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REVIEW

Interventions to Manage Pain Catastrophizing Following Total Knee Replacement: A Systematic Review

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Background: Pain catastrophizing is a maladaptive cognitive strategy that is associated with increased emotional responses and poor pain outcomes. Total knee replacement procedures are on the rise and 20% of those who have the procedure go on to have ongoing pain. Pain catastrophizing complicates this pain and management of this is important for recovery from surgery and prevention of chronic pain. This study examines the effect of interventions on PC for patients undergoing total knee replacement (TKR).

Methods: Multiple search engines were searched from inception up to March 2021 for relevant studies measuring PC in adults who have undergone TKR. Studies were screened using the Downs and Black Checklist. We included 10 studies (n = 574) which recruited peri surgical TKR participants. Effect sizes were calculated and compared on effect of intervention on PC.

Results: Five studies examined the effect of cognitive behavioral therapy-based intervention on PC with low to moderate effects. Two studies examined the effect of a pain neuroscience education on PC with small effects short term. One study examined the effect of hypnotic therapy on PC with small, short-term effect (1 month) but large effect at 6 months. One study compared the effect of an isometric quadricep exercise with auditory and visual feedback on PC to treatment as usual with small, short-term effects. One study compared the effects of an activity and goal setting diary on PC with a moderate effect at 4 weeks.

Conclusion: PC is a modifiable characteristic. Several interventions show modest benefit, however more research is needed to aid in clinical decision-making for this population. Interventions are most likely to produce benefits when they are targeted to people with high levels of PC.

Keywords: pain catastrophizing, fear-avoidance, fear of pain, psychological, psychosocial, treatment

Introduction

The experience of pain is the manifestation of biological, psychological and social factors.[1] This is an individual experience that varies widely in both the acute perception of pain and its chronic progression. While pain serves an adaptive role, its continued presence can have a significant, negative effect on quality of life and functional capacity. In fact, pain is the leading cause of disability and disease burden worldwide.[2] It is estimated that 10% of the world's population – 60 million adults – suffer from pain.[3] Chronic pain poses a significant burden for patients, health-care systems and societies. For example, lost work due to arthritis in the United States is estimated to cost approximately $7.1 billion.[4] There are also significant individual costs of pain including: inability to work, depression, disrupted social relationships and suicidal thoughts.[3]

While the mechanism for progression of pain is assumed to be driven largely by physical stimuli, there are cognitive drivers of this progression. Vlaeyen and Linton offer the "fear-avoidance" (2000) model as a possible explanation.[5] They hypothesize that fear-avoidance is the primary mechanism by which long-term painful conditions persist. Individuals who are fearful of pain are likely to avoid movement activities that are key for the management of disability. This contributes to a negative feedback loop in which pain is viewed as threatening, leading to hypervigilance and negative affectivity that ultimately increases fear and avoidance, leading to an ongoing pain cycle.[6] In some cases, this ongoing

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threat of pain can lead to excessive worry and ruminating thoughts that rise to a more significant level of avoidance termed pain catastrophizing.

Pain catastrophizing was introduced by Albert Ellis[7] and adapted by Aaron Beck[8] to describe a maladaptive cognitive strategy that is associated with the magnification of threat from painful sensations and the anticipation of pain[9] and has been found to affect the experience of pain in both healthy individuals and those with chronic pain.[17,19] Individuals who engage in pain catastrophizing exaggerate the threat of a painful stimulus and perceive a lack of control over the experience that results in excessive fear and avoidance behaviors.[10] These emotional and behavioral responses predict both the response to pain and experience of future pain.[11] While pain catastrophizing has been widely studied with non-surgical chronic back pain, it has received less attention in on-going pain that have a surgical solution, eg, joint replacement procedures. The possibility of a surgical solution would be expected to provide a greater sense of control and an outcome with reduced pain. Thus, it may be that pain catastrophizing has a distinct set of outcomes for pain that has a surgical solution. This study is designed to fill this void and will examine the effect of interventions on pain catastrophizing for patients undergoing total knee replacement (TKR).

