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How Do People Communicate About Knee Osteoarthritis? A Discourse Analysis

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Title: How do people communicate about knee osteoarthritis? A discourse analysis

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Abstract

Objective: To explore the ways in which people talk about knee osteoarthritis and how this may influence engagement in physical activity and activity-based interventions as recommended by clinical practice guidelines.
Design: A qualitative synthesis using discourse analysis methods.
Methods: Systematic review methods were used to identify qualitative studies exploring the perceptions of people with knee osteoarthritis, their carers and/or clinicians. Methodological quality was evaluated using the Critical Appraisal Skills Programme. Raw quotes extracted from each study were analysed using inductive discourse analysis.
Results: A search of five electronic databases from inception until August 2019 yielded 778 articles. Sixty-two articles from 56 studies were included, reporting data (1673 direct quotes) from people with knee osteoarthritis, carers and clinicians in 16 countries. Two overarching discourses were identified - impairment and participation. The overarching impairment discourse prevailed in all participant groups and study settings. In this discourse, knee osteoarthritis was likened to a machine that inevitably wore-down over time and required a doctor to repair. The overarching participatory discourse almost always co-existed alongside an impairment discourse. According to this discourse, a 'busy body' was perceived as 'healthy' and people could remain active despite knee osteoarthritis.
Conclusion: The prevailing impairment discourse may potentially discourage people from using knees that have passed their 'use-by-date' and increase reliance on doctors to repair joint damage. Consistent with recommendations in clinical practice guidelines, a participatory discourse may provide an alternative way of communicating, which may encourage people with knee osteoarthritis to continue to engage in physical activity by focusing on what they can do, rather than what they cannot do.

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Introduction

Radiographic signs of knee osteoarthritis are observed in approximately 20% of the adult population (1, 2), and among those aged ≥65, one in two are receiving treatment for it (3). With population ageing and other risk factors such as obesity and sedentarism (reduced activity levels) on the rise, the prevalence of osteoarthritis is increasing such that it will become one of the most common diseases in populations from high-income countries (4). Knee osteoarthritis is already one of the most common causes of mobility limitation world-wide (5). Reduced mobility due to knee osteoarthritis impacts on engagement in work, social activities and the ability to manage other comorbid chronic conditions such as diabetes and heart disease (6). As a result, people with knee osteoarthritis die younger (by 10 years) than those without (7).

With access to high-value care, people with knee osteoarthritis can manage their symptoms and lead active, engaged lives into old age (8, 9). Clinical practice guidelines recommend physical activity and lifestyle interventions such as targeted exercises and weight loss (where indicated) as the first-line treatment of knee osteoarthritis (10). Knee replacement surgery is recommended for the minority of people with advanced signs and symptoms (10). A range of factors including pain, deformity and stiffness, as well as co-morbidities such as obesity, can hinder participation in activity-based interventions. In addition, common misconceptions about knee osteoarthritis may contribute to low uptake of high-value care (11, 12). For example, our previous research in an Australian setting has shown that people with knee osteoarthritis avoid activity and exercise when they believe it will further damage their joint (13, 14).

The way(s) in which people talk about their health (known as health discourses) both shape and reflect their experiences with and attitudes to health, illness and healthcare (15). Health discourses emerge within a social, cultural and political context and evolve over time to serve the purpose of those that use them (16). Diverse groups of people within a context (for example, people from culturally and linguistically diverse backgrounds, carers, clinicians, policy makers) may use different language to each other when trying make sense of a health symptom; emphasising the importance of a common narrative in health communication and healthcare (15). Discourse analysis provides a framework for studying the way people talk and the implications of 'talk' (16). For example, in the field of chronic disease prevention, discourse analysis has revealed that the dominant discourse used by clinicians and policy makers termed 'personal choice', silences conversations about the social determinants of health. The use of the ‘personal choice’ discourse therefore can have the effect of disadvantaging people with low health literacy most at risk of chronic disease (17). These findings have informed changes in public health messaging and institutional processes and practices, in fields as diverse as heart disease and worker health (17, 18).

Understanding how people talk about knee osteoarthritis and the potential implications of this, can inform health communication and healthcare. Therefore, the aims of this systematic

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review of the qualitative literature involving people with knee osteoarthritis, their carers and clinicians were to: (i) explore the ways in which people talk about knee osteoarthritis (health discourses) and (ii) consider how the identified health discourses might influence engagement in physical activity and lifestyle interventions, including self-management as recommended by clinical practice guidelines.

Method

Identification and selection of studies

The dataset for our synthesis was identified using systematic review methods, developed in our previous reviews exploring the scope of qualitative studies in the field of knee osteoarthritis (19), and psychosocial aspects of knee osteoarthritis (20).

The following five electronic databases were searched from inception until August 2019: CINAHL, Embase, Medline, Psychinfo, SPORTDiscus. Two key concepts were used for the search strategy: knee osteoarthritis and qualitative research. Key words and MeSH terms were combined for each concept using the 'OR' operator and results were combined using the 'AND' operator (see example search Table 1). Search results were downloaded into bibliographic software. The reference lists of selected articles were hand-searched for additional relevant articles.

Titles and abstracts obtained were independently reviewed by two authors according to the inclusion criteria (Table 2). A full text version of the study was obtained where eligibility was uncertain based on title and abstract. Studies were included where they reported: perceptions of people with knee osteoarthritis, their carers or clinicians managing people with knee osteoarthritis; perceptions on management and attitudes to living with knee osteoarthritis; and where they explored attitudes about the decision to proceed to knee replacement surgery. Studies were excluded where they focused on the perioperative or postoperative experience of knee replacement. Systematic reviews of qualitative studies were excluded.

Data extraction

Data extracted from each study included participant characteristics (age, sex, disease severity, body mass index and current management, where available) and study characteristics (setting, sample size, method of data collection and qualitative framework informing the analysis). For each study, raw quotes were extracted. For studies that included participants pre and post knee replacement, only quotes from pre-knee replacement participants were extracted. Likewise, for studies that included participants with a range of conditions (e.g. people with hip and knee osteoarthritis), only quotes from participants with knee osteoarthritis were extracted. Raw quotes were indexed with the study name and uploaded into NVivo 10 (QSR International) to facilitate analysis.

