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Patient preferences and decision-making when considering surgery for musculoskeletal disorders: A mixed methods systematic review

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Abstract

Introduction: The burden of Musculoskeletal disorders (MSD) is large. Surgery is an important management option but the factors that shape patients' surgical decisions are not well understood. As prior reviews have explored only single data types or conditions, a mixed methods appraisal across the musculoskeletal spectrum was undertaken.

Methods: A mixed-methods systematic, convergent segregated approach was used, with PubMed, Cumulated Index to Nursing and Allied Health Literature (CINHAL), Embase and PsycINFO searched to identify studies of adult patients' decisions about whether to undergo surgery. A narrative synthesis was conducted, with identified themes integrated across quantitative, qualitative and mixed-methods studies.

Results: Forty-six studies were included (24 quantitative, 19 qualitative and three mixed methods), with four decision-making themes identified (symptoms, socio-demographic and health factors, information and perceptions). Decision-making involves a complex interaction of individual sociodemographic, health and symptom information, integrated with individual perceptions of candidacy and surgical expectations. While most studies investigated hip and knee surgery, across all included conditions, patients are more likely to favour surgery if symptoms and/or dysfunction are higher, and if perceptions of surgical candidacy and processes (outcomes, inconvenience, and risk) are favourable. Other factors including age, general health, race, financial context, professional and non-professional communication, and information sources also impact decision-making but exert a less consistent impact upon the propensity to prefer surgery.

Conclusion: Patients are more likely to choose surgery for MSD when they have higher levels of symptoms or dysfunction and positive perceptions of surgical suitability and expectations. Other factors important to individuals, have a less consistent impact upon the propensity to prefer surgery. These findings have potential to aid the efficient referral of patients to orthopaedics. More research is needed to validate these findings across the spectrum of MSD.

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1 | INTRODUCTION

Musculoskeletal disorders (MSD) are the leading cause of disability worldwide (WHO, 2021). As demand for musculoskeletal care increases, surgical waiting lists grow (Curtis et al., 2010) and costs increase (March et al., 2014). Factors reported to influence patient preference (or patients' decisions) to have surgery for MSD known to be multifactorial (Lam & Loke, 2017; O'Neill et al., 2007) and include a variety of physical, sociodemographic, psychosocial factors and other factors related to the clinical encounter, such as decision aids (Chung et al., 2006; Clark et al., 2004; Figaro et al., 2004; Modi et al., 2014). However, potential commonality and contribution of factors across different MSD is unclear. A better understanding of these factors across the spectrum of MSD could aid communication and care efficiency.

Current understanding of factors impacting patients' decisions to have surgery is greatly limited to single methodological approaches (qualitative or quantitative) or a single surgery. This hinders discovery of common factors across condition-types and integration of qualitative and quantitative findings, which can yield greatly different outcomes; a quantitative systematic review of spinal surgery found pain and function to most influence patient decisions (Lam & Loke, 2017), yet in contrast, a meta-synthesis of qualitative data related to knee arthroplasty found the role of health professional communication, coping strategies, and perceptions of ageing to be most influential (O'Neill et al., 2007). Furthermore, as reviews to date have investigated single conditions, it is unclear whether preferences are unique to specific conditions, or whether there is commonality across MSD that could aid patient communication and shared decision-making.

A mixed methods synthesis seeks provide a richer understanding (Stern et al., 2020) of the factors that influence the decision to undergo surgery for MSD. This review aims were to identify factors reported to be associated with or influence patients' decisions to choose surgery and where possible determine which factors have the greatest association or influence in specific or varied MSDs.

2 | METHODOLOGY

Methodology was informed by the Joanna Briggs Institute (JBI) Mixed Methods Systematic Reviews convergent segregated approach (Stern et al., 2020) and the Cochrane qualitative and mixed methods guidance (Harris et al., 2018). Question formulation and eligibility criteria followed SPIDER (Sample, Phenomenon of Interest, Design, Evaluation, Research type) format (Cooke et al., 2012). The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) Statement guided reporting (Liberati et al., 2009; Tong et al., 2012). The protocol was registered with the Open Science Framework in October 2020 (osf.io/3t46j).

2.1 | Eligibility criteria

Sample: Participants over 18 years old who had or were considering surgery (orthopaedic or neurosurgery) for MSD were included. Paediatrics, non-elective or emergency surgery (such as fractures or malignancy) were excluded.

Phenomenon of Interest: Patient decision-making specific to whether to undergo surgery, such as willingness, preference, or surgical rate. Unless data pertaining to the surgical decision could be extracted, decisional conflict, impact on outcomes, effectiveness of decision-aids or shared-decision models upon patient knowledge and satisfaction, were excluded.

Design: All study designs published in peer-reviewed journals, in English with full text available.

Evaluation: Factors reported to be associated with or influence patient surgical decision-making, including (but not limited to), pain, function, beliefs, attitudes, expectations, information, prior experiences, or decision certainty.

Research Type: Qualitative, quantitative, and mixed methods studies were included.

2.2 | Search strategy and study selection

Electronic searching (PubMed, Cumulated Index to Nursing and Allied Health Literature (CINHAL), Embase and PsycINFO) was conducted 27 October 2020, and re-run on 4th November 2021 (Higgins JPT, 2016). The full search strategy is documented in supplementary files. Titles and abstracts were screened for eligibility by two independent reviewers (ED and SH), with relevant studies retrieved in full and independently assessed against the inclusion criteria by both reviewers. Disagreements were resolved by a third reviewer (DM).

2.3 | Data extraction

A data extraction template was developed based on the guidelines for a Segregated Mixed Methods Systematic Review described by JBI (Stern et al., 2020) and the Cochrane Qualitative and Implementation Methods Group (Noyes et al., 2018). Data was extracted by two reviewers (ED and SH), with disagreements resolved by a third (DM).

2.4 | Synthesis and analysis

Synthesis used a three-phase critical narrative approach (Phelps et al., 2020; Ryan et al., 2018; Stern et al., 2020); first descriptive synthesis of quantitative studies, second thematic synthesis and iterative coding of qualitative data. Reflexivity was achieved through regular discussions between authors (ED, SH) and discussions with a third (DM) to resolve any disagreements as themes emerged and were refined and developed. The third phase aggregated quantitative and qualitative data (Lizarondo L et al., 2020).

2.5 | Assessment of methodological quality

Joanna Briggs Institute Critical Appraisal Tools (JBI, 2021) matched to the relevant study type and design (mixed method with both) (Stern et al., 2020) were applied independently by two reviewers (ED and SH), with disagreements resolved by a third reviewer (DM). A percentage score was calculated for each included study by dividing the amount of agree 'yes' criteria by the total number of criteria minus the number of 'NA'.

3 | RESULTS

3.1 | General description

Figure 1 shows electronic searches yielded 2169 articles, of which 66 were read in full and 46 studies were included. Twenty four quantitative, included randomised controlled trial, cross-sectional, case control and cohort designs, with conditions predominantly related to hip and knee but including spinal deformity, back pain, shoulder,

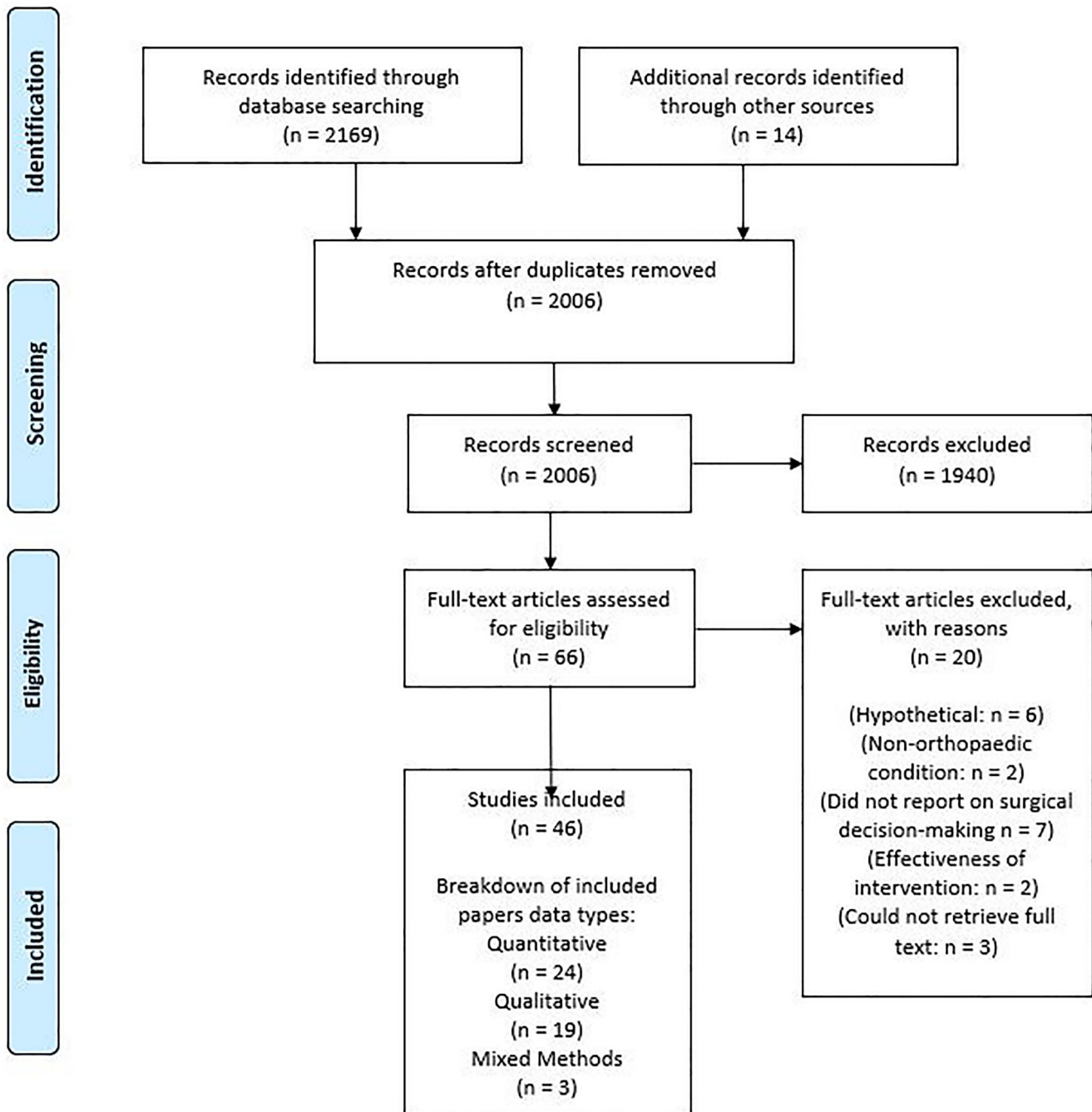


FIGURE 1 PRISMA diagram (Liberati et al., 2009)

elbow and hand conditions. Nineteen qualitative studies used individual semi-structured interviews or focus groups and all but one reported on people experiencing hip and or knee osteoarthritis (OA). There were also three mixed methods studies. The majority (16/24 quantitative, 17/19 qualitative and 3/3 mixed methods) involved pre-surgery data (perceived willingness to undergo surgery). Findings did not differ greatly between pre and post-surgical (Tables 1–4).

