ISSN: 2755-631X

Review Article

Journal of Global Health and Social Medicine

Knee Osteoarthritis Falls Interactions Update and Synthesis: Personal and Global Implications, Challenges, and Opportunities

Ray Marks

OARC Clinical Research and Education Director, Ontario L3T 5H3, Canada.

Corresponding author
Ray Marks, OARC Clinical Research and Education Director, Ontario L3T 5H3, Canada.

Received: March 17, 2026; **Accepted:** March 24, 2026; **Published:** April 06, 2026

ABSTRACT

Knee osteoarthritis, the most common form of disabling osteoarthritis and an immense global health concern is often associated with an increased tendency to fall, that too is an enormous global health concern, and one that commonly engenders various degrees of non fatal and often fatal injuries. But what does the current research show specifically? Are there any novel 2026 insights or recommendations for mitigating knee osteoarthritis falls beyond those cited in past decades of which many view as merely palliative? Using the PUBMED data base and others, clinical studies published between January 1, 2020 and March 15, 2026 concerning possible falls and osteoarthritis of the knee linkages and their current findings were sought and reviewed. The results revealed these conditions may be understandable, bidirectional or cyclical but modifiable-that is, knee osteoarthritis that can lead to one or more falls and one or more falls that can hasten a form of post traumatic knee joint destruction may be averted or mitigated. Yet, and despite a great need in this regard, there are few emergent action plans to obviate this possible interactive adverse scenario, despite many documented falls and osteoarthritis explanatory risk factors that somewhat overlap in parts in the realm of neuromuscular underpinnings. Research that is posted is also commonly flawed or subject to untested conclusions, thus more resounding research is strongly indicated to avert a public health disability tsunami among most aging populations.

Keywords: Aging, Falls, Fall Injuries, Falls Risk Factors, Knee Osteoarthritis, Pain, Prevention

Introduction

Knee joint osteoarthritis, a universally disabling disease, commonly affecting one or both knee joints in the context of high age adults is frequently associated with various degrees of pain plus oftentimes a progressive loss of the ability of the affected person to function physically. In addition, the disease may induce multiple localized joint destructive alterations that render the affected knee unstable or unprotected or both and include joint swelling of varying degrees, joint stiffness, ligament laxity, meniscus tears, joint deformities, alterations in joint sensibility, surrounding muscle weakness, gait abnormalities, and often a strong tendency for one or more affected knee joints to 'give way' and in the frail older adult - a high risk of fractures as well as osteoarthritis bone attrition [1-4]. At the same time, even if the knee joints are stable, knee osteoarthritis symptoms plus any prevailing diseases commonly associated with both aging and osteoarthritis such as anxiety, diabetes, and cardiovascular diseases can all increase the risk of injurious falls, including recurrent falls, and fractures [5,6]. Other related disease factors including the strong presence of depression, the lack of adequate sleep, sarcopenic muscle mass declines and fat infiltration, plus possible medications that can heighten the occurrence of a falls event [2,7] as well as kinematic impairments, and timely accurate neurosensory responses to perturbations [8]. In their own right falls, which are common in aged adults may engender a state where knee osteoarthritis either manifests or is exacerbated.

As such, and in the face of rising health care costs, and high numbers of aging adults worldwide who seek to age successfully and 'in place' rather than an institution, the increasing prevalence of knee osteoarthritis, as well as falls that occur in the home or community often recurrently and that are rising in numbers and severity among high age adults [7] a strong need arises as far as understanding of what remediable factors can be applied to avert any excess disability is increasingly urgent as far as any meaningful outcome being evidenced [6,9], Moreover, as time progresses, cases with severe osteoarthritis who must often rely on joint replacement surgery- a procedure that is costly in its own right can yet be accompanied by falls occurrences and post surgical muscle atrophy [1].

Key Research Questions

- Is there any agreed upon linkage between knee osteoarthritis and falls that could be harnessed towards more effective falls and/or osteoarthritis prevention efforts. If so, what

Citation: Ray Marks. Knee Osteoarthritis Falls Interactions Update and Synthesis: Personal and Global Implications, Challenges, and Opportunities. J Glob Health Soci Med. 2026. 2(1): 1-9. DOI: doi.org/10.61440/JGHSM.2026.v2.37

specific approaches are indicated to mitigate the debility of either of these two disablers. Finally is the association between falls and knee osteoarthritis uni- or bidirectional in selected cases?

- Will careful early evaluation of adults with knee osteoarthritis disease to examine their risk for falling, as well as those who experience one or more falls events improve the outlook for older adults at risk for knee osteoarthritis disability and falls [9].
- Since falls associated with knee osteoarthritis can magnify or induce a life time of suffering, plus account for significant proportion of health costs [8], should more emphasis on this possible preventable health association be forthcoming? That is, is there evidence that a strong case can be made for more public health investments towards well designed and resourced efforts to mitigate the possible cycle of excess knee osteoarthritis progression, plus persistent or recurrent fall-associated injuries?.
- Moreover, if preventive strategies do exist are they grounded in a strong evidence base or are they too general, or of high merit-but not followed, contemplated or actively avoided by adults with knee osteoarthritis because they are seen as 'stigmatizing? [10].

Rationale

Both knee osteoarthritis as well as falls injuries currently pose an enormous challenge to many aging individuals worldwide, as well as tremendous challenges to health providers, plus immense public health hospital and societal resource and remediation costs. At the same time, the disease may impact life quality, as well as the ability to live independently in the community and thus to carry out much needed self-care strategies advocated for this condition. But what key determinant produces a high falls risk such that it can impact knee osteoarthritis outcomes negatively is uncertain at best. Whether a fall or a history of multiple falls can initiate a cycle of knee osteoarthritis damage in its own right is even less well understood and relatively unknown.

Since outcomes for knee osteoarthritis sufferers' who fall are significantly worse than those who don't, and surgery to replace a knee, does not always prevent falls post surgery, it appears a better understanding of what specific variables might be amenable to intervention in at risk individuals, and achieving evidence based guidelines in this respect would undoubtedly be highly advantageous in the context of primary, as well as secondary and tertiary preventive efforts [11]. Moreover, since falling, as well as excess pain and disability that can arise due to falls are important mediating causes of premature mortality and morbidity in some advanced age vulnerable adults, the more routine assessment of risk factors for falling followed by effective targeted and tailored strategies to prevent these appear of high salience to consider in the context of primary disabling knee osteoarthritis.