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Methodological rigour

Consistent with other qualitative systematic reviews in orthopaedics (21, 22), evaluation of the methodological quality of the included articles was performed using the Critical Appraisal Skills Programme (CASP) for qualitative research checklist (23). The CASP checklist consists of 10 questions which cover the validity of the results, ethical considerations, trustworthiness and clarity of results and the value of the research. Two reviewers (SB, PO) read the articles and independently answered 'yes', 'no' or 'unsure' for each criterion, entering the values into a table. For the two included articles authored by the two reviewers; the evaluation was conducted by two additional reviewers (JW, NT). Discrepancies between reviewers were discussed among the authorship team until consensus was reached with all criteria scored as yes or no. Articles were not excluded on the basis of the CASP scores.

Data analysis

Our analysis involved adapted discourse analysis methods. Health discourse analysis studies the ways in which people talk about a health condition. It can provide insight into what the condition means to them, what it is like to live with it and why they may feel and act as they do (24). In the current study, the discourse analysis approach enabled us to explore how people communicate about knee osteoarthritis and the implications this may have for engagement in physical activity and active lifestyle interventions, including self-management. Our dataset was quotes extracted from studies included in the systematic review; this enabled us to explore similarities and differences in the way people communicate about knee osteoarthritis in different settings around the world.

The discourse analysis was conducted by a multidisciplinary research team comprising of Australian-based clinicians (physiotherapists, nurse, orthopaedic surgeon) with extensive careers in orthopaedics and rehabilitation, and track records in clinical guideline development and health services research. The team have content expertise in cognitive behavioural aspects of musculoskeletal pain and surgical decision-making. The formulation of discourses was driven by the data rather than a pre-determined framework. Data analysis comprised of three stages adapted from Willig (16). In the first stage, one author (SB, a physiotherapist and qualitative researcher) read and re-read the entire data set of raw quotes extracted from the included studies, generated a list of codes which captured the ways in which the participants talked about knee osteoarthritis, and formulated provisional discourses. A second author (PO, a social scientist) then independently read a sample of the data set and coded quotes using the provisional discourses. In the second stage of analysis, the provisional discourses were presented to the multi-disciplinary research team who challenged the emerging interpretations from different clinical and theoretical standpoints. In the third stage of analysis, final discourses, their function and implications for engagement in healthy behaviours and uptake of lifestyle interventions were agreed through consensus discussion and considered in relation to the existing literature.

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Results

The search strategy yielded 778 articles. Following title and abstract screening by two authors, 84 underwent full text review. Of these, 22 were excluded, leaving 62 articles in the final sample (see Figure 1). The 62 included articles reported data from 56 studies. Forty-seven articles reported data from the perspective of 1208 people with knee osteoarthritis; 1 article from the perspective of 28 carers; and 14 articles from the perspective of 2043 clinicians. Most articles were set in the UK (25-39), Australia (13, 14, 40-47), USA (48-56) and Canada (57-66) with remaining studies from Belgium (67), Denmark (68), France (69, 70), Hong Kong (71), Korea (72), Kuwait (73), Malaysia (74), New Zealand (75), Spain (76, 77), Singapore (78), Sweden (79, 80) and Taiwan (81-84). Details about the characteristics of the included studies are presented in Table 3.

Evaluation of methodological rigour revealed that only 13 of the 56 studies fulfilled all 10 questions on the CASP; 12 studies failed on two or more questions and seven articles failed most (>5 not fulfilled). Question one (*"was there a clear statement of the aims of the research?")* and two ("*is a qualitative methodology appropriate?*") were met in all 56 studies. Question six (*"has the relationship between the researcher and participant been adequately considered?")* was most commonly not met, with 41 studies failing to address it (see Table 4)

From the 62 articles, 1673 quotes were extracted. Three articles (27, 48, 71) contained no quotes. The process of data reduction from codes to discourses and overarching discourses is presented in Table 5. Two overarching discourses were identified: an impairment discourse and a participatory discourse.

The overarching impairment discourse comprised three discourses, which we termed: (i) 'the body as a machine', (ii) 'ageing', and (iii) 'normalisation'. This overarching discourse focused on what individuals could not do because of knee osteoarthritis. People who used this discourse perceived the body to be a machine (*body as a machine discourse*) that came with a use-by date. Wear and tear in the knee was perceived to be an inevitable part of ageing that one had little control over (*ageing discourse*). According to this discourse, knee osteoarthritis could be seen as a 'normal' condition that people had to 'put up with' until the knee machinery was 'broken enough' to warrant a knee replacement (*normalisation discourse*).

The overarching participatory discourse comprised two discourses, which we termed: (i) 'healthy ageing', and (ii) 'empowerment'. This overarching discourse focused on what individuals could, rather than what they could not do. People who used this discourse perceived that a 'busy body' was a 'healthy body' and the knee could be healthy despite osteoarthritis (*healthy ageing discourse).* In this discourse, people with osteoarthritis felt empowered to take charge of their 'knee health' (*empowerment discourse*).

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The impairment discourse was the prevailing discourse among all participant groups (people with knee osteoarthritis, their carers and clinicians) and all study settings. Where it existed, the participatory discourse almost always co-existed alongside an impairment discourse, except in four studies (45-47, 63) (see Table 3). Of these, three studies (two involving physiotherapists, one involving people with osteoarthritis) took place in Australia and were embedded in clinical trials of cognitive behavioural approaches in osteoarthritis care (45-47). One study explored the experiences of community/outpatient physiotherapists in Canada (63). Comparative quotes illustrating how people talk about of knee osteoarthritis using impairment and participatory discourses are presented in Table 6.

Discussion

Discourses evolve over time to meet the changing needs of the societies that use them and new discourses can coexist and combine with earlier ones (85). While the studies included in this review took place in a range of socio-historical and geographical contexts, we identified two recurring and overarching discourses related to knee osteoarthritis: a dominant impairment discourse, and a less prevailing participatory discourse that almost always co-existed alongside an impairment discourse.