3.2 | Study quality

Quality appraisal scores are recorded in the corresponding table according to study type (Tables 1, 3 and 4). Overall quality was moderate to good. In the 24 quantitative studies, scores ranged from 44%–100% with a mean of 80%. In the 19 qualitative studies, scores ranged from 30%–100% with a mean of 73%. In the three mixed methods studies, appraisal means were 73% for qualitative and 85% for quantitative.

3.3 | Phase 1: Quantitative synthesis

Twenty four quantitative and three mixed methods studies (Tables 1 and 4) revealed 4 themes (symptoms, sociodemographic and health factors, information and perceptions). Heterogeneity of statistical approaches and outcome measures precluded meta-analysis or meaningful comparison of effect sizes. Where available, the size of association has been reported (Table 1). Commonly investigated factors are displayed with a tally of reported significant associations with preference for surgery in Table 2.

3.3.1 | Theme: Symptoms

Summary

Sixteen studies revealed subthemes of quality of life, pain, function. Increased pain and decreased function were almost always associated with a preference for surgery across the range of spinal, knee, hip, hand and shoulder conditions (Tables 1 and 2).

Health related quality of life

Six studies found that worse scores in knee and hip osteoarthritis in quantitative (Cronström, Nero, et al., 2019) and mixed methods studies (Nelson et al., 2020), thumb-base osteoarthritis (Wouters et al., 2019), scoliosis (Glassman et al., 2007; Pizones et al., 2017) and shoulder pain (Somerson et al., 2018), were significantly associated with a preference for surgery. Furthermore, hip and knee OA patients (Cronström, Nero, et al., 2019) with improvement in Health related quality of life (HRQoL) following rehabilitation, shifted from willing to unwilling, while those with poor improvements shifted from unwilling to willing to undergo surgery. One study reported that non-surgical patients had worse HRQoL on subscales of general health (Glassman et al., 2007).

Pain

Six studies found greater pain was significantly associated with preference for surgery, or lower pain was associated with preference for non-surgical care (Chung et al., 2006; Cronström, Nero, et al., 2019; Glassman et al., 2007; Kwoh et al., 2015; Riffin et al., 2018; Wouters et al., 2019). This was a consistent finding (Table 2) and spanned hip, knee, hand, shoulder and spinal patients. Improvement in pain intensity (with non-surgical treatment) was associated with deciding against surgery (Cronström, Nero, et al., 2019; Gillian A. Hawker et al., 2004; Wouters et al., 2019; Yoo et al., 2018). One lower quality study found no relationship between pain and surgical preference, in spinal patients (Behairy et al., 2003).

Function

Twelve studies found poorer disease-specific and/or multidimensional functional scores were associated with preference for surgery, spanning all conditions (Chung et al., 2006; Cronström, Nero, et al., 2019; Gillian A. Hawker et al., 2004; Nelson et al., 2020; Pizones et al., 2017; Somerson et al., 2018; Trask et al., 2020; Wouters et al., 2019; Zeni et al., 2010). Three studies found no significant association between pain and preference for surgery (Behairy et al., 2003; G. A. Hawker et al., 2001; Modi et al., 2014).

3.3.2 | Theme: Sociodemographic and health factors

Summary

Sixteen studies found mixed associations with factors including health, employment, gender, race, and age (Table 2).

Health

Seven studies reported an association between general health and decision-making. Co-morbidities (heart disease, circulatory disorders, and diabetes) were significantly associated with deciding against spinal (Glassman et al., 2007) and mixed orthopaedic surgery (Kinghorn et al., 2021). Furthermore, in three studies better general health was significantly associated with choosing spinal surgery or knee arthroplasty (Glassman et al., 2007; Gillian A. Hawker et al., 2004; Somerson et al., 2018). Conversely, two studies found no significant association between health factors and surgical preference (Pizones et al., 2017; Zeni et al., 2010), and one study found higher body mass index significantly associated with surgery (Cronström, Nero, et al., 2019).

Employment

Four studies reported a mixed associations with employment status. It was significantly associated with choosing shoulder arthroplasty (Somerson et al., 2018) and knee arthroplasty (Kwoh et al., 2015) but not associated with choosing knee or hip arthroplasty (Cronström, Nero, et al., 2019; Gillian A. Hawker et al., 2002).

TABLE 1 Summary of quantitative studies

Study	Population (n) timing ^a	Study process	Measures and Statistics	Results	Quality Appraisal (%)
Behairy, et al., 2003	LBP (70) Pre-surgery	Data collection at hospital surgical outpatient clinic (patients offered surgery) and follow up phone call 3 months post consultation.	Low back outcome score One or more reasons for declining surgery Descriptive statistics, Chi-square	39 declined surgery for fear of: failed surgery 31%, 72 procedure danger (20%), paralysis (17%), or perception of: insufficient symptoms (14%), too old (9%). No change at 3 months. No significant difference in low back outcome score between those who accepted or declined surgery.	72
Božić, et al., 2013	Hip ± knee OA (198) Arthroplasty Pre-surgery	Randomized to usual care or a shared decision-making intervention involving a video and booklet about treatment options, surgery and phone call with a health consultant	Patients defined as 'informed' if scored >50% on a knowledge survey. Also measured treatment choices. Fisher exact test used to compare proportions choosing surgery in each group	Significantly more in the intervention group reached an informed decision within their surgical consultation ($p = 0.01$) but no difference between groups in choice or surgical or non-surgical care ($p = 0.48$).	85
Chung, et al., 2006	Hand arthroplasty (61) Post-surgery	Prospective observational cohort patients meeting criteria for arthroplasty were enrolled, then they decided whether to have (33) or decline (28) surgery	Logistic regression analysis for association between surgical choice and IVs function (Michigan hand questionnaire, pain (high = more pain), function (high = good), aesthetics (high = good)).	Age and gender-controlled regression analyses: OR 0.50 ($p = 0.001$) for function, 1.47 for pain ($p = 0.002$), 0.83 for aesthetics ($p = 0.13$). Age >50 OR 0.03 ($p = 0.01$)	100
Cronström, Nero, & Dahlberg, 2019	Hip and/or knee OA (458) Pre-surgery	Data collection pre and post completion of 6-week conservative care programme.	Baseline: Age, gender, employment status, EQ-5D, walking difficulties, fear of physical activity, willingness to have surgery, pain VAS, 30 s chair stand test (CST). Chi-square, t-tests, Wilcoxon's to compare differences between willing or unwilling to have surgery. At 6 weeks: Age, gender, BMI, previous surgery adjusted logistic regression of factors association with willingness to have surgery at 6-week, OR.	At baseline: Factors significantly stronger in those willing to have surgery: Male ($p = 0.005$), higher BMI ($p = 0.007$), medication use ($p = 0.007$), previous surgery ($p = 0.005$), walking difficulties ($p = 0.001$), lower quality of life on EQ-5D ($p = 0.001$). Factors not significantly different in those willing versus unwilling: Age, working, pain location, fear of physical activity. At 6 weeks: improvement in pain (OR 0.67) and improved quality of life (OR 1.64) significantly associated with change from wanting to not-wanting surgery. Worse pain (OR 1.63), quality of life (OR 1.30) or less improved (OR 0.63), walking difficulties (OR 4.30) significantly associated with change from not-wanting to wanting surgery	82
Deyo, et al., 2000	LBP (393)Post-surgery	RCT comparing impact upon surgical decisions of an interactive diagnosis-specific video plus a booklet, compared with only a booklet.	Surgical rate in each group Comparison of the two groups using t-tests and chi square	No overall significant difference in surgical rates (thus choice of surgery) between groups involving all patients.	85

(Continues)

TABLE 1 (Continued)

