

Exploring how physiotherapists consider falls risk during the clinical management of
people with osteoarthritis

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Abstract

Introduction. Falls and the number of people diagnosed with osteoarthritis are on the rise. In Aotearoa New Zealand (AoNZ), physiotherapists are well-positioned to incorporate falls screening of people with osteoarthritis into their routine practice. Early identification of falls risk presents an opportunity to implement preventive measures that could reduce the incidence of future falls. The literature suggests a link between osteoarthritis and an increased risk of falls, but the connection is not yet fully understood. Despite this, people with osteoarthritis have been consistently shown to be at risk of falls; therefore, considering falls in assessment and offering appropriate treatment should be routine. I wanted to explore how physiotherapists in AoNZ conceptualised the relationship between falls risk and osteoarthritis.

Objective. To explore how physiotherapists consider falls risk during the clinical management of people with osteoarthritis, if they are screening for falls, or if they include falls-prevention strategies in their practice.

Methods. I used a qualitative descriptive approach, collecting data via 10 semi-structured interviews and analysing them using directed content analysis. Participants were eligible if they were physiotherapists in AoNZ who worked in musculoskeletal practice and commonly managed people with lower limb osteoarthritis.

Results. Three themes were conceptualised from the data. Theme one: 'What is the risk of a fall?', this theme explores the physiotherapists reasoning about falls risk. Theme two: 'Making assumptions about patients' explores physiotherapists' assumptions when deciding whether a person with osteoarthritis is at risk of a fall. Theme three: 'Gatekeeper of treatment' looks at factors influencing behaviour behind assessment which direct the treatment plan of people with osteoarthritis.

Conclusion. A physiotherapist's decision to assess falls risk is influenced by their assumptions about perceived falls risk and beliefs about their clinical role. These factors appear to shape their clinical reasoning and decision-making. My findings suggest that some physiotherapists practice reactively rather than proactively when assessing people with osteoarthritis. They provide assessment and treatment only if the patient indicates a fall or fits a preconceived notion of what constitutes a falls risk. Work is needed to raise physiotherapists' awareness of falls risk in people with osteoarthritis. Achieving this could include formal teaching and updating guidelines, recommendations, and assessment forms.

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Attestation of authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor used artificial intelligence tools or generative artificial intelligence tools (unless it is clearly stated, and referenced, along with the purpose of use), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Signature:

Date: 18.2.2025

Positionality statement

I am a novice postgraduate researcher with a degree in physiotherapy from Cardiff University in the United Kingdom. My clinical experience focused on musculoskeletal outpatient services, rehabilitation wards, and community-based work with people at risk of falls. After moving to New Zealand in 2015. My work across the Auckland and Wellington regions allowed me to gain valuable insights into the participants' social and cultural contexts, enabling me to empathise with them.

In 2019, I left clinical practice and joined the physiotherapy teaching team at the Auckland University of Technology. As an emerging academic, I often reflect on my clinical practice, especially regarding osteoarthritis and fall prevention. My interest in this area deepened when I read a research article linking falls to osteoarthritis. It made me question why, as a clinician, I hadn't made that connection myself and whether other clinicians might feel the same way.

Before beginning my research, I conducted a pre-supposition interview with my supervisors to explore my biases and perspectives on this topic. The interview results, which identified aspects of my professional identity that may influence my perspective, are discussed in the methods section.

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Ethics approval

Ethics approval was obtained from the Auckland University of Technology Ethics Committee (AUTEK) on 16/10/22. The approval code is 22/289. The ethical approval can be found in Appendix C.

Chapter 1 Introduction

This research explores physiotherapists' understanding of the relationship between falls risk and osteoarthritis in AoNZ. I chose this research inquiry based on my experiences as a musculoskeletal physiotherapist and falls prevention community physiotherapist.

As a new graduate physiotherapist, I worked in the public and private sectors but spent most of my clinical years as a musculoskeletal physiotherapist in public hospitals. Working in private practice and hospitals has given me experiences that have shaped my viewpoint on the treatment and management of chronic conditions such as osteoarthritis. While treating patients with chronic conditions in the hospital, I noted how they were managed, the disciplinary teams involved, and the funding available. In the outpatient department, I set up an osteoarthritis management plan; I updated a flow chart (Appendix A) that indicated what should be assessed, common treatments we could provide, and onward referrals available. I became interested in falls when a role was developed from Accident Compensation Corporation (ACC) funding. The role was to deliver a falls prevention programme in the community to those unable to access community strength and balance classes or come into the hospital for an assessment. While working in older people's rehabilitation services, fracture clinics, medical assessment and planning units, and orthopaedic wards, I saw the impact falls have on a person's life and how they can be a life-changing event.

I became aware of research linking osteoarthritis and falls whilst working at Auckland University of Technology (AUT). This made me reflect on my practice and how we could be missing the opportunity to assess and treat falls in a cohort of people with osteoarthritis, who have an increased falls risk. In AoNZ, physiotherapists commonly manage people with osteoarthritis and those at risk of falling. I reflected on the physiotherapy management of osteoarthritis, particularly the flow chart of treatment that was implemented at my place of work (Appendix A). I wondered if other physiotherapists consider falls risk during the clinical management of people with osteoarthritis. To my knowledge, there has been no research in AoNZ to study the link. This led to the research question: How do physiotherapists understand the relationship between osteoarthritis and falls risk?

1.1 Falls

For this study, I am using the term 'falls' to describe a fall. A fall is "*an event which results in a person coming to rest inadvertently on the ground or floor or other lower level*" (World Health

Organisation, 2021). Falls are a major public health concern associated with injury, death and high costs (World Health Organisation, 2021). Globally, 37.3 million falls requiring medical attention occur each year; approximately 684,000 of these are fatal, making falls the second leading cause of death by unintentional injury (World Health Organisation, 2021). This figure does not account for the undocumented falls, so it is likely to be higher. In AoNZ, 30 per cent of people aged 65+ will have a fall once a year in the community. Out of this 30 per cent, five per cent of them will have a fracture or require hospitalisation (Health Quality and Safety Commission New Zealand, 2022). Consequently, high fall-associated costs worldwide are reported; in the United States, the average annual cost associated with falls is \$26,143 (USD) per person (Newgard et al., 2021); this translated in 2018 to an overall cost of \$50 billion (USD) for nonfatal falls, and \$754 million (USD) related to fatal falls (Florence et al., 2018). In the United Kingdom, the Office for the Health Improvement and Disparities (2022) found the cost of falls was over £2bn a year. In AoNZ, this cost was \$1.56 billion (NZD) a year, as reported in 2021 (Accident Compensation Corporation, 2021). These figures do not include the intangible costs associated with a fall for the patient, such as reduced quality of life, reduced independence and decreased functional ability (Jónsdóttir & Ruthig, 2021).

1.2 Osteoarthritis

This research focuses on osteoarthritis of the lower limb, primarily hip and knee osteoarthritis. The definition of osteoarthritis is:

“a disorder involving movable joints characterised by cell stress and extracellular matrix degradation initiated by micro- and macro-injury that activates maladaptive repair responses including pro-inflammatory pathways of innate immunity. The disease manifests first as a molecular derangement (abnormal joint tissue metabolism) followed by anatomic, and/or physiologic derangements characterised by cartilage degradation, bone remodelling, osteophyte formation, joint inflammation and loss of normal joint function), that can culminate in illness.” (Kraus et al., 2015)

The number of people diagnosed with osteoarthritis globally in 2019 had increased by 113.25% since 1990 (Long et al., 2022). This prevalence is likely to increase because of the increase in known osteoarthritis risk factors such as, sedentary behaviour rates (Berenbaum et al., 2018), obesity and increasing age (Berenbaum et al., 2018; Murphy et al., 2008; World Health Organisation, 2023).

However, it is important to note that the increased risk of falls in people with osteoarthritis is not limited to those aged over 65 years. Ofori-Asenso et al. (2021) found a history of falls was common amongst people aged 45-64 who had osteoarthritis, and they recommended screening for falls risk and tailoring existing falls prevention interventions to this patient group. My research focuses on exploring physiotherapists' experience of people with osteoarthritis of all age groups and, their consideration of falls risk in the group of people they assess and treat in their usual practice.

1.3 What we know

The risk factors for falls are well documented; these include increased age, limited vision, poor mobility, poor cognition, medication side effects, physical inactivity, balance deficits and underlying medical conditions (World Health Organisation, 2021). Hip and knee osteoarthritis have also been shown to be a risk factor for falling (Arnold & Gyurcsik, 2012; Doré et al., 2015; Smith et al., 2018; Tsonga et al., 2015; van Schoor et al., 2020), which I have explored further in the literature review.

We know there is a large number of people falling (World Health Organisation, 2021) and the prevalence of osteoarthritis is increasing (Long et al., 2022). As the likelihood of developing osteoarthritis increases with age, the prevalence of osteoarthritis can be linked to the ageing population, with the world's population aged over 60 years expected to double to 2.1 billion by 2050 (World Health Organisation, 2022). We are also aware of the impact falls have on a person and the healthcare system (Health Quality and Safety Commission New Zealand, 2022; Jónsdóttir & Ruthig, 2021).

Physiotherapists are front-line healthcare professionals who commonly manage people with osteoarthritis in AoNZ (Abbott et al., 2019; Baldwin et al., 2017; O'Brien et al., 2021). There have been successful joint clinics for people with osteoarthritis set up in AoNZ, which are physiotherapist-led (Abbott et al., 2019). Physiotherapists are, consequently, well placed to incorporate into their practice falls screening of people with osteoarthritis. They commonly manage osteoarthritis and prescribe falls prevention programmes like the Otago Falls Programme; an exercise-based programme shown to reduce falls in people with osteoarthritis (Chao et al., 2020).

1.4 What we need to know

The extent to which physiotherapists assess people with osteoarthritis for falls risk has received little attention, this is despite knowing the impact of falls and that physiotherapists are well placed to deliver a falls assessment. One exception is a recent study by Ackerman et al. (2020) in Australia, which suggested that falls assessment may not be considered routinely by physiotherapists in people with osteoarthritis. There is no research to determine whether this is true for AoNZ. If physiotherapists are not screening people with osteoarthritis for falls risk, there might be a missed opportunity to prevent injury and reduce health costs, especially as most falls are preventable (James et al., 2020). This research will be an important step in gaining insight into what is happening in clinical practice.

1.5 Implications

The findings of this study will enhance our understanding of how physiotherapists manage falls in people with osteoarthritis. By identifying current practices, we can propose changes that may improve assessments and interventions, ultimately reducing the risk of falls. This approach aims to support more effective management of people with osteoarthritis in clinical practice to help prevent and reduce falls.

1.6 Organisation of thesis

- Chapter One introduces osteoarthritis and falls, the background for this research, and an outline of the study aims.
- Chapter Two is a narrative literature review that incorporates a structured literature search using two online databases, EBSCO (Medline, CINAHL complete) and Scopus. I present the literature surrounding the link between osteoarthritis and falls and the existing research on physiotherapy management of falls among people with osteoarthritis.
- Chapter Three outlines my rationale for using qualitative descriptive methodology. The methods section includes the study design, participants, recruitment, data collection, data analysis, ethics, rigour and credibility.
- Chapter Four presents the findings through three themes: (1) *Physiotherapists' risk assessment of falls*, (2) *Making assumptions about patients*, and (3) *Gatekeeper of treatment*.
- Chapter Five is a discussion of my key findings, the clinical implications and potential future research and conclusion.

1.7 Rationale for the study

The number of people falling and the number of people diagnosed with osteoarthritis are on the rise. Physiotherapists who frequently manage osteoarthritis in AoNZ are well-positioned to incorporate fall-risk screening and fall prevention into their care (Abbott et al., 2019; Baldwin et al., 2017; O'Brien et al., 2021). Although evidence indicates the increasing prevalence of falls, there is a lack of research on whether physiotherapists routinely assess falls risk in people with osteoarthritis, particularly in AoNZ. This study aims to examine the literature on the relationship between osteoarthritis and falls, and to answer the research question: How do physiotherapists understand the relationship between osteoarthritis and falls risk when working with people with osteoarthritis?

1.8 Delimiters

The study focused on the current physiotherapy management of osteoarthritis across AoNZ by interviewing physiotherapists who routinely assess and treat people with osteoarthritis.

Assessment forms used by physiotherapists have yet to be investigated as they fall outside the intended scope of this study.

Chapter 2 Literature Review

This chapter presents a narrative review of the literature investigating the factors linking osteoarthritis and falls. In preparation for my qualitative enquiry into physiotherapists' assessment of people with osteoarthritis, I undertook a structured search and narrative literature review to answer the following questions: Is osteoarthritis an independent risk factor for falls, and what factors put people with osteoarthritis at increased risk of falls?

2.1 Literature review search methods

In April 2024, I undertook a structured search using two online databases, EBSCO (Medline, CINAHL complete) and Scopus (Table 1). I combined synonyms of the two key constructs, osteoarthritis and falls.

The search focused on the link between osteoarthritis and falls. Due to the abundance of separate literature on falls and osteoarthritis, the search was limited to a title search to ensure that the primary focus was on the literature linking falls and osteoarthritis. Linking the search terms "osteoarthritis AND fall" or "OA and fall*" meant this focus was maintained. Inclusion criteria were articles including participants with hip or knee osteoarthritis only. This was chosen as the knee and hip are the most frequently affected lower limb joints (Long et al., 2022); exclusion criteria were intervention studies, studies that looked at pre- and post-joint replacement, those including participants with health conditions in addition to osteoarthritis, and studies of fear of falling. The date range for the research included was set from 2000 to the present day to obtain up-to-date research, and only English language articles were included.

Table 1 *Structured literature search*

Database	Search terms	Limits	Results	After screening
EBSCO (Medline and CINAHL complete)	“Osteoarthritis” AND “fall*” OR “OA” and “fall*”	English, 2000+, hip and knee OA, title search	212	52
Scopus	“Osteoarthritis” AND “fall*” OR “OA” and “fall*”	English, 2000+, hip and knee OA, title search	123	55
Total remaining to review after removing duplicates			59	
Total number of articles after full review			52	

2.1.1 Screening and article selection

After completing the database search, the title and abstract of the retrieved articles were screened and evaluated based on the exclusion and inclusion criteria. The remaining articles were imported into Endnote 21 (Clarivate, 2023), where duplicates were excluded. The full texts were reviewed using the inclusion criteria to finalise article selection.

