigating its Stressful Ramifications, and Enhancing Coping, and Self Efficacy Cognitions Indicated?

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Abstract

Efforts to mitigate or prevent painful disabling osteoarthritis have been pursued for more than a century with limited success. This current overview briefly summarizes how selected beliefs and behaviors, including coping and stress management approaches are potential mediators or moderators of osteoarthritis pain and its overall common adverse prognosis and outcome. Published data housed predominantly in **PUBMED, PUBMED CENTRAL**, **SCIENCE DIRECT**, and **GOOGLE SCHOLAR** sites and pertaining to selected aspects of the literature of current interest, cumulative results reported as of May 30, 2024, show a modest to strong rationale exists for considering the abovementioned factors in efforts to reduce pain and enable daily functions. Accordingly this line of research should be continued, and translated clinically without undue delay, especially in the face of increases in the aging population and osteoarthritis prevalence and undue suffering.

Introduction

Osteoarthritis, a prevalent form of arthritis and a clinical syndrome affecting a substantive proportion of older adults in all parts of the world is frequently accompanied by unrelenting often times debilitating episodes of intractable pain, 'low grade' inflammation, declining functional and self-care-related abilities, plus life quality. As well as its predominant physical manifestations that include stiffness, joint laxity and instability, plus poor physical endurance, multiple psychological symptoms that are commonly observed to emerge over time may well impact the extent of any prevailing physiological disease correlates and its progression, as well as outcome expectations, and confidence or self efficacy for managing the disease. Additional disabling features include but are not limited to fears of movement and injury, sleep disturbances, heightened degrees of worry and pain sensitivity, fatigue and possible depression. Moreover, there may be a gradual decline in health perceptions, motivation to help oneself, poor treatment adherence, self imposed limitations in activity, and decreases in coping ability and efficacy [1-3]. Although deemed to occur with age, this pattern of declining physical prowess and increasing dysfunction is not consistently observed however, suggesting some degree of variability does exist that may be remediable. For example, while often deemed 'incurable' with few universally efficacious treatment options, adopting a view that osteoarthritis as a health syndrome is potentially amenable to some degree of mitigation through the adoption of a variety self management approaches may indeed have implications for possibly reducing its immense personal and societal costs [3, 4].

At present, the options for advancing non-surgical non medicinal self-regulatory, self-management practices and strategies aimed at helping the supplicant to remain as active and productive as possible are largely reliant on exercise, weight reduction, and joint protection. Unfortunately, these widespread recommendations are often not followed consistently, possibly due to the presence of persistent pain, plus potentially erroneous disease and pain beliefs and others that focus on a perceived personal incapacity to control pain, fears of movement, and a belief intervention is futile. In addition, the presence of a depressed mood state may impact the desire or motivation to act, as may pervasive feelings of helplessness and hopelessness [6].

In particular, ample research indicates that in cases where there is an emergent intrinsically perceived low sense of personal self-efficacy for overcoming osteoarthritis challenges, plus overwhelming feelings of doom, doubts or uncertainty about one's coping ability, as well as uncertainty about recommendations and their efficacy, successful outcomes are less likely than not. Moreover a parallel adoption or perpetuation of an 'unhealthy' sedentary lifestyle and poor nutrition coupled with a failure to protect against joint as well as emotional stresses may be expected to further interact with the underlying condition to engender a cycle of pervasive joint destruction, feelings of unabated distress, anxiety, fear, frustration, and depression, plus pain and sleep challenges that may not be commonly addressed by standard therapies [3, 7-10], but can undoubtedly interfere with what can be done to mitigate this disease in the older adult population effectively and significantly.

Given the immense persistent social and personal costs of osteoarthritis and that little progress has been made in more than a century to advance basic day to day osteoarthritis management and a life of promise, rather than dysfunction, we elected to focus on the what is currently observed in this regard with respect to the broad topic of stress, coping and coping efficacy, and coping methods and their relevance to secondary and tertiary disability prevention, factors not well studied or highlighted in most practice realms.

The rationale for this stems from the 2010 report by Benyon et al. [11] that coping strategies and

self-efficacy are important prognostic factors for people with osteoarthritis that may be amenable to modification. This idea is indeed consistent with the well reported observation that radiographic osteoarthritis and pain are not directly correlated in many cases and surgery to replace the diseased joint does not always yield desired functional outcomes. It is also consistent with the importance of achieving a non stressful rather than stressful state of being as regards overall health and life quality and evidence of considerable stress factors affecting older adults with osteoarthritis [12]. Another related health determinant known as self-efficacy, and describing a person's belief about his or her ability to successfully organize and implement a specific behavior or cease an unhealthy one, which can range from low to high is a significant mediator of multiple chronic illnesses such as osteoarthritis where behaviors are strong disease explanatory and mediating factors.

Specific Aim

As per Benyon et al. [11], this updated brief overview highlights the need for further research to ascertain the predictive value of coping on osteoarthritis wellbeing as well as what coping strategies are recommended even if less well investigated than other realms of practice. It also highlights pertinent aspects of the importance of assessing and maximizing self-efficacy perceptions, especially in relation to excess pain perceptions [8. 13] as well as coping efficacy [14. 15], pain being the most common sought after symptom experienced by osteoarthritis sufferers.

Based on the principles of self efficacy and as outlined by DiRenzo and Finan [14] it aimed to uncover if indeed the adoption of selected behavioral and cognitive strategies or avoidance of negative behaviors and thoughts do justify their usage in older adults with painful osteoarthritis, mood disturbances, and possible declining participation in physical and social realms. Whether. improvements in self-efficacy and coping skills and capacity are associated with improvements in patient-reported outcomes and can be altered to reduce pain, fears, threats of disability and improve functioning, for example in those exhibiting neuropathic pain was specifically sought [14-16].