Study	Population (n) timing ^a	Study process	Measures and Statistics	Results	Quality Appraisal (%)
Fraenkel, et al., 2019	Rheumatoid or psoriatic arthritis, ± OA arthroplasty (648) Pre-surgery	Online arthritis network randomized into four groups that received the same condition and surgery information in different formats (numeric, numeric plus icon array, numeric plus 50 images, numeric with functional spinner).	Preference for TKR measured with 11-point scale, pre and post provision of information. Least squares mean (LSM) differences in TKR preferences used to compare groups	Preferences for TKR significantly higher in the icon array group (LSM 7.17 $P = 0.0002$), images group (LSM 7.14; $P = 0.0005$), and spinner group (LSM 7.19 $P = 0.0001$), compared to the group receiving the numbers only format (LSM +/- SE 6.66), after controlling for baseline preference. Among participants with preferences generally against TKR, LSM preferences were greater in participants randomized to the images compared to those viewing numbers only ($p = 0.0376$). All formats had greater preference scores compared to the numbers only group ($P < 0.05$ for all). No significant differences in preferences across formats for participants with an uncertain or very strong preference for TKR at baseline	38
Glassman, et al., 2007	Scoliosis (322) Post-surgery	Retrospective analysis of consecutive adults with spinal deformity, 161 matched surgical and non-surgical matched pairs	Patient characteristics, clinical symptoms, SF-12, SRS-22, radiological spinal deformity parameters. Forward stepwise binary logistic regression and t-tests used to compare surgical and non-surgical groups.	Surgical had significantly greater radiological spinal deformity (thoracic curves $p = 0.006$ and thoracolumbar $p = 0.000$), more leg pain ($p = 0.04$), more daily pain ($p = 0.008$), more likely to report being very unhappy with their body shape ($p = 0.000$) and lower SF-12 scores ($p = 0.04$). Non-surgical had greater medical risk factors (BMI $p = 0.003$, cardiac disease $p = 0.004$).	80
Hawker et al., 2001	Hip ± knee arthritis (1027) Arthroplasty Pre-surgery	Population survey individuals with WOMAC scores >39, arthritis on XR and clinical examination, not already on a waiting list.	Willingness for surgery measured on a 5 point likert scale. Multivariate logistic regression investigated the association of factors with willingness (age, gender, language, severity, associate has had arthroplasty).	Factors significantly associated: Increasing age OR 0.57 (0.41-0.79) $p = 0.0008$, spoken with a doctor about it OR 2.93 (1.78-4.82) $p = 0.0001$, gender, knowing someone who's had the operation and WOMAC scores were not significantly associated.	72
Hawker, et al., 2002	Hip ± knee arthritis (456) Arthroplasty Pre-surgery	Population survey individuals with WOMAC scores >39, arthritis on XR and clinical examination, not already on a waiting list.	Willingness for surgery measured on a 5 point likert scale. Logistic regression modelling to examine the association of factors with willingness to have surgery	Only sig OR was not having spoken with a doctor about arthroplasty OR 3.19 (1.63-6.23) 0.0007 Education level and income were not independently associated with willingness for arthroplasty	64
Hawker, et al., 2004	Hip ± knee arthritis (379) Arthroplasty Pre-surgery	Population survey individuals with WOMAC scores >39, arthritis on XR and clinical examination, not already on a waiting list.	Willingness for surgery measured on a 5 point likert scale. Multivariate logistic regression to determine independent correlates of willingness (dichotomised as willing or unwilling) to undergo surgery	The following were independent significant correlates of willingness to have surgery: Younger than 75 OR 2.42, greater perceived arthritis severity OR 1.3, fewer comorbid OR 0.74, perceiving TJR as appropriate OR 3.29, walking limited to <1 block OR 1.99, risk of revision surg is acceptable OR 3.73	72

TABLE 1 (Continued)

Study	Population (n) timing ^a	Study process	Measures and Statistics	Results	Quality Appraisal (%)
Hurley, et al., 2020	Hip ± knee OA (5751) Arthroplasty Post-surgery	Quasi-experimental in which intervention group viewed condition-specific decision aids on video, online or on-screen in surgeon's offices. Matched patients not exposed to decision aids. Patients were surveyed about treatment preferences.	Willingness for surgery measured on a 5 point likert scale. Multivariate regression for relationship between decision aid exposure and surgical utilization, controlled for factors the authors deemed potential influence upon decisions such as age, sex, race, insurance type. Odd ratios calculated for factor comparison between those who had and did not have surgery	At 6 months those exposed to decision-aids were significantly more likely to have undergone surgery: Hip 29% V 54% (decision aid)—sig $p < 0.0001$, knee 24% V 32% (decision aid)—sig $p < 0.0001$. The following factors were significant: Diabetes had lower odds of arthroplasty (OR 0.84, $p < 0.05$), depression had higher odds of arthroplasty (OR 1.54, $p < 0.0001$) Race: Blacks (OR 0.48, $p < 0.0001$) and hispanics had lower odds of having arthroplasty (OR 0.60, $p < 0.0001$). Older age had lower odds of arthroplasty (OR 1.03 $p < 0.0001$)	78
Kinghorn et al., 2021	Mixed orthopaedic waiting list: (196) Pre-surgery	Telephone survey of patients on the orthopaedic surgery waiting list investigating the impact of COVID-19 on readiness to undergo surgery.	Primary outcome: Willingness to undergo surgery (proceed, defer or cancel). Independent variables: Clinical risk was categorised (low, medium, high, very high) based on comorbidities including asthma, chronic lung disease, diabetes, serious heart conditions, chronic kidney disease, severe obesity, immunocompromise and liver disease, age and surgery type Chi square and Fisher's exact tests used.	Fear of contracting covid was the most common reason for not wishing to proceed with surgery $n = 49$. Willingness to proceed with surgery was significantly associated with clinical risk profile; higher risk were less likely to proceed (chi squared = 50.073, $p = 0.000$). Significantly less patients with hand and wrist or hip surgery were willing to undergo surgery and significantly more patients with knee and foot and ankle surgery were willing to undergo surgery ($P < 0.05$) The higher risk groups had significantly greater mean age (kruskal–Wallis test. $p = 0.000$)	87
Kwoh et al., 2015	Knee OA (799) Arthroplasty Pre-surgery	Single group with participants aged >50 with moderate-severe knee OA defined as western Ontario McMaster index (WOMAC) score >39 and radiographic evidence of OA.	Willingness for TKR surgery 5-point scale, dichotomised to willing or unwilling. Factors investigated: Race, age, medical outcomes study-social support scale, WOMAC, charlson comorbidity index, SF12, depression via the patient health Questionnaire-9, religiosity 3 questions about perceptions of benefit and risk knowledge, doctor consultations about knee OA, healthcare system distrust measure. Sociodemographic and clinical characteristics compared between willing and non-willing with <i>t</i> -tests, wilcoxon, chi square. Logistic regression (stratified by race) for association between factors and surgical preference.	Compared to those unwilling, participants willing to have surgery were significantly less frequently African American ($p < 0.001$), more frequently employed ($p = 0.006$), less educated ($p = 0.008$), had higher expectations ($p < 0.001$) and higher trust in physicians ($p = 0.034$), they also perceived short inpatient stay ($p = 0.023$), lower pain ($p < 0.001$), less difficulty walking after surgery ($p < 0.001$). Multivariate regression found the following had significant associations with willingness to have surgery: Greater trust in physicians ($p = 0.047$), greater TKR knowledge ($p, 0.001$). Note: Several functional and quality of life scales were compared between races but not by surgical decisions.	88

(Continues)

TABLE 1 (Continued)

Study	Population (n) timing ^a	Study process	Measures and Statistics	Results	Quality Appraisal (%)
Lurie, et al., 2011	Low back pain (198) Pre-surgery	Participants provided with a video-based educational decision aid on lumbar surgery specific to their condition. Preference for surgery was measured before and after.	Surgical preference measured on a 5-point likert scale. Chi square and ANOVA analysis of preference and use of the video	86% of patients watched the video. Overall, no significant shift towards or away from surgery with the use of this video, although some significant findings reported in post-hoc subgroup analyses.	78
Modi, et al., 2014	Shoulder or elbow pain (384) Pre-surgery	Pre-surgical consultation (n = 384) completed questionnaire about willingness to have surgery. Of these, 120 were offered surgery and then completed another questionnaire about understanding and concerns regarding the surgery.	Willingness for surgery measured on a 6-point likert scale; later dichotomised to willing versus unwilling/unsure Multivariate logistic regression investigated association between sociodemographic (age, gender, employment/health factors and pre-consultation willingness for surgery, also the decision to have surgery in those offered it.	Before initial consultation: Significantly more willing to undergo surgery: Greater expectation of success (OR, 41.84; $p < 0.001$) and greater English fluency (OR, 28.39; $p = 0.002$) Significantly less willing to undergo surgery: Lower income (OR 0.02; $p < 0.001$), living alone (OR 0.25; $p = 0.015$), physical functioning did not influence willingness ($p = 0.994$). Decision to undergo surgery (post consultation): Willingness to consider surgery before the consultation (OR 4.56 $p = 0.042$). Concern about inconvenience less likely to decide to proceed with surgery (OR 0.12; $p = 0.017$).	100
Phelan, et al., 2001	Low back pain (100) Pre-surgery	Randomized to information via video and book versus book alone, post consultation.	T-tests used to compare numbers converting to surgery.	More in book group preferred surgery 42% than video group 23% ($p < 0.04$) but not significant.	69
Pizones et al., 2017	Scoliosis (184) Post-surgery	Retrospective analysis of 90 surgical and 94 non-surgical adult cases of thoracolumbar scoliosis.	Scoliosis research society quality of life (SRS22), SF-36, demographic factors, radiological measures, Oswestry disability index and core outcomes measures index (COMI). Surgical versus conservative cohorts were compared with the student t test, chi-square, and the mann-whitney U.	Surgical patients had worse COMI ($p = 0.001$), worse ODI scores ($P = 0.000$), worse SF-36 physical ($P = 0.001$), mental scores ($P = 0.032$), and worse SRS-22 scores in all domains. No significant differences between groups in demographic and radiographic parameters.	73
Riffin et al., 2018	Knee/Hip OA (99) Arthroplasty Pre-surgical	Telephone interview of patients contemplating arthroplasty	Willingness to undergo surgery via 5-point likert scale. Bivariate correlations and generalised linear model examined associations among characteristics (age, gender, general health, pain level, pain location, personality, and network size), decision conflict, willingness for surgery, support.	Significant associations with increased willingness to undergo surgery: Lower age -0.04 $p < 0.001$, increased pain 0.07 $p < 0.01$ Significant associations with reduced willingness to undergo surgery: Reduced informational support 0.49 $p < 0.001$, reduced instrumental support 0.14 $p < 0.05$	100

TABLE 1 (Continued)