Long-term changes in the knee can lead to chronic pain and eventually osteoarthritis. A common treatment for knee osteoarthritis is TKR. In 2009, 686,000 TKR procedures were performed in the United States, with this number predicted to increase by 110% by 2025 and by over 400% by 2040.[38] A recent study showed that 58% of patients undergoing total knee replacement experienced a fear of pain associated with the surgical procedure.[12] Additionally, pain catastrophizing pre-surgery is associated with ongoing pain 3 to 6 months post-operatively.[13,14] As predicted by the fear-avoidance model of pain,[6] it is not surprising that an estimated 20% of patients continue to experience chronic pain after TKR.[15] Modifiable risk factors for chronic pain after TKR include a greater number of preoperative pain sites, greater preoperative pain, lower preoperative function, depression, anxiety, and increased pain catastrophizing.[15,16]

Fortunately, a recent review found strong evidence that pain catastrophizing is a modifiable characteristic that is responsive to intervention.[18] Results from this review found an overall moderate benefit, but much larger effects on pain catastrophizing in interventions that specifically targeted those with higher pain catastrophizing pre-surgery.[18] In addition, interventions yielding the greatest benefits utilized cognitive behavioral therapy, multimodal treatment and acceptance and commitment therapy.[17] Likewise, a randomized controlled trial in individuals with chronic low back pain succeeded in reducing pain catastrophizing by treatment elements that do not directly target cognitive factors, indicating that increasing physical activity alone may be enough to modify fear-avoidance beliefs.[41] Psychological and functional outcome-based interventions have also been effective at reducing the disability associated with pain catastrophizing.

While TKR generally follows a period of long-term pain, it also represents an acute event from which the individual expects to improve and experience both reduced pain and improved mobility. This differs from the kind of inoperable chronic pain that has been the focus of the reviews completed to date. It may be that pain catastrophizing is more responsive to intervention following surgery versus those who are seeking to cope with chronic pain. However, to date, there has been no systematic review investigating pain catastrophizing in conjunction with TKR. Given the rising incidence of TKR, potential for poor surgical outcomes, and the rates of chronic pain following surgery, there is a critical need to provide effective treatment. Thus, this review has two aims: (1) to systematically review and describe clinical trials that measure pain catastrophizing in TKR patients peri surgically and (2) compare the effect of interventions on pain catastrophizing.

Method

Literature Search

Applying the PICO tool [40](Problem, Intervention, Comparison, Outcome) for systematic reviews, we identified trials that measured pain catastrophizing in patients undergoing or post TKR. Our search included all intervention types addressing pain catastrophizing in this population. A primary search of electronic databases (Web of Science, CINHAUL, MEDLINE, PsychINFO and PubMed) was performed from inception until March 2021. These databases were searched for relevant studies using combinations of the following keywords: pain catastrophizing, total knee replacement, total knee arthroplasty, TKR, TKA, osteoarthritis and psychological outcomes. Eligible studies had to be published in English,

in a peer-reviewed journal, designed as an intervention for individuals undergoing primary TKA or post TKA, had to measure pain catastrophizing as a variable or outcome and have a patient cohort age greater than or equal to 18. Titles, abstracts and full texts of the identified papers were screened for eligibility (refer to Figure 1 for full details). All abstracts were read, and the inclusion criteria applied. When the abstract suggested a match, the entire article was retrieved and reviewed in depth. References of selected papers were checked for additional eligible studies.

Outcome Measures

The outcome measure for included studies was pain catastrophizing measured with the Pain Catastrophizing Scale (PCS).[19] The PCS includes 13 items in three subscales: magnification (3 items), rumination (5 items) and helplessness (5 items). The scale asks the participant to self-rate each item on a 5-point scale ranging from 0 ("not at all") to 4 ("all the time") with a total score ranging from 0 to 52 and greater scores indicating higher overall catastrophizing.