Implications

While osteoarthritis may not be reversible, the perception of its threat may be a variable that can be altered through cognitive strategies and others and that may hence afford more promise than not. In this regard, a better understanding of the role of functional versus maladjusted coping in the presence of osteoarthritis may enable practitioners to assist their patients to be motivated to do all they can to manage their condition effectively and with less stress on a routine basis. It is proposed that encouraging a focused approach that goes beyond standard patient education alone may indeed successfully eliminate or delay the need for toxic narcotics to control pain, as well as maximizing functional abilities even if surgery is eventually required. Costs of care and health care resource demands are likely to be lower than projected if successful in all likelihood as well if long term self management strategies are adopted rather than sporadic or suboptimal uni modal short term self care efforts [17-19].

Methods

To examine the value of the aforementioned premises as well as the value of pursuing this topic focus in the future, a wide ranging scan of the relevant literature located in **PUBMED, PUBMED CENTRAL,** and **GOOGLE SCHOLAR** was undertaken. All articles of relevance regardless of design were eligible if they focused on fostering self-regulation or modification through efforts to actively

assert control over their situation as this pertains to averting or reducing chronic osteoarthritis pain and improving function. Only an overview is provided in this limited topic realm and the searches conducted were considered preliminary in this respect. Most sought were articles published in the time periods 2010-2024 and those reflecting what can be done in the community versus assisted living or long term care settings, although the same ideas might well apply. All forms of osteoarthritis research were deemed eligible, and were examined regardless of disease manifestations or sub-groupings. No other management issues were sought or discussed. Readers who want to expand their insights may find the current references and the analyses by Beynon et al. [11] enlightening. All forms of osteoarthritis and all research designs were deemed acceptable. The focus was on community dwelling older adults and rather than functional stress, which was assumed may be the cause of the disease, stress as a cognitive state that can prove aversive was the topic of interest, and was assumed to be of higher relative import than often acknowledged [20]. It is recognized that some biophysical and socio economic stresses may be unavoidable in low income areas and that this subgroup may hence not only be disproportionately affected by osteoarthritis and need more than self care to transform their lives than not, however, most published studies currently appear to focus on the mobile community dweller who is clearly often well educated, literate, and linked to a research or supportive health team. The focus of this currently limited scoping review is not on research, research design, or future such recommendations, but on clinical trends and possible avenues for clinical as well as therapeutic improvements.

Key Findings

Although we did not conduct a critical review or quantitative assessment of the materials reviewed, overwhelming numbers of these research reports over many decades show painful disabling osteoarthritis of one or more joints appears to be widespread among older adults and to be increasing in prevalence and possibly severity despite years of research [eg., 21]. Regardless of year or data base reviewed, the disease, when it occurs is considered to be progressive and one that can tentatively spread from one joint to involve others. It is also well documented that the disease is highly disabling and that the multiple fiscal and social costs of keeping older adults with osteoarthritis active and able to live productively and independently is increasing rapidly. Affecting overall wellbeing as well as general health and health quality of life, most commonly the presence of the disease not only reduces an individual's ability to live independently and in a meaningful manner, but may impact the lives of families who have to care for their disabled parents or grandparents, as well as draining diminishing and precious health care resources. Strongly associated with multiple diverse emergent or concurrent adverse physiological tissue and joint structural changes including inflammation, its ensuing physical challenges and factors that undermine a host of physical, social, occupational, and economic functions, psychological factors such as pervasive bouts of intractable pain, fears, and anxiety have far reaching disease as well as serious health and longevity implications as well.

However, even if osteoarthritis is a costly public health issue, as well as one that is widely burdensome to communities, and can lead to injurious falls, recurrent falls, dependence and limited self care ability [22], osteoarthritis is potentially both underreported, (for example, if data are based solely on secondary sources or internet surveys) and often treated only when its symptomatic state commonly hard to reverse emerges. As well, myths about the disease being basically untreatable and inevitable and guidelines that do not include mental health correlates and the weaknesses of those that do [23] may arguably impact the motivation for self management, and ultimately mobility and pain. In particular when compared to the physical manifestations of osteoarthritis, it is clear its cognitive impacts that can

greatly determine overall outcomes and costs have been poorly studied and acknowledged over time, including the influential role of stress and coping perceptions and beliefs.

This is despite data from other chronic illnesses that show distinct psychological health attributes can predict illness outcomes to a high degree, especially if possible external and/or internal sources of stress are not sought, identified, and treated accordingly. These include physiological, biomechanical, social, economic, physical, occupational, and psychological stresses (including denial, misperceptions and unrealistic outcome expectations), and may pertain to actual as well as imagined future situations [24]. In particular, unaddressed stress arising from pain, disability, and dependence [24] as well as other health issues can predict the emergence of less than desirable coping methods especially if their health situation is appraised as being over taxing or one exceeding their ability to cope assertively, adaptively, and confidently [25, 26]. In those cases where no favorable outcome is experienced in the short or long term and no remedy or benefit is envisaged other than operative and invasive or toxic approaches cumulative stress in its own right can be predicted to compound one or more prevailing disease manifestations and possibly their extension, magnitude, and intensity [27].

