

# Osteoarthritis injury and obesity perceptions: can persuasive protective communications impact these key health threats?

## Abstract

The perpetuation of enormous upward osteoarthritis trends despite more than a century of research implies both a need and possible attention to practical self-motivated protective health behaviors that can be disseminated and diffused readily even in the face of a strong belief in the idea that artificial intelligence when combined with surgery and drugs, will prove uniquely helpful. Yet, many aspects of osteoarthritis may be traceable to human behaviors that can arise at any age and may persist to impact osteoarthritis negatively, despite surgery and/or drug administration. At the same time, multiple authors have begun to harness behavioral theories of health in efforts to foster pain reduction and aid function in osteoarthritis at all disease stages, but commonly only to modest avail. Unfortunately, inconsistent with current osteoarthritis studies and predictions of an enormous osteoarthritis burden in the older population, efforts to prevent osteoarthritis are rarely discussed, even though it is established that alone or in combination the significance of injury and excess body weight on the risk and progression of disabling osteoarthritis joint disease is indisputable. Moreover, a wealth of research supports the idea that the degree of osteoarthritis pathology may depend on the supplicant's efforts to prevent joint macro as well as micro trauma and among the most potent mechanisms here for many reasons is the need to counter excess obesity. This idea is not novel, but is often ignored or addressed inconsistently. In going beyond the self efficacy theory model of individual perceptions about weight control and its association with joint loading and pathology, we propose the thoughtful application of the attributes of the Protection Motivation Theory in this realm warrants attention.

**Keywords:** cognitions, disease predictions, injury, obesity, osteoarthritis, prevention, protection motivation theory, rehabilitation, self-efficacy theory, threat

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## Background

Osteoarthritis, the most common form of arthritis is a painful joint disease predicted to affect enormous numbers of older adults, in all parts of the globe by 2050. A disease with no known cure, it is clear aging alone cannot account for the fact most adults will not present with this disease in its active form, and that many cases only present with problems in a single joint. Trauma of varying degrees is however considered a major determinant and can act to harm an affected joint even if drug therapy or injections as well as surgery are employed to reduce pain. Among efforts to guide patients towards reducing exposure of their joints to excess harm are a variety of educational approaches, wherein the role of obesity-which is increasing worldwide,<sup>1</sup> is often a key preventive approach that is consistently put forth.

This paper concerns the potential application of the extended or revised 1983 Roger's Protection Motivation Theory<sup>2</sup> often used as a guide to impact behavior change including intent to change<sup>3</sup> and can be applied at least conceptually relative to efforts to encourage lifelong joint injury and obesity prevention in at risk older adults. A topic quite well studied and applied to advance health promotion in multiple realms, very little use or criticisms and possible utility of these ideas appears in any peer reviewed osteoarthritis document in 2023, although these ideas that focus on perceived threats and coping ability and efforts to respond adaptively and confidently in the face of a health challenge may of course be used clinically and intuitively as a routine clinical strategy.

This author, in agreement with Whittaker et al.,<sup>4</sup> and Hoveidaei et al.,<sup>5</sup> believes it very important to begin to explore and enact all possible methods that can both help to understand why protective

behaviors may not be readily adopted by those older adults at risk for severe osteoarthritis disability, as well as to avert excess disability, for example that due to preventable injuries and abnormal joint loading situations consistently known to be potent cumulative osteoarthritis risk factors.<sup>6,7</sup> Especially at a time when health inequities are pervasive, those in the lower socioeconomic levels may be especially at risk<sup>7</sup> and where predictions about osteoarthritis surging trends apply to both high and low income countries, and are proceeding at an unprecedented rate, modifiable counter strategies such as personalized persuasive low cost educational efforts to address any maladaptive or inaccurate cognitive perceptions about the importance of injury self-protection may provide one mechanism for advancing a potentially efficacious tailored set of practical low cost health opportunities for many, rather than the sole reliance on high tech approaches available only to a select few.<sup>6</sup>