These two overarching discourses can be placed within the context of early and more recent discourses described in the wider medical literature. The impairment discourse we described has its roots in the dualism of the mental and the physical. Human beings find it natural to distinguish between the physical world containing matter, tangible objects, including human bodies, which are public; and the human mind, a private world hidden by our behaviour. We think that each individual has a privileged access to his own mind, while our access to the minds of others is indirect, based on observations of their behaviour, and at best uncertain. The dualism of the mental and the physical informs not just Cartesian dualism, but the mainstream of modern philosophy, including materialism. Materialism rejects the Cartesian conception of the mind as a non-physical substance, but concludes that it must be a material substance, thereby replacing the mind-body dichotomy, with a brain-body dualism, in which the brain takes on the role of the mind. According to materialism, the body is a complex machine comprised of different parts (e.g. musculoskeletal, cardiovascular, endocrine system) that could each break down with time and/or give rise to separate disease entities or health conditions (such as osteoarthritis, heart disease, diabetes). Break-downs in the machine require specialised 'mechanics' to fix them (i.e. orthopaedists, cardiologists, endocrinologists). The complaint of pain is viewed as damage or disease symptomology. While not every patient shows damage or disease in the same way, the expression of what doctors perceive to be 'excessive' pain or suffering was put down to a 'fault of the mind' (86). 'Faults of the mind' are separate from the body, and thus perceived to be beyond the concern of the specialist 'body doctor' (85). Aspects of the impairment discourse we identified in our review overlap with the simplistic dualism of the mental and the physical (87, 88). For example, materialistic notions that 'broken' body parts are unsafe to use and that pain can only be cured by fixing the broken body part.

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We suggest the impairment discourse we identified does not encourage people with knee osteoarthritis to be actively engaged in the management of their condition. This discourse implies people cannot fix a diseased or damaged joint themselves. As such, those who use an impairment discourse may resort to 'putting up with' their symptoms until someone else (e.g. a surgeon) can fix it for them. This conflicts with recommendations in practice guidelines that all people with knee osteoarthritis can benefit from active self-management strategies and evidence that multiple trajectories in knee osteoarthritis exist, including trajectories of stability and recovery (89).

Contemporary pain management has moved medicine beyond simplistic dualism. While materialism explains the philosophical underpinnings of impairment discourse, the explanation of participatory discourse within the context of materialism is missed and may not apply. The participatory discourse we have described has roots in the sociopsychobiomedical conceptual framework which recognises that the illness experience can be influenced by more than just a malfunctioning physical machine; it can also be influenced by one's sociopsycho context (90). This can be bidirectional: sociopsycho factors can cause pain; they can also result from chronic pain (91-93). According to the sociopsychobiomedical framework, while an individual may be unable to make pathoanatomical changes within their knee joint, they may be able to control modifiable factors within their psychosocial context that contribute to their pain experience. According to this discourse, by making the 'right' choices, individuals can maintain an active, engaged lifestyle and age 'healthily' (94). However, while some people will be experts in their own health, others will lack the literacy or knowledge to make health-related decisions and lack the skills, confidence or resources to implement them (95). Empowering people who seek care with the knowledge, skills and resources to take control of the modifiable aspects of their health becomes the key objective of the clinical encounter (96).

The participatory discourse we have described takes its name from the International Classification of Functioning, Disability and Health (known as the ICF). The ICF is a biopsychosocial framework for measuring health and disability at both individual and population levels that integrates medical and social models of health and disability (97). It promotes the use of a common language to describe health in a way that both positive and negative aspects of functioning can be considered. According to the ICF, even in severe or life-threatening health conditions where there may be a focus on ‘curing the disease’, psychosocial and environmental factors remain important contributions. Participation (defined as ‘involvement in a life situation’), is considered as the ultimate health outcome (98). In the context of knee osteoarthritis, the ICF focus on 'participation' turns attention to what an individual can do despite their knee, rather than what they cannot do. Consistent with evidence-based recommendations (99-101), with the participatory discourse, clinicians aim to empower individuals with strategies that support them to live active, engaged lives where possible, rather than only focussing on 'fixing' the knee.

While our study is the first to explore discourses in knee osteoarthritis, findings from the broader field of musculoskeletal pain suggest that the participatory discourse has been slow

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to trickle into mainstream medical discourse. The dualism of the mental and the physical pervasively instantiated in Western culture has profoundly affected our view of human nature and language to such an extent that it remains challenging to understand the nature of pain without the implicit assumption of dualism. While some people will require pathoanatomical changes to be clinically assessed before pain and mobility can be restored, there is evidence that pain can persist in the absence of injury or demonstrable tissue damage (102, 103); that pain experience is poorly correlated with the extent of patho-anatomical changes (104); and that appropriately graded physical activity is beneficial for most if not all people with persistent musculoskeletal pain (105, 106). People around the world of all ages, both with and without musculoskeletal pain, including clinicians, commonly believe persistent musculoskeletal pain always signals a damaged body part that needs to be investigated, healed or fixed, even when there is evidence to the contrary, or is lacking entirely (21, 107-109). People with persistent musculoskeletal pain who endorse these beliefs are more likely to rest and avoid activity in order to 'protect' the damaged body part (110, 111).

Clinicians play an important role in shaping health discourses and are ideally placed to provide people seeking care with an alternative way of communicating about knee osteoarthritis. Building on the collaborative partnership between the patient and clinician, sensitive clinicians can communicate to the person with pain, not the brain or alleged injured tissue. If eventually the individual does require surgery, the participatory discourse can complement management and provide guidance for recovery and rehabilitation. The side-by-side participant quotes presented in Table 6 may assist clinicians to transition away from a discourse of impairment towards one of participation when helping people 'make sense' of knee osteoarthritis (110, 112).

Design considerations

Calls for a biopsychosocial approach in the management of knee osteoarthritis have been made previously (112). Here, we have adopted a novel approach to look at the sociopsychobiomedical paradigm in relation to how people talk, rather than how clinicians clinically reason about knee osteoarthritis. To the best of our knowledge, this is the first time a discourse analysis approach has been applied to the field of knee osteoarthritis.

The studies included in this review took place in a range of socio-historical and geographical contexts, providing us insight into how people talk about knee osteoarthritis around the world and how discourses evolved over time. However, a limitation of this design is that the quotes we extracted had already been subjected to an interpretive process through the lens of each study's authors. As is inherent to the qualitative research paradigm, we acknowledge alternative interpretations to those presented are possible. A limitation of our review is the lack of consumer involvement in the analysis; as such these findings reflect our predominantly clinical lens. Consultation with a consumer representative after the completion of data analysis supported the credibility of our interpretations. Exploring how minority groups and people in other non-Western settings communicate about knee osteoarthritis is a

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fruitful avenue for future research, as these populations were under-represented in our review.