In this realm alone, ample research supports psychological issues and their underpinnings as having the potential to strongly influence osteoarthritis disease manifestations, plus its rate of progression and extent, and outcomes [11] including the perpetuation of psychological distress [28] and depression [27]. That is, it appears that the ability of the affected individual to cope adaptively rather than mal adaptively with their condition is paramount to their wellbeing, and especially to their treatment adherence and pain control behaviors. Hence evaluating and treating remediable stress oriented threats at the earliest point in time, including the role of stressful life events, negative perceptions and thoughts, and chronic biophysical stressors [29] that are often hard to reverse if long standing is strongly indicated [25, 30].

In the specific well documented case of exercise adherence, very key to a favorable long term disease prognosis, research shows that among the many explanations propounded to explain non-adherence despite its known negative impacts are psychological factors including the nature of the proposed regimen, depression, fatigue, pain, stress, anxiety, poor pain coping skills, as well as feelings of powerlessness in general [30, 31]. Not wanting to do all that is required, having an unfavorable attitude to this specific commonly recommended intervention, along with other patient specific beliefs and/or attitudes is another possible determinant of non-adherence, along with questionable or erroneous or prevailing self-efficacy, or confidence perceptions. In addition, an associated pessimistic outcome expectation or the emergence of unanticipated actual adverse outcome experiences that are readily repeated may well increase the degree of reactivity to any ongoing stress and pain [27] along with a possible declining degree of desirable self care actions and behaviors [32, 33].

It further appears safe to say that whether positive or negative the perceptions and behaviors generated in the face of a chronic stressor such as osteoarthritis may hence not only determine its controllability, but the nature of its progression and outcomes [30, 34]. In particular, thoughts, or feelings that are not health affirming or directed, including feelings of excess stress can be expected to perpetuate and magnify a cycle of overwhelming bouts of pain and distress [28], depression, additional dysfunctional coping, and dissatisfaction, even in the face of technologically sound surgical joint replacement [27, 35]. That is, research since the mid 1970s shows having a sense of control and efficacy for managing pain and other negative osteoarthritis disease symptoms and multiple bio-psychosocial stressors is likely to impact the ability of the affected older adult to deal more optimally than not with their

situation. They may also show observable advantages as far as being able to react assertively to movement evoked pain, disease flares, negative pain thoughts and feelings of helplessness or hopelessness, plus depression. They may show less evidence of pain anxiety and activity avoidance, suboptimal control beliefs, and low life quality [29, 36-39].

Fortunately, it appears that unlike many osteoarthritis disease correlates that are not remediable, the generation or acquisition of effective coping skills, especially skills to offset negative pain coping reactions, if not inherent, can be taught. Especially promising in this regard are mindfully applied cognitions designed to mitigate those disease attributes that are emotionally as well as reactively derived, and known to induce stress, excess pain and negative affect [16. 28, 40-42] plus poor self efficacy for function and pain control [43, 44].

As well, efforts to advance coping skills as well as coping efforts clearly have a strong bearing on the degree to which an older adult with one or more osteoarthritis affected joints may adapt successfully to their situation. For example, it appears maladaptive avoidance behaviors, or disengagement strategies to minimize or deny the presence and impact of any excess osteoarthritis associated stressor [26] real or perceived is likely to produce a trajectory of more pain and distress than not [44, 45]. On the other hand encouraging an optimistic stance and more positive health beliefs and carefully delivered provider interactions may engender a heightened willingness by the individual to take all the steps needed to secure their desired health outcomes [46, 47]. As they begin to do this, they may also experience a heightened state of self care self efficacy and a higher potential for resilience rather than deterioration [17-19, 41, 48]. In particular, their pain coping skills may increase [18, 19], while their excess stress perceptions and experiences as well as reactive depression may decline. In time, health quality of life quality and a sense of empowerment and enablement not defeat may be duly maximized [39, 49, 50].

Discussion

What can be done to help older adults diagnosed with osteoarthritis that is increasingly exponentially to remain independent and active, an increasingly desirous state from many perspectives in the face of multiple health challenges and limited disease mitigation successes or recipes? While several standard approaches have been employed for some considerable time with some degree of success, a possible improvement in this regard may yet be realized by a focus on psychological disease correlates.

In this regard increasing evidence appears to support a role for better stress control and intervention efforts to improve coping ability and confidence perceptions [eg., 12] and avert a cycle of decline both physical as well as psychological. As mentioned above, ample research shows the controllability of a chronic stressor such as osteoarthritis may well determine the prognosis and outcome of the disease, and the ongoing ability of the individual to function independently-as indicated. Even if surgery is required an older adult with a high degree of pain control may heal more optimally than a similar case that has poor pain control and confidence to manage successfully. They may also have less progressive joint damage than a similar patient who has not been involved proactively in mediating or moderating their health behaviors and thoughts as well as a possible lower degree of health care resource needs and costs of care, while averting a possible cascade of negative long term outcomes including a low quality of life [26, 51-53].

Romer [24] has revealed that the stressors associated with osteoarthritis involve physical, psychological, as well as social aspects of their lives. In particular, pain, disability and dependence on

others were identified as major stressors. The majority of the respondents that were studied appraised the personal significance of having osteoarthritis as stressful both in terms of actual loss and potential loss in the future, and felt angry on occasion as a result as well as frustrated, discouraged, fearful and helpless. No differentiation was made between stress due to osteoarthritis and non osteoarthritis sources, but both may have been implicated, and could have been impacted to some degree via thoughts directed towards hope or some form of prayer [30].