Hypothesis

As a basis for this report we hypothesized there would be a consistent cyclical linkage between the onset and progression of disabling knee osteoarthritis and falls occurrences in the older population that can be mediated by neuromuscular factors and others that may be remediable.

Methods

The desired data believed to address the key questions posed in this mini review were sought largely on the PUBMED electronic data base when applying the key terms: "knee osteoarthritis and falls", "knee osteoarthritis and falls risk/injury". As well, the PubMed Central, and Google Scholar data bases were reviewed for additional data. Articles published in the English language as full reports and pertinent to the current theme, with the exception of falls relative to older adults in general, and/or total knee joint replacement surgery prospective follow up studies were sought. Excluded were articles that did not discuss knee osteoarthritis per se, for example those that discussed falls and hip osteoarthritis, articles on the perception of possible falls, the fear of falling, or falls self-efficacy. Available data representing the post-COVID 19 onset period and extending from January 1 2020-March 15, 2026 were carefully reviewed even if their embedded data sources were not current. No ethics approval was required, as this narrative review and presents data that does not violate human rights, as documented in The Helsinki Declaration. Those articles of potential relevance deemed pertinent in the author's view to the present topic, were downloaded and scrutinized further. The review material was then carefully examined and summarized and reported in narrative form, given the lack of any uniform focus or diagnostic descriptions in most studies. All forms of clinical study as well as review articles were deemed acceptable, and stressed the topic of falls risk factors in the context of definitive knee osteoarthritis, rather than the role of falls in causing possible knee osteoarthritis. Post-surgical knee osteoarthritis falls studies were excluded, as were treatment proposals or partially completed studies. Each review focused on what was observed and concluded. PUBMED was selected as the key electronic data source of information given its widespread data repository and effective method of accessing relevant data. Readers seeking more historic perspectives are encouraged to refer di Fraturra et al. Tasci Bosbaz et al. Li et al. Mat et al. Manlapaz et al. and for more current information Zhang et al. [6,14-18].

Results

Even though this was a restricted review, it was clear that knee osteoarthritis remains a topic of immense interest and one of high public health relevance along with falls. Moreover, there appears to be a link between neuromuscular deficits, joint status, and kinematic alterations that perpetuates these deficits in multiple ways and to multiple degrees [13].

In terms of falls alone, an age associated decline in postural stability may have a higher than anticipated link to falling, as may those muscle weakness and early pathological changes in the neuromuscular system as often observed [13,28]. Indeed, most researchers identify that a focus on recommendations for mitigating this impact warrants addressing any concurrent neuromuscular and mobility alterations, rather than any cognitive or environmentally oriented intervention plan.

One problem in arriving at any consensus though and that many groups have tried to do is the small number of well-designed and robust prospective studies, a largely atheoretical approach to the research, and the lack of any unified agreed upon disease definitions as well as falling features and what this constitutes. Rather, many studies depict highly differing risk factors for

either condition, and even in comparable studies, their use of subjective measurements (for example, for assessing pain or fear) are often non uniform and produce contradictory or non conclusive findings [18,26]. In addition to that, even though the presence of knee pain is often identified as a risk factor for falls; it is often measured in different ways and may refer to, or include or exclude local as well as distant or multi pain sites, however this is commonly unclear, for example when foot pain predominates [28].

Indeed the strength of evidence in one systematic report was unsurprisingly rated as "conflicting". In addition to that, while most of the studies published in 2026 mention muscle related disease factors and falls are correlated, very few detail whether there is any common ground in this respect and if so what this might be, for example muscle stiffness, or low muscle mass, or another motor attribute. The probable role of medical, physical and cognitive health status, as well as the possible role of environmental or neurological factors in perpetuating a possible knee osteoarthritis falls associations or their independent underpinnings, is rarely examined, however.

In our view without solid evidence based justification it thus remains challenging to deliver or develop any sound predictive beneficial therapeutic model that could prove influential at all disease stages; as many published studies may not only be flawed, underpowered, and cross sectional, but questionable to aggregate [6] or validate. Many too exclude high age adults or those with highly salient clinically relevant health conditions such as neuropathies. Moreover, outcomes of the same variable or construct may not be comparable, for example body mass-high versus low [8] or other possible key clinical factors may confound the ability to generalize [9]. Rosadi et al. [8] however, felt their study showed that knee proprioception and joint range of motion are potential falls risk factors as these may tentatively fail to serve as an inherent protective mechanism against falls or any form of unanticipated or day to day joint impact. This explanation has reasonable support and conceivably may well increase the rate of onset and progressive of knee joint damage, even in a healthy elder if it induces increasing gait, knee ligament damage, and postural instability [20]. In another study, where adults with knee osteoarthritis fell more often than those without knee osteoarthritis, the researchers demonstrated a relevant percentage of falls to be associated with the 'perception' of knee or gait instability-rather than actual knee joint imbalances or evidence of the knee giving way due to the presence of actual joint instability [21].

In one study [22] the authors who examined cases with sarcopenia-an age associated muscle mass and bone mass declining presence, and a knee osteoarthritis diagnosis found these subjects tended to have a 4.17 times higher odds of incurring two or more falls than controls after adjustment for age, sex, and body mass index. An increased recurrent falls experience was not clearly confirmed in participants with isolated sarcopenia and knee osteoarthritis, but it is possible a progressive loss of muscle mass is likely to have an impact on balance and the generation of timely protective reflex responses. Those with low bone mass may also be expected to sustain macro or microinjuries that compound the impact of sarcopenic frailty signs quite readily. As per van Schoor et al. [23] older adults with sarcopenic or non sarcopenic knee osteoarthritis may also be at an increased risk for recurrent falls in the face of excess pain medication usage, particularly the use of opioids.