2.1.2 Data extraction and synthesis

Data were extracted from the 52 included studies: The authors, location, study type, demographics, and findings. Each study was graded on a scale from one to seven using Melnyk and Fineout-Overholt (2015) levels of evidence, a hierarchy was used to rank the strength of research evidence, with level 1 (e.g., systematic reviews or meta-analyses of randomised controlled trials) being the strongest, and level 7 (e.g., expert opinion) being the weakest. The evidence was then categorised into factors related to falls risk and osteoarthritis. This categorisation, guided by elements of the research question, provided a framework for employing an inductive approach to analyse the data and develop themes. The question of whether osteoarthritis is an independent risk factor for falls will be addressed. Then factors identified in the review as being associated with osteoarthritis and the risk of falls will be considered.

2.2 Is osteoarthritis an independent risk factor for falls?

None of the systematic reviews identified directly addressed whether osteoarthritis was an independent risk factor for falls. However, six studies using various methods attempted to address the question.

Ackerman et al. (2021) and Soh et al. (2020) conducted longitudinal studies using the same data set from the Osteoarthritis Initiative (OAI) (Osteoarthritis Initiative, 2020) and found osteoarthritis is not an independent risk factor for falls. This data set is a multicentre 10-year study that included men and women of all ethnicities aged between 45 and 79 years who had, or were at risk of, symptomatic femoral-tibial knee osteoarthritis. They excluded those with bilateral end-stage knee osteoarthritis, those with rheumatoid arthritis, and those who could not undergo imaging. In contrast, Harris et al. (2023) using the same OAI dataset, reported that older adults with radiographic knee osteoarthritis had a higher likelihood of falls than those without knee osteoarthritis, independent of other risk factors, this could be attributed to the study only looking at older adults, whereas Ackerman et al. (2021) and Soh et al. (2020) looked across all ages.

Three other studies also found that osteoarthritis may be an independent risk factor for falls (Doré et al., 2015; Smith et al., 2018; Wilfong et al., 2023). Doré et al. (2015), in a longitudinal analysis of data from 1,619 participants, found symptomatic hip and knee osteoarthritis are important risk factors for falls. The results were controlled for age, sex, race, body mass index, a history of prior falls, a history of neurologic or pulmonary diseases, and current use of narcotic medications. A limitation of this study is that the recording of a fall was reliant on the participant and limited to the date range of 12 months prior, potentially missing a proportion of falls that happened outside this timescale. This measure is prone to recall bias and individual interpretation of what constitutes a fall (Dolan & Taylor-Piliae, 2020; Sonnad et al., 2014). This potential underreporting of falls, which would have given more evidence to support outcomes, applies to any data using patient self-reported falls as a measure, including those using the OAI (Ackerman et al., 2021; Cai et al., 2022; Doré et al., 2015; Harris et al., 2023; Ofori-Asenso et al., 2021; Smith et al., 2018; Soh et al., 2020).

Wilfong et al. (2023), in a longitudinal study of 21,710 participants, noted different circumstances between those with and without knee osteoarthritis who fall, supporting the idea that knee osteoarthritis could be an independent risk factor for falls. Smith et al. (2018), using the OAI dataset identified people diagnosed with hip or knee osteoarthritis within a 12-month period, compared to those without osteoarthritis. They also observed that people with osteoarthritis have an increased falls risk when compared to people with similar characteristics without osteoarthritis. They also had a risk of underreporting falls by limiting their data to 12 months, similar to Doré et al. (2015), and by only recording falls that resulted in injuries and limited activity.

2.2.1 Summary of whether osteoarthritis is an independent factor

The studies suggesting osteoarthritis as an independent risk factor for falls risk were not high-level evidence; most didn't adjust for covariates and were based on age-restricted, time limited (12 months), longitudinal data primarily from the OAI, which relies on patient reported falls as the outcome measure. There are also varying definitions of osteoarthritis across studies: symptomatic, clinician-diagnosed, or radiologically diagnosed, which presents difficulties in comparisons between studies and in making statements about osteoarthritis in general. Despite this, there is a connection between osteoarthritis and falls, and the next section will explore the factors that influence the risk of falls in people with osteoarthritis.

2.3 Factors that influence the risk of falls in people with osteoarthritis

The factors included radiological evidence of osteoarthritis, pain, additional osteoarthritic joints, age, impairments and functional ability, a history of previous falls and difference between sexes. The highest level of evidence is presented first in each category.

2.3.1 Does the radiographic presence of osteoarthritis put people at increased risk?

The systematic reviews presented conflicting results on the link between radiographic lower limb osteoarthritis and increased falls risk. Zhang et al. (2023) and Deng et al. (2021) both found associations between radiographic knee osteoarthritis and an increased risk of falls. For the hip joint, Zhang et al. (2023) found radiographic osteoarthritis to be associated with a decreased falls risk, whereas Deng et al. (2021) found no link between falls and radiographic hip osteoarthritis. Both reviews point out that the quality of evidence of the included studies in their reviews was low to moderate. A review by Ng and Tan (2013) reported conflicting evidence for falls risk in older adults with radiographic osteoarthritis. Their review found one study that indicated an increased falls risk in older women with radiographic osteoarthritis, while other studies showed either a decreased or unchanged falls risk. Ng and Tan (2013) attributed these mixed findings to the varying criteria used to diagnose osteoarthritis.

The cross-sectional and cohort studies reviewed showed similar inconsistencies. All studies used the Kellgren-Lawrence system (Kellgren & Lawrence, 1957) to classify the presence and severity of osteoarthritis. Several studies found that radiographic knee osteoarthritis is not

significantly associated with falls risk (Alkan Melikoğlu & Kul, 2018; Cai et al., 2022; Foley et al., 2006) whereas symptomatic osteoarthritis is linked to falls (Cai et al., 2022; Foley et al., 2006).

Yet Harris et al. (2023), using data from the OAI, found older adults with radiographic knee osteoarthritis had a higher likelihood of recurrent falls, independent of other risk factors, suggesting that radiographic knee osteoarthritis is a risk factor for recurrent falls. Some studies found that higher severity of knee osteoarthritis increased falls risk (Bozbas et al., 2017; Khalaj et al., 2014). In contrast, Sonobe et al. (2024) found no association between the severity of radiographic knee osteoarthritis and falls risk in their cross-sectional study of 1,083 participants, and suggested that the patients' symptoms, knee pain, physical function and psychological factors should also be included. This suggestion is supported by Cai et al. (2022) who found symptomatic osteoarthritis is not statistically correlated with the radiological grade of osteoarthritis, indicating it is not the radiological grade, but the symptoms of osteoarthritis that increase the falls risk.

2.3.2 Radiographical evidence summary

The reviewed research provides conflicting evidence on whether the presence and severity of radiographically diagnosed osteoarthritis increase the risk of falls. Systematic reviews report a difference in the risk of falls between hip and knee osteoarthritis. An association was found between knee osteoarthritis and an increased risk of falls, but no association was reported between hip osteoarthritis and increased falls.

Many of the identified observational studies reported that radiographic knee osteoarthritis is not associated with falls. Ng and Tan (2013) suggest that the difference between outcomes found in studies may be due to the varying criteria used to diagnose osteoarthritis and whether the participants had symptoms or not. Cai et al. (2022), in a longitudinal study using data from the OAI, found no significant correlation between knee symptoms and radiological osteoarthritis grade, which might explain the conflicting findings. This suggests that studies should consider both symptom-based and radiographic diagnosis in osteoarthritis research.

2.4 Is pain a risk factor for osteoarthritis and falls?

Pain was the main symptom associated with osteoarthritis across the studies. Many outcomes were used to measure pain, such as the Western Ontario and McMaster Universities Osteoarthritis Index WOMAC (Cai et al., 2022; Foley et al., 2006; Mat et al., 2015; Soh et al., 2020; Tsonga et al., 2015), Visual Analogue Scale (VAS) (Bozbas et al., 2017), 36-item Short

Form Health Survey (SF-36) (Tsonga et al., 2015), Knee Injury and Osteoarthritis Outcome Score (KOOS) (Rosadi et al., 2022; Soh et al., 2020), Joint-Specific Severity (Doré et al., 2015), Patella Quadriceps Tenderness/Tendinitis Knee Exam (Xiong et al., 2023), Numerical Rating Pain Scale (NRPS) (Fidelis-de-Paula-Gomes et al., 2022), Pain-Related Self-Statement Scale (PRSS) (Fidelis-de-Paula-Gomes et al., 2022) and finally in some studies participants were just asked if they had pain (Barbour et al., 2019; Wilfong et al., 2023).

2.4.1 Systematic reviews on pain associated with osteoarthritis and falls risk

All the identified systematic reviews investigated the relationship between osteoarthritis symptoms, particularly pain and stiffness, and falls. Zhang et al. (2023) found inconsistent findings linking pain and falls risk, but concluded symptomatic hip and knee osteoarthritis did increase the risk of falls.

Similarly, reviews by Manlapaz et al. (2019) and Ng and Tan (2013) also found inconsistent findings on pain and its impact on falls risk for people with osteoarthritis. In the review by Deng et al. (2021), 10 of the 21 studies reviewed mentioned pain as a symptom of knee osteoarthritis, identifying pain as a factor increasing the risk of falls. Deng et al. (2021) also discussed how pain can negatively impact postural control, muscle function, and proprioception in knee osteoarthritis. They concluded that the low number and high heterogeneity of studies examining these outcomes in hip osteoarthritis prevented any conclusion on possible links.

2.4.2 Observational studies on pain and falls risk

Doré et al. (2015) undertook a longitudinal study of 1,619 participants and found that symptomatic hip and knee osteoarthritis are important risk factors for falls after adjusting for covariates. Other observational studies also linked pain with increased falls risk for people with osteoarthritis (Alkan Melikoğlu & Kul, 2018; Barbour et al., 2019; Cai et al., 2022; Doré et al., 2015; Foley et al., 2006; Rosadi et al., 2022; Tsonga et al., 2015). Discrepancies between sexes for symptomatic osteoarthritis have been found by Barbour et al. (2019). They investigated knee osteoarthritis and the risk of medically treated falls, and found older men with symptomatic knee osteoarthritis had a greater risk of an injurious fall than women. Severity and intensity of pain were also linked to higher falls risk; those with severe symptoms were more at risk of falls than those with mild symptoms (Mat et al., 2015). Severity of symptoms

was also linked to a history of falls, where the severity of knee pain was linked to a higher odds ratio for falls (Sonobe et al., 2024).

Some studies found knee symptoms did not contribute to the risk of falling (Bozbas et al., 2017; Soh et al., 2020; Wilfong et al., 2023; Xiong et al., 2023). Wilfong et al. (2023) and Xiong et al. (2023) reported pain only increased the risk of recurrent falls. Fidelis-de-Paula-Gomes et al. (2022) found no relationship between pain intensity and the number of falls in their cross-sectional study of 100 older people with knee osteoarthritis.

2.4.3 Pain management and falls risk in osteoarthritis

No high-level evidence has been reported on the relationship between medications and falls risk in people with osteoarthritis. Cross-sectional and cohort studies reported various medicines used to manage osteoarthritis symptoms, focusing on medication to control pain or inflammation, which also increases falls risk. These include bisphosphonates (Smith et al., 2018), non-steroidal anti-inflammatory drugs (Taqi et al., 2021), opioids (Aparasu & Chatterjee, 2014; Ofori-Asenso et al., 2021; Silverman et al., 2022; Taqi et al., 2021; van Schoor et al., 2020), narcotics (Alshehri et al., 2019; Rolita et al., 2013) and paracetamol (Taqi et al., 2021). Only Bozbas et al. (2017) looked at medications and falls risk, finding no significant difference between analgesic use and risk of falling; however, only 15 of the 98 participants were using medication, and the study did not clarify specific medications. This point is important as polypharmacy in the elderly (Aparasu & Chatterjee, 2014) and medication interactions may further increase falls risk (Khan et al., 2024).

2.4.4 Pain summary

The systematic reviews and observational studies showed conflicting results, possibly due to the various outcome measures used to assess pain. There does seem to be a link between pain and falls risk, and there is a consensus that certain medications and multiple medications heighten falls risk among people with osteoarthritis. However, no randomised controlled trials or systematic reviews specifically examine the impact of medications on falls risk in this population.

2.5 Additional osteoarthritic joints associated with falls risk

Only one systematic review by Manlapaz et al. (2019) reported that an increased number of symptomatic joints is an intrinsic risk factor for falls in people with knee osteoarthritis. In their

review of 11 studies, two high-quality studies found this, with Manlapaz et al. (2019) reporting them as moderate-level evidence. They emphasised that an increased number of symptomatic osteoarthritis joints should prompt clinicians to conduct a falls risk assessment.

Several observational studies support the conclusions of Manlapaz et al. (2019). Ofori-Asenso et al. (2021), in a longitudinal study using data from the OAI, found having both knee and hip osteoarthritis increases falls risk compared to knee osteoarthritis alone. Similarly, Rosadi et al. (2022), in a cross-sectional study of 372 people with knee osteoarthritis, found, using univariate logistic regression, that bilateral knee osteoarthritis is significantly associated with risk of falls. Furthermore, Doré et al. (2015), in a longitudinal analysis, identified that falls risk increases with the number of symptomatic osteoarthritic joints. This finding was also supported by Cai et al. (2022), who found when analysing data from the OAI, that falls and recurrent falls were most frequently seen in participants with bilateral knee symptoms compared to symptomatic unilateral osteoarthritis or no osteoarthritis.

However, Cai et al. (2022) reported a difference in falls risk for radiographically diagnosed osteoarthritis compared to symptomatic osteoarthritis, finding that bilateral radiologically diagnosed knee osteoarthritis was associated with a lower risk of falls after adjusting for physical activity, comorbidities, and other covariates. This finding demonstrates the importance of differentiating between the methods used to diagnose osteoarthritis, whether it's based on symptoms or radiological evidence. Smith et al. (2018), using data from the OAI, found that within 12 months of an initial knee osteoarthritis diagnosis, an additional hip osteoarthritis diagnosis was a significant predictor of falls. However, an additional knee osteoarthritis diagnosis within the same period was not a significant predictor of falls for those first diagnosed with hip osteoarthritis.

2.5.1 Additional osteoarthritic joints and falls risk summary

The evidence suggests that the diagnosis of multiple osteoarthritic joints increases falls risk. However, the inconsistencies in diagnostic criteria across studies make comparisons difficult. The studies identified multiple symptomatic joints, as opposed to multiple radiologically diagnosed joints, as making a difference as to whether multiple joints increase the falls risk. Some studies use clinical diagnosis with or without radiological evidence (Ofori-Asenso et al., 2021; Smith et al., 2018), others use radiological evidence and referral to health services for less than a year (Rosadi et al., 2022), whereas others use knee symptoms and radiological

grade (Cai et al., 2022). The evidence implies that diagnosing arthritis symptomatically rather than radiologically is associated more closely with an increased risk of falls.