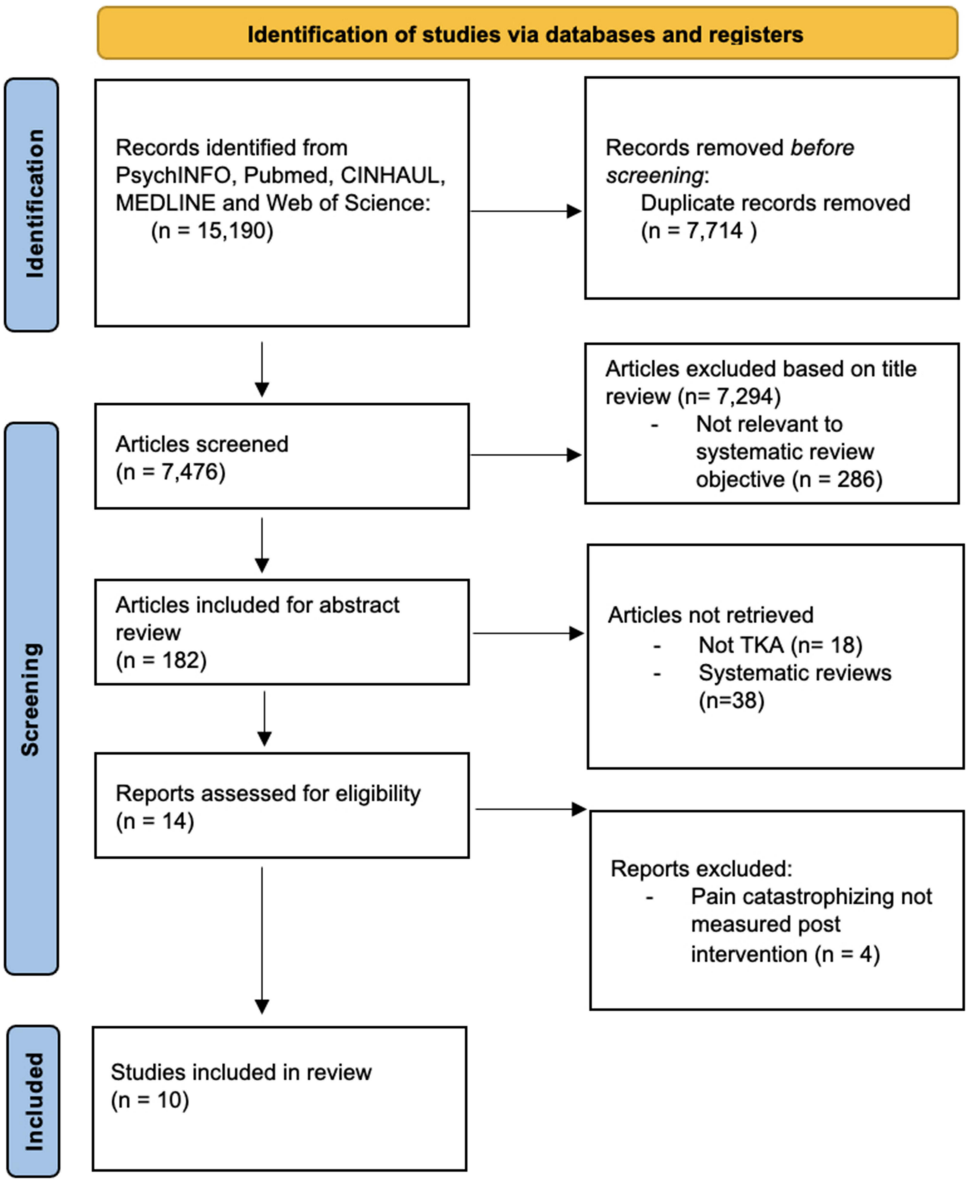

Figure 1 PRISMA flow chart.
Notes: PRISMA figure adapted from Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. Common Creative.[39]