Study	Population (n) timing ^a	Study process	Measures and Statistics	Results	Quality Appraisal (%)
Somerson et al., 2018	Shoulder (931) Pre-surgery	Analysis of factors associated with patients deciding to opt for surgery (arthroplasty, hemiarthroplasty, ream and run)	Sociodemographic characteristics, simple shoulder test (SST), surgical preference taken at point of consent for surgery. Univariate association of factors and significant ones entered into multivariate analysis.	Factors significantly associated with electing for surgery: All reported as $p > 0.001$: Younger, lower BMI, currently working, healthier, commercial insurance, worse SF-36 scores. Some factors also varied depending on the type of surgical procedure undertaken.	82
Spunt et al., 1996	Back pain (239) Pre-surgical	Interactive information on video-disc viewed by participants.	Preference for surgery rated pre and post viewing. Descriptive statistics only presented for surgical preferences.	Descriptive statistics only: 12% increase in numbers who preferred surgery, 1% decrease in numbers who preferred non-surg, 12% decrease in undecided patients	44
Trask et al., 2020	Hip ± knee OA (103) Arthroplasty Pre-surgery	Cross sectional study investigating functional scores ability to predict patient preference to total joint arthroplasty Prospective survey of consecutive patients attending for consultation. Initial surgical willingness compared to subsequent treatment plans	Baseline: Demographics, radiographic scores, satisfaction with prior treatment, work status, education, living status, hip disability and osteoarthritis outcome score, knee injury and osteoarthritis outcome score, veterans RAND 12-item health survey score Surgical willingness: Participants selected from 4 categories with averse to surgery defined as selection of 'I am not interested ... I want to avoid surgery at all costs' Treatment selection (surgery or conservative) determined at initial or subsequent visit. Univariate logistic regression + Youden's J statistic used to find associations between willing and averse to surgery	Baseline age, satisfaction with prior treatment, employment, education, living status, veterans RAND 12-item health survey and radiology were not predictive of surgical aversion. Functional scores were significantly higher (better function) for averse patients (knee injury and osteoarthritis outcome score 66.6 vs. 50.6, $P < 0.001$; hip disability and osteoarthritis outcome score 73.2 vs. 62.2, $P < 0.05$). Baseline aversion was a strong predictor of the ultimate method of treatment chosen. (4.6% vs. 23.5%, $P < 0.05$)	87
Wouters et al., 2019	Thumb carpo-metacarpal OA (584) Post-surgery	Cross-sectional study comparing a variety of factors in patients who chose surgical versus non-surgical management	Sociodemographic (age, sex, duration, side, dominance, work, second opinion, and type of surgery. Michigan hand function, satisfaction, and quality of life, pain, satisfaction with the hand), and psychological factors (credibility/expectancy questionnaire, illness perception questionnaire, pain catastrophizing scale, patient health questionnaire). Factors associated with choosing surgery via hierarchical logistic regression.	Adjusted for sociodemographic, clinical, and psychological factors, the following were significantly associated with surgical choice: Worse pain/function (VAS and Michigan hand function $p < 0.001$ – 0.006), worse QoL (EQ5D5L $p < 0.001$), longer symptom duration (standardized odds ratio [SOR], 1.86; $p = 0.004$), second opinion visit (SOR, 3.81; $p = 0.027$), lower satisfaction with the hand (SOR, 0.65; $p = 0.004$), higher treatment expectations (SOR, 5.04; $p < 0.001$), shorter perceived timeline (SOR, 0.70; $p = 0.011$), worse personal control (SOR, 0.57; $p < 0.001$) and emotional response (SOR 1.40; $p = 0.040$).	100

(Continues)

TABLE 1 (Continued)

Study	Population (n) timing ^a	Study process	Measures and Statistics	Results	Quality Appraisal (%)
Yoo et al., 2018	Shoulder rotator cuff tears (137). Post-surgery	Consecutive patients who were offered shoulder surgery in an outpatient setting. Compared those who actually had surgery (104) with those who declined the offer of surgery (33).	Baseline demographics at time of surgical offer, symptom duration, range of motion, tear-size, fatty infiltration on MRI, constant score, UCLA score. T-tests, Wilcoxon's, chi square, Fisher's exact test used to compare surgical and non-surgical groups. Reasons for declining surgery collected from those who declined were presented descriptively.	Baseline factors: Significantly worse constant ($p = 0.025$) and UCLA ($p = 0.049$) the surgical group. Significantly better MRI findings in the non-surgical group (tear size smaller ($p < 0.001$), less fatty infiltration ($p < 0.001$)). At 1 year post surgical recommendation no significant differences in constant or UCLA scores in those who had compared with didn't have surgery. Main reasons for declining surgery were: Improving symptoms or minimal pain (55%), economic burden (12%), concerns about post-operative rehabilitation time (9%)	80
Zeni et al., 2010	Knee OA (120) Post-surgery	Evaluation was conducted on consecutive patients with knee OA attending a physical therapy department. Groups (surgical and non-surgical) formed by patients decision to have or not have surgery within 2 years timeframe.	Factors: Delaware osteoarthritis profile), quadriceps strength, knee range of motion, self-perceived functional ability, functional tests, anthropometric measurements (gender, BMI), timed UP and go, stair climbing task, knee outcome survey (ADL subscale), T Tests and chi square compared factors across surg and non-surg groups and significantly different factors were analysed for their association with surgical decisions using logistic regression	Factors significantly associated with having surgery: - Older ($p = 0.002$) - Worse timed UP and go ($p = 0.034$), stair climbing task times ($p = 0.012$), knee outcome scale ADL (0.027) - Less strength ($p = 0.01$) - Less knee extension range ($p = 0.013$) Using backward logistic regression, age, knee extension ROM and KOS-ADLS together significantly predicted whether or not a person would undergo TKA ($p \leq 0.001$, $R^2 = 0.403$).	100

Abbreviations: ADLs, Activities of daily living; BMI, Body mass index; CT, computed tomography; DVD, Digital video disk; LBP, low back pain; MRI, magnetic resonance imaging; OA, Osteoarthritis; OR, odds ratio; QoL, Quality of life; RCT, randomised controlled trial; WOMAC, Western Ontario and McMaster Osteoarthritis Index.

^aTiming of data collection (pre-surgery or post-surgery).

TABLE 2 Tally of results of association with a preference for surgery in commonly investigated factors, quantitative data from quantitative and mixed methods studies, arranged by theme

Theme	Factor Description (surgical preference)	Number of studies		
		Significant finding	Significant opposing finding	Non-significant finding
Symptoms	Function/QoL: worse (surgical), better (non-surgical)	11 (Chung et al., 2006; Cronström, Nero, et al., 2019; Glassman et al., 2007; Hawker et al., 2004; Nelson et al., 2020; Pizones et al., 2017; Somerson et al., 2018; Trask et al., 2020; Wouters et al., 2019; Yoo et al., 2018; Zeni et al., 2010)	0	3 (Behairy et al., 2003; G. A. Hawker et al., 2001; Modi et al., 2014)
	Pain: More (surgical), less (non-surgical)	6 (Chung et al., 2006; Cronström, Nero, et al., 2019; Glassman et al., 2007; Kwoh et al., 2015; Riffin et al., 2018; Wouters et al., 2019)	0	1 (Behairy et al., 2003)
Demographics and general health	Health/Comorbidities/BMI: Better (surgical), worse (non-surgical)	4 (Glassman et al., 2007; Hawker et al., 2004; Kinghorn et al., 2021; Somerson et al., 2018)	1 (Cronström, Nero, et al., 2019)	2 (Pizones et al., 2017; Zeni et al., 2010)
	Age: Young (surgical), older (non-surgical)	6 (Chung et al., 2006; Hawker et al., 2001; Hurley et al., 2020; Kinghorn et al., 2021; Riffin et al., 2018; Somerson et al., 2018)	1 (Zeni et al., 2010)	6 (Cronström, Nero, et al., 2019; Kwoh et al., 2015; Modi et al., 2014; Pizones et al., 2017; Trask et al., 2020; Wouters et al., 2019)
	Employment status: Employed (surgical)	2 (Kwoh et al., 2015; Somerson et al., 2018)	0	2 (Cronström, Nero, et al., 2019; Trask et al., 2020)
	Race: White (surgical), other (non-surgical)	2 (Hurley et al., 2020; Kwoh et al., 2015)	0	1 (Modi et al., 2014)
	Gender: Male (surgical)	1 (Cronström, Nero, et al., 2019)	0	4 (Hawker et al., 2001; Modi et al., 2014; Wouters et al., 2019; Zeni et al., 2010)
Information	Decision aids: Use of (surgery)	1 (Hurley et al., 2020)	0	4 (Bozic et al., 2013; Deyo et al., 2000; Lurie et al., 2011; Phelan et al., 2001)
Perceptions	Expectations: Higher (surgical)	5 (Frankel et al., 2012; Kwoh et al., 2015; Matthies et al., 2020; Modi et al., 2014; Wouters et al., 2019)	0	0
	Psychological/body image/distress: Higher (surgical)	5 (Chung et al., 2006; Glassman et al., 2007; Hurley et al., 2020; Pizones et al., 2017; Wouters et al., 2019)	0	0

Note: Significant finding: studies that reported significant finding in line with the Factor Description. Significant opposing finding: studies that reported significant result favouring the opposing option to the Factor Description. Non-significant finding: studies that reported the Factor Description as not significant.

Abbreviation: BMI, body mass index.