2.6 Does increasing age impact on risk of falls in people with osteoarthritis?

Older age can be linked both to an increased risk of falls (World Health Organisation, 2021) and a higher likelihood of developing osteoarthritis (Shane Anderson & Loeser, 2010). However, having osteoarthritis is not inevitable in older age (Shane Anderson & Loeser, 2010) and there are no high-quality studies examining the impact of age on falls risk in people with osteoarthritis, or determining if age is an independent risk factor for falls in this group.

2.6.1 Systematic reviews looking at age and its relation to falls risk in people with osteoarthritis

Ng and Tan (2013) evaluated the literature on osteoarthritis and falls in people over 65, they concluded the relationship between osteoarthritis and falls remains unclear due to conflicting evidence. Their review focused on people with osteoarthritis over 65, meaning conclusions made are only for that population, preventing conclusions about the link between osteoarthritis and falls in those under 65. This conclusion is significant, as 27% of people with osteoarthritis are under the age of 55 (World Health Organisation, 2023). Furthermore, a later systematic review by Manlapaz et al. (2019) examined the evidence of risk factors for falls in adults with knee osteoarthritis and did not identify age as one of the eight risk factors for falls in people with osteoarthritis. Similar to Ng and Tan (2013), Manlapaz et al. (2019) focused on adults over 65, with eight of the 11 studies in their review only including people in this older age category.

2.6.2 Observational studies looking at increasing age and its relation to falls risk in people with osteoarthritis

Five of the observational studies identified used age-matched controls to compare people with and without osteoarthritis to explore whether the disease increases the risk of falls regardless of age (Alkan Melikoğlu & Kul, 2018; Boroujeni et al., 2023; Bozbas et al., 2017; Hill et al., 2013; Iosimuta et al., 2022; Tsonga et al., 2015). Some studies concluded osteoarthritis influenced falls risk independent of age (Boroujeni et al., 2023; Bozbas et al., 2017; Hill et al., 2013; Iosimuta et al., 2022; Tsonga et al., 2015). Alkan Melikoğlu and Kul (2018), in a cross-sectional

study, also found that people with osteoarthritis had a higher risk of falls compared to the age-matched control group; however, among the osteoarthritis group, they found higher falls risk was significantly correlated with age, pain and WOMAC scores.

These studies often excluded younger populations and had small sample sizes, limiting their generalizability. Of these five studies, three used participants over the age of 65 (Hill et al., 2013; Iosimuta et al., 2022; Tsonga et al., 2015). Alkan Melikoğlu and Kul (2018), in their cross-sectional study of 100 people with knee osteoarthritis and 30 controls without osteoarthritis, and Bozbas et al. (2017) in a cohort study with 50 participants with knee osteoarthritis and 50 healthy controls, included participants of all ages. A criticism of the Boroujeni et al. (2023) descriptive cross-sectional study of 15 participants with knee osteoarthritis, is they only reported the mean ages, so it is unclear the age range of participants. Another criticism of these studies is the small sample size. Some included fewer than 20 participants (Boroujeni et al., 2023; Hill et al., 2013; Iosimuta et al., 2022), whereas others had a higher number of participants; Tsonga et al. (2015) included 68 participants, Alkan Melikoğlu and Kul (2018) included 130 participants and Bozbas et al. (2017) included 100 participants.

Age was also used as a confounding variable in data analysis to explain falls risk in people with osteoarthritis. Mat et al. (2017) in their cross-sectional study compared the relationship between postural control and osteoarthritis in older adults with and without a history of falls and with either asymptomatic, symptomatic or no osteoarthritis. Their results were confounded by old age and comorbidities rather than osteoarthritis. Again, critical limitations of these studies were the small sample size and age-based inclusion criteria. Mat et al. (2017) participants were, aged 65 and above, and their outcome to measure falls, was not only self-reported, but also further defined by the number (2 falls) or an injurious fall. These restrictions have the potential to skew the results by not including all falls, regardless of the injury and number.

Several longitudinal studies (Soh et al., 2020; Sonobe et al., 2024; Wilfong et al., 2023) and one retrospective study (Alshehri et al., 2019) looked at the link between age and falls risk in people with osteoarthritis. These studies used larger populations, Alshehri et al. (2019) study assessed data from 760 people aged 65 and above with osteoarthritis who were seen between 2011 and 2017 at a tertiary hospital, and Soh et al. (2020) and Wilfong et al. (2023) used large study multi-centre data sets such as the OAI (Soh et al., 2020) and the Canadian Longitudinal Study on Aging (Wilfong et al., 2023). They show correlational rather than causal links between age and falls. The study by Wilfong et al. (2023) looked to identify factors that contributed to

falls in people with knee osteoarthritis and included participants under 65. They found that older age did not increase the risk of falling. Similarly, Sonobe et al. (2024) reported that age did not significantly influence falls risk. These two studies were the only studies using large data sets that found age not to be a significant factor in increasing risk of falls in people with osteoarthritis.

In contrast, Soh et al. (2020), in a study that included participants aged over 45 found that personal factors such as age were more likely to predict falls than other branches of the International Classification Function (ICF) model (World Health Organization., 2001). Alshehri et al. (2019) looked at the association between falls and comorbidities and medication use in older adults with osteoarthritis. This study, which only included adults aged 65 and older, found significant associations between increased falls risk and age, although it had a smaller data set compared to Wilfong et al. (2023) and Soh et al. (2020).

2.6.3 Increased age and falls risk summary

Whilst the evidence suggests a link between older age and higher falls risk in people with osteoarthritis, it is difficult to conclude whether osteoarthritis is an independent risk factor for falls in older adults. The data indicates that age-related physiological changes contribute to falls risk, regardless of osteoarthritis status. However, osteoarthritis can cause physiological and functional changes that independently increase falls risk, as shown in the studies that use age-matched control groups. There needs to be more high-level evidence, specifically looking at age as an independent factor in falls risk in people with osteoarthritis.

2.7 What effect does osteoarthritis have on impairments, functional ability and its relation to falls risk?

The most common symptoms of osteoarthritis include joint stiffness, weakness and pain, which typically affect functional ability (World Health Organisation, 2023). Therefore, exploring these concepts as factors relating to falls is essential. Impairments of gait, balance, and strength have been researched in people with osteoarthritis in relation to the risk of falling.

2.7.1 Systematic reviews exploring the effect of osteoarthritis on impairments, functional ability and falls risk

Three systematic reviews were identified that found that impairments in people with osteoarthritis increase their risk of falls (Deng et al., 2021; Manlapaz et al., 2019; Ng & Tan, 2013). Manlapaz et al. (2019) focused on knee osteoarthritis, whereas Ng and Tan (2013) and Deng et al. (2021) focused on knee and hip osteoarthritis. Despite this, there are some similarities between the findings. The systematic review and meta-analysis investigating the association between falls and hip and knee osteoarthritis by Deng et al. (2021), found that impaired dynamic stability, postural control, reduced muscle strength/activity, and impaired proprioception increase falls risk. Ng and Tan (2013) reviewed the literature on knee and hip osteoarthritis and falls in older people and found similar results. They also described impaired toe clearance, obstacle avoidance, and gait and balance disorders as factors increasing falls risk. Manlapaz et al. (2019) reviewed risk factors for falls in adults with knee osteoarthritis and found moderate evidence for reduced balance and strength, but limited evidence for impaired proprioception and knee instability.

2.7.2 Observational studies looking at osteoarthritis effect on impairments, functional ability and falls risk

My review included 22 studies that examined the common impairments found in people with osteoarthritis and their relation to falls risk. The findings from observational studies have been grouped into themes: balance, gait, range of motion (ROM), and muscle strength.

2.7.3 Balance

To test dynamic balance, some studies simulated a fall or used an obstacle to investigate instability in people with osteoarthritis. Levinger et al. (2016), in a cross-sectional study compared balance recovery after induced falls in 24 people with knee osteoarthritis to 15 asymptomatic healthy controls. They reported participants had difficulties absorbing impact and slowing down the forward momentum during a recovery step, and reduced dynamic postural control was demonstrated as the task got more complex. Downie et al. (2021), who also compared balance recovery in 48 older people with knee osteoarthritis to 15 asymptomatic older adults, found that people with osteoarthritis have a higher risk of obstacle contact from having reduced toe clearance and from the close position of the recovering foot to the obstacle. Ren et al. (2022) looked at simulated gait disturbance and explored the first

recovery step after an induced backward slip perturbation in those with and without osteoarthritis; they found people with knee osteoarthritis have significantly reduced step length, speed and vertical ground reaction forces. A limitation of these studies is that they all used an older cohort, which limits the generalizability for younger adults with osteoarthritis.

Several studies looked at static and dynamic balance in people with osteoarthritis, mostly comparing people with osteoarthritis to those without (Boroujeni et al., 2023; Hill et al., 2013; Khalaj et al., 2014; Taglietti et al., 2017; Yilmaz & Bağcier, 2021). Only Alencar et al. (2007) used history of falls as the variable, comparing 15 older women with knee osteoarthritis and a history of falls to 15 older women with osteoarthritis but no history of falls. They found those with a history of falls needed more time to transfer their centre of gravity in a Sit-To-Stand test and had altered functional ability. Only Hill et al. (2013), in a cross-sectional comparative study, age-matched those groups with and without osteoarthritis, whilst others used comparable ages across the groups (Alencar et al., 2007; Boroujeni et al., 2023; Khalaj et al., 2014; Taglietti et al., 2017; Yilmaz & Bağcier, 2021). A limitation of these studies is the small number of participants, with samples ranging between 21 and 81 participants.

Three studies measured stability using a force platform Taglietti et al. (2017), Boroujeni et al. (2023) and Hill et al. (2013). Boroujeni et al. (2023) measured participants standing stability by looking at the displacements of the centre of pressure, Hill et al. (2013) used a force platform and a functional reach test to measure balance. They all found reduced balance in the osteoarthritis groups compared to controls without osteoarthritis. Both Yilmaz and Bağcier (2021) and Khalaj et al. (2014) used the Biodex Stability System to measure balance, finding reduced balance in participants with osteoarthritis. A limitation of using this tool, that it doesn't fully replicate the dynamic, unpredictable situations encountered in daily activities like walking on uneven ground or multitasking. Khalaj et al. (2014) addressed this issue and used a Timed Up and Go (TUG) functional measure, alongside the Biodex Stability System. They looked at people with bilateral knee osteoarthritis and found reduced dynamic and static balance across their two groups of mild and moderate osteoarthritis compared to their control group without osteoarthritis. Yilmaz and Bağcier (2021) investigated people with hip osteoarthritis and similarly found that postural stability was disrupted and linked to increased falls risk.

Some studies looked at larger populations, Sonobe et al. (2024) evaluated 1,084 participants with knee osteoarthritis and found that static balance, measured by the one-leg standing balance test, was not significantly associated with falls. However, decreased mobility,

measured by the TUG, was significantly linked to a history of falls. Wilfong et al. (2023) also assessed balance using the TUG, One-leg Standing Balance and the Chair Rise Test and found that lower scores were associated with a higher risk of recurrent falls. Iosimuta et al. (2022) investigated perceptions of balance, surveying 18 people with osteoarthritis and found that there were perceptions of imbalance and instability among adults and older adults with osteoarthritis. Like many of the cross-sectional studies identified by this review, this study had a small number of participants.

2.7.4 Gait

Ikutomo et al. (2019) in their cross-sectional analysis, investigated gait variance in women with end-stage hip osteoarthritis and found limping was significantly correlated with falling. A cross-sectional study analysing the biomechanics of limping found increased falls risk in people with moderate hip osteoarthritis, noting shorter stance time and faster trunk movements toward the unaffected side due to pain and hip abductor weakness (Lin et al., 2015). Walking endurance was also found to be reduced and associated with falls in a secondary cross-sectional study by Aljehani et al. (2021) of 259 people with end-stage knee osteoarthritis.

2.7.5 Range of movement (ROM)

Two observational studies (Ren et al., 2022; Rosadi et al., 2022) found the ROM of osteoarthritic joints is linked to falls risk. Ren et al. (2022) found reduced ROM in the hip and knee predisposed people with knee osteoarthritis to a fall in response to a backwards slip perturbation, compared to 15 age-matched healthy older adults. A limitation of this study is the influence of age. Although the participants were age-matched healthy older adults, age-related changes, such as reduced reaction times, which are common in older adults, may still have introduced variability across the group (Hardwick et al., 2022). A cross-sectional study by Rosadi et al. (2022) that investigated factors associated with falls in people with knee osteoarthritis and found the better their ROM and proprioception were, the lower their risk of falls.

2.7.6 Muscle strength

Systematic reviews by Deng et al. (2021) and Manlapaz et al. (2019) concluded that reduced muscle strength is a risk factor for falls, and five observational studies supported this finding (de Zwart et al., 2015; Ikutomo et al., 2019; Levinger et al., 2018; Mawarikado et al., 2023; Soh

et al., 2020). Many studies linked reduced knee extensor strength to increased falls risk, but only Mawarikado et al. (2023) examined toe grip strength. They found an association between a history of falls and toe grip strength; the weaker the toe grip strength in those with knee osteoarthritis, the higher the falls risk. The remaining studies focused on knee extensor strength; Soh et al. (2020) applied the ICF model to the OAI database of 4796 people with knee or hip osteoarthritis to determine the predictors of falls. They found that knee extensor strength was the only osteoarthritis impairment significantly associated with an increased falls risk.

Other studies also found a link between knee extensor strength and falls risk (de Zwart et al., 2015; Ikutomo et al., 2019; Levinger et al., 2018). A cross-sectional analysis by Ikutomo et al. (2019) focused on women with end-stage knee osteoarthritis compared to age-matched healthy women found limping and knee extensor muscle weakness are associated with falls. Whilst de Zwart et al. (2015) focused on people with all stages of knee osteoarthritis and self-reported knee instability, and found both high knee flexor and extensor strength decreased the risk of falls. Levinger et al. (2018) found in the 24 people with osteoarthritis they studied, the 15 who had a multiple-stepping response in an induced fall, had reduced knee extensor strength as well as decreased scores in functional tests. This finding indicates a higher falls risk due to the improper step response in a fall relating to a trip.

2.7.7 Narrative review looking at osteoarthritis effect on impairments, functional ability and falls risk

Hoops et al. (2012) conducted a narrative review investigating whether lower extremity osteoarthritis exacerbates falls risk in older adults. They found that osteoarthritis symptoms decreased the ability to maintain dynamic and static stability. However, the review is classed as lower-level evidence as per Melnyk and Fineout-Overholt (2015) stages of evidence.