In this conceptual overview, the focus was placed on the exploring the potential for the expanded Protection Motivation Theory, an explanatory and applied cognitive oriented framework<sup>2</sup> for developing persuasive communications and that considers a key role for self-efficacy or confidence beliefs including response efficacy as one its social cognitive constructs. Self-efficacy is often put forth as a salient behavioral predictor and that may explain why osteoarthritis sufferers do not always follow careful protection strategies to limit their pain and how and why they might do so if they felt more confident to do this than not.<sup>8</sup> The currently applied focus was placed on injury in general, as well as modifiable injurious impacts of excess body weight on a vulnerable joint, both key well established osteoarthritis risk and pathogenic factors.<sup>9</sup> By targeting a non-specialist as well as specialist audiences including scientists, clinicians, and patients, the goal was

to raise awareness and motivate any inquiry that may propel the field of osteoarthritis prevention forwards at low cost and is one that raises life quality and reduces its immense disability threat optimally. While multiple factors influence osteoarthritis risk and progression, symptoms that could be offset or favorably managed if care is made to limit joint insults are pain, inflammation, amplification of joint pathologies, considerable functional disability, need for narcotic medications, and possible premature mortality.<sup>6</sup> The report draws on allied health data assumed to be of value to exploit and explore in the future.

## Aims

To examine a possible extended use of the theories of Protection Motivation and Self efficacy to foster self-management of health behaviors in overweight adults with osteoarthritis.

## Hypotheses

Tailored thoughtful evaluation and carefully articulated persuasive personalized messages and skill support to reframe fears such as fear of moving and that nothing can be done for osteoarthritis can potentially help an older adult suffering from osteoarthritis to better frame their motivation and ability to exert some degree of control over their joint health. To the contrary, fear of disability, excess pain, and disablement may foster sedentary weight gain as well as muscle wasting and excess joint loading stresses and possible joint structural damage, failed attempts at repair, and joint pain and disuse.

The cognitive constructs of the Protection Motivational Theory that can be harnessed or targeted to overcome inactions or maladaptive behaviors and intent to carry out health affirming behaviors are:

**Threat/fear**-increase perceptions of threat of not moving moderately/weight gain/muscle loss

**Self-efficacy**-enhance beliefs about their ability to offset pain and injury/outcome expectations

**Response/coping efficacy**-enhance ability to cope, enable skills, and reward small steps

## Methods

To examine the current line of inquiry, a broad based literature review was conducted using the **PUBMED** and **Google Scholar** data bases believed to house salient information. Key words included: *osteoarthritis and injury, obesity, prevention, protection motivation, and self-efficacy*. No preclinical, surgical, intra articular approaches or drug related articles were examined. Only a narrative commentary of ideas is presented.

## Notable findings

Although no articles were found linking osteoarthritis management to the Protection Motivation Theory, unlike many other topics studied such as smoking, cancer, and adherence issues, as per a report by Austine et al.,<sup>10</sup> there is general consensus that-osteoarthritis produces a significant disease burden and oftentimes a severe degree of pain and impairment that necessitates a multipronged intervention approach. Although a great need exists for globally oriented public health messages, as opposed to large scale public health approaches, this group found patients appeared to prefer or receive individual messages that can be directed towards helping them with pain management. While medication is often needed in this regard, and prescribed, patients who do not follow optimally recommended self protection pain management approaches such as weight loss, may benefit

from counseling and careful evaluation of the patient's skills and perceptions if they seek to help improve patients' quality of life. They do not specifically advance any mode of education or communication, but possibly assume a thoughtful provider will examine the situation holistically and empathetically and advise accordingly.

Roos et al.,<sup>11</sup> show such an approach may not be a linear one or an instantly successful one as osteoarthritis is not a disease of single tissue that is readily targeted or uniform, but is a disease that may develop slowly over a 10-15 year period, and only become symptomatic as the disease progresses, and at a time it appears largely incurable. A strong focus on disease control is indicated however at all times, to mitigate excess interference of the condition with required activities of daily living and the ability to work even if future surgical joint replacement is undertaken. Many patients may however simply tolerate or mask the pain, they may be very fearful and not move, or fatalistic and ignore the impact of adverse joints impacts on their affected joint and others. As well, many health-care providers may accept pain and disability as inevitable corollaries of the disease and ageing and thus not pursue a course of conservative education and interventions for their clients. Too often according to these authors, health-care providers passively await final 'joint death', necessitating knee or hip joint replacements, rather than addressing osteoarthritis as a chronic condition, where prevention and early comprehensive-care models are the accepted norm, as is the case with other chronic diseases. Joint injury, obesity and impaired muscle function are key well established osteoarthritis risk factors and are all possibly modifiable risk factors amenable to primary and secondary prevention strategies, but are poorly represented in the management arena or clinical research realms. The strategies that are most appropriate for each patient should however be identified, by selecting interventions to correct--or at least attenuate--and apply consistently before the osteoarthritis becomes unmanageable.