Data Extraction

Data were extracted using a comprehensive and pretested data extraction form for systematic reviews developed by Cochrane. Studies were grouped for analysis according to intervention type. They were further divided into time points assessed (≤1 month, 2–3 months, 6 months, and 12 months), delivery type and dosage of intervention. Effect size (cohen's d[20]) was calculated using data provided in the publications. Where means and standard deviations were not provided, estimations were made using methodology by Wan et al.[21]

Methodological Appraisal

Two authors (R.M.P., B.A.) independently assessed each study using the Downs and Black checklist.[22] Differences in ratings were resolved through discussion until consensus was achieved. Each study was assessed against 5 domains in the standard tool: reporting, external validity, internal validity (bias), internal validity (confounding – selection bias), and power. The power question of the study was modified to rate whether the study performed a power calculation or not. Accordingly, the maximum score was 28 instead of 32. The studies were given corresponding quality levels as previously reported by Hooper et al.[23] Excellent (26–28), good (20–25), fair (15–19) and poor (≤14).

Results

Search Results

The original search retrieved 15,190 papers. Of these, 7718 were duplicates and 7476 went through a title review. From these, 7294 were excluded because their primary focus was not the investigation of interventions measuring pain catastrophizing in TKA patients. Following this initial review, an abstract review was conducted on 182 articles, resulting in 14 articles for full text review. Of these 14 articles, 4 were eliminated because PC was not included as an outcome measure, resulting in 10 articles included in this review. Reasons for exclusion are included in a PRISMA flow diagram (Figure 1).

Study Characteristics

Ten studies were reviewed. Of these, 8 were RCTs, 1 was a cohort study and 1 was a controlled trial. The number of participations varied between 12 and 100 (median = 61.5), totaling 574 subjects. All studies were limited to patients undergoing unilateral TKA secondary to knee osteoarthritis. With regard to intervention, five examined the effects of a cognitive behavioral approach (CBT) to treatment primarily focused on pain coping skills,[24–28] and two examined the effects of a pain neuroscience education (PNE) program.[29,30] One study examined the effect of isometric quadriceps muscle exercises with visual and auditory feedback.[31] One examined the effects of using an activity diary for goal setting.[32] Finally, one study examined the effects of a prerecorded hypnotic intervention focusing on relaxation and psychological well-being for post surgical recovery.[33]

Of the CBT interventions, 1 was delivered by a psychologist,[27] one was delivered by both a psychologist and a physical therapist,[26] two were delivered by physical therapists[24,28] and one did not report who delivered the program.[25] The PNE programs were delivered in a group format by a physical therapist, the hypnotic recording intervention was self-administered with education provided by authors, the activity diary program was self-administered through the course of occupational therapy, the isometric quadricep with feedback intervention was self-administered with education for use provided by a physical therapist.

Post intervention assessments and follow-up periods varied between the studies from directly following the delivery of the intervention to 12 months.

Participants

There were 574 participants (81.5% female) in total with an average age of 66. Baseline PCS scores were an average of 27.27 across all groups. No significant differences were found between baseline and experimental groups across all included studies. When scores were dichotomized on the basis that PCS scores greater than or equal to 30 represents high pain catastrophizing, as is described to represent the upper 75% percentile,[34] 7 studies were found to have low PC samples at baseline. Demographic details for the studies are listed in Table 1 including baseline PCS scores and study details.

Methodological Quality of the Studies

Details of the intervention administered were available in all reports. The 10 studies were comprised of 24 groups including 13 treatment groups, 1 minimal-effect treatment (MET) and 10 treatment as usual groups (TAU). Using the Downs and Black checklist[22] for quality assessment, 2 were found to be of good quality, 7 were rated fair and 1 was found to be of poor quality. As interventions, control groups and follow-up periods were heterogeneous across studies, we decided not to pool effect sizes in a meta-analysis. Figure 2 summarizes the quality assessment findings of all included studies. The Downs and Black[22] final score on the 10 included studies ranged from 15 to 22 with a median score of 17 (maximal possible score was 28). Scores for each of the 5 factors varied from 5 to 9 for reporting (out of 10), 1 to 2 for external validity (out of 3), 5 to 6 for bias (out of 7) 2 to 5 for selection bias (out of 6) and 0 to 1 for power (out of 1).