2.7.8 Osteoarthritis effects on impairments, functional ability and falls risk summary

This area has the most evidence, with numerous studies examining various impairments and functional limitations associated with osteoarthritis. Based on these studies, despite the limitations, it can be concluded that impairments in balance, strength, ROM and gait can contribute to falls in people with osteoarthritis. Both systematic reviews and observational studies that look at impairments such as balance, ROM, and particularly knee extension

strength have demonstrated a link to falls risk in people with osteoarthritis. Within the observational studies, the variety of impairments were measured across a heterogeneous group of participants (age, sex) in frequently small studies, making it difficult to draw definitive conclusions.

2.8 Do previous falls affect the falls risk in people with osteoarthritis?

No systematic reviews have been undertaken to investigate previous falls as a predictor of falls in people with osteoarthritis. Longitudinal studies by Wilfong et al. (2023) and Ackerman et al. (2021) found that reported a history of falls was a significant predictor of increased falls. A limitation of Wilfong et al. (2023) is they only included injurious falls, meaning they may have underestimated the actual number of falls, which may have resulted in a stronger correlation. There have been two cross-sectional studies that have indicated that those with a history of falls have altered postural control. One by Petrella et al. (2012), looked at 56 older age women with and without osteoarthritis and with and without a history of falls, they limited their falls history data collection even further to just 6 months. Similar restrictions of the time period for falls history were made by Alencar et al. (2007), who examined 30 older women with osteoarthritis, both with a history of falls in the last 6 months and those without a history of falls.

In summary, there is a lack of high-quality evidence on how previous falls impact future falls risk in people with osteoarthritis. More research is needed in this area. The lack of research in this area may be due to the acceptance that among older adults, having a history of falls is a risk factor for future falls (Deandrea et al., 2010). Limiting fall history to the timeframe of these studies risks overlooking falls that occurred prior to the study period, which could potentially skew the results.

2.9 Are there differences between the sexes?

Three systematic reviews looked at the differences in osteoarthritis and fall risk between the sexes. Ng and Tan (2013) found that older women with symptomatic osteoarthritis have an increased risk of falls. In contrast, the evidence for older men is unclear. Being female is a risk factor for osteoarthritis (Tschon et al., 2021), this may be why studies tend to include more females. In the systematic review by Manlapaz et al. (2019), they reported that their included studies had more female (91.34%) than male (8.66%) participants, with four studies including only female participants.

There are nine observational studies that look at osteoarthritis and falls risk differences between sexes. Ackerman et al. (2021) review of 4,796 OAI participants found, after adjusting for covariates, female sex was one of the two significant predictors of increased falls; this finding is supported by Ofori-Asenso et al. (2021), Soh et al. (2020) and Doré et al. (2015). Excluding the study by Doré et al. (2015), whose longitudinal study used data from a community-based prospective cohort, all these studies used data from the same data set, the OAI. Within the OAI cohort, Ofori-Asenso et al. (2021) only looked at middle aged participants and the prevalence and correlates of falls in people with osteoarthritis, whereas Ackerman et al. (2021) and Soh et al. (2020) did not have age restrictions when using OAI data.

In contrast to the studies which found female sex was a predictor of increased falls for people with osteoarthritis (Ackerman et al., 2021; Doré et al., 2015; Ofori-Asenso et al., 2021; Soh et al., 2020), Barbour et al. (2019) found no association for increased falls in women with osteoarthritis. Instead Barbour et al. (2019) reported that men with symptomatic or radiographic knee osteoarthritis, compared to those without osteoarthritis, had a greater risk of injurious falls. However, studies such as Sonobe et al. (2024) found no significant association between sex and falls risk, and others reported that the sex of the participant did not confound their results (Alkan Melikoğlu & Kul, 2018; Cai et al., 2022; de Zwart et al., 2015).

2.9.1 Summary of the differences in sex and falls risk in people with osteoarthritis

In conclusion, it is unclear if sex influences the risk of falls in people with osteoarthritis. The studies that did find sex was a significant predictor of falls in people with osteoarthritis used the same data set. There is a lack of high-level evidence for people with osteoarthritis that reports on this link. Additionally, studies have disproportionate numbers of female participants compared to males, as reported by Manlapaz et al. (2019).

2.10 Literature review conclusion

This review highlights the key factors which may help explain the link between falls and osteoarthritis, but the lack of high-level evidence prevents a definite conclusion on whether any factor is an independent risk factor. The literature suggests a link between osteoarthritis and an increased risk of falls, but the connection is poorly understood. A study by Norouzi et al. (2023), who compared falls variables in 700 older people with and without knee osteoarthritis, suggested variables in combination may increase the risk of falls in the elderly

with knee osteoarthritis, while each of them alone may not be associated with an increased falls risk. This is an interesting point as it suggests an increased falls risk in people with osteoarthritis may be due to a combination of some or all the factors discussed in this review. The reason the link between falls and osteoarthritis remains unclear could be due to that each of the participants in the studies would have had a combination of variables influencing their falls risk.

Nevertheless, the reviewed studies had high heterogeneity concerning the diagnosis of osteoarthritis, outcome measures, participant demographics, and data collection methods. Although not conclusive, the included literature shows evidence strongly suggestive of an increased risk of falls in people with osteoarthritis; therefore, considering falls in assessment and treatment should be routine. As physiotherapists, we should be aware of this link and incorporate falls prevention into our practice when treating people with osteoarthritis. Few studies have explored physiotherapist assessment of falls in people with osteoarthritis. Ackerman et al. (2020) found that most Australian physiotherapists surveyed did not use falls risk screening tools when assessing people with osteoarthritis, despite most being aware that there was an association between osteoarthritis and falls risk. It is unknown how physiotherapists in AoNZ manage falls risk for people with osteoarthritis. This highlights a need to better understand the practice of physiotherapists in AoNZ. Therefore, I plan to address this gap and explore how physiotherapists consider falls risk during the clinical management of people with osteoarthritis.

Chapter 3 Methodology and Methods

This chapter describes the study's purpose, methodology, and methods. The methodology section presents justifications for using qualitative descriptive methods, the rationale, and the philosophical background, including the primary researcher's theoretical orientation. The methods section details the analytical framework, sampling approach, data analysis, and ethical considerations.

3.1 Purpose of the study

The previous chapter described the Australian-based study by Ackerman et al. (2020), who reported a lack of awareness of the relationship between falls and osteoarthritis in physiotherapists. There has yet to be research to investigate practice amongst physiotherapists in AONZ. Identifying falls risks early in a person's life presents an opportunity to mitigate and prevent falls. The aim of this study is to explore how physiotherapists consider falls risk during the clinical management of people with osteoarthritis. The findings will support our understanding of how physiotherapists might most effectively manage falls risk for people with osteoarthritis in clinical practice to shape future guidelines and recommendations. This research will provide important insight into what is presently happening in clinical practice.

3.2 Methodology

3.2.1 Philosophical background

A qualitative approach was chosen to answer the research question, as there was a need for a deeper understanding of the perception of osteoarthritis and falls amongst physiotherapists. A quantitative approach would have produced limited learning about the meanings participants gave to the phenomenon (Sandelowski, 2000). The specific methodology chosen was a qualitative descriptive design, which has been used to gain a rich description of the experiences, events and processes (Bradshaw et al., 2017; Sullivan-Bolyai et al., 2005) and to help focus on the participants' experiences of patient interaction and the organisation of the health care system (Neergaard et al., 2009). Qualitative descriptive studies are translatable into healthcare situations, such as falls and osteoarthritis, and the knowledge gained can provide actionable insight into ways to improve healthcare (Sullivan-Bolyai et al., 2005).

This design was considered the most appropriate for this study because the data is interpreted, staying close to the participants' descriptions and from their viewpoint (Neergaard et al., 2009; Sullivan-Bolyai et al., 2005). Using a qualitative design and semi-structured interviews for data collection focused on the participants' perspectives and experiences, ensuring we captured what was important to them and allowed them to add any information they considered useful to the study. It is especially relevant in research aiming to gather insight into a professional's experiences with a specific topic (Neergaard et al., 2009).

While reflexive thematic analysis was considered as a potential method (Terry, 2021), it was ultimately deemed unsuitable due to its emphasis on interpretive depth and the researcher's subjectivity. In contrast, directed content analysis was chosen because it supports a targeted exploration of predefined constructs, making it well-suited for applied health settings where timely, actionable insights are required to inform service design, policy, or intervention development. Summative content analysis was not selected, as the goal was to analyse the data holistically rather than concentrating on specific keywords within the text (Hsieh & Shannon, 2005).

3.2.2 Theoretical orientation

My theoretical orientation was acknowledged through a pre-supposition interview, which allowed me to explore my assumptions, biases, and preconceptions (Barrett-Rodger, 2022). This was important for me as a qualitative researcher (Becker, 1996; Bradshaw et al., 2017; Johnson et al., 2020), as despite using a qualitative descriptive design, whereby I stay close to the data by using direct quote, a researcher's biases and preconceptions from their personal background, experiences, and beliefs can influence the research (Johnson et al., 2020).

Through reflection following the pre-supposition interview, I noted my understanding and experiences from my professional context and background. My personal and professional background of working across private and public health systems influenced my experiences and perspectives on managing chronic conditions. This acknowledges how systems can influence the care delivered by staffing, funding, and availability. This information clarified the need to ensure a mix of private and public interviewees in the study. The interview also allowed me to explore why I was interested in falls and the personal and professional background of the impact falls have had on my practice and viewpoint. Answering questions about my previous practice showed me how passionate I am about delivering falls prevention assessment and treatment to patients.

The pre-supposition interview was also valuable for exploring my preconceptions, biases, and beliefs, and it gave me direct experience of being the interviewee. One belief I became aware of is my frustration with the differences I experienced working in private practices and public hospitals. In private settings, the patient's expectation that they will receive specific treatments, such as massage, often is strengthened by the fact that they are paying for services, even when the treatments provided are not evidence-based. This realisation led me to reflect on the pressures of different work environments and consider that my interviewees may also experience pressures from their patients and workplaces. This may include factors such as time, roles and funding pressures.

This experience helped shape the interview questions (Appendix B) to include opportunities for participants to describe their professional background and current work, to help them feel more comfortable, and to build rapport, an essential aspect of interviews (McGrath et al., 2018). To help build this rapport, an introductory segment was added, where I introduced myself, explaining who I was and why I was focused on these topics. From undertaking a pre-supposition interview with experienced interviewers, I also learnt how probing questions can be used to delve deeper into assumptions in interviews. These probing questions were added to the interview schedule (Appendix B), which helped explore the reasoning behind decision-making to ensure the data collected answered the research question.

3.3 Methods

The Auckland University of Technology Postgraduate Research Committee (AUTEC) approved the study, and ethics approval was received from AUTEC (AUTEC #:22/289) (Appendix C). The study was a qualitative descriptive design, with data collected via semi-structured interviews and analysed using directed qualitative content analysis (Hsieh & Shannon, 2005).

3.3.1 Participants and recruitment

Participants were eligible to participate if they were physiotherapists in Aotearoa New Zealand who worked in musculoskeletal practice and commonly managed people with lower limb osteoarthritis. Purposeful sampling was used to recruit participants with the experience and qualities required for the study (Bradshaw et al., 2017). This provided a range of perspectives and experiences and ensured diversity in ethnicity, public and private physiotherapy settings, qualifications, experience level, age, gender, and geographical location. Before the interview, these demographics were collected via a demographic form (Appendix D).

During the recruitment phase, the study was advertised via relevant professional networks (Appendix E). The interested participants contacted me and were sent an information sheet (Appendix F) and consent form (Appendix G). They were required to read and sign these documents to indicate that they understood the research process, as well as their roles and rights when participating in the research. They had the opportunity to call, text or email if they had any questions between receiving the information and participating in the research. Participants emailed these documents prior to the interview, and the participants kept copies of both forms.

3.3.2 Sample size

Ten participants were purposively recruited through professional networks. Through conducting the interviews, code saturation was achieved after nine interviews, which aligned with Hennink et al. (2017), who reviewed 25 interviews and also found that code saturation was reached after nine interviews; at this point, no new themes were identified. The number of participants interviewed was continuously reviewed throughout data collection to ensure sufficient information was gathered in relation to the study's aim (Malterud et al., 2016). If it were found that code saturation was not reached, more participants would have been interviewed.

3.3.3 Data collection

Physiotherapists interested in participating were contacted and provided with an information sheet, consent form, and demographic form. After completing and returning these documents, participants were contacted to arrange an interview at a time that suited both groups. These were conducted in person or online using Zoom (Zoom Video Communications, 2024)

3.3.4 Interviews

The interviews were conducted between November 2022 and January 2023 and lasted between 45 minutes and one hour. They were digitally recorded using a physical recorder and Zoom's (Zoom Video Communications, 2024) built-in recorder to allow for transcription and analysis.

I chose to collect data using semi-structured interviews with a mixture of broad, open questions and more specific questions (Appendix B). The Qualitative Descriptive approach and semi-structured interviews placed importance on the participants' perspectives and

experiences (Hsieh & Shannon, 2005). This structure gave them the opportunity to add any information they considered useful to the study. The participants were not provided with a list of interview questions before the interview; this helped prevent them from preparing 'ideal answers' about their clinical practice. At the start of the study, they were reminded that they were not being assessed based on their knowledge; I was interested in their experiences of treating people with osteoarthritis in the context of falls, as outlined in the information sheet (Appendix F).

The initial interview questions (Appendix B) were developed using information gathered from the literature review and my disciplinary knowledge of osteoarthritis and falls. They were adapted in response to the insights offered by participants, as was the type of information gathered, to ensure the research question was answered. A pilot interview was undertaken with a physiotherapist independent of the research, which allowed for interview skill practice in prompting and asking for clarification, using the prompts learnt from the pre-supposition interview. Within the pilot interview, it was found that the interviewee focused on the age of a person with osteoarthritis as a factor initiating falls assessment rather than osteoarthritis itself, and most of the answers were focused on age. This was discussed with the project supervisors, and because of this reflection, the wording of the questions was changed to acknowledge age as a factor influencing management, and a further question was added to explore why participants considered age as a factor. More probing questions were developed and added to the interview schedule based on the pilot and the pre-supposition interview to create an updated set of interview questions (Appendix H).

The interview questions were refined as themes were conceptualised through content analysis. The study design allowed for this flexibility and adaptation as new insight emerged with the participant's responses (Neergaard et al., 2009). After the interview, the recording was played back to allow for reflection, and notes were added to optimise future interviews. Due to this process of reflection and ongoing familiarisation with the data after four interviews, the interview questions were further adapted to remove the focus on falls risk (Appendix H). This was due to the finding that participants were separating balance and falls risk, and I wanted to explore how people linked these concepts and what influenced their opinions on falls and balance.