In this regard, Allen et al.,<sup>7</sup> argue that osteoarthritis is clearly an increasingly prevalent condition with worldwide impacts on many health outcomes and where the strong evidence for obesity and joint injury risk factors call for heightened efforts to mitigate these risks at both the clinical and public health levels. They also suggest a need exists for continued research regarding how potential person- and joint-level risk factors may interact to influence the development and progression of the disease, but do not specifically focus on cognitions that may drive health behaviors. As outlined by Whittaker et al.,<sup>4</sup> prevention is an attractive solution in this regard, even though it is not well researched and the ability to reduce risk factors for osteoarthritis to any degree has potential personal, financial and societal benefits. Most important is potentially the adoption of modest forms of activity rather than rest or extreme forms of activity. These however are theoretically valid ideas as far as we know, even if they are not followed by many,<sup>12</sup> Indeed, effective non impactful, non fatiguing exercise regimens including education along with cognitive restructuring as indicated, can both foster and promote healthful behavioral actions. They can strengthen the intent of the patient to take charge and bear some responsibility for their own wellbeing in an effort to foster one's life quality. As well, the goal of reducing the rate and magnitude of pain due to traumatically induced joint overload may be advanced, and where inertia, sedentary behaviors, and a failure to protect vulnerable joints predict worsening disability and overall outcomes.

In this regard, increasing research shows long-term, consistent, individualized carefully construed exercise-based treatment approaches are more likely than not to improve pain control and function, as well as help in weight control and muscle mass maintenance. The avoidance of any adverse impact of excess joint

loading and subsequent inflammation also needs to be somewhat moderated by the osteoarthritis sufferer where possible. However, fears of movement or kinesiophobia alone can undoubtedly moderate this potentially favorable self-management approach, if ignored.<sup>13</sup> As well, excess exercise or exercising to fatigue may prove counterproductive and is not recommended for countering injury and pain.<sup>14</sup> However, even if the above ideas have been applied successfully in multiple health realms, a pervasive view that it only through molecular science that a remedy will emerge to avert osteoarthritis damage may well be a hindrance to addressing the aforementioned more upstream disease countermeasures. Moreover, even if molecular solutions and others are effective, they may lose their potency if the impact of persistent harmful or excess movements or joint loads persist unabated.<sup>15</sup>

In addition, even if the provider believes more can be done to avert excess osteoarthritis damage, patients in need may not comprehend the significant aspects of their condition, and their role in its progression and outcome, thus may fail to appreciate any high-quality guidelines for managing osteoarthritis consistently including exercise, education, and weight management.<sup>16</sup> As well, even if extremes of belief lead to a fear of re injury and movement<sup>17</sup> a lack of protection oriented motivations may prevail due to the belief that surgery restores function and injections can be used to mitigate pain with no side-effects, or alternately a belief in protection but harboring a feeling of low self-efficacy for self-management of this chronic condition. At the same time, remote rehabilitation approaches presumed to help the patients' self-efficacy and self-management of their chronic condition may fail to address individual factors that are imperative to uncover and reframe as well as identify.