In addition, a falls risk appears to be more likely in cases showing possible challenges in carrying out walking or trying to balance [24,25], being of an advanced age, female sex, with a lower body mass index, having gaze related visual problems and depression [26,27]. Structural angulation deformities of the lower leg that may be inherent or present if knee ligaments are damaged, along with impaired joint stabilizing support tissues [18,28,35,36].

The problems above are however not necessarily isolated but most tend to progress towards end-stage knee osteoarthritis regardless of underpinnings [37]. Wjile not necessarily associated with clinical osteoarthritis symptoms, as identified by Harris et al. [29] it appears older adults with radiographic evidence of knee osteoarthritis [usually only visible late in the disease process] do tend to have an increased likelihood of experiencing single or recurrent falls that may be explained by the severity of the disease, as well as the use of opioids or narcotics to control pain along with the possible emergence of a fear of falling [23,30-34]. Those who have disease linked sensory losses [such as diabetics], neurosensory lesions associated with knee joint osteoarthritis [such as subnormal proprioception], or those who may not sense any pending state of damage or warning or sende of injury post perturbation may suffer dire consequences including falls and fractures [31,33] even if somewhat disputed [18].

The questions posed here must remain unanswered though in our view, because few studies combine an array of well conceived physical as well as psychological measures that can objectively examine issues studied reliably and thus do not test their relative bearing on knee osteoarthritis falls risk [7,19] or help guide the incorporation of specific attributes into reproducible practical therapeutic protocols of action. A possible oversight of relevant points or publications in some systematic review and the incorporation of flawed data and very few longitudinal studies likely exacerbate this issue [39].

In this regard, one group [18] who did show impaired balance, muscle weakness, the presence of comorbidities, and increasing numbers of symptomatic joints are falls risk factors, did not refer to possible cognitive attributes of associated dysfunction. As in other realms of osteoarthritis as well as falls research among high age adults, the strength of the evidence presented and often rated as "conflicting" or inconsistent, remails unchanged in our view. Thus some authors may not concur in validating a role for knee instability, impaired proprioception, and use of walking aids as falls determinants, while others show poor stability and balance functions and level of pain may yet be of high relevance [37,38]. Muscle elements alone that hold explanatory and intervention promise and that need to be specifically examined are not only multilayered and diverse, but their functional implications or correlates such as the 'timed get up and go test' or 'six minute walking test' are not commonly examined [37,39].

Ren et al. [40] have however observed knee osteoarthritis cases to exhibit a significantly lower step length, gait speed, and set of vertical ground reaction forces in both normal walking

as well as during the first recovery step following a backward slip perturbation suggesting a role for reactive muscle forces in falls mediation explanations. It was also evident that the falls could be precipitated by the presence of an inadequate degree of joint flexion and extension range of motion [due possibly to physiological disease impacts such as joint swelling and muscle contractures] and the generation of deficiently protective joint moments. In end-stage knee osteoarthritis, fallers are also found to walk a shorter distance than non-fallers, and increases in low back pain tend to induce a heightened risk of falling [37].

It is also apparent that multiple personal factors including deficient pain control and a low exercise efficacy can predict both a falls risk and a possible fracture occurrence even in the absence of a distinct osteoarthritis diagnosis. For example, if the older adult has a declining ability to respond effectively to obstacles in the environment or when encountered, or fatigues readily when walking [37,39,40] and especially among those who may have measureable postural control and stability deficits [28,41].

In short, apparent clinically relevant interactive linkages between knee osteoarthritis and falls are clearly multiple but remain complex to unravel temporally. At the same time, whether numbers of affected joints, osteoarthritis severity, muscle force cap acity and timing, balance, walking ability, the use of walking aids, pain, and medication intake are of import or not, and in what order, is hard to discern. Moreover, it is unclear whether possible cognitive factors deemed to underpin falls risk as well as osteoarthritis progression are strongly implicated in perpetuating a cycle of increasing disability linking these conditions is impossible to validate in any uniform framework.

In addition, more study is needed to uncover possible neuromotor coordination, balance, inflammation, and gait control determinants that appear to underlie falls risk in older weakened adults with painful knee osteoarthritis [13,24,37,39,45].

In the interim, it appears safe to say knee osteoarthritis, which is clearly an important disabler in its own right, as are falls injuries and events, can be a potent contributor to falls among older adults in its own right. Their individual or dual mitigation and prevention should however not be studied for its own sake but because these health issues warrant urgent attention. Indeed, the challenges of knee osteoarthritis even in the face of a single fall are far reaching, including mental health and economic implications and ramifications, an increased risk of restrictive daily activities, pain, weakness, and falls fears plus a high chance of the elder becoming increasingly sedentary, as well as dependent and having to move into a nursing home within one year [42].

Discussion

Knee osteoarthritis, a progressively disabling joint disease that is increasing in prevalence despite years of study is a costly disease among older adults in all parts of the world. At the same time, the prevalence of falls among older populations and that can be attributed in part to knee osteoarthritis disease features is an unsolvable problem in its own right. In this regard, many have turned their attention towards teasing out the underpinnings of observed knee joint disease determinants as well as those that hasten its progression or drawing attention to aspects of falls often not well documented such as the role of 'long falls lies' the need for a more focused research and a more inclusive insightful clinical approach [42]. Others have sought to reveal the key importance of identifying remediable disease outcomes and pathogenic factors in general, and those related to falls risk. In this regard, a sizeable number of investigators tend to agree regarding the key factors that may predispose older knee osteoarthritis and raise the risk for falling and sustaining one or more additional injuries, as well as possible joint damage or worse knee osteoarthritis outcomes than anticipated [11] even if no conclusive results prevail [43]. Yet it is concluded by most authors that evidence supports the view that falls are inextricably linked to knee osteoarthritis among other determinants. But fewer groups have sought to examine if falls, a major health issue in its own right, can lead to the onset of knee osteoarthritis, a possible hypothesis that cannot be ruled out. However, many papers currently imply some degree of relevance must be attributed to muscle as well as nerve associated pathways that affect gait. In addition, most researchers tend to agree that knee osteoarthritis and falls are potentially associated even if their underpinnings are not singular or well codified [44]. Moreover, even if it appears those with more severe disease may fall to the same degree as those with less joint damage, this is mostly true for radiological not the clinical disease features of knee osteoarthritis and suggests more be done earlier rather than later [43]. However, even when the data sources examined are known to be reputable, and give the impression that they house a reasonable number of statistically acceptable relevant papers on the present topic of interest, most do not appear to be based on any sound theoretical framework, do not refer to the role of cognitions, behaviors, pain block injections, inflammation issues as far as reflex responses are concerned, or social factors such as food deserts and housing disadvantages. A high number either examine many possible isolated falls knee osteoarthritis correlates simultaneously, but not all, while others only examine a small number. Some data in systematic reviews are drawn from specific data repositories not primary sources, and their analyses may indeed employ data sets captured in the previous decades using surveys and medical charts that may not represent the entirety of the situation as this occurs globally in 2026, nor the objective reality of the time. It is also noteworthy that while COVID-19 greatly impacted the older adult, where many older adults health was impacted negatively, this sub group is generally not included in current knee osteoarthritis or falls investigative studies, but it can be seen a fall in the space of time allotted to the 'lockdown' period has resulted in life changing modes of disability or premature institutionalization.