That only 13 of the 56 included studies met all of the methodological rigour criteria deserves further consideration. Qualitative methods are relatively novel in orthopaedic research, a field dominated by quantitative approaches and positivist paradigms. While a long tradition in the social sciences has provided qualitative researchers with the tools to conduct robust qualitative health research, translating these for an audience unfamiliar with qualitative methods can be challenging, particularly in the context of tight journal word counts. We recommend future studies in the field use widely accepted checklists such as the Consolidated Criteria for Reporting Qualitative Research (COREQ) (113) during the design and reporting stages of a study.

Conclusion

The way people talk about knee osteoarthritis provides insight into what the condition means to them and what it is like to live with it, including why people feel and act as they do. Our review identified a dominant impairment discourse. We have argued this discourse may potentially discourage people from using knees that have passed their 'use-by-date', discourage people from actively participating in their own care and increase reliance on doctors to repair the joint damage. Future work is needed to understand how best to reconfigure communication in the clinical setting to encourage people with knee osteoarthritis to engage in physical activity and active lifestyle interventions, including self-management. Consistent messaging from health professionals involved in osteoarthritis care that knees do not have a ‘use-by-date’; that knee pain does not always get worse with age; and that knees are safe to use despite 'changes' on imaging, is important. Revisiting how we teach communication skills to trainees by incorporating the participatory discourse into curricula is likely to be an important step towards this goal.

Further qualitative studies involving primary data and reported using widely accepted checklists such as the Consolidated Criteria for Reporting Qualitative Research (COREQ) (67) are needed to explore the range of ways in which people talk about knee osteoarthritis. Future research to understand how a participatory discourse impacts on the lived experience of knee osteoarthritis would be fruitful, as would future intervention studies exploring the effect of changing the way people talk about musculoskeletal pain on behaviour.

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Table 1: Search strategy in Medline

Search
1. knee osteoarthritis mp or Osteoarthritis, Knee/
2. knee/
3. knee arthroplasty.mp or Arthroplasty, Replacement, Knee/
4. Knee joint/
5. (knee adj3 osteoarthritis).mp
6. qualitative research.mp or Qualitative Research/
7. qualitative analysis.mp
8. qualitative evaluation.mp
9. qualitative study.mp
10. 1 or 2 or 3 or 4 or 5
11. 6 or 7 or 8 or 9
12. 10 and 11

/ denotes MeSH term; mp denotes keyword

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Table 2. Inclusion criteria

	Inclusion criteria	Exclusion criteria
Design	Qualitative studies - Full text article in peer reviewed journal	-Systematic reviews of qualitative research -Questionnaires/surveys -Single case studies
Participants	Knee osteoarthritis -Perceptions of people with knee osteoarthritis, their carers or clinicians -Can include other conditions if perceptions about knee osteoarthritis are reported separately from the other conditions	- Participants not identified as having knee osteoarthritis (for example, knee pain)
Interventions	No intervention needed -Can include perceptions about interventions for knee osteoarthritis	-Perceptions of peri-operative or post-operative knee replacement

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Table 3: Characteristics of included studies

Study	Country	Population	Demographics (N, age, sex, BMI)	Method: Framework / analysis	Sampling	Data collection	Research questions	Overarching discourse
Ahmad *et al*., 2018	Malaysia	Patients with knee OA attending Physiotherapy outpatients >2/10 on VAS median score 5/10	12 participants, 8 female 53-85 yrs, mean 67.1	Thematic analysis	Purposive sampling	Individual interviews -In-depth	Explore perspectives of patients with knee OA mainly about pain experiences, its impact, effects of physiotherapy and their personal expectations	Impairment discourse Participatory discourse
Alami *et al*., 2011	France	Knee OA Health professionals	N=81 71% women, N=29: 11 GPs, 4 surgeons, 6 rheumatologists, 8 alternative therapists	Descriptive -Inductive	Purposive	Individual interviews -semi-structured	Explore views of patients and health professionals about management of knee OA	Impairment discourse
Ali *et al*., 2017	USA	Knee OA -relatively independent	N=18 Mean age 65 yrs, 78% women, Mean BMI 33	Descriptive Content analysis	Purposive -participation in trial	Individual interviews -semi-structured	Explore effects of massage	Impairment discourse
Al-Taiar *et al*., 2013	Kuwait	Severe knee OA Kuwaiti women waitlisted for TKR	N=39 Mean age 62 yrs. 100% women	Thematic analysis	Convenience sample from waiting list in one public orthopaedic hospital	Focus groups	Explore the pain experience and mobility limitation as well as the patient's decision making process to undertake TKR among women with knee	Impairment discourse

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							pain in the waiting list for surgery.	
Barber *et al*., 2019	Canada	Primary care physicians who often see patients with knee OA and Patients with knee pain on most days of the month at any time in the past.	Clinicians: n= 4, 3 woman, 6-22 years since graduation patients: n=5, 3 woman, 57-72 years (mean 63)	Clinicians: cognitive task analysis Patients: participatory action research overall: consensual qualitative research	Intentional (purposive)	Individual interviews -semi-structured	Explore patient and physician perspectives of knee OA, its management and if they would use a self-management app	Impairment discourse
Belsi *et al*., 2010	UK	Knee OA -receiving rehabilitation	N=21 Age range 45-65 yrs, 90% women	Framework analysis	Convenience	Focus groups	Explore expected impact of wearable technology	Impairment discourse Participatory discourse
Briggs *et al*., 2019	Australia and New Zealand	Practicing primary care clinicians (GPs, GP registrars, nurses, physios) and students	1886 clinicians. (75% F, 41 (12.3) years), 1161 students (63% F, 24.5 (3.5) years	Summative content analysis	Cross sectional survey of representative sample	Survey with free text	Attitudes toward exercise/PA as a core intervention for OA	Impairment discourse Participatory discourse
Bunzli *et al*., 2017	Australia	Orthopaedic surgeons performing TKR	N=20	An implementation approach involving deductive and inductive analysis	All orthopaedic surgeons performing TKR at one tertiary hospital	Individual interviews -semi-structured	Explore the barriers and facilitators to TKR decision aid uptake among orthopaedic surgeons	Impairment discourse
Bunzli *et al*., 2019	Australia	Patients with advanced knee	n= 27, 48% F, mean 67 years	Framework analysis	Purposive	Individual interviews -semi-structured	Explore why do patients feel that nonsurgical interventions are of little	Impairment discourse