Effect on PC by Intervention Type and Length of Follow Up

Cognitive Behavioral Therapies

Five of the ten studies examined the effect of a CBT-based intervention on PC.[24–28] The study conducted by Buvanendran et al looked at the effect of a CBT intervention on PC in two Phases. Phase 1 consisted of 4 groups and was used to assess the most optimal period for delivery of the intervention. As the study did not state exactly what period follow-up assessments were made, we calculated effect sizes based on Phase 2 only. Two studies[25,28] found medium effects (d=0.48, d=0.57, respectively) (See Figure 3) and one[26] found a medium effect (d=0.42) at 1 month post-op. Buvanendran et al assessed PC at 3 months post op and found a medium effect size (d=0.42). Riddle et al looked at the effect of a CBT-based pain coping skills intervention at 2 months and found a medium effect (d=0.50). Additionally, Birch et al and Sun et al found small to medium effects at 3 months (d=0.20 and d=0.50). Cai et al found a large effect (d=1.74) at 6 months post op. Birch et al and Sun et al found a small effect at 12 months (d=0.16, d=0.24).

Pain Neuroscience Education

Two studies[29,30] examined the effect of a pain neuroscience education program on PC. Louw, Puentedura et al found a small effect size in comparisons between pre and post intervention (d=0.30). An additional study conducted by Louw, Zimney et al compared a PNE program to a control and found a small effect size at 1 month (d=0.32), moderate effect size at 3 months (d=0.54) and small effect size at 6 months (d=0.25).

Hypnotic Therapy

Lee et al studied the effects of a peri-surgical hypnotic recording to TAU and found small effects on PC at 1 month (d=0.30) and 3 months (d=0.02) post-operatively. However, they found a large effect at 6 months (d=1.42).

Isometric Quadricep Exercises

Kondo et al compared the effect of an isometric quadricep exercise with auditory and visual feedback to quadricep exercises without any feedback and found the intervention to have a small effect on PC at 1, 2 and 3 weeks post operatively (d=0.31, d=0.1, d=0.4).

Goal Setting/Activity Diary

Hiraga et al compared the effects of a self-monitoring activity diary to control (eg, occupational therapy to promote goal achievement) and found a moderate effect (d=0.74) on PC at 4 weeks post-op.

Effect on PC by Delivery

Physical Therapist

Five studies[24,28–31] had interventions that were delivered by a physical therapist. Three[29–31] of these studies demonstrated a small effect at 1 month post op. One[28] found a medium effect at 1 month follow-up (d=0.57). Birch et al found a small effect at 3 and 12 months follow-ups (d=0.20 and d=0.16, respectively).