However, as crucial as these issues may be to tease out and explore further, the impact and outcomes of most current knee osteoarthritis and falls interactions that are reported may remain unclear or unknown at best if the facts concerning the origins and long term pathogenesis of these two variables discussed here remain understudied with the exception of post arthroplasty surgery studies. At the same time, what is being measured specifically is unclear as the terms applied for both knee osteoarthritis as well as falls, falling, and recurrent falls are not uniformly defined or employed across available studies. As well, a high number of studies continue to rely on subjective reports and measures that could be flawed, for example the frequency of

falls incidents as recounted by older age adults often medicated or in pain who must rely on memory.

The possible confounding factors of differing osteoarthritis phenotypes, types of falls, falls location, disease duration, and extent, plus the role of prior surgery, overall health status, corticosteroid injections and others, and a trend to exclude a wide age range of study subjects and careful stratification of key determinants also continues to truly preclude any meaningful summative analysis of prevailing data from what has been collected or aggregated to date as argued by Li et al. [45].

According to some of this data however, one can predict with reasonable certainty that older adults with knee osteoarthritis may be more prone to falling or falls than healthy age-matched adults, even if this is not universally supported. On the contrary, it has been possible to argue that that osteoarthritis may actually be protective against falls and related fractures, especially if it is severe and induces less rather than more weight bearing activities. However, if this is so, it is unclear why sarcopenia not commonly listed as an osteoarthritis falls risk factor is in fact a recognized falls risk attribute [46], or why a biopsychosocial model of inquiry is not followed generally [47] and why joint replacement surgery does not obviate falls risk entirely [14].

There is also evidence that a persistent preoccupation related to an incident fall, a term also called 'fear of falling' by some authors, is of interest in the fields of osteoarthritis mitigation efforts because it is related to the risk of falling and subsequent morbidity of falling [36].

It is accepted that this report is a limited one and articles that are relevant do exist and were missed or in process. The quality of the reported assessments among the published data too cannot be readily discerned. But even when care has been taken, what the weightings of the possible role of balance, muscle strength and proprioception problems and others play specifically in explaining the prevailing falls rate among osteoarthritis knee cases remains challenging to specify or solidify. Moreover, the role of psychological and lifestyle factors on pain, plus the specific impact of one or more comorbid health conditions, plus obesity versus frailty is clearly relevant but the magnitude of these factors remains hard to weight, uncover, validate, or substantiate [9].

It is also apparent that some of the data may be erroneous or underreported or exaggerated by the immense reliance in this data base on a) self-reports to assess falls history, b) the exclusion of osteoarthritis cases who might be cognitively challenged as well as at high risk for falls, and c) failure to clarify the presence of neuropathy, joint inflammation, assistive device use, footwear type, use of sedatives, sleep issues, frailty, fatigue, social factors, and health beliefs about falling

Research Implications

In light of the above arguments, we propose future research remains indicated, and may well offer more conclusive applied directions and insights that have measurable public health impacts. These may include: examining the falls risk mediating role of

- Nutritional, cognitive, and health status factors [44,47,49].
- Medication intake.
- Environmental, lifestyle and sleep factors [11,47].
- Specific knee osteoarthritis correlates, such as pain-location, intensity, frequency, type, postural sway, joint structural stability, dynamic balance, muscle endurance, contractures, stiffness, and mass, and joint range of motion, muscle modulation capacity [48,52,53,55].
- Psychological factors [47,51,53,55].
- Falls fears and falls self-efficacy impacts [34,38,41,46-50].
- Sarcopenia and obesity interactions [9, 46].

To advance this line of inquiry, future efforts to:1) differentiate high from low falls risk individuals; 2) samples that match the median age of most knee osteoarthritis cases and who have either distinctive unilateral versus bilateral knee joint disease [68]; 3) early versus late stage knee osteoarthritis, plus those with medial versus lateral compartment knee osteoarthritis should be identified and studied; 4) level ground, uphill, downhill, stair walking ability and related motor adaptations are also indicated [68].

As well, the World Health Organization [WHO] definition of a fall as "… an event which results in a person coming to rest inadvertently on the ground or floor or other lower level" might be uniformly adopted as a starting point [https://www.who.int/news-room/fact-sheets]

In addition to that the development and validation of a practical cost-effective reliable personalized screening tool, including one that can capture the extent of any falls history, fear of falling trends, adverse medication usage, knee osteoarthritis presence and severity, lower limb or multi site body pain exposures, gait challenges/dysfunction, declining muscle force and endurance capacity, cognitive state plus proprioception and vision challenges is paramount as well.

Therapeutic Implications

As noted recently by Fu et al. [58] despite the immense knee osteoarthritis burden that continues to rise, few improvements in system-level outcomes are reported across any region, age group, community and personal level as of 2026. In line with some of the research that has been forthcoming, this group have consequently advocated for a greater emphasis on the importance of further research in the context of averting much suffering and by translating findings towards applying timely targeted and equitable public health and chronic care strategies.