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		OA waiting list for TKR					value in the treatment of knee OA	
Campbell *et al*., 2001	UK	Knee OA	N=20 Age range 40-70+ yrs, 70% women	Inductive	Convenience -Participation in RCT	Individual interviews -in-depth	To understand reasons for compliance or non-compliance with home exercise program for people with knee OA	Impairment discourse
Carmona-Teres *et al*., 2017	Spain	Knee OA -symptomatic	N=10 Mean age 70 yrs, 70% women	Content thematic analysis based on Lazarus stress model categories	Theoretical	Individual interviews -semi-structured	Understand current practice from perspective of people with knee OA Understand experiences of people with OA	Impairment discourse Participatory discourse
Chan and Chan, 2011	Hong Kong	Knee OA -mild to very severe	N=20 Mean age 57 yrs, 65% women	Grounded theory	Convenience	Individual interviews -semi-structured	Evaluate influence of different pain patterns on quality of life Investigate coping strategies	n/a
Chang *et al*., 2004	USA	Severe knee OA 20 White and 17 African Americans actively considering TKR	N=37 Mean age 60 yrs 68% women	Content analysis	Consecutive patients actively considering TKR from one orthopaedic surgeon's office	Focus groups	Examine differences in patients' concerns regarding TKR by race/ethnicity and gender.	n/a
Clarke *et al.*, 2014 Pouli *et al.*, 2014	UK	Knee OA -symptomatic	N=24 Mean age 62 yrs, 71% women	Descriptive thematic analysis	Purposive	Individual interviews -semi-structured	Explore participant's experience of living with knee OA and their beliefs about knee OA and its treatment	Impairment discourse

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Darlow *et al*., 2018	New Zealand	Patients with knee OA	n=13, 7F, median 60-65 years	Interpretive Description	Purposive sampling	Individual interviews -semi-structured	Explore the beliefs of people with knee OA, explore how these beliefs had formed and what impact they had on behaviour	Impairment discourse
Egerton *et al*., 2017	Australia	Health professionals	N=11 GPs	Descriptive -Inductive	Purposive	Individual interviews -semi-structured	Explore GP expectations to use a telephone service for patients with knee OA	Impairment discourse
Elwyn *et al*., 2018	UK	Health professionals	N=6 Physiotherapists	Descriptive -Inductive	Convenience	Individual interviews -semi-structured	Explore reactions of health professional to using a patient decision support tool	Impairment discourse Participatory discourse
Figaro *et al*., 2004	USA	Knee OA Not actively seeking TKR	N=94 Mean age 71yrs African American	Content analysis Constant comparative methods	Purposive sampling to recruit from a church and seniors centre proportionately. Network, convenience and snowball sampling to extend the sample	Field interviews -structured	Explore older urban Blacks with knee OA to determine their preferences and expectations of TKR	Impairment discourse
Gay *et al*., 2017	France	Knee OA -mild to moderate symptoms	N=20 (interviews) Mean age 67 yrs 60% women N=7 (focus groups) Mean age 69 yrs	Content analysis	Convenience -recruited from Spa Therapy	Individual interviews -semi-structured Focus groups	Explore the motivators for, and barriers to, regular physical activity in people with knee OA	Impairment discourse Participatory discourse

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			86% women					
Hall *et al*., 2008	Canada	Unilateral knee OA Scheduled for TKR	N=15 Mean age 67 yrs 40% women	Grounded theory	Purposive sampling of preoperative patients at one orthopaedic hospital	Individual interviews -semi-structured	Explore views of TKR and the role of physiotherapy	Impairment discourse
Hendry *et al*., 2006	UK	Knee OA -mild to severe symptoms	N=22 Age range 52-86 yrs 73% women	Conceptual Framework	Convenience -recruited from General Practice	Individual interviews Focus Groups (N=6)	Explore the views of primary care patients with knee OA towards exercise, and explore factors that determine acceptability and motivation to exercise, and barriers that limit its use	Impairment discourse Participatory discourse
Hinman *et al*., 2016	Australia	Knee OA -mild to moderate symptoms Physiotherapists -Mean 19 yrs experience Telephone coaches -2 had prior experience -3 health disciplines	N=6 Mean age 62 yrs, 50% women N=10 50% women Mean age 43 yrs N=4 100% women Mean age 42 yrs	Symbolic interactionism Grounded theory - 5 x 30 min sessions over 26 weeks	Convenience -participation in RCT	Individual interviews -semi structured	Explore perceptions of participants, physiotherapists and telephone coaches engaged in an integrated program of physiotherapy and telephone coaching for people with knee OA	Impairment discourse Participatory discourse
Hinman *et al*., 2017	Australia	Knee OA	N=12 50% women Mean age 62 yrs	Donabedian framework	Convenience -participation in RCT	Individual interviews -semi structured	Explore the experiences of people with knee OA and physiotherapists with	Impairment discourse Participatory discourse

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		-mild to moderate symptoms Physiotherapists -Mean 15 years' experience	N=8 50% women Mean age 39 yrs	Thematic and constant comparative analysis			using Skype for exercise management of knee OA	
Hsu *et al*., 2015	Taiwan	Caregivers of people with knee OA	N=28 Mean age 48 yrs, 46% women	Descriptive content analysis	Convenience	Individual interviews -semi-structured	Explore primary caregivers perceptions of their older relatives' knee OA pain and management	Impairment discourse
Johnson *et al*., 2016	UK	Knee OA Scheduled for TKR	N=10 Age range 61-78 yrs 40% women	Interpretive Phenomenological Analysis	Purposive sampling for age and sex from preoperative patients at a large hospital	Individual interviews -semi-structured	Explore how the process of undergoing and recovering from TKR alters patients' experiences and use of their support networks.	Impairment discourse
Kao and Tsai, 2012, 2013	Taiwan	Knee OA -symptomatic	N=17 Mean age 50 yrs, 82% women Mean BMI 28.6	Constant comparison	Purposive	Individual interviews -semi structured	Understand the living and illness experiences of middle-aged adults with early knee OA	Impairment discourse
Keysor *et al*., 1998	USA	Knee OA -presence of functional limitations	N=4 Age range 25-43 yrs, 75% women	Van Kaam method of phenomenologic data analysis	Purposive	Individual interviews -semi structured (each participant interviewed twice)	Understand the experience of living with OA as young and middle-aged adults	Impairment discourse Participatory discourse
Kinsey *et al.,* 2017	UK	Knee OA	N=72 Man age 66 yrs 60% women	Descriptive -Thematic analysis	Purposive	Individual interviews -semi-structured	Explore patients experiences of using a decision support tool	Impairment discourse
Kroll *et al*., 2007,	USA	Knee OA	N=37 Mean age 64 yrs	Grounded theory	Purposively sampled	Focus groups	Explore the experiences, knowledge, beliefs, and	Impairment discourse