Although not yet a mainstream osteoarthritis treatment standard, increasing numbers of researchers point to the importance of an affected individual's active involvement in their self care, including the importance of dealing successfully and in a timely way with pervasive, transient, and future anticipated degrees of disability, pain and stresses [17, 54]. Moreover, it appears the possible additive non disease based stresses of aging, along with pain and other health conditions, and life situations as regards the disease prognosis, implies a more insightful approach to offset or allay excess disability by considering the value of both behavioral and cognitive management approaches in addition to physically oriented care strategies [55] as the standard of care. Indeed, even if the benefits of careful mental health assessments are not at all mainstream or validated, they appear to be strongly advised for dealing with osteoarthritis associated pain and other symptom challenges [39, 56, 57].

This proposed integrated intervention process is arguably not a simple one however, and potentially requires dedicated time and careful long term guidance by a well informed health professional or team, rather than any singular reliance on generic stand alone or remotely delivered sets of customized directives. A considerable body of research indicated that what is especially needed in this regard are careful comprehensive evaluations including assessments of the patients' beliefs, fears of movement and pain, plus beliefs about the origin and expected outcome of their disease.

The provider's willingness to help clients to better understand their options, how stress might effect their joints adversely, for example excess stress might lead to eating behaviors that increase body mass markedly and adversely, while conveying the idea that contrasts possible benefits of actively attempting to cope and promote their wellbeing might reduce their pain and enhance their functional abilities. Additionally, patient education that addresses erroneous beliefs and misconceptions that prevail concerning osteoarthritis, especially the role of active movement as an osteoarthritis causative factor appears imperative to explore and understand [56, 58].

Indeed, without adequate subjective as well as objective patient evaluations and assessments that do not overlook one or more cognitive disease correlates it may be impossible to provide targeted and precise help, such that the destructive osteoarthritis process may continue unabated, and prove overwhelming, and hazardous. For example, in the case of the circulation of unproven remedies or beliefs that surgery alone can restore function and eliminate pain but no other efforts are of possible help, even carefully construed management programs that are integrated suitably may be delivered too late in the disease cycle. In addition, communications that present an ageist portrayal of the older adult, or are not geared to the older versus younger adult, plus those that assume the older adult can duly grasp, interpret and act on medical information and can hence make sound decisions may well prove of more harm than good. At the same time, a combination of fatalism and inaction and/or erroneous beliefs and fears may preclude the emergence of a needed degree of affirmative 'mental toughness' that has been observed to have a favorable bearing on orthopedic disease outcomes [59]. To the contrary, efforts to reduce or mitigate stress, pain, and anxiety along with efforts to strengthen mental health toughness can be expected to enhance general self efficacy as well as coping confidence, plus the motivation to persevere

with and adopt a set of regular health promoting self care practices [50]. Indeed, evidence points to the paramount importance of efforts directed towards fostering pain and disease coping skills even if surgery is forthcoming at some point [50, 55, 59, 60].

However, even if sought, for example using artificial technology, no perfect mitigation recipe currently exists that can be duly delivered to advance management and delay regression of this complex disease where some older adults have no major problems but others may require considerable attention, especially if they appear unaware of their osteoarthritis management options, and have been using blunting: or avoidance strategies to manage their condition due to limited coping skills and confidence. A fair percent of cases may also have associated health problems such as cardiovascular disease, diabetes, or obesity, plus depression and disease severity [61] that must be factored in to any meaningful recommendation program to lower pervasive and transient day to day stressors and advance independence. On the other hand, those who receive due consideration may find they can progressively limit their pain levels proactively through one or more life affirming approaches than those who have given up hope or believe they need to rely on passive modalities and external support, or simply enter a state of denial or inaction blaming age alone for their condition. As such highly recommended are sound mutually motivated patient provider communications, along with emergent patient-centered or personalized tailored approaches [62], designed to affect perceptions of controllability of the disease and its oftentimes highly stressful overall health impact on daily life, sleep, social and cultural activities and work [58].

While the most suitable methods of fostering adaptive coping may consequently differ considerably [34], those that involve problem solving and steps towards improving emotional regulation as indicated show considerable potential as a rule, as do interventions to reduce fear, pain exaggeration tendencies and diminishing aspects of general wellbeing [16, 63-65] especially among those who report low perceptions of their pain coping ability [63, 64]. Linking older adults with chronic illnesses such as osteoarthritis to others in the social network especially those with similar traits and problems who are motivated to succeed and have succeeded may also prove of considerable benefit [66].

To further foster adaptive coping behaviors, a process of small doable steps and short range versus long term goal setting of doable actions is recommended so as to allow for the emergence of some tangible success, and motivation to pursue an increasing array of challenges including aging attributes [52, 64, 66, 57]. Exposure to role models, the receipt of needed resources, and opportunities to rehearse what is desirable in small progressive steps may further enable one or more adaptive coping behaviors to emerge [52, 67] as may efforts to foster integrated, collaborative, and culturally responsive care [58].

Resnick [68] who conducted research to better understand the factors that can influence the efficacy beliefs of older adults as regards being motivated to participate in a rehabilitation program identified 11 major themes amenable to intervention. These included: motivation and verbal encouragement, having exposure to positive role models, being able to deal effectively with patient's past experiences, and current aversive physical sensations. Additional research has shown that for purposes of enhancing exercise adherence, a problem of major concern to all patients who suffer from pain, training the individual in pain reduction skills through relaxation, distraction or imagery, and repeating the demanding activity while applying the acquired pain reduction skills may prove successful. In addition, educating patients to better manage pain and cope with disease flares, helping them to understand why and how emotional reactions can affect their disease status as well as cellular aging may be of additional specific value. To enhance self efficacy for pain control, an important stress and

osteoarthritis coping outcome mediator, the development of a carefully structured plan of achievable steps that can be practiced over time, along with efforts to minimize pervasive emotionally adverse thoughts, can possibly minimize the extent of pain and dysfunction that could otherwise emerge to impact life quality, all factors considered [68-72].