While numerous theories of practice grounded in health psychology abound, as hypothesized earlier in this overview, it is apparent that if the patient is not motivated to be an active player and an informed participant in their health-as they are able-and they fail to conceptualize the need to change and to move from being unaware/or unengaged into the stages of adoption and maintenance for osteoarthritis protective behaviors, less favorable outcomes than desired appear to be hard to avert<sup>18</sup> Physicians and other dedicated health providers and support groups and family members, can play a crucial role in this sense by promoting awareness of how sound self-protection efforts can be maximized through the careful thoughtful selection and activation of behaviors and health practices and decisions. For example, explaining why it is not helpful to rely on excess pain medication to limit their discomfort because this may mask pain and provoke unprotected use of the joints and possible excess damage joints inadvertently. Similarly, extremes of rest or avoidance of movement may have multiple similar adverse effects and others.<sup>19</sup> However, among the many solutions that have been examined in this sense, the allied health professional may be especially helpful if they can help their client plan for any skills development that can strengthen the patient's confidence to proceed.<sup>20</sup> As per Bui et al.,<sup>21</sup> the Protection Motivation Model of Intervention and its coping appraisal explanatory and mediating construct of self-efficacy or confidence beliefs and other constructs, including aspects of susceptibility, severity, rewards, response efficacy and costs can be heightened through well applied communication approaches.<sup>1</sup> Improvements in weight management, physical activity participation, adherence to diet goals, and other life affirming behaviors desired for optimal health have been duly discussed and proved valid even though there are still substantial gaps in the evidence.<sup>1,21-24</sup>

The Protection Motivation Theory is also well accepted in health realms and is soundly grounded in research that shows that a person who values their health and is confident they can perform a task is more likely to do so and commit to this for the long-term than one

who feels helpless, fearful, or fatalistic or assumes technology and drugs are the only solutions. This can be fostered clinically by various approaches, as well as by applying strategies such as motivational interviewing<sup>1,22,24</sup> breaking the desired behavior into small manageable steps, seeing a person like them achieve similar goals, receiving empathetic feedback and social support.<sup>25</sup>

Ritland et al.,<sup>26</sup> found that attention to mediated obesity and related information can significantly increase people's intention to exercise as well as their overall coping appraisals (the perceived effectiveness of the recommended behaviors and their ability to perform them. Likewise, increased threat and coping appraisals can significantly influence people's intention to exercise and diet. Coping (rather than threat) appraisals more strongly predict behavioral intent, the most proximate predictor of actual behavior. Goal setting that is realistic and helps the client to break free from fear and to believe in their abilities to deal with their situation, along with careful follow up thereafter is also likely to be more motivational and empowering than messages that are framed as a threat. Journaling and sharing their needs with significant others and the ability to choose a plan that is of value to the client can also prove beneficial. Tools such educational videos, podcasts, and meditation and imagery may be helpful as well. To foster motivation for averting injury and excess body weight and adopting a balanced daily routine of safe practices and positive thinking -the provision of appropriate elements below can produce a continuum of impacts that lessen the chances of severe disability.

- I. Knowledge that frames outcome expectations of patient participation realistically, but clearly
- II. Skills, advice, and resources as needed
- III. Support as indicated, including emotional support
- IV. Consistent reviews, opportunities for adjustments, and encouragement indicated.
- V. Establishing a long-term therapeutic plan.

Researchers can continue to examine aspects of the above ideas so as to possibly demonstrate their utility and viability as far as fostering optimal rather than adverse long term outcomes and costs and suffering of the older adult with osteoarthritis and are encouraged to do so.

To ensure those at high risk for disabling osteoarthritis with excess challenges do not deteriorate inadvertently due to low self-efficacy and outcome expectations with self-protection care perceptions, those cases who are depressed, isolated, obese, working in ergonomically challenging environments, or are in excess pain should be targeted preferentially.

## Discussion

Older adults suffering from osteoarthritis of one or more joints are not only at risk for high degrees of functional disability, but are at greater risk for all-cause mortality than the general population, particularly for cardiovascular diseases. This excess mortality is closely associated with its disability level, and commonly obesity states that are increasing in prevalence and economic and social costs<sup>1,22</sup> Consequently, strategies to reduce the entire burden of osteoarthritis that prevails and is projected to increase markedly as societies age through primary and secondary prevention programs are increasingly and urgently needed and highly desirable.<sup>6</sup> This current conceptual paper focuses on what can possibly be done at the individual level to mobilize the average older adult with painful



osteoarthritis to protect their joints from excess injury. Grounded in the behavioral sciences, a compilation of cognitive theories clearly point to the possible value of helping reticent or fearful patients from adopting health practices to avert undue harm, and among these the Protection Motivation approach holds promise, especially if framed in terms of self-efficacy attributes that should be duly addressed if indicated. Where the education of the patient is enacted thoughtfully, and the dangers of excess or vigorous loading are articulated alongside methods for countering these possible events<sup>31</sup> and followed up accordingly<sup>28</sup> results in the long-term may prove very valuable in multiple spheres.