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Suarez-Almazor *et al.,* 2010		Not actively seeking TKR	62% women 15 African American, 9 Hispanic and 13 Caucasian		attending primary care clinics at the same outpatient institution		attitudes of African American, Hispanic, and Caucasian patients regarding their knee arthritis and TKR, in order to understand how differing perceptions may influence decision-making about total knee replacement.	
Lawford *et al*., 2018a	Australia	Knee OA -mild to moderate symptoms	N=20 Mean age 59 yrs 65% women Mean BMI 30	Donabedian framework Interpretivist paradigm Thematic analysis	Convenience -Participation in RCT	Individual interviews -semi-structured	Explore participants perceptions of telephone delivered exercise therapy and behavioural change strategies	Participatory discourse
Lawford *et al*., 2018b	Australia	Physiotherapists -Mean 14 years' experience	N=8 Mean age 35 yrs 50% women	Constructivist paradigm	Convenience -Participation in RCT Thematic analysis	Individual interviews -semi-structured	Explore the experiences and impacts from a behavioural management training course for physiotherapists	Participatory discourse
Li *et al*., 2013	Canada	Health professionals	N=10 Orthopaedic surgeons and residents	Descriptive	Purposive	Individual interviews Focus group	Perceptions on management of knee OA and opinion on implants	Impairment discourse
MacKay *et al*., 2014a and 2014b, 2016	Canada	Knee OA -moderately symptomatic	N=51 Median age 49 yrs, 61% women	Constructivist grounded Theory/ constant comparative method	Purposive	Focus groups Individual interviews -semi-structured	Explore the meaning and perceived consequences of knee symptoms and how people with knee OA manage their symptoms	Impairment discourse Participatory discourse

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MacKay *et al*., 2018	Canada	Physiotherapists	n = 33 Mean years in practice = 21 (1-45) 76% women	Thematic analysis	Purposive and snowball	Individual interviews -semi-structured	Identify barriers and enablers to managing patients with perceived early knee OA and the contextual factors affecting implementation of care	Participatory discourse
Maly and Krupa, 2007	Canada	Knee OA	N=3 Age range 62-87 yrs, 67% women	Descriptive phenomenology	Convenience	Individual interviews -semi structured	Understand the experience of living with knee OA in older adults	Impairment discourse
Man *et al*., 2017	USA	Knee OA Waitlisted for TKR	N=8 Age range 46-80 yrs 50% women	Thematic analysis	Secondary analysis of 8 purposively sampled transcripts from a primary study exploring why people with OA do or do not re-engage in pre-operative occupations following hip or knee replacement	Individual interviews -semi-structured	Explore the meaning and importance of occupational changes experienced by individuals during the pre- TKR period	Impairment discourse
Morden *et al*., 2011; Ong *et al.,* 2011	UK	Knee OA -moderate to severe	N=22 Age range 50-75+ yrs, 59% women	Descriptive -constant comparison	Purposive	Individual interviews -semi-structured Diaries	Explore self-management of knee OA and explore the meaning and enactment of self-management in everyday life	Impairment discourse Participatory discourse

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Nielsen *et al.,* 2014	Australia	Physiotherapists - Providing therapy for patients with knee OA	N=8 90% women	Framework analysis	Purposive	Individual interviews -semi structured	Explore therapists' experience with pain coping skills therapy	Participatory discourse
Nyvang *et al*., 2016	Sweden	Knee OA Scheduled for TKR	N=12 Mean age 66 yrs 58% women	Thematic analysis	Purposive sampling for sex and age from patients scheduled for surgery at one hospital	Individual interviews -semi-structured	Explore patients' experiences of living with knee OA when scheduled for TKRand further their expectations for future life after surgery.	Impairment discourse
Pellegrini *et al*., 2018	USA	Patients with knee OA wait listed for TKR	n=21, 67 years, 44% female	Constant comparative analysis	Purposive sampling	Individual interviews -semi-structured	Explore barriers and facilitators to physical activity and healthy eating among TKR patients	Impairment discourse
Pera *et al*., 2016	Spain	Knee OA	N=10 Mean age 67 yrs, 80% women, Mean BMI 41	Phenomenology Thematic content analysis	Purposive	Focus group	Explore meaning of obesity and factors associated with weight loss or gain	Impairment discourse Participatory discourse
Prasanna *et al*., 2017	Canada	Knee OA Health professionals	N=5 Age >50 yrs 60% women N=6: Allied health	Content analysis	Convenience	Focus groups	Explore reasons for delay in management	Impairment discourse
Rabago *et al*., 2016	USA	Knee OA	N=22 Mean age 57 yrs, 22% women	Descriptive	Purposive -Participation in trial	Individual interviews -semi-structured	Explore experiences of participants who received prolotherapy	Impairment discourse Participatory discourse

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Son *et al*., 2013	Korea	Knee OA -mild	N=16 Age range 40-69 yrs 69% women	Content analysis	Convenience -Participation in trial	Individual interviews	Explore experience of moxibustion	Impairment discourse Participatory discourse
Spitaels *et al*., 2017	Belgium	Knee OA	N=11 Mean age 66 yrs 64% women	Content analysis	Convenience	Individual interviews -semi-structured	Explore patient perceptions of guideline recommendations	Impairment discourse
Tallon *et al*., 2000	UK	Knee OA -mild to moderate	N=7	Content analysis	Convenience	Focus groups	Explore perception of treatment preferences	Impairment discourse
Thorstensson *et al*., 2006	Sweden	Knee OA -Moderate to severe radiographically (at least Grade 3 KL score)	N=16 Age range 39-64 yrs 38% women, Mean BMI 30	Phenomenographic analysis	Convenience -Participation in trial	Individual interviews -semi-structured	Describe how middle-aged patients conceive exercise as a treatment for knee osteoarthritis	Impairment discourse Participatory discourse
Toye *et al*., 2006	UK	Knee OA Waitlisted for TKR	N=18 Age range 54-77 yrs 33% women	Interpretive Phenomenological Analysis	Purposive sampling of patients listed for TKR at one orthopaedic hospital with below average scores on the pain / disability. questionnaire	Individual interviews -semi-structured	Explore patients' personal meanings of knee osteoarthritis and total knee replacement	Impairment discourse
Toye *et al*., 2017	UK	Knee OA -listed for TKR	N=6 Age range 59-76 yrs, 100% men, BMI range 31-38	Constructivist grounded theory	Convenience	Individual interviews -flexible guide	Experience of weight loss or gain	Impairment discourse