Keys to success may also include: 1) The ability of the affected individual to forge a sound and supportive client-therapist relationship that permits mutual inquiry and goal setting. 2) Encouraging activity goals that align with the etiology and pathogenesis of the disease as well as the individual's preferences and abilities, 3) Active treatment of persistent depression, 4) Mindfulness meditation, becoming better educated about the values and benefits of exercise, deep breathing, visual imagery, and being exposed to successful models.

Concluding Remarks

Current data reveal several trends that might prove valuable to explore further in the future as follows.

* Multifaceted chronic illnesses and health conditions such as osteoarthritis in any form appear to require a considerable degree of personal management, including regular rest as well as exercise to mitigate the disease and its adverse actual and perceived stressful impact on life goals.
* Along with other modifiable factors, an apparently strong psychological determinant of intervention non adherence and unfavorable disease outcomes are excess exposures to transient and pervasive stresses, stressful actions and thoughts, maladaptive stress perceptions, and beliefs that are controllable, but not addressed.
* Careful comprehensive mental health assessments followed by appropriate proven pain coping and other self-efficacy enhancing strategies may greatly reduce the rate and degree of osteoarthritis damage incurred by an aging adult, plus its stressful impact on sleep, mood, life quality and health status if applied routinely.
* To overcome initial challenges and inertia due to fears of provoking excess pain professional assistance appears desirable and should be sought.
* Learning to put pain into perspective along with visualization, positive self-talk and a technique called thought-stopping appears promising, along with active efforts to substitute positive thoughts for fearful thoughts. In addition, thinking of one's goals rather than one's fears and rewarding oneself for trying may be helpful in reducing one or more self care barriers due to fear.
* Realistic individualized goal setting that focuses the pros rather than the cons of self care or related tasks - not on feelings alone may also prove helpful.
* Expecting to progress over time rather than expecting immediate changes in disease, activity and health status will likely be less stress provoking and health advancing all things considered.

References

1. National Clinical Guideline Centre (UK). Osteoarthritis: care and management in adults. london: national institute for health and care excellence (UK); 2014 Feb.
2. Musumeci G, Aiello FC, Szychlinska MA, Di Rosa M, Castrogiovanni P, Mobasheri A. Osteoarthritis in the XXIst century: risk factors and behaviours that influence disease onset and progression. Int J Mol Sci. 2015;16(3):6093-6112. doi: 10.3390/ijms16036093.

3. Lee DY. Prevalence and risk factors of osteoarthritis in Korea: a cross-sectional study. Medicina (Kaunas). 2024;60(4):665. doi: 10.3390/medicina60040665.
4. Bowden JL, Hunter DJ, Deveza LA, Duong V, Dziedzic KS, Allen KD, Chan PK, Eyles JP. Core and adjunctive interventions for osteoarthritis: efficacy and models for implementation. Nat Rev Rheumatol. 2020;16(8):434-447. doi: 10.1038/s41584-020-0447-8.
5. Li H, Kong W, Liang Y, Sun H. Burden of osteoarthritis in China, 1990-2019: findings from the Global Burden of Disease Study 2019. Clin Rheumatol. 2024;43(3):1189-1197. doi: 10.1007/s10067-024-06885-9.
6. Jia X, Jackson T. Pain beliefs and problems in functioning among people with arthritis: a meta-analytic review. J Behav Med. 2016;39(5):735-756. doi: 10.1007/s10865-016-9777-z
7. Marszalek J, Price LL, Harvey WF, Driban JB, Wang C. Outcome expectations and osteoarthritis: perceived benefits of exercise are associated with self-efficacy and depression. Arthritis Care Res. 2017;69(4):491-498. doi: 10.1002/acr.22969.
8. Jackson T, Xu T, Jia X. Arthritis self-efficacy beliefs and functioning among osteoarthritis and rheumatoid arthritis patients: a meta-analytic review. Rheumatol (Oxford). 2020;59(5):948-958. doi: 10.1093/rheumatology/kez219.
9. Zhou S, Wu L, Si H, Li M, Liu Y, Shen B. Association between nighttime sleep duration and quality with knee osteoarthritis in middle-aged and older Chinese: a longitudinal cohort study. Arch Gerontol Geriatr. 2024;118:105284. doi: 10.1016/j.archger.2023.105284.
10. He Y, Jiang W, Wang W. Global burden of osteoarthritis in adults aged 30 to 44 years, 1990 to 2019: results from the Global Burden of Disease Study 2019. BMC Musculoskelet Disord. 2024;25(1):303. doi: 10.1186/s12891-024-07442-w.
11. Benyon K, Hill S, Zadurian N, Mallen C. Coping strategies and self-efficacy as predictors of outcome in osteoarthritis: a systematic review. Musculoskeletal Care. 2010;8(4):224-236. doi: 10.1002/msc.187.
12. Downe-Wamboldt B. Stress, emotions, and coping: a study of elderly women with osteoarthritis. Hlth Care Women Int. 1991;12(1):85-98.
13. McKnight PE, Afram A, Kashdan TB, Kasle S, Zautra A. Coping self-efficacy as a mediator between catastrophizing and physical functioning: treatment target selection in an osteoarthritis sample. J Behav Med. 2010;33(3):239-249. doi: 10.1007/s10865-010-9252-1.
14. DiRenzo D, Finan P. Self-efficacy and the role of non-pharmacologic treatment strategies to improve pain and affect in arthritis. Curr Treatm Opt Rheumatol. 2019;5:168-178.
15. Tanaka R, Hirohama K. Association of pain quality with pain catastrophizing and self-efficacy in people with knee osteoarthritis. Prog Rehabil Med. 2018;3:20180002. doi: 10.2490/prm.20180002.
16. Wang L, Zhang L, Yang L, Cheng-Qi H. Effectiveness of pain coping skills training on pain, physical function, and psychological outcomes in patients with osteoarthritis: A systemic review and meta-analysis. Clin Rehabil. 2021;35(3):342-355. doi: 10.1177/0269215520968251.
17. Crijns TJ, Liu TC, Ring D, Bozic KJ, Koenig K. Influence of patient activation, pain self-efficacy, and resilience on pain intensity and magnitude of limitations in patients with hip and knee arthritis. J Surg Orthop Adv. 2019;28(1):48-52.