3.3.5 Data processing

The interviews were transcribed after each one took place, and data were analysed by using directed content analysis; by coding the data, I could begin identifying themes and patterns (Hsieh & Shannon, 2005).

To ensure the participants' voices were understood accurately, I immersed myself in the data by listening to the interview audio numerous times whilst transcribing the data. During transcription, notes of my thoughts and reflections were added, with meaningful quotes relating to the participants' understanding of the relationship between osteoarthritis and falls highlighted. This influenced theme and pattern generation. Once the transcripts were produced, each transcript was reviewed multiple times to ensure all the data items were fully coded, which also ensured that any new codes or ideas generated in later transcripts could refine and develop ideas from previous transcripts. Transcripts were shared with the study supervisors, and meetings took place during the data collection process to ensure thoughts were critically challenged and to further familiarise the researchers with the data. This process helped with the refinement of the interview questions.

The data collected were initially coded on physical copies of the transcript and then transferred and organised in Microsoft Excel (Microsoft Corporation, 2024) and RealtimeBoard Inc (2024) (Figure 1) to create a visual representation.

3.4 Rigour and credibility

Rigour and adherence to systemic processes in research are important (Johnson et al., 2020). Due to their interpretive nature, qualitative descriptive studies have been criticised for their lack of rigour (Neergaard et al., 2009). Lincoln and Guba (1985) outline four principles, credibility, confirmability, dependability, and transferability, for assessing the trustworthiness of qualitative research results. To achieve rigour in this study, these four principles were considered.

Credibility is the qualitative version of internal validity. It looks at to what extent the results represent what was researched (Lincoln & Guba, 1985), and what trust can be placed in the research findings (Korstjens & Moser, 2018). To ensure credibility within this study, the following steps were taken. Prior to commencing the study, there was a period of prolonged engagement (Korstjens & Moser, 2018), a literature review was undertaken of osteoarthritis, falls, and physiotherapists' knowledge of both factors. A pre-supposition interview explored

my beliefs and biases about falls and osteoarthritis management among physiotherapists. The interview questions were open-ended (Appendix B and Appendix H) to allow for clarification of the participant's responses for increased credibility and confirmability (Johnson et al., 2020), allowing for the exploration of opinions and beliefs. Finally, regular supervision sessions occurred throughout the data collection and coding process, which ensured the analysis stayed true to the data collected. Confirmability is the degree to which the findings are derived from the participants, not the researcher (Korstjens & Moser, 2018; Lincoln & Guba, 1985). Staying close to the data when generating themes and using direct quotes in the thematic analysis ensured interpretations were from the participants' voices, not the researchers' (Klem et al., 2021). Further steps were taken to ensure the confirmability of the study with the use of open-ended questions, which enabled clarification of the participants' responses (Johnson et al., 2020).

Dependability implies that a study would be repeatable if it were repeated with the same participants, coders, and context (Forero et al., 2018). The data collection, analysis, and interpretation methods were consistent, and the reasoning behind decisions and assumptions was transparent and documented throughout the study. To enhance the study's dependability, regular discussions occurred with the supervisors, and the interview schedule was provided (Appendix B and Appendix H) alongside a clear outline and description of the study's procedures, methodology, and implementations.

Transferability for qualitative research can be defined as the degree to which the results can be applied to other settings with other participants (Lincoln & Guba, 1985). To facilitate an understanding of transferability, the study steps have been described in detail (Korstjens & Moser, 2018), including data such as the participants' demographics (Appendix D) and the data collection methods, such as the location, length of interviews, and how this data was analysed.

3.5 Ethics

AUTEC provided ethical approval for this research (Appendix C). This section presents key ethical considerations for this study, including consent, privacy, and confidentiality.

Informed and voluntary consent was gained as an ongoing process throughout the research. Before the interviews, all participants were required to read the information sheet (Appendix F) and sign a consent form (Appendix G) to indicate that they understood the research process and their roles and rights when participating. They were given the opportunity to discuss

questions that arose directly with the researcher and supervisors. Participants could volunteer freely or decline to participate in this study as part of the recruitment process. They were also informed they could withdraw their data before it became incorporated into the analysis process.

Participants were ensured confidentiality by the removal of all identifying features such as their name, place of work, geographical area of work, and age. The recordings remained confidential, and data were stored in a secure password-protected file, with consent forms kept separate from all other data in separate folders. Before their interview, participants were reassured again about their privacy, confidentiality, and right to withdraw from the study. In the interview, participants could take breaks, withdraw at any point and choose not to answer any questions they did not wish to. They were encouraged to consult with their support people/ whānau and bring them to their interview.

To minimise the risk of discomfort and to remove the risk that the participants may have felt like their practice and knowledge were being tested and judged by the researcher, it was emphasised at the start of the interview and in the participant information sheet (Appendix F) that the focus of the research is not knowledge, but to explore their experiences of treating people with osteoarthritis in the context of falls. Using open-ended questions helped ensure the participants' views were respected throughout the interview.

Chapter 4 Findings

4.1 Participant demographics

Ten participants were recruited to take part in this study. Table 2 shows the participants' demographic characteristics.

Table 2 *Participant demographics*

Characteristics	n
(Total sample: n=10)	
Gender	
Women	7
Men	3
Age range (years)	27-61
Ethnicity (n)	
New Zealand European	7
Indian	1
Australian European	1
Welsh British	1
Level of Experience Range (years)	5- 36
Highest level of qualification (n)	
Bachelors Degree	5
Postgraduate Certificate	2
Postgraduate Diploma	2
Doctorate	1
Place of employment (n)	
Hospitals	4
Private	5
Self	1
Region	
Auckland	5
Gisborne	1
Taranaki	1
Wellington Region	3

4.2 Findings

Three themes were identified from the data; the themes explore the factors influencing the physiotherapists' understanding of the relationship between osteoarthritis and falls. These themes give insight into physiotherapists' clinical reasoning on whom they deem a falls risk among people with osteoarthritis and why. During this process, several themes were initially identified. With continued analysis, discussion, and linking back to the study purpose, three themes, in particular, stood out and captured the experience of the interviewees (Bradshaw et al., 2017). Figure 1 illustrates how the themes are interconnected, showing the complex nature of clinical reasoning. In the first theme, 'What is the risk?' I explore the physiotherapist's reasoning regarding the risk of falls in people with osteoarthritis. In theme two, 'Making assumptions about patients', I explore the assumptions physiotherapists were making when deciding if people with osteoarthritis were a falls risk. In theme three, 'Gatekeeper of treatment', I examine factors influencing the behaviour behind assessments of people with osteoarthritis.

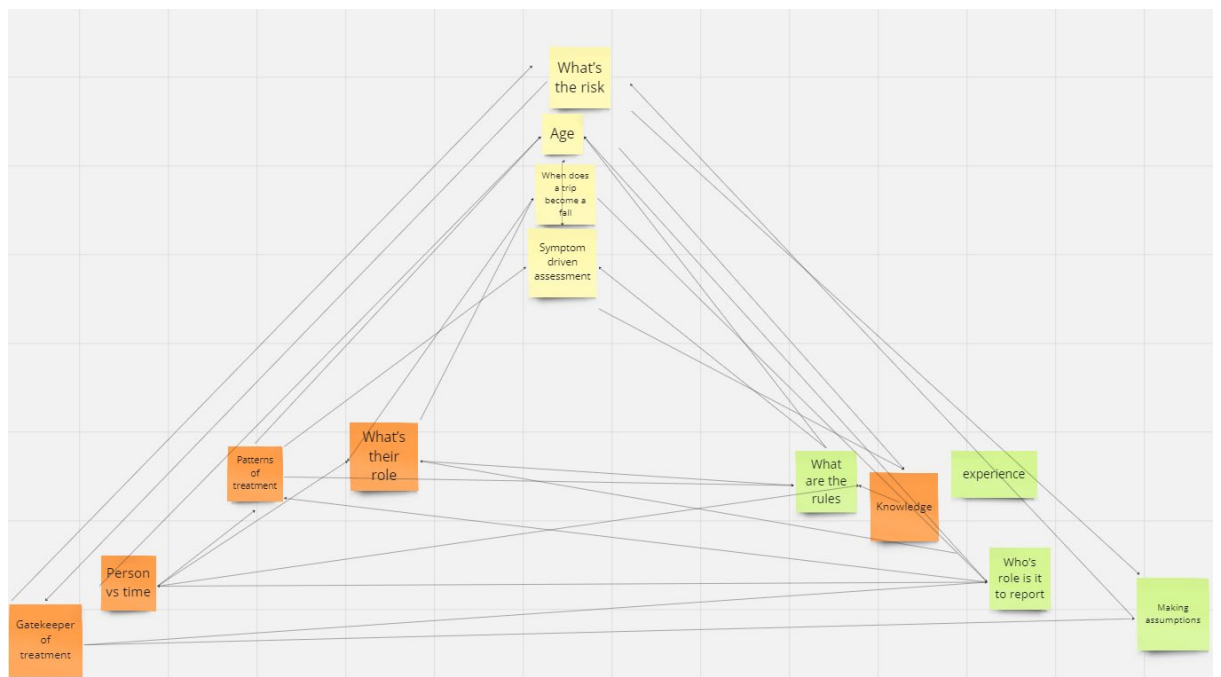


Figure 1 Mind map of the links between the themes generated (RealtimeBoard Inc, 2024)

4.3 Theme one: Physiotherapists' risk assessment of falls

When physiotherapists assess a patient, they conduct a risk assessment based on the patient's presentation. This influences the assessment process in terms of the questions asked, tests

conducted, treatments applied, and referrals made. The clinical reasoning for people with osteoarthritis often revolves around the question, 'What is the risk?' Participants identified several factors they consider when determining which people with osteoarthritis are at risk of falls. These factors were grouped into three sub-themes: (1) "Wouldn't routinely ask" (2) When does "a trip" become "a fall", and (3) "Symptom-driven" assessment.

4.3.1 "Wouldn't routinely ask"

For most participants, it seemed that the older the patient, the more likely the physiotherapist would consider falls risk in their assessment of an osteoarthritis patient. For example, Participant 7 commented, *"I don't look at younger people as being a falls risk."* Participant 3 also commented that *"Falls tend to occur a little bit later in life, so it wouldn't be on the forefront of my mind"*. Participant 10 commented they would not do routine falls management on *"younger ones..."*. Some participants defined ages they associated with a falls risk; Participant 1 commented, *"I guess over, usually over 85. On multiple medications for different things."* Participant 7 said, *"osteoarthritis over 70."*

4.3.2 When does "a trip" become "a fall"

Another factor underpinning clinical reasoning about whether to assess for falls was the consequence of falls, which is linked heavily with age. Participant 9 commented, *"You or I falling over, are probably not going to be as high consequence as someone who's older and frail."* One participant explored the consequences of falls and used this to justify a falls assessment amongst the osteoarthritis population.

"At what age do you stop falling over, and when do you start having a fall? Even the terminology around it is different, isn't it? You know, like you and I, if we fell over, we would have fallen over. But if somebody who's 70 falls over, they've had a fall, it's an event..." (Participant 7)

The occurrence of a fall was also reported to influence whether people with osteoarthritis come into the clinic and are, therefore, being managed for falls. Participant 8 said, *"...we sometimes get people who have osteoarthritis like most of us, but it is not an issue for them unless they have had a fall and if the fall is related [to] an injury"*.

4.3.3 “Symptom-driven” assessment.

Part of the falls risk undertaken on people with osteoarthritis was based on a “Symptom-driven” assessment as described by Participant 6, which means participants “pick and choose” (Participant 2) who they assess for falls. This picking and choosing seems to be based on the patient's symptoms and what the therapist observes on initial contact. Participant 1 said they assess for falls “if they looked slightly frail or had walking aids and things like that. If the patient doesn't report falls and doesn't look unbalanced, then I won't.” This was also mentioned by Participant 4, “I'll get a lot of patients that walked down the corridor, and they look unsteady..., I look at their balance...”. Some participants explored why this was, with Participant 4 saying, “... when you assessed balance, it was never sort of perceived to be part of the assessment of someone that was mobilising safely and independently.”

Symptoms and age were also linked, which influenced the perceived risk of falls by Participant 1, who stated, “lower age, higher functioning wouldn't include assessment.” In relation to a falls assessment across all demographics, Participant 3 also said, “I wouldn't routinely ask that question in the younger demographic, but I would ask that question in people who are obviously more immobile”, highlighting how function and symptoms drive an assessment. One participant described how, regardless of age, a person's injury history and symptoms would indicate a falls assessment, again following a symptom-driven assessment route.

“...ACL, the reality is that if they have locking or giving way you know it is is going to be um an objective sign that's going to make you think and worry about them, in terms of what they do at any age really.” (Participant 10)

One participant also explored the link between balance and falls and mentioned they were two separate constraints when assessing balance in people with osteoarthritis. The assessment was guided by a strengthening perspective rather than a falls risk. “You know gait steps assessment, but balance as itself. Aside from a single leg stand, which is a little bit of balance, but also a little bit of strength in alignment...” (Participant 5)

These findings show that most of the participants' understanding of the risk of falls in people with osteoarthritis is based on age, symptoms, injury, and likelihood of injury following a fall, rather than the underlying understanding that having osteoarthritis means the patient has an elevated falls risk.

4.4 Theme two: Making assumptions about patients

Another theme that was constructed from the data was the assumptions physiotherapists were making when deciding falls risk in people with osteoarthritis. These assumptions influenced the perceived risk of falls, influencing the decisions made about the assessment, treatment and referrals. Factors influencing the assumptions made have been grouped into four sub-themes. (1) “*We all bring our experiences*”, (2) “*They probably would tell me*”, (3) “*My role is to clinically triage*”, and (4) “*The link hadn’t crossed my mind*”.

4.4.1 “We all bring our experiences”

The physiotherapist’s previous experiences with an older age group, as discussed in theme one, seemed to heavily influence the relationship the therapist makes between osteoarthritis and falls. A few participants explored their relationship with their awareness of falls, acknowledging not only professional experiences with patients but also personal ones. Participant 8 said “*...I think we all bring our experiences, professional and personal when you work in these roles.*” This would impact the way they view people with osteoarthritis and who they would consider a falls risk.

“... I’m interested in a real holistic approach and healthy aging is kind of my passion being an older physiotherapist, I have been mindful of that it takes me a lot of work to maintain my, you know fitness and strength, and so I have been really quite passionate about you know imparting that that knowledge...” (Participant 10)

Participant 8 also said, “*I think I have a working knowledge of it...*” in relation to their awareness of osteoarthritis and falls, showing clinical experience can influence practice. One participant also reflected on their knowledge and experience and how it has changed from being a new graduate to a more experienced therapist.