Table 1 Characteristics of Included Studies

Study Reference	Main Diagnosis	N	Follow up Period	Intervention	Control	Intervention Dosage	Intervention Delivery	Baseline PCS		Study Quality
								Control	Treatment	
Louw Puentedura et al, 2019	Unilateral TKA secondary to OA	67	None; measurements taken post intervention (pre-op)	Pain Neuroscience Education	TAU	30 min PNE pre-op	Physical Therapist	17.3 (11.4)	13.9 (11.7)	Poor
Louw, Zimney et al, 2019	Unilateral TKA secondary to OA	12	None; measurements taken post intervention (pre-op)	Pain Neuroscience Education	TAU	30 min PNE pre-op	Physical Therapist	15.6 (0.5)		Fair
Birch et al, 2020	Unilateral TKA secondary to OA	60	3 mo, 12 mo post-op	Cognitive Behavioral Therapy	TAU	6 sessions total (3 pre-op 3 post-op)	Physical Therapist	34 (9.61)	30 (5.68)	Good
Sun et al, 2020	Unilateral TKA secondary to OA	80	3 mo, 12 mo post-op	Cognitive Behavioral Therapy	TAU	6 sessions total (1 pre-op, 5 post-op)	Physical Therapist	31.9 (7.6)	32.5 (8.0)	Fair
Buvanendran et al, 2021	TKA with knee as primary source of pain	68	1 week, 3 months post op	Cognitive Behavioral Therapy	No CBT	Phase I: pre-op; Phase II: post-op	No indication	27.6 (11.85)	28 (10.37)	Fair
Cai et al, 2017	Unilateral TKA secondary to OA	100	1 mo, 6 mo post-op	Cognitive Behavioral Therapy	TAU	4 sessions post-op	Physical Therapist & Psychologist	36.68 (4.19)	37.36 (4.41)	Fair
Riddle et al, 2011	Unilateral TKA secondary to OA	60	2 months post-op	Pain Coping skills using Cognitive Behavioral Approach	TAU	4 sessions pre-op, 4 sessions post-op	Psychologist	25.8 (11.1)	29.3 (8.9)	Fair
Kondo et al, 2020	Unilateral TKA secondary to OA	62	1, 2 and 3-weeks post-op	Quad Sets with visual and auditory feedback	TAU	Post-op	Physical Therapist	30.9 (13.4)	30.7 (11.6)	Fair
Hiraga et al, 2019	Unilateral TKA secondary to OA	41	4 weeks post-op	Activity diary	TAU	Post-op in conjunction with occupational therapy	Occupational Therapist	25.5 (10.2)	27.5 (7.9)	Fair
Lee et al, 2019	Unilateral TKA secondary to OA	24	1 mo, 3 mo, 6 mo post-op	Hypnotic recording	TAU	Peri surgical: 35-minute pre-op and post-op recordings	Nurse	17.25 (16.97)	26.38 (14.34)	Good

Note: Numbers presented as: Mean (standard deviation).
Abbreviations: TAU, treatment as usual; CBT, cognitive behavioral therapy.

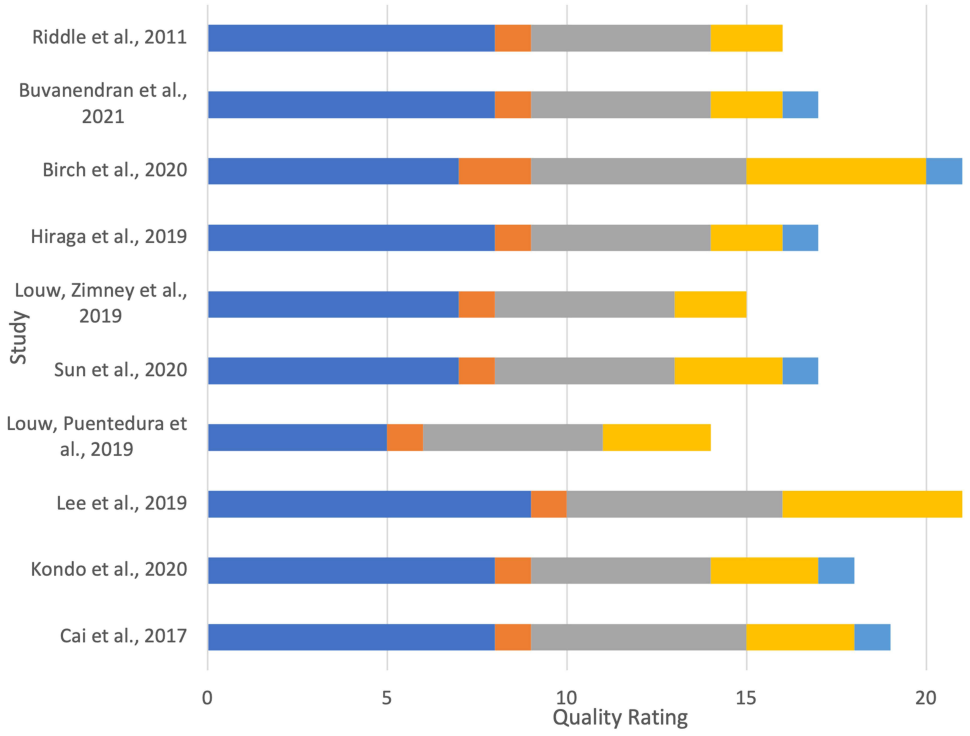

Figure 2 TITLE: Methodological quality assessment using downs & black checklist.
Notes: blue: reporting; orange: external validity; grey: bias; yellow: selection bias; light blue: power.