In support of this approach, research does show that careful guidance and adoption of behaviors to limit harming or traumatizing the already compromised joint can surely limit the pathologic responses that arise in response to abnormal loading of an osteoarthritis joint, while possibly enabling some degree of harm reduction. For example, through applications that are directed by the Protection Motivation framework and designed to foster the intent to prevent excess injury may well yield substantive health benefits when compared to standard care.<sup>28,29</sup> In addition, offering clients understandable evidence based educational communications that attempt to reduce or reframe threat perceptions and that lead to protective actions rather than inaction or adverse actions are strongly indicated. Providers can greatly help by advancing concerted empathetic tailored messages to guide the fearful or fatalistic client, while building their client's confidence for taking action and feeling motivated to actively protect their joint[s] and wellbeing, even if surgery is contemplated or has been forthcoming.

Indeed, even though more research is needed, protection oriented self-care training that is realistic and tailored to align with the patient's ability, inner and outer resources, disposition, degree of pathology, and social situation, and is based on self-efficacy theory, may foster multiple benefits and can help against injury and excess weight states that can cause excess joint destruction. Those with a history of adverse health practices, those who are obese, are more likely to need more intense intervention to overcome fear attributes for taking action<sup>30</sup> and the dire implications of failing to do this should not be overlooked.<sup>31</sup>

Some additional approaches to foster osteoarthritis self-protection efforts and overall health care costs efforts might include efforts to:

Heighten provider awareness about the importance of joint protection at all disease stages.

Improve perceived value of rehabilitation by medical providers as well as patients.

Improve patients comfort and self-efficacy for dialogue.

Improve funding for providers and patient resources.

Focus on general education such as reading skills and basic mathematics.

Focus insurance costs on benefits of taking preventive actions and adherence to self-care approaches.

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## Conflicts of interest

None.

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## References

1. Mirkarimi K, Mostafavi F, Eshghinia S, et al. Effect of motivational interviewing on a weight loss program based on the Protection Motivation Theory. *Iran Red Crescent Med J*. 2015;17(6):e23492.
2. Westcott R, Ronan K, Bambrick H, et al. Expanding protection motivation theory: investigating an application to animal owners and emergency responders in bushfire emergencies. *BMC Psychol*. 2017;5(1):13.
3. Plotnikoff RC, Trinh L. Protection motivation theory: is this a worthwhile theory for physical activity promotion? *Exerc Sport Sci Rev*. 2010;38(2):91–98.
4. Whittaker JL, Runhaar J, Bierma-Zeinstra S, et al. A lifespan approach to osteoarthritis prevention. *Osteoarthritis Cartilage*. 2021;29(12):1638–1653.
5. Hoveidaei AH, Nakhostin-Ansari A, Hosseini-Asl SH, et al. Increasing burden of hip osteoarthritis in the Middle East and North Africa (MENA): an epidemiological analysis from 1990 to 2019. *Arch Orthop Trauma Surg*. 2023;143(6):3563–3573.
6. Palazzo C, Nguyen C, Lefevre-Colau MM, et al. Risk factors and burden of osteoarthritis. *Ann Phys Rehabil Med*. 2016;59(3):134–138.
7. Allen KD, Thoma LM, Golightly YM. Epidemiology of osteoarthritis. *Osteoarthritis Cartilage*. 2022;30(2):184–195.
8. Rippetoe PA, Rogers RW. Effects of components of protection-motivation theory on adaptive and maladaptive coping with a health threat. *J Pers Soc Psychol*. 1987;52(3):596–604.
9. Nedunchezhiyan U, Varughese I, Sun AR, et al. Obesity, inflammation, and immune system in osteoarthritis. *Front Immunol*. 2022;13:907750.
10. Austine J, Nair S, Mirza K. Perspective of orthopedists on pain management in osteoarthritis: a qualitative study. *Indian J Palliat Care*. 2016;22(4):410–415.
11. Roos EM, Arden NK. Strategies for the prevention of knee osteoarthritis. *Nat Rev Rheumatol*. 2016;12(2):92–101.
12. Borisovskaya A, Chmelik E, Karnik A. Exercise and chronic pain. *Adv Exp Med Biol*. 2020;1228:233–253.
13. Aydemir B, Huang CH, Foucher KC. Strength and physical activity in osteoarthritis: the mediating role of kinesiophobia. *J Orthop Res*. 2022;40(5):1135–1142.
14. Baal JD, Cecil KL, Patel R, et al. Imaging of overuse injuries of the hip. *Radiol Clin North Am*. 2023;61(2):191–201.
15. Li B, Guan G, Mei L, Jet al. Pathological mechanism of chondrocytes and the surrounding environment during osteoarthritis of temporomandibular joint. *J Cell Mol Med*. 2021;25(11):4902–4911.
16. Gibbs AJ, Gray B, Wallis JA, et al. Recommendations for the management of hip and knee osteoarthritis: a systematic review of clinical practice guidelines. *Osteoarthritis Cartilage*. 2023;31(10):1280–1292.
17. Mir B, Vivekanantha P, Dhillon S, et al. Fear of reinjury following primary anterior cruciate ligament reconstruction: a systematic review. *Knee Surg Sports Traumatol Arthrosc*. 2023;31(6):2299–2314.
18. Elliott JO, Seals BF, Jacobson MP. Use of the Precaution Adoption Process Model to examine predictors of osteoprotective behavior in epilepsy. *Seizure*. 2007;16(5):424–437.
19. Ruthig JC. Health risk perceptions and exercise in older adulthood: an application of protection motivation theory. *J Appl Gerontol*. 2016;35(9):939–959.