“... guess the the more, the more I practice the, the kind of more you look at the the whole person and things and so like that kind of includes. It's probably a little bit of a, kind of correlation or not a, like a progression through the career as well that you start to look at things like this as well.” (Participant 9)

4.4.2 “They would probably tell me”

Therapists were making assumptions on the falls risk based on a history of falls, some relying on the patient to report rather than asking them directly. Participant 3 said, “*as standard, I probably wouldn’t ask people aged 30, 40, 50, which I see plenty, you know- ‘are you falling’*”

because I feel like they would offer that information to me.” Participant 9 directs questions about falls *“probably more towards the, the older frailer ones...for the younger ones, probably more patient led.”* Other participants also described relying on patient-led falls reporting amongst the younger population. *“... sort of relying on the, on the fact that they would probably tell me?”* (Participant 7). Another participant also commented on this further.

“Um, I suppose when we have [a] younger group of patients who are not complaining of instability and things like that um then were not focusing on falls as a key thing unless the patient has reported that they have had falls.” (Participant 8)

As well as relying on the younger people with osteoarthritis to self-report, Participant 3 didn't ask about falls history as it wasn't in their role, *“In my role, I would go after the low-hanging fruit with regards to strengthening, you know, and just sitting in my area of MSK, really”*. The referral information also influenced the assessment that the therapist undertook and whether falls were considered. Participant 8 mentioned they rely on the referral information, which directs the assessment course, *“referrals which we get specifically for falls and balance training, then we would do the Berg Balance Test and things like that.”*

Participant 2 also mentioned they look at the referral, which contains the patient's falls history *“... reported in the primary referral by the GP because they use it as a tool to try to expedite patient care into surgery.”* The focus on falls history, in this case, is not so much for falls management and assessment; it is for triage.

4.4.3 “My role is to clinically triage”

Rules such as guidelines, forms, treatment patterns, and a clinician's role in the workplace all appear to influence the assessment and treatment of people with osteoarthritis. The therapists followed these 'rules' when assessing and treating patients. Participant 1 reported in their assessment there is *“always a balance assessment as part of osteoarthritis joint assessment.”* (Participant 1). However, when further questioned on falls management, that was a separate construct for them, *“my patients are more high level than that, so it's not really falls management as such.”* (Participant 1)

Participant 4 reflected on their practice, *“I'm not as proactive at recognising that there is probably always an element of balance loss in falls risk in these patients. I'm not routinely screening for it, or like routinely having it as part of my assessment”*. One participant also reported on their osteoarthritis treatment.

"We don't actually consider falls. As an isolated thing when we're doing the assessments and you know, although we may be addressing some falls risk factors, it's certainly not really the forefront of our mind that that's what we're addressing."

(Participant 5)

Participant 5 also said, "... wouldn't say that anybody's actually looking at the single leg stand to see, um do I need to consider this person as a falls risk or not?" lending support to falls and balance being seen as two separate entities. In Participant 5's case, assessment forms had, "... no actual falls-related question...." where there were no prompts for assessing falls.

Guidelines and protocols are also rules followed in clinical practice that influence whether falls are considered. One participant described the symptom-based approach and how guidelines support this.

"But when you read about other rehab protocols and sort of like guidelines they often don't mention high-level balance, they talk about balance is needing to be addressed if it's poor but not, you know the value of addressing balance even if they are safe and independent and so I think that is probably not something that's done as the norm um or sort of encouraged in guidelines or protocols..." (Participant 4)

One participant reported their role within an organisation can influence what questions they ask patients,

"My role really is just to, um, diagnostically to clinically triage, because that's kind of my, that's my interest. It's kind of my expertise, but it's also, yeah, it's also um what I find myself doing in relation to managing patients um, conservatively to remove them from the waitlist." (Participant 3)

4.4.4 "The link hadn't crossed my mind"

During the interviews, via the discussions, some participants reflected on their knowledge of osteoarthritis and the links between osteoarthritis and falls. As well as seeing falls and balance as two different entities, as discussed in the previous subtheme, one participant saw osteoarthritis and falls as separate conditions:

"I probably would treat falls differently to osteoarthritis if that kind of makes sense: osteoarthritis and the options in that respect and if they have falls then I would talk

about falls and that and how we could manage falls and options in that respect.”
(Participant 2)

Participant 2 also said, *“From an evidence base I’m not probably aware to much of, the, how common or how falls are linked to osteoarthritis.”* One participant reflected on their clinical reasoning and how the interview had changed their perspective.

“That osteoarthritis is an, at least, with increased risk of falls. I would openly say it hadn't crossed my mind until you brought it up....yeah, it's not surprising they fall.”
(Participant 6)

Other participants clinically reasoned about how osteoarthritis and falls are linked after being prompted about their knowledge of a link. Participant 10 said *“Well, I haven’t really.... I have to be really honest... If you got uh, yeah, you know, losing strength and muscle mass...Which then put them at risk of falls.”* This was also commented on by another participant.

“um, I guess I understand the link... But I wonder. Is the link because of the lack of strength rather than the actual arthritic changes in the knee? So definitely the link is there, it's but I, I think for me it's still a strength issue. Yeah, yeah.” (Participant 7)

One participant reported they are aware of it but not from an evidence-based perspective.

“Probably don’t have a lot of awareness between, um I like to say I’m aware of falls um I probably from an evidence base I’m not probably aware to much of the how common or how falls are linked to osteoarthritis. But there would definitely be a good link there. Um I like to think I am aware in my practice of it.” (Participant 2)

Participant 4 reflected on her experiences as a student and how that influenced what patients she saw as a falls risk and why it wasn’t associated with all people with osteoarthritis.

“Probably the way I came to understand balance as a student and a new grad. It was something that was always assessed if there was a problem.”

4.5 Theme three: Gatekeeper of treatment

Physiotherapists are front-line workers with a unique position to assess, treat and refer to other professionals or organisations if required. The factors influencing behaviour behind assessments of people with osteoarthritis have been grouped into these two subthemes: (1) *What “hat” do I wear?* (2) *“Sticking in our lane”*.

4.5.1 What “hat” do I wear?

Physiotherapists undertake various roles across different organisations (Table 2), and the care they deliver can often be affected by their role or the context in which they are practising. Participants commented on their roles and how this influences treatment. Participant 8 mentioned the different ‘hats’ they wear and how they influence the lens they apply to clinical practice and their treatment choices. *“...if I was to move my hat from osteoarthritis to the referrals which we get specifically for falls and balance training...”*

The physiotherapist’s role often appears to impact their assessment and treatment choices. Participant 3 also spoke of referring onwards if balance and other co-morbidities became apparent because of their role. They expanded on what they would do if they had a patient, they deemed a ‘falls risk’, *“Refer out if a balance. Falls risk”*. Participant 6 commented on how they practice reactively rather than proactively screening all people with osteoarthritis because falls are less prevalent in younger people with osteoarthritis. *“Falls tends to occur a little bit later on in life. So it probably wouldn't be in the forefront of my mind, however. I do probe a lot with my questions so it wouldn't surprise me if it came out.”*

What is available in the system also impacts the assessment and treatment; when classes and pathways are available, the role of the assessment is to then triage into classes rather than have the focus on the assessment and treatment on falls. Participant 5 said, *“For the majority of our hip and knee osteoarthritis, they are being assessed to go into the groups that we run.”* Participant 3 expanded on this, implying that it was someone else’s role to deliver this care by commenting, *“We have, uh, one of the colleagues does activity with arthritis, which is the conservative arm which basically blends into my role. So I refer into her.”*

4.5.2 “Sticking in our lane”

A few participants mentioned they assess for balance whilst not necessarily thinking about the falls management impact. Participant 1 reported, *“I always [do] a balance assessment as part of osteoarthritis joint assessment”* but as they were high level, they didn’t link it to falls management. Participant 5 also commented on the fact that balance exercises are being provided and the clinical reasoning behind them. *“There are balance exercises that they get given, although I'm not sure how often that is specifically thinking I need to make their balance better.”* One participant commented on why this may be.

“There are things that probably go, once you start doing things you’re pigeonholed into doing certain joints more than the other you sort of lose that um, I suppose things that you should know but don’t know but you haven’t just gone down that narrow route.”

(Participant 8)

Participant 4 mentioned that they do not routinely screen patients with osteoarthritis for falls risk. *“I’m not as proactive at recognising that there is probably always an element of balance loss in falls risk in these patients. I’m not routinely screening for it, or like routinely having it as part of my assessment.”* They also commented on a problem-based assessment and treatment, reiterating what Participant 6 said about being an *“ambulance at the bottom of the hill kind of process.”*

“But when you read about other rehab protocols and sort of like guidelines, they often don’t mention high-level balance, they talk about balance is needing to be addressed if it’s poor but not, you know the value of addressing balance even if they are safe and independent and so I think that is probably not something that’s done as the norm um or sort of encouraged in guidelines or protocols so yeah so that’s probably why I wouldn’t necessarily go to it; not that’s its bad or unsafe or not what you should do. Its just not something that’s advertised or encouraged and I think we are good at sticking in our lane at physio you know. If they work, we keep doing it.” (Participant 4)

Participant 5 mentioned the forms they use to set up their assessment and don’t assess for falls in people with osteoarthritis, *“we don’t actually address falls within that generic assessment form directly.”* Highlighting that systems and processes are limiting the assessments of clinicians, with the pattern of assessment influenced by the forms used:

Problem lists are part of standard physiotherapy assessment, which allows physiotherapists to prioritise and treat patients efficiently. Another reason for not assessing falls amongst people with osteoarthritis was the time it took for treatment, *“I guess you can pick and choose and what the main concerns of the patient are at the time, otherwise it’s a big lecture.”* (Participant 2). One participant reflected on their usual questions with hip and knee patients about shooting pains and joints giving way.

“...and that usually leads on [to] the, you know, have you fallen? But it’s not a have you fallen for other reasons other than your knees giving away? So again, it tends to be quite aimed to the musculoskeletal side of things as opposed to a... a falls assessment...” (Participant 5)

Time was described as a constraint that dictated whether they investigated falls risk among people with osteoarthritis; Participant 3 commented that they are *“more conservative with my outcome measures purely because of the time factor.”*

Chapter 5 Discussion and Conclusion

This study explored how physiotherapists in AoNZ understand falls risk in people with osteoarthritis and how this understanding influences their clinical management. The study findings show that a physiotherapist's decision to assess falls risk is influenced by their assumptions about perceived falls risk and beliefs about their clinical role. These factors appear to shape their clinical reasoning and decision-making. My findings suggest that some physiotherapists practice reactively rather than proactively when assessing people with osteoarthritis. They provide assessment and treatment only if the person with osteoarthritis indicates a fall or fits a preconceived notion of what constitutes a falls risk. This reactive approach is not due to a lack of awareness; physiotherapists understand the link between osteoarthritis and falls when prompted and can clinically reason the connection if guided to do so either by the patient or by the observation they make. However, this link does not seem to be at the forefront of their minds, preventing them from being proactive about assessing falls risk for people with osteoarthritis.

Based on these findings, this discussion will focus on the following question. Why do some physiotherapists practice reactively with people with osteoarthritis and not consider falls risk routinely in this group of patients, despite knowing the link between osteoarthritis and falls risk. Four potential explanations that help answer this question include the assessment forms used to guide the assessment of people with osteoarthritis, the reliance on patient self-reporting of falls, the role of the physiotherapist and the beliefs that the physiotherapist holds.

5.1 Assessment forms

For certain conditions and treatments, physiotherapists commonly rely on established screening guidelines for their assessments and management plans. For osteoarthritis, physiotherapists use outcome measures such as the WOMAC. The WOMAC is a validated, widely used tool for assessing pain, stiffness, and physical function in people with hip and knee osteoarthritis. It consists of 24 self-administered questions (Bellamy et al., 1988). However, the questionnaire does not directly address falls risk and relies on the clinician to make the link between pain, function and falls risk. Based on the findings of this study, this is a link which many clinicians are not making unless prompted. Other outcome measures such as the KOOS (Roos et al., 1998) or 36-Item Short Form Survey (Ware & Sherbourne, 1992) also do not include questions about falls history nor prompt physiotherapists to ask about falls.

Furthermore, none of the most notable international osteoarthritis guidelines for non-surgical management include falls prevention (American Academy of Orthopaedic Surgeons, 2021; Bannuru, 2019; National Institute for Health and Care Excellence, 2022).

The lack of guidelines suggesting a falls assessment for people with osteoarthritis may explain why physiotherapists, despite being able to reason the link clinically when prompted, do not automatically link falls risk to osteoarthritis. This could be further compounded by clinician confidence in carrying out a falls assessment; Ackerman et al. (2020) found Australian physiotherapists only had moderate confidence in assessing falls risk, and only 39% used falls risk screening tools when assessing people with osteoarthritis. This was also indicated in the interviews in the current study, where a participant said they look at single leg balance in their patients to assess balance and strength, not falls risk. Nor do they use it as part of a more validated 4-Stage Balance Test (Rossiter-Fornoff et al., 1995) to measure balance in people with osteoarthritis.

As previously discussed, literature has shown that people with symptomatic osteoarthritis are at risk of falls (Cai et al., 2022; Foley et al., 2006). Despite these assessment forms identifying symptoms, they are not prompting physiotherapists to ask directly about falls or linking falls risk to the outcome measure scores. Studies have shown this can be done, Vennu and Bindawas (2014) found falls and having osteoarthritis are linked to low scores on the KOOS-QoL. A higher falls risk is also associated with scores over 50 on the WOMAC (Foley et al., 2006). This is not documented on the WOMAC assessment form; instead, higher scores are documented to represent worse pain, stiffness, and functional limitations (McConnell et al., 2001). Linking symptoms of osteoarthritis to falls on an outcome measure could be a good starting point to increase physiotherapists' awareness of falls risk amongst symptomatic people with osteoarthritis, without having to change the questions being asked.

Participants in the current study noted that in their place of work, falls risk is not routinely included in osteoarthritis assessment forms, and if it is, it is used primarily to expedite patients into surgery rather than to address the falls risk itself. Consequently, treatment is often limited to those who fit into a preconceived 'falls risk' category, which seems to be related to age, co-morbidities, or if they are visibly unsteady or self-identify as having had falls. This approach leads to a reactive rather than a proactive approach to assessing for falls risk.