18. Zhang L, Fu T, Zhang Q, Yin R, Zhu L, He Y, Fu W, Shen B. Effects of psychological interventions for patients with osteoarthritis: a systematic review and meta-analysis. Psychol Health Med. 2018;23(1):1-17. doi: 10.1080/13548506.2017.1282160.
19. Somers TJ, Blumenthal JA, Guilak F, Kraus VB, Schmitt DO, Babyak MA, Craighead LW, Caldwell DS, Rice JR, McKee DC, Shelby RA, Campbell LC, Pells JJ, Sims EL, Queen R, Carson JW, Connelly M, Dixon KE, LaCaille LJ, Huebner JL, Rejeski JW, Keefe FJ. Pain coping skills training and lifestyle behavioral weight management in patients with knee osteoarthritis: a randomized controlled study. Pain. 2012;153(6):1199-1209. doi: 10.1016/j.pain.2012.02.023.
20. Weinberger M, Tierney WM, Booher P, Hiner SL. Social support, stress and functional status in patients with osteoarthritis. Soc Sci Med. 1990;30(4):503-508.
21. Scheuing WJ, Reginato AM, Deeb M, Kasman SA. The burden of osteoarthritis: Is it a rising problem?. Best Practice Res Clin Rheumatol. 2023 Aug 24:101836.
22. Ling SM, Bathon JM. Osteoarthritis in older adults. J Am Geriatric Soc. 1998;46(2):216-225.
23. de-la-Casa-Almeida M, Villar-Alises O, Rodríguez Sánchez-Laulhé P, Martinez-Calderon J, Matias-Soto J. Mind-body exercises for osteoarthritis: an overview of systematic reviews including 32 meta-analyses. Disabil Rehabil. 2024;46(9):1699-1707. doi: 10.1080/09638288.2023.2203951.
24. Romer CM. Stress and coping in older women with osteoarthritis: a qualitative study. University of Missouri-Columbia; 1999.
25. Sale JE, Gignac M, Hawker G. The relationship between disease symptoms, life events, coping and treatment, and depression among older adults with osteoarthritis. J Rheumatol. 2008;35(2): 335-342.
26. Regier NG, Parmelee PA. The stability of coping strategies in older adults with osteoarthritis and the ability of these strategies to predict changes in depression, disability, and pain. Aging & Mental Hlth. 2015;19(12):1113-1122.
27. Zautra AJ, Smith BW. Depression and reactivity to stress in older women with rheumatoid arthritis and osteoarthritis. Psychosomatic Med. 2001;63(4):687-96.
28. Lentz TA, George SZ, Manickas-Hill O, Malay MR, O'Donnell J, Jayakumar P, Jiranek W, Mather RC 3rd. What general and pain-associated psychological distress phenotypes exist among patients with hip and knee osteoarthritis? Clin Orthop Relat Res. 2020;478(12):2768-2783. doi: 10.1097/ CORR.0000000000001520.
29. Booker S, Josue C, Terry E, Sibille K, Cruz-Almeida Y, Bradley L, Goodin B, Fillingim R. Perceived stress predicts function and movement-evoked joint pain in aging African Americans with osteoarthritis. Innovation in Aging. 2018;2(suppl_1):485. doi 10.1093/geroni/igy023.1810.
30. Alschuler KN, Molton IR, Jensen MP, Riddle DL. Prognostic value of coping strategies in a community-based sample of persons with chronic symptomatic knee osteoarthritis. Pain. 2013;154 (12):2775-2781. doi: 10.1016/j. pain.2013.08.012.
31. Booker SQ, Tripp-Reimer T, Herr KA. "Bearing the Pain": The experience of aging African Americans with osteoarthritis pain. Glob Qual Nurs Res. 2020;7:2333393620925793. doi: 10.1177/2333393620925793.
32. Kooranian F, ParsaYekta Z, Rassouli M. Barriers and challenges to self-care among older adults with knee osteoarthritis: a qualitative study. Ethiopian J Hlth Sci. 2022;32(5):963-974.