20. Yao X, Zhang L, Du J, et al. Effect of information-motivation-behavioral model based on protection motivation theory on the psychological resilience and quality of life of patients with type 2 DM. *Psychiatr Q*. 2021;92(1):49–62.
21. Bui L, Mullan B, McCaffery K. Protection motivation theory and physical activity in the general population: a systematic literature review. *Psychol Health Med*. 2013;18(5):522–542.
22. Mirkarimi K, Eri M, Ghanbari MR, et al. Modifying attitude and intention toward regular physical activity using protection motivation theory: a randomized controlled trial. *East Mediterr Health J*. 2017;23(8):543–550.
23. Dashti S, Dabaghi P, Tofangchiha S. The effectiveness of training program based on protective motivation theory on improving nutritional behaviors and physical activity in military patients with type 2 diabetes mellitus. *J Family Med Prim Care*. 2020;9(7):3328–3332.
24. Zhang Y, Cooke R. Using a combined motivational and volitional intervention to promote exercise and healthy dietary behaviour among undergraduates. *Diabetes Res Clin Pract*. 2012;95(2):215–223.
25. Marks R. Self-efficacy and arthritis disability: an updated synthesis of the evidence base and its relevance to optimal patient care. *Health Psychol Open*. 2014;1(1):2055102914564582.
26. Ritland R, Rodriguez L. The influence of antiobesity media content on intention to eat healthily and exercise: a test of the ordered protection motivation theory. *J Obes*. 2014;2014:954784.
27. Owen PJ, Main LC, Miller CT, et al. Protection motivation theory screening tool for predicting chronic low back pain rehabilitation adherence: analysis of a randomised controlled trial. *BMJ Open*. 2022;12(2):e052644.
28. Kimhasawad W, Punyanirun K, Somkotra T, et al. Comparing protection-motivation theory-based intervention with routine public dental health care. *Int J Dent Hyg*. 2021;19(3):279–286.
29. Botelho RJ, Skinner H. Motivating change in health behavior. implications for health promotion and disease prevention. *Prim Care*. 1995;22(4):565–589.
30. Preissner CE, Kaushal N, Charles K, et al. A Protection Motivation Theory approach to understanding how fear of falling affects physical activity determinants in older adults. *J Gerontol B Psychol Sci Soc Sci*. 2023 28;78(1):30–39.
31. Hettinga DL. II. Normal joint structures and their reaction to injury. *J Orthop Sports Phys Ther*. 1979;1(2):83–88.