TABLE 3 Summary of qualitative data extraction

Study	Population (n) timing ^a	Description	Themes	Sub-themes	Surgical Implication	Quality Score (%)
Al-Taiar, et al., 2013	Knee OA. Arthroplasty (n = 39) Pre-surgical	Focus group discussions with Arab females awaiting surgery	<ol style="list-style-type: none"> 1. Pain-experience 2. Mobility limitations 3. Effect on family 4. Past medical treatment 5. Decision-making 6. Expectation of knee arthroplasty 	<ol style="list-style-type: none"> 1. Pain: Intensity, frequency, duration. Impact on mood and sleep. Pain management 2. ADLs, social or religious activities, and fear of falling 3. Work and study 4. Consultation abroad and experience of past medical treatment 5. Discussion with family, doctors, experience of others 	All participants were planning to have surgery due to pain and disability. Delays in reaching this decision were due to either delay in medical recommendation for surgery or fears about the operation, post-operative pain or outcome	90
Ballantyne, et al., 2007	Hip and knee OA (n = 29) Pre-surgical	Interviews with patients who were medically appropriate for arthroplasty but preferred to avoid surgery	<ol style="list-style-type: none"> 1. Assessment of arthritis 2. Personal meaning 3. Impact of others 4. Health-care system 	<ol style="list-style-type: none"> 1. Hierarchy of health concerns 2. Self-concept, normal aspect of ageing, and inconvenience. 3. Relationships: Marital, family, and friends. 4. Experiences: Health system, hospitals, practitioner 	Participants normalised arthritis as ageing rather than pathological. Prior negative experiences with health care was also observed.	80
Barlow, et al., 2018	Knee OA. Arthroscopy (n = 22) 12 post-surgery 10 pre-surgery	Iterative thematic analysis of the surgical decision-making process, over two focus groups	<ol style="list-style-type: none"> 1. Stress from deliberation 2. Expectation of outcome 3. Preferred model of care 4. Sources of information 5. Personal situation 6. Mental state 7. Coping strategies 8. Loss of control 9. Trust in doctor 	<ol style="list-style-type: none"> 1. Preference of information: Friends or family. 2. Motivation, financial concerns, return to normal life, and personal commitments. 3. Psychological distress from knee OA, and emotional distress from considering surgery. 4. Physical and mental 5. Positive and negative 	There is complex interplay between the nine themes identified, within the deliberation phase. The threshold for decision-making is that the status quo is no longer acceptable. Stress generated by deliberation means that patients are unlikely to re-enter that phase once a decision has been made	70
Chang, et al., 2004)	Knee OA. Arthroplasty (n = 37) Pre-surgical	Six focus groups, participants offered and considering arthroplasty. Groups generated questions considered in decision-making. Comparison of white versus African Americans.	<ol style="list-style-type: none"> 1. Pre-operative phase 2. Intra-operative phase 3. Post-operative phase 	<ol style="list-style-type: none"> 1. Pre-operative Prosthesis lifespan, finance, timing, employment, alternatives, medication addiction, trust in doctor 2. Intra-operative Technique, anaesthesia 3. Post-operative Outcome and function/quality of life, pain relief 	The focus of concern regarding surgery is individual. Findings represent information patients desire. Some are differences between gender and racial groups with respect to the factors which most influence the surgical decision.	30
Clark, et al., 2004	Hip ± knee arthritis. Arthroplasty (N = 17) Pre surgical	Interviews with arthroplasty candidates who were unwilling to consider surgery	<ol style="list-style-type: none"> 1. Influencing factors 2. Costs and benefits 3. Trade off process 	<ol style="list-style-type: none"> 1. Symptoms (pain and disability) and information sources (medical and peer) 2. Post-operative outcomes (pain, recovery, support) and benefits 3. Accommodation (disability and pain) and quality not extension of life. 	Surgical decisions are highly individual and involve trade-offs between changing levels of pain, loss of function and risks.	70

TABLE 3 (Continued)

Study	Population (n) timing ^a	Description	Themes	Sub-themes	Surgical Implication	Quality Score (%)
Cronström, Dahlberg, et al., 2019	Hip ± knee OA. Arthroplasty (N = 19) Pre surgical	Semi-structured interviews pre and post 6 weeks conservative care programme	<ol style="list-style-type: none"> 1. Participation reasons 2. Willingness for surgery 3. Expectations of surgery 	<ol style="list-style-type: none"> 1. Longstanding effects of pain on ADLs, last chance for improvement and mandatory treatment to be eligible for surgery. 2. Surgery, reduced pain and function, No perceived improvements after treatment, trust in healthcare practitioner 	<p>The impact of pain and disability influenced willingness for surgery. Change after 6 weeks conservative care programme was the main factor influencing a shift in willingness towards or away from arthroplasty</p>	100
Dosanjh, et al., 2009	Hip arthritis. Arthroplasty (N = 18) Consent or post-surgery	Semi-structured interviews (n = 9) or focus group (n = 9) Grounded theory qualitative approach	<ol style="list-style-type: none"> 1. Limitations. 2. Psychological distress 3. Perceptions 	<ol style="list-style-type: none"> 1. Self-care, ADLs (house, work and social), relationships and intimacy 2. Depression, fear, coping. 3. Data gathering and personal health priorities 	<p>The decision to have surgery was a result of individual perception of the increasing severity of limitations upon quality of life and psychological well-being</p>	90
Figaro, et al., 2004	Knee OA. Arthroplasty (n = 94) Pre-surgical	African-Americans with knee OA underwent semi-structured interviews exploring beliefs about OA and arthroplasty.	<ol style="list-style-type: none"> 1. Natural remedies 2. Negative expectations 3. Religious beliefs 4. Current state 5. Specialist relationships 6. Fear of surgery 	<ol style="list-style-type: none"> 1. External locus of control, natural remedies, body's perceptions, and old school views 2. Negative perceptions of surgery and informed opinion 3. God control's lifespan 4. Fear and increase risk of death. 5. Last resort and negative experiences with surgeon 6. Fear of medical system, bad outcomes, racial disparity, lack of information and understanding in community 	<p>Strong over-arching theme of non-surgical preference due to the themes identified.</p>	70
Hudak, et al., 2002	Hip ± knee OA. Arthroplasty (N = 17) Pre-surgical	Face to face interviews with elderly individuals who had severe disabling arthritis and had indicated they would not consider surgery	<ol style="list-style-type: none"> 1. Deferral 2. Assumptions 3. The nature of arthritis 4. Candidacy 5. Decision-making 6. Information and fears 	<ol style="list-style-type: none"> 1. Perceptions regarding candidacy and continuum of deliberation 2. Positive surgical assumption does not equal willingness. 3. Part of ageing 4. Pain and fairness (others need it more) 5. Patient practitioner interaction 6. Experiences of others and lack of information linked with fear 	<p>Not opting for surgery often represents delayed or deferral of the decision to have surgery, views that arthritis is normal ageing rather than pathology and that pain was not bad enough to warrant surgery</p>	80
Karlson, et al., 1997	Hip ± knee OA. Arthroplasty (n = 30) Pre-surgery	Separate male and female focus groups of OA patients aged >60 discussed living with OA and surgical considerations. Iterative thematic content analysis was undertaken.	<ol style="list-style-type: none"> 1. Function 2. Suffering 3. Doctor trust 4. Timing of surgery 5. Fear of bad outcomes 6. Expectations of surgery 	<ol style="list-style-type: none"> 1-3: Males and females. 4. Symptom threshold advancements in technology or not ready for surgery. 5-15: Males and females 	<p>Different factors influence male and female decisions about surgery. Males tended to choose surgery earlier than females, who were more concerned about the risks and disruption to their caregiver roles.</p>	70

(Continues)

TABLE 3 (Continued)

Study	Population (n) timing ^a	Description	Themes	Sub-themes	Surgical Implication	Quality Score (%)
Kroll, et al., 2007	Knee OA. Arthroplasty (n = 37) Pre-surgical	Focus groups conducted according to race (African Americans, hispanic, caucasian). Analysis via grounded theory approach	<ol style="list-style-type: none"> 7. Rehabilitation 8. Dependency 9. Pain 10. Coping by adaptation 11. Trying something. 12. Conflicting advice 13. Other's surgery 14. Elements of decision 15. Gender differences 	<p>Subthemes categorised by African American, hispanic, latino, caucasian:</p> <ol style="list-style-type: none"> 1. Internal cause, accident or injury, and lack of medical knowledge or information 2. Loss of freedom, limitations 3. Trust in doctor and reputation 4. Finances, paying for the best care and paying for surgery over time 	Trust in the medical system may be a more important factor for hispanic groups. Economic circumstances are considered by all groups but are not a barrier to surgery.	80
Mathews, et al., 2016	Hand arthroplasty (n = 20)Pre-surgery	Semi-structured interviews regarding reasons to consider surgery in hand RA.	<ol style="list-style-type: none"> 1. Reasons for surgery 2. Reasons against surgery 3. Involvement in decision 4. Anxiety 5. Picking the surgeon 	<ol style="list-style-type: none"> 1. Pain, function, aesthetics, deformity, and outside involvement 2. Recovery and rehabilitation, health-care practitioner advised against surgery, surgical concerns, cost of surgery (financial and time) 3. No physician involvement and shared decision making model approach 	Pain and lack of function influenced towards surgery, while the demands of rehabilitation and variability of outcomes influenced towards non-surgical management.	60
McHugh & Luker, 2009	Hip and knee OA. Arthroplasty (n = 27) Pre -surgical	Semi-structured interviews about OA, surgery, referral and information sources.	<ol style="list-style-type: none"> 1. Symptoms 2. Opinion of others 3. Risks and benefits 4. Information sources 	<ol style="list-style-type: none"> 1. Pain, function and decrease in symptoms. 2. Family and medical 3. Risks and benefits of surgery 4. Health professional, family, and acquaintances 	Surgical decisions are complex and individual. Symptoms and surgeon's opinions were the main influences towards surgery. Yet many knee patients decide to not have surgery. Patients consider not only the surgeon's opinion but also opinions and experiences of others. Effect upon care-giving responsibilities was a key reason for females to decline surgery.	70

TABLE 3 (Continued)

Study	Population (n) timing ^a	Description	Themes	Sub-themes	Surgical Implication	Quality Score (%)
Parks, et al., 2014	Hip or knee OA. Arthroplasty (N = 36) Pre-surgical	Individual interviews with iterative coding were conducted with African American and hispanic arthroplasty candidates.	<ol style="list-style-type: none"> 1. Self-assessment 2. Surgeon research 3. Social network 4. Faith and spirituality 5. Fear and anxiety 6. Recovery expectations 	<ol style="list-style-type: none"> 1. Pain, ageing and co-morbidities. 2. Surgeon's credentials 3. Positive and negative experiences of others 4. Faith in relation to timing, doctor, and surgical outcome 5. Anxiety and fear 6. Restore QoL 	Self-assessment prior to consultation often pre-determines willingness to have surgery. Pain often drives patients towards surgery, regardless of age. Dynamic exchange of information between patient and their social network is another strong influence	70
Selten et al., 2016	Hip or knee OA. Arthroplasty (n = 24) Pre-surgical	Semistructured interviews about the reasons for treatment choices, with stratified purposive sampling	<ol style="list-style-type: none"> 1. Treatments 2. Personal investment 3. Personal circumstances 4. Support and advice 	<ol style="list-style-type: none"> 1. Effectiveness, fear of risks, personalised treatment, and accessibility 2. Time and cost 3. Age, body weight, co-morbidities, and previous experience 4. Advice: Social and healthcare practitioner 	Surgical decisions are an interplay of the 4 themes identified.	80
Suarez-Almazor et al., 2010	Knee OA. Arthroplasty (n = 37) Pre-surgical	6 focus groups centred on the factors that influence decisions about surgery.	<ol style="list-style-type: none"> 1. Sources of information 2. Personal experiences 3. Financial issues 4. Functional expectations 5. Fears 6. Surgery as last resort 7. Doctor relationship 	<ol style="list-style-type: none"> 1. Healthcare practitioner, non-professionals, and conflicting opinions 2. Experiences of others and previous surgeries 3. Financial concerns 4. Length of recovery, complications, effect on co-morbidities and longevity of prosthesis 5. Difference in racial preference 	Positive and negative personal experiences, expectations about the surgery and fears regarding recovery time and outcomes influence many patients to hold-off as long as they can before having surgery.	70
Toye et al., 2006	Knee OA. Arthroplasty (n = 18) Pre-surgical	Semi-structured interviews, analysed using interpretive phenomenological analysis	<ol style="list-style-type: none"> 1. Medical model 2. Social network 3. Difficulty of pain 4. Functional loss 5. Feelings of vulnerability 6. Dependence 7. Low mood and fatigue 8. Disease progression 9. Expectations of TKR 	<ol style="list-style-type: none"> 1. Diagnosis, HCP recommended surgery 2. Positive or negative accounts from friends, family, pressure to have surgery from friends or family 3. Limitations 4. ADLs, leisure, and age 5. Vulnerability to injure other body parts. 6. Progression of OA, feeling crippled, unable to function, 7. Gender differences 	Personal thoughts identified within the themes, influence the surgical decision alongside pain	70