In this regard, and notwithstanding the empirical limitations discussed above and others, until more compelling data are forthcoming, it still appears worthwhile to consider applying what we do know carefully for purposes of decreasing falls risk among vulnerable older adults as well as those with knee osteoarthritis. This may not only prove this approach is superior to palliative care but to improvements in day to day active living plus favorable longevity outcomes and life quality. In this regard, public health epidemiological oriented strategies to avert falls risk as well as knee injuries, plus careful evaluations of the vulnerable aging community dwelling adult whether they have osteoarthritis or not is likely to be helpful in multiple ways and is strongly indicated in our view.

Efforts to carefully examine the circumstances in which falls occur at a personal as well as regional level may provide for

more targeted opportunities for slowing clinical disability and falls risk among many [11]. It is also apparent that treating low back, chronic neck, or multi site pain may avert its observed effect on falls risk along with insomnia that provokes pain [57] and falling fears [34]. Identifying those older adults with a fall history and evidence of any balance impairment or increased movement anxiety may similarly help to mitigate a persistent state of disrupted mobility participation and postural control [51] and their possible falls and body and knee pain ramifications.

Fan et al. [59] who allude to a possible presence of motor dysfunction as a state closely linked to balance, gait, mobility, and strength deficits that can heighten falls risk, do imply this dysfunctional state is not necessarily irreversible and can be obviated to a degree via Tai Chi intervention practices and others [45]. Another body of data point to a role for efforts to ensure optimal footwear features, including the appropriate use of shock absorbing inner soles that can possibly allay slips and trips [60,61].

Other probable interventions worthy of consideration n are efforts to prevent falls as well as efforts to maximize muscle mass in the older adult through the use of protein or amino acid and vitamin D supplementation [1,49]. Focused efforts designed to strengthen the knee muscles and others, training to foster better postural control and desirable reflex responses, as well as efforts to allay pain, depression, vision problems, and falls fears may also be beneficial [4,55,56].

Others include opioid education aimed at fostering an awareness of its possible harmful impacts, plus falls education to raise awareness [4] especially where educational levels are suboptimal [71]. Other promising strategies are: gait training when combined with visual feedback [62], balance and strengthening exercises [39, 55, 63], phase-specific neuromuscular strategies [54], targeted proprioception exercises [69, 70] and personalized care [71]. At the same time, those older adults with multisite pain symptoms and those having had knee surgery should be preferentially sought out, targeted and treated judiciously [2,52].

To this end, we believe clinicians can help not only assess, and plan, but can greatly help by providing a sense of support and confidence to the client including-

- Emotional Support-empathy and hope
- Instrumental Support-walking aids, footwear
- Informational Support-informational video
- Appraisal Support-periodic feedback

Indeed, research reveals carefully construed and delivered support mechanisms would be expected to not only foster motivation for program adherence but may serve as a protective factor or buffer against the encroachment of any adverse cognitive stress or negative affect reactions, and persistent day to day micro injuries due to behavioral and physical as well as limited self-efficacy [53,55]. Timely targeted intervention support may likewise help improve upon sleep problems, overall anxieties and psychological distress, appetite, and self-care management abilities [55].

To manage the rate at which falls may occur, a novel tool termed STEAFI focusing on several intervention themes as outlined below appears promising as well and involves:

- Outpatient physical therapy.
- Provider education, workflow, and interdisciplinary collaboration, interprofessional communication, and the raising of public awareness of the physical therapists' role in falls prevention that is critical for safe effective behavioral adoption [64,72].

Conclusion

Despite the limitations of this report, it is clear knee osteoarthritis and falls remain and are expected to remain immensely relevant precursors of debility in many older age adults no matter where they reside. Their mitigation in the older adult population in general, as in the knee osteoarthritis population, in particular, is indeed of paramount concern as the numbers of older adults over the next decades is predicted to rise exponentially. The higher ages of the older older gloabal cohorts, who are not well studied adds to the numerous gaps and challenges in unlocking the falls-knee osteoarthritis association, a theme of great importance to public health planners, resource management, as well as overall population health. This conclusion is not only based on data published between 2020 and 2026 but is one believed consistent with prior findings published over the last two to three decades. As such, we feel confident in concluding:

1. Falls remain serious health issues that may prevail in sizeable numbers of older adults as well as older adults with knee osteoarthritis, and can independently heighten knee osteoarthritis disability considerably, and destructively in multiple ways.
2. Posture and balance as well as neurosensory muscle modulation factors appear of high import among the key risk factors explaining falling in general, as well as falls occurring in those with advanced knee osteoarthritis even after knee joint replacement surgery.
3. The entire neurological system, not only the skeletal system appears to have an incremental and collective degrading impact on muscle reaction time, muscle composition, joint stability, joint proprioception, joint kinematics and kinetics, and muscle strength unless identified and attenuated in a timely manner.
4. To advance this line of inquiry-the clinical prediction rule developed by Amano et al. [65], along with the Comprehensive Geriatric Assessment tool [66], a risk prediction model performances tool for sarcopenia [46] and objective neuromuscular analogues of balance [64,72] and the Simplified Decision Tool [67] should be carefully applied in those cases at perceived risk for falling as collectively these appear to hold great therapeutic promise.
5. It is also concluded that older age knee osteoarthritis cases should be screened for their falls risk periodically including pre surgery and made aware of their falls risk [even post surgery] and their assistance should be sought in averting falls in the future, rather than ignored.
6. In planning to avert excess falls associated knee osteoarthritis disability, efforts to address knee extensor muscle weakness, muscle wasting, and deficient reflex responsiveness, and pain as well as efforts to minimize falls risk factors such as fear or stress, should be forthcoming at all disease stages.
7. However, even if deemed effective when studied in controlled conditions, some falls preventive programs may not be sufficiently personalized or accessible to all who

need these, thus accounting for the high [40%] percentage of those with a falls history undergoing surgery [57] and implying social determinants of health such as community based health support services and offerings and public health budgets may need to be vastly improved and increased accordingly and equitably distributed [72].

8. At the same time, data show not all home based exercises or treatment plans are likely to prove helpful if not individualized, delivered empathetically, and closely monitored, especially among those with one or more balance problems, cardiovascular conditions and others, such as intractable pain, depression, and neuromuscular deficits.