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Traumer *et al*., 2018	Denmark	Patients undergoing TKR	n=11, 5F, 69 years (57-55)	Thematic analysis	Convenience sample -participation in RCT	Individual interviews -semi-structured	To investigate decision making processes for TKR among patients with knee OA	Impairment discourse
Victor *et al*., 2004	UK	Knee OA	N=170 Mean age 63 yrs, 73% women	Content analysis	Convenience -Participation in trial	Individual interviews Group discussion Diaries	Explore meaning of osteoarthritis for those receiving health promotion	Impairment discourse
Wallis *et al*., 2019	Australia	Knee OA -severe radiographic findings	N=21 43% women Mean age 67 yrs Mean BMI 34	Phenomenological	Convenience -participation in RCT	Individual interviews -semi structured	Explore the perceptions of people with severe knee osteoarthritis and increased cardiovascular risk about participating in a walking program	Impairment discourse Participatory discourse
Webber *et al*., 2018	Canada	Patients pre and post TKR (only pre included)	8 pre-operative, 6 Women, 67 yrs	Interpretive description	Purposive sampling	Focus groups	Explore understanding of physical activity and sedentary behaviour in people with knee OA	Impairment discourse Participatory discourse
Wen-Ling *et al*., 2017	Taiwan	Older people with knee OA Recommended a TKR by surgeon but are indecisive	N=26 Mean age 74 yrs 77% women	Thematic analysis	Convenience sampling from two medical centres and one regional hospital	Individual interviews -semi-structured	Explore factors related to the indecision of older adults with knee osteoarthritis about receiving physician-recommended total knee replacement and their needs during the decision-making process.	Impairment discourse
Woolhead *et al*., 2002	UK	Knee OA except for 1 person with rheumatoid arthritis and	N=25 Mean age 65 yrs 58% women	Constant comparison	Purposive sampling for sex and age from patients wait listed for	Individual interviews -semi-structured	Explore patients' views on who should have priority for total knee replacement	Impairment discourse

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		systemic lupus erythematosus. Waitlisted for TKR			surgery with 3 orthopaedic surgeons			
Xie *et al*., 2006	Singapore	Knee OA -symptomatic	N=41 Mean age 64 yrs, 66% women	Grounded theory/ Content analysis	Purposive	Focus groups	Determine health-related quality of life domains affected by knee osteoarthritis Identify ethnic variations in the importance of these domains	Impairment discourse

UK = United Kingdom;
USA = United States of America
OA = Osteoarthritis
TKR = Total Knee Replacement
Yrs = Years
KL = Kellgren Lawrence
GP = General Practitioners
BMI = Body Mass Index
RCT = Randomised Controlled Trial

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Table 4: Critical Appraisal Skills Programme (CASP) assessment

Study name	1. Was there a clear statement of the aims of the research?	2. Is a qualitative methodology appropriate?	3.Was the research design appropriate to address the aims of the research?	4. Was the recruitment strategy appropriate to the aims of the research?	5. Was the data collected in a way that addressed the research issue?	6. Has the relationship between researcher and participant been adequately considered?	7. Have ethical issues been taken into consideration?	8. Was the data analysis sufficiently rigorous?	9. Is there a clear statement of findings?	10. How valuable is the research?
Ahmad *et al.,* 2018	Y	Y	Y	Y	Y	N	Y	N	Y	Y
Alami *et al.,* 2011	Y	Y	Y	Y	N	N	Y	Y	Y	Y
Ali *et al.,* 2017	Y	Y	N	N	N	N	Y	N	Y	N
Al-Taiar *et al.,* 2013	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Barber *et al.,* 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Belsi *et al.,* 2016	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
Briggs *et al,*. 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bunzli *et al,*. 2017	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bunzli *et al*., 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Campbell *et al*. 2001	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
Carmona-Teres *et al.,* 2017	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Chan and Chan., 2011	Y	Y	Y	Y	Y	N	Y	N	Y	Y
Chang *et al.,* 2004	Y	Y	N	N	N	Y	N	N	Y	N
Clarke *et al.*, 2014 and Pouli *et al.,* 2014	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Darlow *et al.,* 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Egerton *et al.,* 2017	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Elwyn *et al.,* 2016	Y	Y	Y	N	Y	N	Y	Y	Y	N
Figaro *et al.,* 2004	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Gay *et al.,* 2017	Y	Y	N	N	N	N	Y	N	N	N
Hall *et al.,* 2008	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Hendry *et al.,* 2006	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Hinman *et al*., 2016	Y	Y	Y	Y	Y	N	Y	Y	Y	Y

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Hinman *et al.,* 2017	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Hsu *et al.,* 2015	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Johnson *et al.,* 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Kao *et al.,* 2012, 2014	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Keysor *et al.,* 1998	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Kinsey *et al.,* 2017	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Kroll *et al.,* 2007, Suarez-Alma *et al.,* 2010	Y	Y	Y	N	Y	N	N	N	N	N
Lawford *et al.* 2018a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Lawford *et al*. 2018b	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Li *et al.,* 2013	Y	Y	N	N	N	N	Y	N	Y	N
Mackay *et al.,* 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mackay *et al.,* 2016, 2014a. 2014b	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Maly and Krupa, 2007	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Man *et al.,*2017	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Morden *et al.,* 2011, Ong *et al.,* 2011	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Nielsen *et al.,* 2014	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Nyvang *et al.,* 2016	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Pellegrini *et al*., 2018	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Pera *et al.,* 2016	Y	Y	Y	N	Y	N	Y	N	Y	Y
Prasanna *et al.,* 2013	Y	Y	Y	Y	N	N	Y	Y	Y	N
Rabago *et al.,* 2016	Y	Y	N	N	N	N	Y	N	N	N
Son *et al.,* 2013	Y	Y	N	N	Y	N	N	N	Y	N
Spitaels *et al.,* 2017	Y	Y	Y	Y	Y	N	Y	N	Y	Y
Tallon *et al.,* 2000	Y	Y	Y	N	Y	N	N	N	Y	Y