(Continues)

TABLE 3 (Continued)

Study	Population (n) timing ^a	Description	Themes	Sub-themes	Surgical Implication	Quality Score (%)
Trauer et al., 2018	Knee OA. Arthroplasty (n = 11) Pre-surgical	Semi-structured interviews conducted with patients awaiting arthroplasty, thematic analysis.	<ol style="list-style-type: none"> 1. Pain and limitations 2. Conservative outcome 3. Medication 4. Experiences of others 5. Doctors/X-rays 	<ol style="list-style-type: none"> 1. Affecting ADLs, employment, mood and QoL 2. Exercise therapy: Improvements, pain, and restoration of QoL 3. Pain education and surgery as an alternative for less medication 4. Positive and negative experiences 5. Healthcare practitioner explanation, positive patient-doctor relationship, felt well informed 	All themes reveal influencing factors driving decisions to undertake surgery.	70
Yeh et al., 2017	Knee OA. Arthroplasty (n = 26) Pre-surgical	In-depth interviews of older adults undecided about arthroplasty	<ol style="list-style-type: none"> 1. Treatment concerns 2. Physical concerns 3. Surgery concerns 4. Postsurgical concerns 5. Further information 	<ol style="list-style-type: none"> 1. Surgery is not first treatment choice, last resort, and preference for conservative management 2. Age addresses co-morbidities first. 3. Surgical concerns (outcome, risk, complications, etc), fear (previous bad experience) and fear from experience of others 4. Post-surgical care 5. Information: Surgery prep, post-surgical care, rehabilitation, and medications 	Indecision regarding surgery is derived from the themes identified, with many expressing a desire for more information.	70

Abbreviation: OA, Osteoarthritis.

^aTiming of data collection (pre-surgery or post-surgery).

TABLE 4 Summary of mixed methods data extraction

Study Population (n) Endpoint ^a	Description	Measures and Statistics	Results Quantitative	Results Qualitative	Quality Appraisal Score	
					(%)	Quantitative
Nelson 2020 Knee meniscal tears (n = 24) Pre-surgery	Semi-structured interviews of patients 18–50 years old with MRI evidence of meniscal tear. Also quantitative comparison of patient reported outcomes.	Knee injury and osteoarthritic outcome score (KOOS). T-tests used to compare KOOS scores in surgical versus non-surgical patients. Semi-structured with step-wise open ended questioning about surgical preferences.	The non-operative group had significantly lower KOOS symptoms ($p = 0.05$), greater participation ($p = 0.05$) and higher quality of life ($p = 0.01$).	1. Perceived impairment 2. Personality 3. Time commitments Those opting for non-surgical care frequently reported less impact of symptoms upon their daily lives, conservative personalities and other social factors precluding surgery including financial, accommodation, work concerns.	91	80
Frankel 2012 Hip ± knee OA. Arthroplasty (n = 58) Pre-surgical	11 focus groups discussing appropriateness for surgery and its interaction with decision-making. Also quantitative analysis of questionnaire data.	Sociodemographic questionnaire, WOMAC. 5-point willingness for surgery scale, 5-point arthroplasty candidacy scale, 10 point pain VAS. Quantitative data analysed using Fisher's exact test and Spearman's correlation to explore candidacy and willingness. Focus groups followed standardized processes facilitated by a trained facilitator using a funnel questioning approach.	Subjects with a prior arthroplasty were significantly more likely to be willing to have surgery ($p = 0.03$). Perceived candidacy was significantly and positively associated with willingness for surgery (Spearman's $r = 0.71$, $p < 0.0001$).	1. Pain (primary indicator) 2. Being 'bad enough' 3. Importance of outlook 4. Influence of physician's opinions 5. Other important factors 6. Relationship between willingness and appropriateness for surgery Pain and ability to cope with it were the most important influences upon perceived surgical candidacy. Participants unwilling to have surgery had stricter criteria about candidacy.	100	70
Matthies et al., 2020 Low back pain. Spinal surgery (n = 124) Pre-surgical	Survey and open-response questions of consecutive patients referred to a spinal surgery clinic.	Open ended questions pre and post-consultation, with thematic analysis. Descriptive statistics used to analyse changes in surgical preference and concerns	Success (27%) and risk (26%) were the most commonly cited concerns about surgery pre-consultation. 87% of patients had decided whether they wanted surgery before the consultation.	1. Risks 2. Success 3. Quality of life 4. Physical function and pain 5. Surgeon 6. Fear Surgical decision-making is multifactorial and complex	63	70

Abbreviation: OA, Osteoarthritis.

^aTiming of data collection (pre-surgery or post-surgery).

Gender

Five studies suggest gender does not influence decision-making. While one found males were more likely to choose surgery (Cronström, Nero, et al., 2019), four found gender to be non-significant (G. A. Hawker et al., 2001; Modi et al., 2014; Wouters et al., 2019; Zeni et al., 2010).

Race

Three studies indicate mixed association between race and decision-making. In two, minority (non-white) patients were significantly less likely to choose surgery (Hurley et al., 2020; Kwoh et al., 2015), another found race was not significantly associated in shoulder and elbow conditions (Modi et al., 2014).

Age

Complicated by heterogeneous age groupings, six found a significant relationship between younger age and preference for arthroplasty (hip, knee, shoulder or hand) (Chung et al., 2006; G. A. Hawker et al., 2001; Hurley et al., 2020; Kinghorn et al., 2021; Riffin et al., 2018; Somerson et al., 2018), while one found older age was significantly associated with a preference for knee arthroplasty (Zeni et al., 2010). Additionally, six studies found age to have a non-significant association with surgical preference (Cronström, Nero, et al., 2019; Kwoh et al., 2015; Modi et al., 2014; Pizones et al., 2017; Trask et al., 2020; Wouters et al., 2019).

3.3.3 | Theme: Information sources

Summary

Eight studies included decision aids (videos, displays or information packages), or the presentation of information in different formats, such as visual versus numerical. The overall impact upon the decision to prefer or not prefer surgery was inconsistent (Table 2).

Decision aids

Six studies investigated decision aids, with only one reporting a significant association with preference for surgery (knee and hip osteoarthritis) (Hurley et al., 2020). Four reported no overall significant association in low back pain (LBP) (Deyo et al., 2000; Lurie et al., 2011; Phelan et al., 2001) and in hip and knee OA (Bozic et al., 2013). One LBP study reported only descriptive statistics (Spunt et al., 1996). Two studies investigated different methods of information presentation. Patients who lacked information were less likely to undergo surgery (Riffin et al., 2018) and in one lower quality study patients were more likely to prefer surgery when presented with images rather than numerical data (Fraenkel et al., 2019).

3.3.4 | Theme: Perceptions about surgery and candidacy

Summary

Nine quantitative and mixed methods studies contributed quantitative data to this theme. Expectations and concerns were defined

heterogeneously across studies with a variety of outcome-related surgical expectations or concerns, psychological measures and perceptions about the pathology or disability (Table 1). More consistent significant associations were present between higher expectations and higher psychological distress and the preference for surgery (Table 2).

Surgical expectations and candidacy

While there was variation in definitions and measurement processes (Table 1), five studies were consistent in finding an association between positive expectations (or a positive perception of personal candidacy) and a preference for surgery. Two reported positive perceptions about surgery, such as expectations of a good outcome, minimal inconvenience and lower complication fears, to be significantly associated with a preference for surgery (Kwoh et al., 2015; Wouters et al., 2019). One reported fear of poor outcome to be significantly associated with not choosing surgery (Modi et al., 2014). In two mixed methods studies, patients who perceived they were good candidates were significantly more likely to choose surgery (Fraenkel et al., 2019; Matthies et al., 2020).

Psychological

Three studies acknowledged that increased psychological distress was significantly associated with the decision to have surgery for patients with hip, knee or thumb OA and spinal scoliosis (Hurley et al., 2020; Pizones et al., 2017; Wouters et al., 2019). Two reported low aesthetic or body image was significantly associated with surgery among patients considering hand and scoliosis surgery (Chung et al., 2006; Glassman et al., 2007).

3.4 | Phase 2: Qualitative synthesis

18/19 qualitative studies investigated knee and/or hip arthritis and surgical decisions about arthroplasty, one involved hand patients (Table 3). Three mixed methods studies contributed qualitative data (Table 4), one each for hip, knee and spine pathology. Factors that influence patients' surgical decisions fell within four inter-related themes: symptoms, sociodemographic and health factors, information and perceptions, with sub-themes listed for each.

3.4.1 | Theme: Symptoms

Summary

Seventeen studies revealed three sub themes: pain behaviour, function, and psychological factors. Ongoing intense pain and/or decreased function increased propensity for surgery, while coping-strategies and accommodation of symptoms allowed some patients to avoid surgery.

Pain behaviour

Thirteen studies discussed pain severity, with high levels usually linked to choosing surgery (Al-Taiar et al., 2013; Clark et al., 2004; Dosanjh et al., 2009; Frankel et al., 2012; Hudak et al., 2002; Karlson et al., 1997; Mathews et al., 2016; Nelson et al., 2020; Parks

et al., 2014; Selten et al., 2016; Toye et al., 2006; Traumer et al., 2018; Yeh et al., 2017). Many patients described pain as unbearable and viewed surgery as a way to alleviate intense pain.