To impact the immense global burden of knee osteoarthritis as well as falls, where both obesity-a knee osteoarthritis correlate-that is rising along with frailty and that place elders at risk for multiple falls and functional impairments warrants the timely development of sound insightful public health prevention and mitigation strategies, elderly health prevention and intervention measures, plus resource development and sound allocation of these resources [73,74].

Funding: None.
Acknowledgments: None.
Conflicts of Interest: None.

References

1. Khani Y, Salmani A, Elahi M, Sadooghi Rad E, Bahrami Samani A, et al. Peri-operative protein or amino acid supplementation for total joint arthroplasty: a systematic review and meta-analysis. J Orthop Surg Res. 2025. 20: 439.
2. Alenazi AM. The interaction between knee osteoarthritis and multimorbidity with fall risk: a longitudinal study using data from the Osteoarthritis Initiative. Clin Rehabil. 2026. 12: 2692155261420780.
3. Waghorn J, Maxwell SP, Rayner SE, Moyer R, Rockwood K, et al. Association of frailty with risk of osteoarthritis development, progression, and worse clinical outcomes in older adults. J Rheumatol. 2026. 53: 314-321.
4. Yoshikawa A, Wu HS. Factors associated with falls among community-dwelling older adults with osteoarthritis: a sex subgroup analysis. J Appl Gerontol. 2026. 45: 86-96.
5. Cai G, Li X, Zhang Y, Wang Y, Ma Y, et al. Knee symptom but not radiographic knee osteoarthritis increases the risk of falls and fractures: results from the Osteoarthritis Initiative. Osteoarthritis Cartilage. 2022. 30: 436-442.
6. Zhang Y, Li X, Wang Y, Ge L, Pan F, et al. Association of knee and hip osteoarthritis with the risk of falls and fractures: a systematic review and meta-analysis. Arthritis Res Ther. 2023. 25: 184.
7. Iijima H, Shimoura K, Aoyama T, Takahashi M. Low back pain as a risk factor for recurrent falls in people with knee osteoarthritis. Arthritis Care Res. 2020. 7.
8. Rosadi R, Jankaew A, Wu PT, Kuo LC, Lin CF. Factors associated with falls in patients with knee osteoarthritis: a cross-sectional study. Medicine (Baltimore). 2022. 101: 32146.
9. Veronese N, Koyanagi A, Soysal P, Bolzetta F, Dominguez LJ, et al. Dynapenic abdominal obesity and susceptibility to fall: a prospective analysis of the Osteoarthritis Initiative. Front Nutr. 2023. 10: 1153399.
10. Tsindos T, Ayton D, Soh SE, Ackerman IN. Perceptions of falls risk and falls prevention among people with osteoarthritis. Disabil Rehabil. 2022. 44: 1839-1846.
11. Wilfong JM, Perruccio AV, Badley EM. Examination of the increased risk for falls among individuals with knee osteoarthritis: a Canadian longitudinal study on aging population-based study. Arthritis Care Res. 2023. 75: 2336-2344.
12. Veronese N, Honvo G, Bruyère O, Rizzoli R, Barbagallo M, et al. Knee osteoarthritis and adverse health outcomes: an umbrella review of meta-analyses of observational studies. Aging Clin Exp Res. 2023. 35: 245-252.
13. Phu S, Sturnieks DL, Lord SR, Okubo Y. The impact of age on muscle and kinematic responses following an unpredictable forward slip while walking. Clin Biomech (Bristol). 2026. 134: 106779.
14. G di Laura Frattura G, Filardo G, Giunchi D, Fusco A, Zaffagnini S, et al. Risk of falls in patients with knee osteoarthritis undergoing total knee arthroplasty: a systematic review and best evidence synthesis. J Orthop. 2018. 15: 903-908.
15. Tasci Bozbas G, Sendur OF, Aydemir, AH. Primary knee osteoarthritis increases the risk of falling. J Back Musculoskelet Rehabil. 2017. 30: 785-789.
16. Li Y, Hou L, Zhao H, Xie R, Yi Y, et al. Risk factors for falls among community-dwelling older adults: a systematic review and meta-analysis. Front Med (Lausanne). 2023. 9: 1019094.
17. Mat S, Tan PJ, Ng CT, et al. Mild joint symptoms are associated with lower risk of falls than asymptomatic individuals with radiological evidence of osteoarthritis. PLoS One. 2015. 22: 0141368.
18. Manlapaz DG, Sole G, Jayakaran P, Chapple CM. Risk factors for falls in adults with knee osteoarthritis: a systematic review. PM R. 2019. 11 :745-757.
19. Norouzi P, Javadian Y, Hosseini SR, et al. Comparison of falls and its determinants in the elderly with and without knee osteoarthritis. J Babol University of Med Sci. 2023. 25: 46-57.
20. Raizah A, Reddy RS, Alshahrani MS, Tedla JS, Dixit S, et al. Investigating knee joint proprioception and its impact on limits of stability using dynamic posturography in individuals with bilateral knee osteoarthritis-a cross-sectional study of comparisons and correlations. J Clin Med. 2023. 12: 2764.
21. Iosimuta N, Santos WN, Sousa T, Jardim R, Matos A. Number of falls in elderlies and adults with knee osteoarthritis (KOA). Arch Phys Med Rehabil. 2022. 103: 36.
22. Iijima H, Aoyama T. Increased recurrent falls experience in older adults with coexisting of sarcopenia and knee osteoarthritis: a cross-sectional study. BMC Geriatr. 2021. 21: 698.
23. van Schoor NM, Dennison E, Castell MV, Cooper C, Edwards MH, et al. EPOSA research group. Clinical osteoarthritis of the hip and knee and fall risk: the role of low physical functioning and pain medication. Semin Arthritis Rheum. 2020. 50: 380-386.
24. Cheng LY, Chien YC, Lin TT, Lin JY, Cheng HT, et al. Assessment of gait and balance in elderly individuals with knee osteoarthritis using inertial measurement units. Sensors. 2025. 25: 6288.