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Thorstensson *et al.,* 2006	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Toye *et al.,* 2017	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Toye *et al.,* 2006	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Traumer *et al.,* 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Victor *et al.,* 2004	Y	Y	Y	Y	Y	N	N	N	Y	Y
Wallis *et al.,* 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Webber *et al.,* 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wen-ling *et al.,* 2017	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Woolhead *et al.,* 2002	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Xie *et al.,* 2006	Y	Y	Y	Y	Y	N	Y	Y	Y	Y

Y = yes
N = no

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Table 5. Process of data reduction

Codes	Discourses	Overarching discourse
Loss of cartilage and bone Mechanical problem, mechanical fix Down hill trajectory	Body as a machine	Impairment discourse
Use-by date Ageing Losses and failures Fear Fatalism Degeneration vs regeneration	Ageing discourse	
Normal wear and tear Lack of disease Invisible suffering Not a priority	Normalisation discourse	
Owning my knee Healthy ageing Busy bodies Maintaining the knee Preventing progression	Healthy ageing discourse	Participatory discourse
Strong muscles Patient in charge Clinician as coach Legitimising suffering Fitting exercise into life Vehicle for living	Empowerment discourse	

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Table 6. Comparative quotes illustrating how people make sense of knee osteoarthritis using impairment and participatory discourses

Making sense of knee osteoarthritis	Impairment discourse	Participatory discourse
The meaning of imaging findings	"The bones on the joint get closer together and the bits in between isn't working as it should and it closes and closes and as it closes it get more painful"(28)	"I've made a decision not to use that term 'wear and tear'... the implication is that it's not unusual and everybody gets it and, you know, it's not something we need to take any notice of"(75) "Even someone with 'severe osteoarthritis' would likely still benefit from an activity program to promote improved flexibility, strength and balance"(40)
The impact of osteoarthritis	"My knee prevented me from doing so many things I valued, and that also affects one's mood and wellbeing, right?"(68) "Thanks to this ... Well, I think, Why should I go here when I just as well can die, and so on; that's how I can think, it's not a long time left"(79)	"All these activities, they're ways to meet people. When you meet new people, it does them all sorts of good, and you too. You should never cut yourself off because you have osteoarthritis"(70) "Physical activity is everything. I mean it's being mindful of, you know, getting up and walking and doing as much as you possibly can. It's not just going to the gym... it's walking the dog, it's activities with the grandchild, it's that whole component of wellness for me and behaviours"(66)
The future with osteoarthritis	"It must get worse and worse ... its frightening ... I will just become totally immobile, chair- bound"(36) "I think it's the worry associated with not knowing what it is"(65)	"Because of what I have learned, I really now understand what the problem is. And I know what I need to do . . . and what will happen if I don't. I'm not as afraid and I believe I am able to adapt as I need to over the years to come(51)"` .
Seeking care for osteoarthritis	"So I go to the doctor and all he just simply done was put his hand on my knee, he said "move your leg, . . . you are getting old you've got rheumatism"(26)	"I think trying to develop a bit of trust, and I think that comes about by listening to the person, and giving them time and opportunity to talk about what their problems are and how they're feeling"(46)
Treatment of osteoarthritis	"And if the bone's worn like mine was, the pain will be there. There's only one thing to do, it's like cancer, is to cut it away"(35)	"I know I have a problem with my knee; it's not gone, but I feel that I have control over it in that I'm doing these exercises and that has helped me to have some sort of feeling of control over it, and I'm sure I have"(44)

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Exercising with osteoarthritis	"Pain is an alarm that has to be listened to. Killing the pain is not enough for the disease to disappear"(69) "I was walking 4 miles 3 times a week but the doctor told me it wasn't really a good idea to walk because the pounding"(52)	"It definitely made it a stronger knee, or stronger muscles around the knee, I suppose, e.g., quad muscles and things like that. Therefore, I was able to move around a bit easier and stairs weren't as bad"(45) "You just feel great when you've done it . . . so this is why I persevere, painful knees or not . . . you know, they say exercise releases happy something in your brain and it certainly does"(30)

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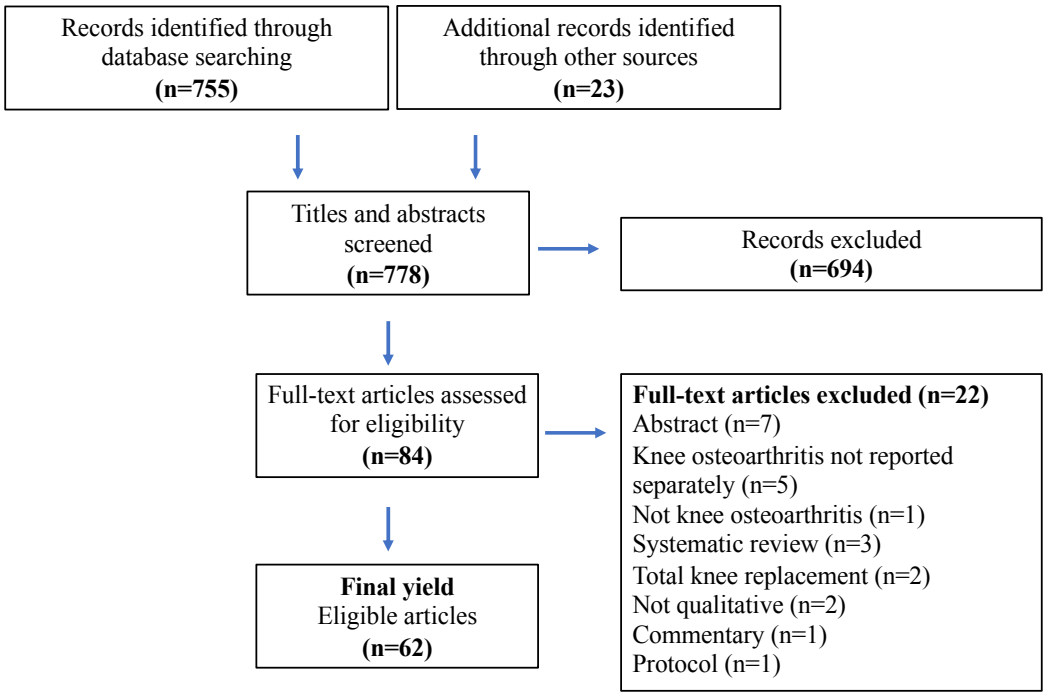


Figure 1. Search yield

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