33. Davis MC, Zautra AJ, Reich JW. Vulnerability to stress among women in chronic pain from fibromyalgia and osteoarthritis. Ann Behav Med. 2001;23:215-226.
34. Liu R, Damman W, Kaptein AA, Rosendaal FR, Kloppenburg M. Coping styles and disability in patients with hand osteoarthritis. Rheumatol (Oxford). 2016;55(3):411-418. doi: 10.1093/rheumatology/kev295.
35. Lopez-Olivo MA, Ingleshwar A, Landon GC, Siff SJ, Barbo A, Lin HY, Suarez-Almazor ME. Psychosocial determinants of total knee arthroplasty outcomes two years after surgery. ACR Open Rheumatol. 2020;2(10):573-581. doi: 10.1002/acr2.11178.
36. Ilves OE, Hermsen LA, van der Wouden JC, Holla JF, van der Leeden M, Smalbrugge M, Leone SS, van der Horst HE, Dekker J. Are changes in pain, cognitive appraisals and coping strategies associated with changes in physical functioning in older adults with joint pain and chronic diseases?. Aging Clin Exptal Res. 2019;31:377-383.
37. Kim M, Bae SH. Factors influencing health-related quality of life in older adults with osteoarthritis: Based on the 2010-2011 Korea national health and nutrition examination survey. J Muscle Joint Hlth. 2014;21(3):195-205.
38. Sarfraz R, Aqeel M, Lactao J, Khan S, Abbas J. Coping strategies, pain severity, pain anxiety, depression, positive and negative affect in osteoarthritis patients; a mediating and moderating model. Nat. Nurt. J. Psychol. 2021;1:18-28.
39. Ackermans L, Hageman MG, Bos AH, Haverkamp D, Scholtes VAB, Poolman RW. Feedback to patients about patient-reported outcomes does not improve empowerment or satisfaction. Clin Orthop Relat Res. 2018;476(4):716-722. doi: 10.1007/s11999.0000000000000069.
40. Allen KD, Somers TJ, Campbell LC, Arbeeva L, Coffman CJ, Cené CW, Oddone EZ, Keefe FJ. Pain coping skills training for African Americans with osteoarthritis: results of a randomized controlled trial. Pain. 2019;160(6):1297-1307. doi: 10.1097/j.pain.0000000000001525.
41. Lee AC, Harvey WF, Price LL, Morgan LPK, Morgan NL, Wang C. Mindfulness is associated with psychological health and moderates pain in knee osteoarthritis. Osteoarthritis Cartilage. 2017;25(6):824-831. doi: 10.1016/j.joca.2016.06.017.
42. Hunt MA, Keefe FJ, Bryant C, Metcalf BR, Ahamed Y, Nicholas MK, Bennell KL. A physiotherapist-delivered, combined exercise and pain coping skills training intervention for individuals with knee osteoarthritis: a pilot study. Knee. 2013;20(2):106-112. doi: 10.1016/j.knee.2012.07.008.
43. Nagasawa Y, Oka K, Shibata A. [The effects of pain coping skills training among older outpatients with osteoarthritis]. Nihon Ronen Igakkai Zasshi. 2017;54(4):546-554. Japanese. doi: 10.3143/geriatrics.54.546.
44. Bahrami Rad M, Rafezi Z. Predicting pain acceptance based on perceived stress and coping strategies in individuals with rheumatoid arthritis. Hlth Psychol. 2019;7(28):151-166.
45. Pulling BW, Braithwaite FA, Mignone J, Butler DS, Caneiro JP, Lipp OV, Stanton TR. People with painful knee osteoarthritis hold negative implicit attitudes towards activity. Pain. 2024. doi: 10.1097/j.pain.0000000000003210.
46. Smith MD, McKendry R, Shah S, Desai V, Abouzed A, Byrnes B, Farmer S, Glyde C, Lawrenson PR, Ross MH, Collins NJ. An exploration of footwear preferences, attitudes and beliefs in people

with knee osteoarthritis: a qualitative study. Musculoskelet Sci Pract. 2024;72:102948. doi: 10.1016/j.msksp.2024.102948.

47. Bhardwaj A, FitzGerald C, Graham M, MacFarlane A, Kennedy N, Toomey CM. Barriers and facilitators to implementation of an exercise and education programme for osteoarthritis: a qualitative study using the consolidated framework for implementation research. Rheumatol Int. 2024;44(6):1035-1050. doi: 10.1007/s00296-024-05590-9.
48. Aree-Ue S, Roopsawang I, Belza B. Self-regulation in older Thai women with self-reported knee osteoarthritis: a path analysis. J Women Aging. 2016;28(3):247-258. doi: 10.1080/08952841.2014.951240.
49. Koh LH, Hagger MS, Goh VHH, Hart WG, Gucciardi DF. Effects of a brief action and coping planning intervention on completion of preventive exercises prescribed by a physiotherapist among people with knee pain. J Sci Med Sport. 2017;20(8):723-728. doi: 10.1016/j.jsams.2017.02.008.
50. Martinez-Calderon J, Cano-García FJ, García-Muñoz C, Rufo-Barbero C, Matias-Soto J, Infante-Cano M. How can clinicians enhance self-efficacy beliefs in osteoarthritis? An overview of systematic reviews with meta-analysis. Clin Rheumatol. 2024;43(5):1435-1446. doi: 10.1007/s10067-024-06943-2.
51. Hoch JM, Swann A, Kleis R, Hoch MC, Baker C, Dlugonski D. Health-related quality of life and psychological outcomes in participants with symptomatic and non-symptomatic knees after ACL reconstruction. Int J Sports Phys Ther. 2024;19(2):206-214. doi: 10.26603/001c.91649.
52. van Scherpenseel MC, Kloek CJJ, Veenhof C, Pisters MF. Pain coping and healthcare use in patients with early knee and/or hip osteoarthritis: 10-year follow-up data from the cohort hip and cohort knee (CHECK) study. J Clin Med. 2023;12(23):7455. doi: 10.3390/jcm12237455.
53. Østerås N, Aas E, Moseng T, van Bodegom-Vos L, Dziedzic K, Natvig B, Røtterud JH, Vlieland TV, Furnes O, Fenstad AM, Hagen KB. Longer-term quality of care, effectiveness, and cost-effectiveness of implementing a model of care for osteoarthritis: a cluster-randomized controlled trial. Osteoarthritis Cartilage. 2024;32(1):108-119. doi: 10.1016/j.joca.2023.10.003.
54. Harris ML, Byles JE, Townsend N, Loxton D. Perceptions of coping with non-disease-related life stress for women with osteoarthritis: a qualitative analysis. BMJ Open. 2016;6(5):e010630. doi: 10.1136/bmjopen-2015-010630.
55. Williamson W, Kluzek S, Roberts N, Richards J, Arden N, Leeson P, Newton J, Foster C. Behavioural physical activity interventions in participants with lower-limb osteoarthritis: a systematic review with meta-analysis. BMJ Open. 2015;5(8):e007642. doi: 10.1136/bmjopen-2015-007642.
56. Jayakumar P, Crijns TJ, Misciagna W, Manickas-Hill O, Malay M, Jiranek W, Mather RC 3rd, Lentz TA. What are the underlying mental health constructs associated with level of capability in people with knee and hip osteoarthritis? Clin Orthop Relat Res. 2024;482(4):633-644. doi: 10.1097/CORR.0000000000003003.
57. Tak ECPM, Verweij LM, Chorus AMJ, Hopman-Rock M. What are the predictors of self-reported change in physical activity in older adults with knee or hip osteoarthritis? Int J Behav Med. 2023;30(2):199-210. doi: 10.1007/s12529-022-10080-y.
58. O'Brien P, Prehn R, Green C, Lin I, Flanagan W, Conley B, Bessarab D, Coffin J, Choong PFM,