5.2 Patient self-reporting falls

Since physiotherapists are not prompted to ask about falls when assessing people with osteoarthritis, falls may go unidentified unless the patient volunteers this information or the physiotherapist identifies the risk through other means. Relying on patient reports can be problematic, as patients have been reported to be embarrassed about falls (Dolan & Taylor-Piliae, 2020). These authors only examined older adults, which limits the applicability of this assumption to younger adults with osteoarthritis. However, Frias and O'Connor (2024) reported younger adults were more likely than older adults to tell health-related lies due to feelings of shame, embarrassment, and concern about others' opinions. Although this study didn't directly look at falls, you could apply this to falls and fall-related injuries. Sonnad et al. (2014) further reported that a patient's perceptions of the risk of falls do not align with their clinical risk of falling. If they do not identify themselves as at risk of falls when they have a fall, they may not see it as a fall and instead report it as a trip or not report at all. During interviews, this was also referred to by participants in the interviews, highlighting the point, "When does a trip become a fall?". This lack of awareness of falls was also reported by Tsindos et al. (2020), who found many participants, despite having a fall, did not believe having osteoarthritis increased their risk of falling. However, these findings may be limited due to the small sample size, which included only 18 women and two men.

By relying on patients to report falls, physiotherapists may miss a significant portion of the population who have tripped or stumbled but do not recognise these incidents as falls or perceive them as related to the assessment of their osteoarthritic joint. This underreporting leads to criticism of studies that used patient-reported falls as outcome measures and predictors, such as those that used data from the OAI (Ackerman et al., 2021; Cai et al., 2022; Doré et al., 2015; Harris et al., 2023; Ofori-Asenso et al., 2021; Smith et al., 2018; Soh et al., 2020) as it is not possible to be confident in the accuracy of the data.

5.3 Role of the physiotherapist

This qualitative inquiry suggests that physiotherapists' roles in the health system and their available time affect what gets assessed and prioritised. Similar findings were reported by Ackerman et al. (2020), who found that time constraints and competing clinical priorities are the most commonly perceived barriers to including falls prevention in osteoarthritis care.

Physiotherapists hold various roles in healthcare in Aotearoa New Zealand, such as private practitioners and hospital-based musculoskeletal and triage physiotherapists (Abbott et al., 2019; Baldwin et al., 2017; O'Brien et al., 2021). Assessment and treatment vary depending on the physiotherapist's

role and geographical location. In this study, my research suggests that falls prevention and osteoarthritis care are delivered separately, sometimes by a different clinical team. This statement was also made by Ackerman et al. (2022) who commented on how physiotherapists consider falls and osteoarthritis separately. This separation between falls and osteoarthritis assessment and treatment may contribute to physiotherapists not linking falls prevention with osteoarthritis when assessing patients.

5.4 Factors that may shape a physiotherapist's perception of falls risk in people with osteoarthritis

This study's findings show that in clinical practice, participants frequently do not link falls and osteoarthritis. They could only clinically reason how reduced balance is linked to osteoarthritis when prompted. Many only looked at falls risk if the patient was elderly, had co-morbidities, a history of falls, or was visibly unsteady; even then, some referred those patients on. Older age is associated with falling (World Health Organisation, 2021), and my research suggests that older age is one of the primary factors that physiotherapists consider when deciding the risk of falling, despite osteoarthritis increasing the risk of falls regardless of age. The topic of age frequently surfaced throughout the study, even after we adjusted the interview questions to steer participants away from associating older age with falls risk. The revised questions aimed to delve into how people understand and connect the ideas of balance and falls risk, given that participants often viewed these as distinct issues. My goal was to investigate the factors that shape physiotherapists' perspectives on the link between balance and falls, and how their experiences or beliefs might bring these concepts together.

My findings suggest that age influences how balance and falls are perceived. Participants appeared to clinically reason the impact osteoarthritis has on proprioception, strength and balance loss. Still, they did not associate these factors with falls unless another factor, such as older age, was present. This may be because there is a higher risk of injury or death following a fall in older people than in younger people (World Health Organisation, 2021). Therefore, the older population and those who treat them may see a trip or fall as a significant event. This increases the likelihood of reporting a fall, assessing a fall and then engaging in falls prevention. Similarly, with conditions like dementia, age impacts diagnosis; a younger age of onset was considered to be one of the significant predictors of diagnostic delay (Loi et al., 2022). This reinforces that age plays a crucial role in clinical assessments and decision-making in many chronic conditions and is not limited to osteoarthritis.

The term elderly relates to those aged 65 and over; however, the evidence on which this definition is based is unknown (Orimo et al., 2006). This age is shown in documentation regarding falls from the Health Quality and Safety Commission New Zealand (2022); other organisations are also similar in their age ranges when discussing falls. The World Health Organisation (2021) uses 60 and above, as does the ACC (2021). In osteoarthritis research, studies on falls risk are also focused mainly on participants aged 65 and over, as highlighted in the literature review for this thesis. The emphasis on age in much of the falls-prevention literature may inadvertently lead health professionals to associate falls risk predominantly with older adults and reinforce the misconception that falls risk is only significant in people with osteoarthritis who are over 65. As a result, health professionals may overlook the fact that osteoarthritis can increase falls risk at any age, potentially leading to gaps in prevention and care for younger people with the condition.

One of the reasons for the link between older age and falls being at the forefront of physiotherapists' minds may be the widespread use of the evidence Otago Falls Programme (Campbell & Robertson, 2007). The programme, developed in Aotearoa New Zealand, consists of strength and balance exercises that target people aged 65 and over, and is a common falls prevention tool among physiotherapists (Campbell & Robertson, 2007). In recent years, the promotion of falls prevention by ACC (2024) has also directed falls prevention towards those aged 65 and over with their 'Live Stronger for Longer' programmes. The constant emphasis on age in falls prevention programmes may influence physiotherapists' perceptions, leading them to primarily associate falls risk with older patients rather than considering the risk posed by osteoarthritis across all age groups.

Regardless of age, when people with osteoarthritis are visibly unsteady, this research suggests that all physiotherapists would conduct a falls assessment or refer the patient to another service. This is another example of a reactive rather than preventative approach to falls. This reactive approach may stem from the problem-based method used in physiotherapy assessments and clinical reasoning. One participant suggested that these challenges may stem from how physiotherapy is traditionally taught and practical constraints such as limited time and resources. Physiotherapists may not fully consider falls risk unless there is a clear and immediate need. This finding could explain why falls prevention is only sometimes a primary focus for therapists when assessing people with osteoarthritis. Other studies, like Hill et al. (2020), have found that time constraints, resource limitations, and insufficient training or exposure can prevent physiotherapists from using clinical practice guidelines effectively in

treating lower back pain. The results of this study highlight potential similar challenges in assessing patients with osteoarthritis, suggesting that these barriers also limit the consistent use of clinical screening tools for osteoarthritis-related falls risk.

5.5 What are the clinical implications?

Physiotherapists do not appear to actively screen people with osteoarthritis for falls risk or use balance outcome measures routinely. If screening people with osteoarthritis for falls risk becomes standard practice, there is an opportunity to reduce fall-related injuries, fatalities, and healthcare costs, benefiting the healthcare systems and patients. If osteoarthritis guidelines were changed to include falls assessment as a prompt, similar to how red flags have been for cervical manipulation (Physiotherapy Board., 2022), that may lead to a change in physiotherapists' practice where falls are assessed as a standard procedure in a person with osteoarthritis. By prompting physiotherapists to assess falls risk directly, this approach helps prevent gaps in proactive fall prevention, which can occur when falls are not explicitly reported and, therefore, don't appear on the patient's problem list.

One recommendation from this study is to review the scores of the WOMAC and see on a larger scale if they align with falls risk. The WOMAC is a validated and widely used questionnaire that assesses pain, stiffness, and physical function in people with osteoarthritis; however, it does not directly address falls risk, relying instead on the clinician to make the connection between reduced function, pain, and falls. If a consensus can be reached on a specific WOMAC score threshold that indicates an increased risk of falls, integrating this threshold into the assessment tool could be more effective in prompting physiotherapists to assess and intervene in falls.

Another recommendation is that clinicians consider using validated falls risk assessment tools for people with osteoarthritis. While participants reported that they often used a Single-Leg Stand Test, this could be expanded to include the validated 4-Stage Balance Test, which involves four increasingly challenging balance positions, including single-leg standing (Rossiter-Fornoff et al., 1995). This tool is quick and practical, usually taking under two minutes to complete, making it well-suited for assessing falls risk in clinical settings instead of the single-leg stand. One limitation of the 4-Stage Balance Test is that it only assesses static balance and does not account for dynamic balance, that are more reflective of real-life fall risks. Additionally, it lacks consideration of other contributing factors such as gait, strength, or

environmental influences. Despite these limitations, it can still serve as a useful starting point in falls risk screening due to its simplicity and speed. If concerns remain after this initial screen, more comprehensive assessments such as the Berg Balance Scale or the TUG test can be used to evaluate dynamic balance and mobility, although these are more time-consuming.

To support this, physiotherapists could receive training on the importance of fall risk assessment in people with osteoarthritis. This could be implemented through curriculum updates, awareness initiatives like research presentations at events like the Physiotherapy New Zealand Conference, and dedicated courses on balance, fall prevention, and osteoarthritis management. These activities can contribute to continuous professional development, which physiotherapists are required to complete at least 100 hours over a three-year period (Physiotherapy Board of New Zealand, 2024). These efforts would help physiotherapists incorporate this simple but effective test into their practice alongside broader education on osteoarthritis care.

5.6 What future research is needed?

Building on this research, an audit of a range of osteoarthritis handbooks from AoNZ and other countries would be informative to see how prevalent the information on falls risk is. Additionally, osteoarthritis management programmes could be reviewed to assess how well balance and falls education are covered. This would help our understanding of the level of exposure clinicians have to the impact of falls on people with osteoarthritis.

To build on this research and further explore physiotherapists' knowledge, a large-scale questionnaire similar to the one conducted by Ackerman et al. (2020) but adapted for the New Zealand context could be used. This would collect information on the beliefs and practices of physiotherapists across the country, helping to capture cultural and regional perspectives that my research may not have fully represented. It would also provide insight into whether there is a broader consensus in clinical practice across New Zealand. These findings could help confirm our current results and offer valuable guidance for the next steps in developing targeted education, screening tools, and updates to national guidelines.

Assessment forms are clearly identified as a barrier to participants assessing falls in people with osteoarthritis. Therefore, it would be useful to audit the types of clinical and patient-reported outcome measures and documentation used in clinical practice. Once we know this,

recommendations could be made on which form or assessment is best, or it may highlight the need for a standardised osteoarthritis assessment form with falls risk included.

To implement the recommendation of including a falls risk question in commonly used screening tools, the first step would be to conduct a large-scale review of tools such as the WOMAC or KOOS, focusing on scores related to falls risk. If a consensus can be reached on a specific score threshold that indicates if a patient is at risk of falls, incorporating this threshold into the outcome measure could be more effective in prompting a falls assessment and treatment than adding an extra question on falls.

5.7 Strengths and limitations

This research is the first in Aotearoa New Zealand to explore fall management for people with osteoarthritis. Using a Qualitative Descriptive study design, I gained a detailed understanding of participants' experiences, events, and processes in clinical decision-making. Some of the recommendations from this study could be incorporated into clinical practice at low cost and minimal time investment and may significantly improve the lives of people with osteoarthritis whilst saving healthcare resources. The recommendations apply to most physiotherapists who see people with osteoarthritis regularly and could be applied across a broad range of healthcare settings.

The study had several strengths regarding participant demographics. It included a mix of hospital-based and private-practice physiotherapists, and participants represented a broad range of experience levels, from those holding a bachelors degree to those with a doctorate. While not currently practising, I believe my background as a physiotherapist positively influenced the interviews and data collection. Participants seemed to trust me and the process, openly sharing their clinical reasoning when assessing and treating people with osteoarthritis. While there was a potential risk of bias or participants withholding information due to fear of judgment from a colleague, the findings, particularly their reflections on previously unconsidered links and subsequent clinical reasoning, suggest this had minimal impact on the data quality.

Sex diversity in the sample mirrored that of the Aotearoa New Zealand physiotherapy workforce, with 70% female and 30% male physiotherapists (Physiotherapy Board., 2023). Including clinicians with diverse professional backgrounds and experiences provided a comprehensive view of current clinical practices in Aotearoa New Zealand. However, despite these strengths, the findings are limited by a lack

of ethnic diversity of participants. Despite significant efforts, we could not recruit any Māori or Pasifika physiotherapists. This reflects the broader landscape of the physiotherapy workforce in AoNZ, where only 4% of practitioners identify as Māori and 2% as Pasifika (Physiotherapy Board., 2023), indicating a small representation of these groups within the profession.

Another potential limitation is that ten clinicians participated in the study, meaning data was collected from only some regions of AoNZ. Despite this, code saturation was reached after nine interviews, suggesting that interviewing more participants across AoNZ would probably not have added new information or themes to the data.

A further limitation is that the literature review was restricted to the most common types of lower limb osteoarthritis, hip and knee, which may have limited the data collected in the literature review. Including other types of osteoarthritis, such as foot or spine, may have provided additional data, which could have also contributed to evidence linking osteoarthritis and falls risk and altered the focus of some of the qualitative data collection.

5.8 Conclusion

This research is the first in AoNZ to investigate how physiotherapists consider falls risk when managing people with osteoarthritis. It has highlighted the limited consensus in the literature on the link between osteoarthritis and falls, and the apparent lack of physiotherapy assessment and treatment for falls risk in people with osteoarthritis. This research provides an important contribution to our understanding of physiotherapists' clinical reasoning regarding falls risk in people with osteoarthritis. Physiotherapists honestly shared their clinical reasoning process when assessing and treating people with osteoarthritis. However, this study has shown a gap in physiotherapists' clinical reasoning, which affects the link between falls and osteoarthritis. Although physiotherapists demonstrate relevant knowledge when questioned, they do not consistently identify falls risk in people with osteoarthritis unless prompted.

This research suggests that physiotherapists often take a reactive rather than proactive approach to falls prevention in osteoarthritis care. From this study, we can identify that physiotherapists have preconceived notions about which people are at risk of falling and tend to rely on existing assessment forms. Additionally, their specific roles and responsibilities appear to influence their clinical decisions when the patient is at overt risk of falls, contributing to a tendency for reactive rather than preventative treatment. The research highlights the necessity for physiotherapists to take a proactive stance on falls risk among people with

osteoarthritis. By regularly evaluating the risk of falls for every person with osteoarthritis, physiotherapists can better pinpoint and manage risks, potentially minimising falls and enhancing outcomes for these people.