25. Mawarikado Y, Uchihashi Y, Inagaki Y, Ogawa, M., Uchihara, Y., et al. Relationship between history of falls and foot pressure centre parameters during gait and stance in patients with lower-limb osteoarthritis. Sci Rep. 2025. 15: 26723.
26. Saokhieo P, Pliannuom S, Vidhayakula N, Tavivadhanasubhakij I, Promprasit T, et al. Factors associated with falls in older adults: a retrospective hospital-based study using comprehensive geriatric assessment in Thailand (2020-2023). J Prim Care Comm Hlth. 2025. 16: 21501319251385068.
27. Le Rossignol S, Fraser E, Grant A, Doma K, Wilkinson M, et al. Patients with knee osteoarthritis have altered gait and gaze patterns compared to age-matched controls: a pilot study. PLoS One. 2023. 18: 0283451.
28. Mak JKL, Tan KCB, Wong JSH, Chung MMH, Cheung CL. Foot and knee deformities in relation to functional limitations and incident osteoarthritis: a prospective cohort study. Osteoporos Sarcopenia. 2024. 10: 114-118.
29. Harris R, Strotmeyer ES, Sharma L, Kwoh CK, Brach JS, et al. The association between severity of radiographic knee oa and recurrent falls in middle and older aged adults: the Osteoarthritis Initiative. J Gerontol A Biol Sci Med Sci. 2023. 78: 97-103.
30. Taqi A, Gran S, Knaggs RD. Current use of analgesics and the risk of falls in people with knee osteoarthritis: a population-based cohort study using primary care and hospital records. Osteoarthr Cartil Open. 2021. 3: 100165.
31. Silverman S, Schepman P, Rice JB, Beck CG, Pajerowski W, et al. Risk factors associated with falls and fractures following prescription of opioids among privately insured patients with osteoarthritis. J Health Econ Outcomes Res. 2022. 9: 47-56.
32. Wang F, Xiao J, Song Z, Zhang C, Zhu Z. The association between anserine bursa pain and fall susceptibility: a prospective analysis of the osteoarthritis initiative. Front Aging. 2025. 6: 1666627.
33. Capiau A, Huys L, van Poelgeest E, van der Velde, N Petrovic M, et al. EuGMS Task, Finish Group on FRIDs. Therapeutic dilemmas with Benzodiazepines and Z-drugs: insomnia and anxiety disorders versus increased fall risk: a clinical review. Eur Geriatr Med. 2023. 14: 697-708.
34. Yin M, Fang W, Cheng Y, Feng Y. Personalizing fall fear prevention in knee osteoarthritis: an interpretable prediction framework via IGKSO synchronous optimization and SHAP-based risk stratification. Front Public Health. 2026. 26: 1749921.
35. Ofori-Asenso R, Ackerman IN, Soh SE. Prevalence and correlates of falls in a middle-aged population with osteoarthritis: data from the Osteoarthritis Initiative. Health Soc Care Community. 2020. 14.
36. González-Olguín A, Ramos Rodríguez D, Higueras Córdoba F, Martínez Rebolledo L, Taramasco C, et al. Classification of center of mass acceleration patterns in older people with knee osteoarthritis and fear of falling. Int J Environ Res Public Health. 2022. 19: 12890.
37. Aljehani MS, Crenshaw JR, Rubano JJ, Dellose SM, Zeni Jr JA. Falling risk in patients with end-stage knee osteoarthritis. Clin Rheumatol. 2021. 40: 3-9.
38. Lee PA, Wu KH, Lu HY, Su KW, Wang TM, et al. Compromised balance control in older people with bilateral medial knee osteoarthritis during level walking. Sci Rep. 2021. 11: 3742.
39. Di Iorio A, Pellegrino R, Paganelli R, Candeloro M, Bandinelli S, et al. The skeletal muscle function deficit: From an operational definition to clinic results from the InCHIANTI longitudinal study. Exp Gerontol. 2026. 213: 113018.
40. Ren X, Lutter C, Kebbach M, Bruhn, S., Yang, Q, et al. Compensatory responses during slip-induced perturbation in patients with knee osteoarthritis compared with healthy older adults: an increased risk of falls? Front Bioeng Biotechnol. 2022. 15: 893840.
41. De Freitas REJ, De Freitas JGA, Vieira CP, Endres DC, Inacio FM. Analysis of postural control in patients diagnosed with unilateral knee osteoarthrosis and its relationship with the risk of falls. Adv Orthop. 2023. 5536304.
42. Kubitza J, Reuschenbach B, Drey M, Eberl I. Das sturzbedingte Liegetrauma: The long lie fall: An overview of consequences, diagnostics and interventions. Z Gerontol Geriatr. German. 2026.
43. Ribeiro IC, Coimbra AMV, Costallat BL, Coimbra IB. Relationship between radiological severity and physical and mental health in elderly individuals with knee osteoarthritis. Arthritis Res Ther. 2020. 22: 187.
44. Zheng Z, Luo H, Xu W, Shi L, Wang F. et al. Association between elevated magnesium intake and reduced risk of recurrent falls and frailty in osteoarthritis: data from the Osteoarthritis Initiative. J Nutr Health Aging. 2023. 27: 775-784.
45. Chu MJ, Lee CK, Kim HJ, Park IB. The effects of walking exercise using water inertial load on dynamic balance ability and pain in women aged 65 years and older with knee osteoarthritis: a randomized clinical trial. J Funct Morphol Kinesiol. 2025. 10: 469.
46. Lei K, Chen Y, Guo W. Risk prediction model performances for sarcopenia in middle-aged and elderly people: a systematic review and meta-analysis. BMC Musculoskelet Disord. 2026.
47. Overton M, Swain N, Falling C, Gwynne-Jones D, Fillingim R. Understanding the biopsychosocial knee osteoarthritis pain experience: an ecological momentary assessment. Pain Rep. 2024. 9: e1172.
48. Alenazi AM. Multisite pain is longitudinally associated with an increased risk of fall among older adults with or at risk of knee osteoarthritis: Data From the Osteoarthritis Initiative. Am J Phys Med Rehabil. 2025. 104: 452-457.
49. Ong MT, Tsang KC, Lu VYZ, Yam SLS, Shen W, et al. Effect of serum 25-hydroxyvitamin D level on quadriceps strength: a systematic review and meta-analysis. BMC Sports Sci Med Rehabil. 2024. 16: 215.
50. Kiyohara M, Hamai S, Okazaki K, Fujiyoshi D, Mizu-Uchi H, et al. Evaluation of the balance function before and after total knee arthroplasty using Berg balance scale. Arch Orthop Trauma Surg. 2022. 142: 3461-3467.
51. Bozyiğit B, Söylemez E, Apaydin AS. The impact of fall history on instability, disability, and anxiety in patients with chronic neck pain. Turk J Med Sci. 2025. 56: 162-168.
52. Vertesich K, Staats K, Schneider E, Willegger M, Windhager R, et al. Balance and mobility in comparison to patient-reported outcomes-a longitudinal evaluation after total hip and knee arthroplasty. J Clin Med. 2025. 14: 4135.