The pain was getting to where it was [too much]. I mean it still hurts [after receiving surgery], ... but it's a liveable hurt

(Mathews et al., 2016)

Frequency of pain was discussed in six studies. A lack of constant pain made patients feel they did not warrant surgery, even if the pain was severe at time (Hudak et al., 2002), while patients in constant pain often more inclined to choose surgery (Al-Taiar et al., 2013; Clark et al., 2004; Hudak et al., 2002; Karlson et al., 1997; McHugh & Luker, 2009; Nelson et al., 2020).

In two studies, reduction in pain prompted a decision to not have surgery and an increase in symptoms was often the catalyst for surgery (Clark et al., 2004; McHugh & Luker, 2009). In three studies longer duration of symptoms was related to increased willingness to have surgery (Clark et al., 2004; Cronström, Dahlberg, Nero, & Hammarlund, 2019; McHugh & Luker, 2009).

Function

Twelve studies reported inability to perform essential and meaningful activities motivated patients to choose surgery (Al-Taiar et al., 2013; Dosanjh et al., 2009; Frankel et al., 2012; Karlson et al., 1997; Kroll et al., 2007; Mathews et al., 2016; McHugh & Luker, 2009; Nelson et al., 2020; Parks et al., 2014; Suarez-Almazor et al., 2010; Toye et al., 2006; Traumer et al., 2018). Many patients viewed surgery as a means of freedom, expecting to re-engage in meaningful function post-operatively:

We have about 300 m to our supermarket, but in the end, I could not even go to the supermarket because of the pain

(Traumer et al., 2018)

Psychological factors

Distress tended to increase willingness for surgery via anxiety (Mathews et al., 2016; Parks et al., 2014), depression (T. Barlow et al., 2018), feelings of suffering (Karlson et al., 1997), vulnerability (Barlow et al., 2018; Nelson et al., 2020; Toye et al., 2006), or fear of further injury and loss of function (Toye et al., 2006). In eight studies non-surgical patients adjusted to their reduced function, focussed on self-managing symptoms and avoiding surgery (Barlow et al., 2018; Clark et al., 2004; Dosanjh et al., 2009; Frankel et al., 2012; Hudak et al., 2002; Karlson et al., 1997; Kroll et al., 2007; Toye et al., 2006):

My office is two floors up, so I have to do the stairs ... they brought my laptop down and said work from down here

(Barlow et al., 2018)

3.4.2 | Theme: Sociodemographic and health factors

Summary

Sub-themes of personal situation, gender, race, religion, and age had a mixed influence upon patient-decision-making. Caucasian patients were regularly more likely to choose surgery across a variety of MSD, also being younger and in good health often influenced patients towards choosing surgery.

Gender

Females were often more process-orientated, with concerns related to recovery process, post-operative limitations and pain control, while males focussed on factual knowledge in the decision-making process for knee arthroplasty (Chang et al., 2004). Female primary caregivers sometimes delayed surgery, knowingly dealing with functional decline for longer (Karlson et al., 1997).

Race

While surgical timing, impact on employment and medications featured strongly in decision making for Caucasian patients, African American concerns trended more towards finances and trust (in the surgeon and the healthcare system) (Chang et al., 2004). Caucasians' fears were related to surgical risks, complications, and outcomes, while the influence of faith was not race-specific (Figaro et al., 2004; Parks et al., 2014). Several studies observed Caucasian patients were more likely open to surgical intervention while African American, Hispanic, or Latino patients were more hesitant (Chang et al., 2004; Figaro et al., 2004; Kroll et al., 2007; Parks et al., 2014).

Age

Older age hip and knee osteoarthritis patients were often less inclined to opt for surgery, many considering functional decline a natural consequence of ageing (Hudak et al., 2002; Parks et al., 2014; Selten et al., 2016; Yeh et al., 2017).

When you're this age and you have an ache, well so what? You expect to have aches when you're this age
(Hudak et al., 2002)

3.4.3 | Theme: Information

Summary

Twenty-one papers investigated the impact of a variety of information sources upon decision-making. Experiences and opinions of others (positive and negative) were the most influential. A perceived lack of information from medical professionals and poor doctor-patient relationships reduced willingness, while sharing information such as x-rays along with a positive doctor-patient relationship increased willingness for surgery. When different sources presented conflicting information, patients were less willing to choose surgery.

Medical sources of information

Patients desire a range of clinical, social, administrative and financial information (Chang et al., 2004). A perceived lack of information, commonly makes surgery less likely (Al-Taiar et al., 2013; Clark et al., 2004; Kroll et al., 2007; Suarez-Almazor et al., 2010; Yeh et al., 2017). Nine studies reported positive doctor-patient relationships influence how information is perceived and shapes decision-making (Barlow et al., 2018; Figaro et al., 2004; Frankel et al., 2012; Hudak et al., 2002; Mathews et al., 2016; McHugh & Luker, 2009; Selten et al., 2016; Toye et al., 2006; Traumer et al., 2018). Positive information from the doctor often had the most influential effect:

I knew that I needed somebody that was really going to do the best for me, and I felt that he was going to do that...

(Barlow et al., 2018)

Medical imaging

Three studies reported that medical imaging played a large role in confirming a diagnosis, justifying symptoms, and influencing patients to undergo surgery (McHugh & Luker, 2009; Toye et al., 2006; Traumer et al., 2018):

There was no cartilage between my bones. That's why I had to undergo surgery

(Traumer et al., 2018)

Yet suboptimal communication can override the influence of medical imaging results.

Well, he did an x-ray, and I didn't actually see the x-ray, and he just came, and he said oh yes you want a new knee, you want a knee replacement, I thought well that's a bit drastic, you know, and I thought well no

(McHugh & Luker, 2009)

Non-medical sources of information

Ten studies reported that the surgical experiences of others had a large influence (positive or negative) (Al-Taiar et al., 2013; Ballantyne et al., 2007b; Barlow et al., 2018; Clark et al., 2004; Hudak et al., 2002; Karlson et al., 1997; Kroll et al., 2007; Parks et al., 2014; Toye et al., 2006; Traumer et al., 2018).

I have friends who have had the replacements. It's like "new bones." Well, it's just marvellous

(Clark et al., 2004)

Surgeries for me, I am really cautious, because there was an incident that happened with my husband ... And that just did something to me

(Parks et al., 2014)

The opinion of friends and family often influenced surgical decision-making (Al-Taiar et al., 2013; Mathews et al., 2016; McHugh & Luker, 2009; Parks et al., 2014; Selten et al., 2016; Suarez-Almazor et al., 2010; Toye et al., 2006). The Internet was another common source of information about conditions and surgical process, often easing the psychological burden of the unknown (Dosanjh et al., 2009; McHugh & Luker, 2009; Parks et al., 2014; Suarez-Almazor et al., 2010), specific surgical techniques (Dosanjh et al., 2009) and the credentials of the surgeons (Parks et al., 2014).

Conflicting information

Conflicting information from health professionals, friends and family often hindered decision-making (Ballantyne et al., 2007a; Karlson et al., 1997; Suarez-Almazor et al., 2010). Often, negative experiences of others conflicted with doctors' recommendations and strongly influenced decision-making.

Well, he (doc) was recommending that operation on my spine. Well, my sister in Barrie, she had an operation on her back ... and it never worked out. I don't want to take a chance and end up worse

(Ballantyne et al., 2007a)

3.4.4 | Theme: Perceptions (of surgery)

Summary

From eleven studies, it emerged that positive expectations about surgery and its outcomes influence decision-making towards surgery, while negative expectations had the opposite impact. Many interacting subthemes include concerns of fear, risk and racial disparity within the healthcare system, which consistently reduced the tendency to choose surgery.

Surgery-related concerns and expectations

The hope of restoration of quality of life (decreased pain and improved function) influenced the choice of surgery among osteoarthritis patients (Al-Taiar et al., 2013; Parks et al., 2014; Suarez-Almazor et al., 2010). Furthermore, negative surgical expectations, sometimes from lack of knowledge reduced surgical preference for knee osteoarthritis (Al-Taiar et al., 2013; Figaro et al., 2004).

You could do all the things you didn't do. I imagine, for me, I could go back to the gym every day... I know I could go play tennis...

(Suarez-Almazor et al., 2010)

Similarly, surgery-related concerns (fear, racial disparity, duration of recovery) and fear of surgery or bad outcomes (surgical risk, complications, medications, anaesthetic and longevity of prosthesis) were frequently reported as a negative influence (Figaro et al., 2004; Frankel et al., 2012; Mathews et al., 2016; Nelson et al., 2020; Selten et al., 2016; Suarez-Almazor et al., 2010; Yeh et al., 2017). Other

surgical concerns were racial disparity within the healthcare system, lack of surgical information or understanding (Figaro et al., 2004), negative previous experience (Yeh et al., 2017), co-morbidities (Suarez-Almazor et al., 2010) and duration of recovery influenced against surgery (Barlow et al., 2018; Mathews et al., 2016; Selten et al., 2016; Suarez-Almazor et al., 2010).

That's the reason I didn't have surgery; I was afraid I'd die.

(Figaro et al., 2004)

Six studies indicated that lower surgical expectations tended to make surgery a 'last resort' or 'not first choice' (Barlow et al., 2018; Frankel et al., 2012; Hudak et al., 2002; Nelson et al., 2020; Suarez-Almazor et al., 2010; Yeh et al., 2017). Most patient's attempted conservative management, turning to surgery as a last resort if no improvement in pain or function was experienced (Cronström, Dahlberg, et al., 2019; Traumer et al., 2018; Yeh et al., 2017).

Furthermore, the longer a patient spends deliberating the factors which present as pros and cons, the more stress surrounding their decision, making it more complicated (Barlow et al., 2018).

3.4.5 | Theme: Perceptions (of personal candidacy)

Summary

Thirteen studies addressed candidacy (perceived surgical appropriateness), with subthemes related to patient's personal situation, experience, expectations and assessment of whether their situation was bad enough to choose surgery. Negative previous experiences and the perception of not being bad enough for surgery made patients more inclined to not undergo surgery.