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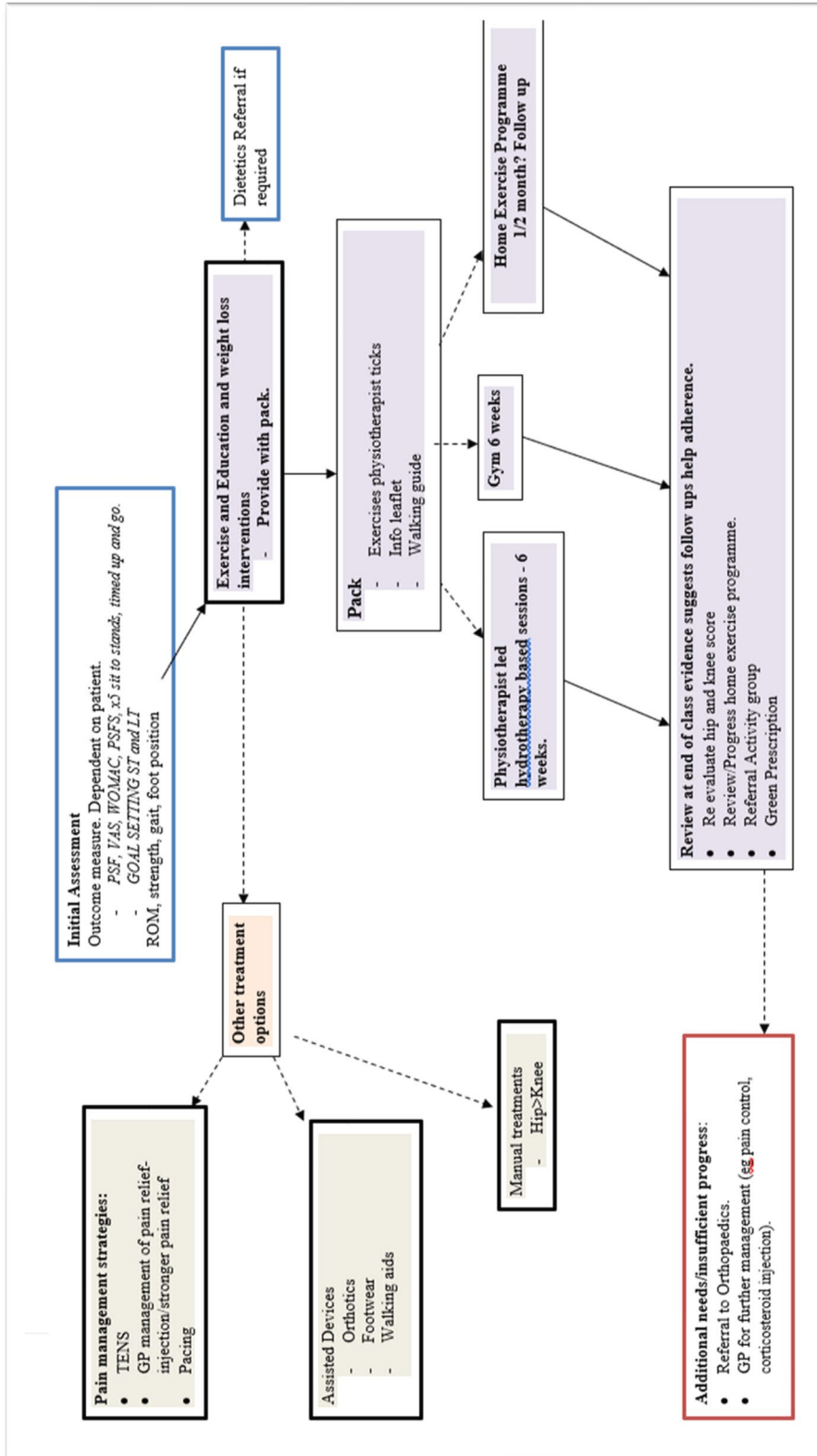
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Appendices

Appendix A: Osteoarthritis pathway

Originally developed by Thomas Keef (Physiotherapist at Hutt Valley Hospital).



Appendix B: Interview questions version 1

- Tell me about your current physiotherapy work / clinical experience
- When you see a patient with lower limb osteoarthritis, what do you consider in your assessment?
 - Subjective
 - Objective
-
- What are the main problems that people with osteoarthritis come in with
-
- Can you tell me about a time where you saw a patient with osteoarthritis and you did include falls management?
-
- Can you tell me about a time when you saw a patient with osteoarthritis and you didn't include falls management?
- What would signal a focus on falls risk?
 - Expect to talk about age at this point. Ok, so if someone looked like that were going to fall
-
- What would be the main features of a programme set up to manage osteoarthritis for all ages?
 - Would falls education appear?
 - What does that look like?
- Yes: what?
- No: could you explain why?
- How much awareness do you have about the link between osteoarthritis and falls?

Appendix C: Ethics approval



Auckland University of Technology Ethics Committee (AUTEC)

Auckland University of Technology
D-88, Private Bag 92006, Auckland 1142, NZ
T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

17 October 2022
Daniel O'Brien
Faculty of Health and Environmental Sciences

Dear Daniel

Re Ethics Application: **22/289 Exploring how physiotherapists consider falls risk during the clinical management of people with osteoarthritis (osteoarthritis).**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC).

Your ethics application has been approved for three years until 17 October 2025.

Non-Standard Conditions of Approval

1. Please include the study title on the Information Sheet.

Non-standard conditions must be completed before commencing your study. Non-standard conditions do not need to be submitted to or reviewed by AUTEC before commencing your study.

Standard Conditions of Approval

1. The research is to be undertaken in accordance with the [Auckland University of Technology Code of Conduct for Research](#) and as approved by AUTEC in this application.
2. A progress report is due annually on the anniversary of the approval date, using the EA2 form.
3. A final report is due at the expiration of the approval period, or, upon completion of project, using the EA3 form.
4. Any amendments to the project must be approved by AUTEC prior to being implemented. Amendments can be requested using the EA2 form.
5. Any serious or unexpected adverse events must be reported to AUTEC Secretariat as a matter of priority.
6. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTEC Secretariat as a matter of priority.
7. It is your responsibility to ensure that the spelling and grammar of documents being provided to participants or external organisations is of a high standard and that all the dates on the documents are updated.
8. AUTEC grants ethical approval only. You are responsible for obtaining management approval for access for your research from any institution or organisation at which your research is being conducted and you need to meet all ethical, legal, public health, and locality obligations or requirements for the jurisdictions in which the research is being undertaken.
9. Please quote the application number and title on all future correspondence related to this project.

For any enquiries please contact ethics@aut.ac.nz. The forms mentioned above are available online through <http://www.aut.ac.nz/research/researchethics>

(This is a computer-generated letter for which no signature is required)

The AUTEC Secretariat

Auckland University of Technology Ethics Committee

Cc: jess.cahan@aut.ac.nz; nada.signal@aut.ac.nz

Appendix D: Demographic information form



Demographic information form

Project supervisor: Daniel O'Brien, Nada Signal

Primary researcher: Jessica Cahan

1. Age: Click or tap here to enter text.
2. Gender: Click or tap here to enter text.
3. Ethnicity: Click or tap here to enter text.
4. Highest Level of Qualification (e.g. *Undergrad/ masters/ phd*): Click or tap here to enter text.
5. For how many years have you practised as a physiotherapist? Click or tap here to enter text.
6. In what setting do you currently work? (e.g. *private/ hospital/community*) Click or tap here to enter text.
7. What region of NZ do you work in?: Click or tap here to enter text.
8. Type of Employer: (*DHB/ Private Practice/ Self*) Click or tap here to enter text.

Appendix E: Advertisement for the study



Interview Participants Wanted

Physiotherapists experiences of assessing and treating people with osteoarthritis (osteoarthritis).

An Invitation

Kia ora, I am Jessica Cahan, and I am inviting you to take part in a research project that I am completing as part of my Masters project through Auckland University of Technology.

Aim

The purpose of this research is to explore how physiotherapists consider falls risk during the clinical management of people with osteoarthritis. I want to learn from physiotherapists about their experiences of assessing and treating hip and knee osteoarthritis patients.

It is unknown currently if physiotherapists consider falls risk when assessing and treating osteoarthritis patients. Guidelines such as American Academy of Orthopaedic Surgeons (AAOS), National Institute for Health and Care Excellence (NICE) and Osteoarthritis Research Society International (OARSI) omit falls screening as part of their recommendations. I would like to find out if falls are screened amongst an osteoarthritis population in practice.

Inclusion Criteria

- Physiotherapists who work in musculoskeletal practice and commonly manage people with lower limb osteoarthritis.

Interviews

One interview will be conducted via online video communication (e.g., zoom) of between 45 to 90 minutes or in person if preferred. Following your interview, I will transcribe and start analysing the data. Your participation is completely voluntary, and you can withdraw at any time from the study. I will ensure your information is kept confidential and you will not be identifiable in any reports or publications.

Please Get in Touch

Please contact me for further information, or if you have any questions or concerns

Jessica Cahan 0221967935 jess.cahan@aut.ac.nz

Appendix F: Participant information sheet



Participant Information Sheet

Date Information Sheet Produced:

14 October 2022

Project Title

Invitation

Kia Ora!

You are invited to take part in research exploring how physiotherapists assess and provide treatment for osteoarthritis patients. This research is being carried out by researchers based at AUT University. This information sheet will explain the study. We appreciate your time reading this material. Your participation in this study is entirely voluntary (your choice). Please feel free to ask the researchers any questions you might have about the study:

Primary researcher: Jessica Cahan: 0221967935 jess.cahan@aut.ac.nz

Supervisors: Dr Daniel O'Brien: daniel.obrien@aut.ac.nz

A/Professor Nada Signal: nada.signal@aut.ac.nz

What is the purpose of this research?

The purpose of this research is to learn about the experiences of physiotherapists who manage osteoarthritis patients. I want to learn from physiotherapists in their own words about how you assess and treat people with osteoarthritis and whether you consider falls risk among this. The number of people diagnosed with osteoarthritis is rising, and international guidelines omit the screening and treatment of falls amongst an osteoarthritis population. There has been a lack of research surrounding what physiotherapists do in practice.

How will this study help?

The views and experiences you share will help enhance our understanding of what physiotherapists consider when they treat hip and knee osteoarthritis patients. We believe that understanding what clinicians do can help shape the future of guidelines and recommendations.

How was I identified, and why am I being invited to participate in this research?

You have been identified as a potential participant because you responded to an advertisement about the study that we promoted via physiotherapy professional networks, newsletters, professional social media channels or special interest groups. As a physiotherapist who commonly works with hip and knee osteoarthritis patients, I believe you fit the study inclusion criteria and would contribute a valuable perspective informing our findings.

What happens in the study?

If you consent to take part, you will be invited to an individual interview which is likely to last up to 60 minutes. They will be held at a time and in a venue that is suitable for those taking part either online or in person. The questions will focus on your experiences treating hip and knee

osteoarthritis patients. The interviews will be digitally recorded for transcription. All interviews will be transcribed verbatim by me, and recordings will be deleted following transcription.

What are the costs of taking part?

There will be no cost to you except your time.

What are the risks of taking part?

You may feel concerned about being identified via your interview recordings and be concerned that knowledge of treatment/assessments of osteoarthritis will reflect badly on your own practice.

How will these discomforts and risks be alleviated?

Firstly, I would like to reassure you that you will not be identifiable through your interviews, report, or any dissemination of this research. Your recordings will remain confidential to me and my supervisors, and all data is stored in secure, password-protected files. I will not use your name, the name of your place of work or any identifying demographic information within the report.

Secondly, we are not assessing you on your knowledge but rather their experiences of treating osteoarthritis patients in the context of falls. There should not be any risk to you from this study. The researcher will make all possible efforts to ensure that your views are respected throughout the interview. You can choose not to answer any questions you do not feel comfortable answering and can choose to cease your involvement in the interview at anytime.

How do I agree to take part in the research?

You can contact the researcher Jess Cahan (jess.cahan@aut.ac.nz) and indicate your willingness to take part in an interview. You will be asked to fill out a consent form to show that you understand what participating in this research entails, and that you are willing to take part in this study.

What will happen with the findings of this study?

We believe that by understanding what clinicians do, it can help shape the future of guidelines and recommendations. Key findings will assist the primary researcher in obtaining a post-graduate qualification. It will also be submitted for publication in relevant professional journals, used in academic publications, and presented at conferences or in workshops.

Will I receive feedback on the results of this research?

A summary of results may be sent to participants via email if they wish. There is space on the consent form for you to indicate if you give consent to keep your contact details for future research and to receive feedback on the results for this research.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Daniel O'Brien daniel.obrien@aut.ac.nz

Any concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTC: Liz Binns. Phone [+64 9 921 9999](tel:+6499219999) extn: 6038 Email ethics@aut.ac.nz

Approved by the Auckland University of Technology Ethics Committee on 17/10/22, AUTC Reference number 22/289

Appendix G: Consent form



Interview Consent form

Project title

Exploring how physiotherapists consider falls risk during the clinical management of people with osteoarthritis (osteoarthritis).

Project Supervisors: Dr Daniel O'Brien , Associate professor Nada Signal

Researcher : Jessica Cahan

- I have read and understood the information provided about this research project in the Information Sheet dated October 2022.
- I have had an opportunity to ask questions and am satisfied with the answers.
- I understand interviews will be audio-taped and transcribed.
- I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the study at any time without being disadvantaged in any way.
- I understand that if I withdraw, I can ask for data identifiable as belonging to me to be destroyed. However, once the analysis has been completed this may not be possible.
- I agree to take part in this research.
- I wish to receive a summary of the research findings (please tick one):

Yes No

Participants signature:

Participants name: [Click or tap here to enter text.](#)

Participants contact details: [Click or tap here to enter text.](#)

Date: [Click or tap here to enter text.](#)

I am happy to be contacted about future related studies : Yes

No

Appendix H: Interview questions version 2

- Tell me about your current physiotherapy work / clinical experience
- When you see a patient with lower limb osteoarthritis what do you consider in your assessment?
 - Subjective
 - Objective
- What are the main problems that people with osteoarthritis come in with?
- Can you tell me about a time where you saw a patient with osteoarthritis and you included a balance assessment?
 - What outcome measures do you use?
 - Were you concerned about falls risk in this patient?
 - What made you think this?
- Can you tell me about a time where you saw a patient with osteoarthritis and you didn't include a balance assessment?
- When you think of falls risk what demographic do you think of?
-
- What do you think has influenced this view?
 - What would signal focus on falls risk?
 - Expect to talk about age at this point. Ok so if someone looked like that were going to fall
- What would be the main features of a programme set up to manage osteoarthritis for all ages?
 - Would balance appear?
 - Would falls education appear?
 - What does that look like?
 - Yes: what?
 - No: could you explain why?

How much awareness have you got about the link between osteoarthritis and falls.