53. Chen YY, Weng LC, Li YT, Huang HL. Mediating effect of self-efficacy on the relationship between social support and self-management behaviors among patients with knee osteoarthritis: a cross-sectional study. BMC Geriatr. 2022. 22: 635.
54. Liu P, Hamid MSBA, Shi Y, Deng H, Hafiz E, et al. Associations between muscle stiffness, muscle co-activation, and balance in older individuals with knee osteoarthritis: a cross-sectional study. Eur J Med Res. 2025. 31: 62.
55. Guo Y, Liu Y, Wang G, Chen W, Zhou Y, et al. Pain, post-traumatic stress, and sleep disturbance in older adults with knee osteoarthritis: a path analysis of the mediating effect of depression and social support. BMC Geriatr. 2026.
56. Tsindos T, Ayton D, Soh SE, Ackerman IN, et al. Perceptions of falls risk and falls prevention among people with osteoarthritis. Disabil Rehabil. 2022. 44: 1839-1846.
57. Haber T, Dyer B, Klyne DM, Ferreira PH, Nicolson P, et al. Insomnia and progression to total joint replacement in hip (41 737) and knee pain (81 958): a prospective UK biobank cohort study. RMD Open. 2026. 12: e006357.
58. Fu F, Dong L, Lian J, Liu C, Pang T, et al. Tracking global quality of life trajectories in knee osteoarthritis: a population-based long-term analysis. Ther Adv Musculoskelet Dis. 2026. 18: 1759720X261426247.
59. Fan X, Soh KG, Mun CY, Soh KL. Effects of different types of Tai Chi intervention on motor function in older adults: a systematic review. Aging Clin Exp Res. 2025. 37: 32.
60. Park H. Assessment of balance control using limits of stability and Tandem walk Tests: Immediate and long-term effects of textured insoles in individuals with knee osteoarthritis. J Bodyw Mov Ther. 2025. 43: 102-107.
61. Cheever CR, Sim H, Ahmidouch MY, Moon J, Powell A, et al. Evidence-based footwear recommendations for older adults: enhancing mobility, comfort, and fall prevention. J Am Geriatr Soc. 2026. 74: 556-565.
62. De Souza TS, Pereira DB, Hagihara RJ, Fuzinato CT, Ribeiro AP. Effect of rehabilitation program for muscle strength, balance, and gait retraining with visual feedback in older women with and without knee osteoarthritis: clinical trial. J Pers Med. 2025. 15: 631.
63. Tangkanjanavelukul P, Khumtong N, Chaemklan K, Kumar Agrawal D, Rachnavy. Impact of combined balance and strength exercise program on lower limb energy flow in individuals with knee osteoarthritis. Front Sports Act Living. 2025. 7: 1661125.
64. Vincenzo JL, Wingood M, Council SK, Scott AJ, Brach JS, et al. Implementing STEADI for routine falls prevention of all older adults attending outpatient physical therapy: key partner perspectives. Front Health Serv. 2026. 5: 1718490.
65. Amano T, Tamari K, Suzuki N. Cross-validation of a screening tool to distinguish between fallers and nonfallers in community-dwelling older adults with knee osteoarthritis. Arch Phys Med Rehabil. 2020. 102: 598-603.
66. Veronese N, Siri G, Cella A, Maggi S, Zigoura E, et al. The Multidimensional Prognostic Index predicts falls in older people: an 8-year longitudinal cohort study of the Osteoarthritis Initiative. J Am Med Dir Assoc. 2020. 2: 669-674.
67. Makino K, Lee S, Bae S, Harada K, Katayama O, et al. Simplified decision-tree algorithm to predict falls for community-dwelling older adults. J Clin Med. 2021. 10: 5184.
68. Wang Z, Hou Y, Yang L. The effect of bilateral knee osteoarthritis on spatiotemporal gait parameters during incline walking: implications for gait rehabilitation. PeerJ. 2026. 14: e20910.
69. Joseph SS, Ampat G. Neuromuscular and proprioceptive exercises for knee osteoarthritis: building balance, stability, and patient confidence. J Surg Case Rep. 2025. 12: rjaf1011.
70. Mohammadi V, Mohebitabar S, Mohammad Rahimi GR. Effects of a targeted exercise program on pain, balance, proprioception, and function in adults with knee osteoarthritis. Biol Res Nurs. 2026. 10998004261425677.
71. Maruszewska A, Ambroży T, Rydzik Ł. Risk factors and socioeconomic determinants of falls among older adults. Frontiers in Public Health. 2025. 13: 1571312.
72. Foxworth J, Collins ME, Williams A. Fall risk and social determinants of health in older adults in a medically underserved community. Topics Geriatr Rehabil. 2025. 41: 288-292.
73. Xu J, Lei M, Xu D. Global, regional, and national burden of knee osteoarthritis attributable to high BMI: a systematic analysis from 1990 to 2021 and projections to 2050. Front Publ Hlth. 2025. 13: 1668257.
74. Ma Q, Shang X, Zhang X, Nie X, Lu L. Dynamic burden of elderly knee osteoarthritis: global, regional, and national analysis (global burden of disease 1990 to 2050). JAAOS Global Research & Reviews. 2026. 10: e25.

Copyright: © 2026 Ray Marks. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.