Dowsey MM, Bunzli S. Understanding the impact and tackling the burden of osteoarthritis for Aboriginal and Torres Strait Islander People. Arthritis Care Res (Hoboken). 2023;75(1):125-135. doi: 10.1002/acr.25004.

59. Stamatis A, Morgan GB, Spinou A, Tsigaridis KG. Mental toughness and osteoarthritis: Postsurgery improvement in knee pain/functionality in older adults. Rehabil Psychol. 2023;68 (2):212-219. doi: 10.1037/rep0000499.
60. Rini C, Katz AWK, Nwadugbo A, Porter LS, Somers TJ, Keefe FJ. Changes in identification of possible pain coping strategies by people with osteoarthritis who complete web-based pain coping skills training. Int J Behav Med. 2021;28(4):488-498. doi: 10.1007/s12529-020-09938-w.
61. van der Meulen C, van de Stadt LA, Rosendaal FR, Runhaar J, Kloppenburg M. Determination and characterization of patient subgroups based on pain trajectories in hand osteoarthritis. Rheumatol (Oxford). 2023;62(9):3035-3042. doi: 10.1093/rheumatology/kead017.
62. Conley B, Bunzli S, Bullen J, O'Brien P, Persaud J, Gunatillake T, Dowsey MM, Choong PFM, Lin I. Core Recommendations for osteoarthritis care: a systematic review of clinical practice guidelines. Arthritis Care Res (Hoboken). 2023;75(9):1897-1907. doi: 10.1002/acr.25101.
63. Ismail A, Moore C, Alshishani N, Yaseen K, Alshehri MA. Cognitive behavioural therapy and pain coping skills training for osteoarthritis knee pain management: a systematic review. J Phys Ther Sci. 2017;29(12):2228-2235. doi: 10.1589/jpts.29.2228.
64. Sánchez-Herán Á, Agudo-Carmona D, Ferrer-Peña R, López-de-Uralde-Villanueva I, Gil-Martínez A, Paris-Alemany A, La Touche R. Postural stability in osteoarthritis of the knee and hip: analysis of association with pain catastrophizing and fear-avoidance beliefs. PM R. 2016;8(7): 618-628. doi: 10.1016/j.pmrj.2015.11.002.
65. Wilk M, Zimba O, Haugeberg G, Korkosz M. Pain catastrophizing in rheumatic diseases: prevalence, origin, and implications. Rheumatol Int. 2024;44(6):985-1002. doi: 10.1007/s002 96-024-05583-8.
66. Hammond A, Freeman K. One-year outcomes of a randomized controlled trial of an educational-behavioral joint protection programme for people with rheumatoid arthritis. Rheumatol. 2001;40:1044-1051.
67. Hampson SE, Glasgow RE, Zeiss AM. Coping with osteoarthritis by older adults. Arthritis Rheum. 1996;9(2):133-141.
68. Resnick, B. Geriatric rehabilitation: the influence of efficacy beliefs and rehabilitation. Rehabil Nur, 2002;27:152-159.
69. Marks R. Knee osteoarthritis and exercise adherence: a review. Curr Aging Sci. 2012;5(1):72-83. doi: 10.2174/1874609811205010072.
70. Goff AJ, Jones LE, Lim CJ, Tan BY. A cross sectional study exploring the relationship of self-reported physical activity with function, kinesiophobia, self-efficacy and quality of life in an Asian population seeking care for knee osteoarthritis. BMC Musculoskelet Disord. 2024;25(1):74. doi: 10.1186/s12891-024-07181-y.
71. Sibille KT, Langaee T, Burkley B, Gong Y, Glover TL, King C, Riley JL 3rd, Leeuwenburgh C, Staud R, Bradley LA, Fillingim RB. Chronic pain, perceived stress, and cellular aging: an exploratory study. Mol Pain. 2012;8:12. doi: 10.1186/1744-8069-8-12.

72. Fu K, Metcalf B, Bennell KL, Zhang Y, Deveza LA, Robbins SR, Hunter DJ. The association between psychological factors and pain exacerbations in hip osteoarthritis. Rheumatol (Oxford). 2021;60(3):1291-1299. doi: 10.1093/rheumatology/keaa494.