Personal situation

The cost of surgery was a concern that influenced many patients (Barlow et al., 2018), often overriding other considerations (Selten et al., 2016; Suarez-Almazor et al., 2010).

I would borrow, if I didn't have the money and the pain was bad enough, I would have it done, I'd get the money.

(Kroll et al., 2007)

Three studies reported that having support for post-surgical recovery contributed to decisions to undergo surgery (Riffin et al., 2018; Selten et al., 2016; Yeh et al., 2017).

Previous experience

Two studies reported that the relationship between perceived candidacy and previous experience with the healthcare system influenced decision-making (Ballantyne et al., 2007b; Hudak et al., 2002). Negative personal experiences and/or mistrust of a doctor's advice

established resistance to surgery in knee OA (Ballantyne et al., 2007b; Hudak et al., 2002).

Being 'bad' enough

Two studies examined the perception of being bad enough to warrant surgery for hip or knee osteoarthritis (Frankel et al., 2012; Hudak et al., 2002). Some noted others had greater need for surgery, thus consolidating their decision against surgery (Hudak et al., 2002). Older osteoarthritis patients stated that they had tried 'everything' before accepting surgery (Cronström, Dahlberg, et al., 2019).

It would have to be at the point where life is just plain bloody miserable or ... where I had no options of improving any other way.

(Frankel et al., 2012)

The concept of appropriate surgical candidacy included acknowledgement of a hierarchy of health concerns, age-related co-morbidities, pain levels and other priorities which may take precedence over surgery (Ballantyne et al., 2007b; Nelson et al., 2020; Parks et al., 2014; Yeh et al., 2017).

3.5 | Phase 3: Aggregation of quantitative and qualitative synthesis

Key findings reported across the four themes overlap across quantitative and qualitative studies, are summarised in Table 5 and represented in a proposed decision-making model (Figure 2). The level of symptoms and dysfunction often influence decision-making in a consistent direction; more pain, reduced function and/or poorer quality of life increases preference for surgery. Although most included studies related to hip and knee conditions, these findings are consistent across the range of MSD represented and across both quantitative (hip, knee, shoulder, spine, hand, elbow) and qualitative (hip, knee, hand, spine) data. A variety of sociodemographic and information sources also underpin perceptions of personal candidacy (suitability, sufficient symptoms) and perception of surgery (expectations about outcomes, inconvenience and risk). Favourable perceptions in both these domains consistently increase preference for surgery in the range of MSD represented.

Qualitative studies often identified factors that patients consider important to surgical decision-making and quantitative data provided further clarification by demonstrating the direction (increase or decrease preference for surgery) and the consistency of a factor's influence. For example, reduced function and general health concerns feature qualitatively as important considerations for patients (Table 3) and quantitative data adds to this insight by showing that reduced function is highly consistent in its association with a preference for surgery, while better general health is less consistently associated with a preference for surgery (Table 2).

TABLE 5 Aggregated summary of main findings by data type and condition

Theme	Key Quantitative Findings	Conditions represented	Key Qualitative Findings	Conditions represented
Symptoms	Increased pain and decreased function, lower quality of life highly consistently associated with a preference for surgery.	Hip knee spine shoulder elbow hand	Problematic pain and decreased function (with resulting vulnerability and a reduction in activities of daily living) influenced patients to undergo or consider surgery	Hip and knee arthritis, spine ^a , hand†
Socio-demographic and health factors	Race (white) and being employed tend to be associated with a preference for surgery. Less consistent associations between age, gender, general health and preference for or against surgery	Hip knee spine shoulder elbow hand	Age is an important consideration and being older can influence against surgery. Race and finances are important considerations.	
Information sources	Decision aids have an inconsistent impact upon preference for surgery	Hip knee spine shoulder hand	Experiences and opinions of others are often the most influential type of information. Conflicting information from medical and non-medical sources, and/or a lack of information can promote unwillingness for surgery.	
Perceptions of surgery	Positive expectations and lower fears, also psychological and/or body image distress consistently associated with a preference for surgery	Hip knee spine shoulder elbow hand	Positive expectations influence for surgery. Surgical concerns, or fear of risks influence against surgery.	
Perceptions of candidacy	Limited data indicates a positive perception of candidacy is associated with a preference for surgery.	Hip knee	Uncertainty about being 'bad' enough influence decisions against surgery	

^aLimited data for spine and hand (one study for each).

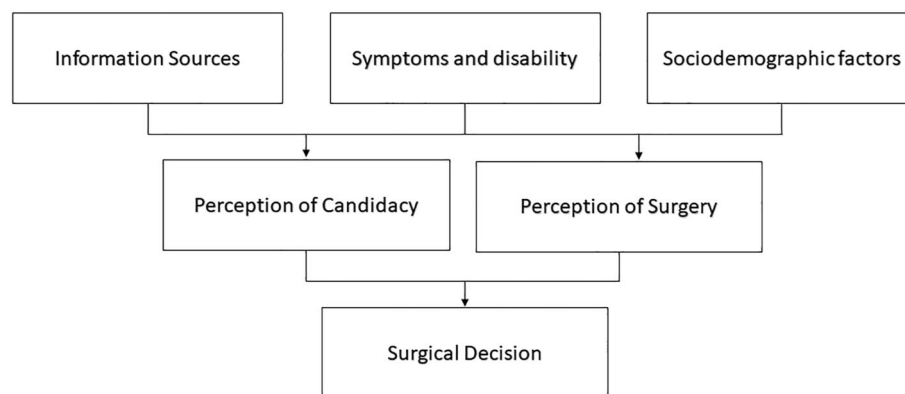


FIGURE 2 Proposed model of surgical decision making

4 | DISCUSSION

This is the first review to synthesise the breadth of qualitative, quantitative, and mixed methods research into the influences upon patient decision-making when considering surgery across the spectrum of MSD. Key themes relating to decision-making overlap across the qualitative and quantitative literature, revealing that patients are more inclined to prefer surgery based on their symptoms (patients with worse symptoms have greater propensity for preferring surgery), their perceptions about personal candidacy/suitability for the procedure and their perceptions about the likely outcomes of surgery (when perceptions/expectations are positive and fears are low, surgery is

more likely to be chosen). Other factors such as age, general health, race, financial context and variety of professional and non-professional communication and information sources exert a less consistent impact upon the propensity to prefer surgery. Patients undergo a complex and individual decision-making process that involves assessment of individual sociodemographic, health, symptoms and information, integrated into individual perceptions of candidacy and surgery before reaching a decision whether to proceed with surgery.

While this is not the first review to report that patient surgical decision-making is individual and complex, it is the first to demonstrate commonality in the factors that influence surgical decisions across a spectrum of MSD. The strong link between being highly symptomatic

and surgery, also the lack of a consistent relationship between patient characteristics and surgical preference, have both previously been reported in a review of patient decisions in spinal surgery (Lam & Loke, 2017). Two prior qualitative reviews conducted in patients undergoing knee arthroplasty reported decision-making themes relating to age, professional support, symptoms, expectations and concerns (Timothy Barlow et al., 2016; O'Neill et al., 2007). Our qualitative evaluation supports these findings, and our mixed-methods approach reveals how consistently these themes are associated with surgical preference (Tables 2 and 5). Conversely, quantitative investigations of associations between a set of patient characteristics and surgical willingness, gain added impact when considered alongside qualitative data. Several overlapping themes were identified (Table 5), indicating that patients consciously consider the factors (such as pain and candidacy) that are also associated with surgical preference. This link could be explored further with primary mixed-methods research into patient decision making.

The process by which patients' reach the point of surgical opinion, has been the subject of criticism; with inefficiencies reported in primary and secondary care interfaces (Briggs et al., 2012), low surgical conversion rates from General Practitioner referrals (Marks et al., 2019) and uncertainty about the optimal profession for early musculoskeletal care and gate-keeping (Foster et al., 2012). The findings of this review could help make surgical referrals more efficient, by prompting communication, supporting decision-making around conservative management of MSD and assisting the timing of orthopaedic referral. These findings suggest that patients with higher levels of symptoms, positive perceptions of candidacy and expected surgical outcomes are more likely to take up an offer of surgery, thus patients with this profile may benefit from earlier orthopaedic referral. Conversely, the absence of these features might prompt persistence with conservative care, knowing that the likelihood of surgical conversion is lower. Further research, involving mixed methods designs with pre and post-surgical data, are needed further inform tailored care. Future research should also interrogate the stability of patient's perceptions of surgical willingness and whether early identification of those with a preference for surgery results in more efficient musculoskeletal care.

4.1 | Limitations

Due to the heterogeneity of statistical methodologies and outcome measures, meta-analysis was not feasible. Consequently, we presented a tally of the consistency with which different quantitative factors impacted surgical preference (Table 2). Presentation of univariate analyses for each factor in future research would aid future pooling of data in this field. While hip and knee osteoarthritis studies are well represented, the low numbers of studies in some other types of MSD means that findings should be applied cautiously across other MSD. It may be that some conditions or settings prompt an impact of different influences upon the surgical decision to those reported here. Finally, surgical preference sampled early within care may

represent a different phenomenon to surgical decisions sampled post-operatively. We believe this challenge reflects the present state of the literature and highlights the need for more longitudinal research in this field.

5 | CONCLUSION

For MSD, patients' surgical decision-making involves complex, individual, interlinked themes of sociodemographic/health factors, information sources, symptoms, perceptions of candidacy and surgical outcomes. Patients are more inclined to prefer surgery when their symptoms and/or disability is worse, when they perceive they are suitable candidates and have positive expectations about surgical outcomes. Other factors including age, general health, race, financial context, and information are also important considerations but less consistently impact propensity to prefer surgery. While these findings can cautiously be generalised across MSD and aid the efficient referral of patients to orthopaedics, more research is needed to validate these findings across the spectrum of MSD.

AUTHOR CONTRIBUTIONS

Sarah Healy: Literature search; data extraction, manuscript preparation. **Eric Dorflinger:** Literature search; data extraction; manuscript preparation. **Zoe A. Michaleff:** Data extraction; manuscript preparation. **Darryn Marks:** Conceptualization; literature search; data extraction; manuscript preparation.

KEYWORDS

decision-making, musculoskeletal, orthopaedic, patient preference, surgery

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.