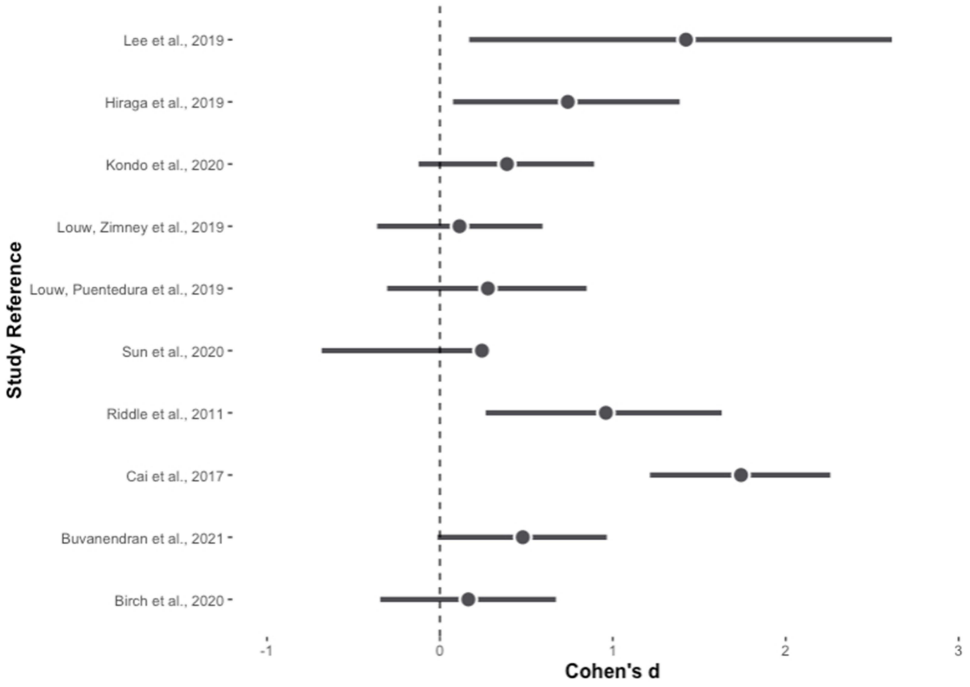

Figure 3 Forest plot of effect of interventions to address pain catastrophizing in TKR.

Occupational Therapist

One study was delivered by an occupational therapist[32] and found a medium effect (d=0.74) at 1 month post operatively.

Psychologist

One study was delivered by a psychologist[27] and found a medium effect at 2 months (d=0.5).

Physical Therapist and Psychologist

One study was delivered by both a physical therapist and psychologist[26] and found a small effect at 1 month (d=0.42) and large effect at 6 months post op (d=1.74).

Nurse

One intervention was delivered by a nurse[33] and found a small effect at 1 month (d=0.28) and large effect at 6 months (d=1.42).

Other

One study did not disclose who delivered the intervention[25] and found a medium effect (d=0.48) at 1 month.

Other Methodological Factors

Dosage of Intervention

CBT sessions varied in dosage from 120 to 270 minutes. Birch et al delivered the CBT intervention over 6 sessions with 2 pre-operatively and 4 post operatively for a total of 270 minutes[24] and found a small effect at both 3 and 12 months post-op (d=0.20 and d=0.16, respectively). Sun et al delivered their CBT intervention over 6 sessions for a total of 180 minutes with the first session being 2 weeks pre-op and the other 5 post-op[28] and found a medium effect at 1 month (d=0.57) and a small effect at 12 months (d=0.24). Buvanendran et al delivered their intervention over 4 weeks pre-operatively with one session delivered 3 weeks following surgery[25] and found a medium effect at 1 month (d=0.48). Cai et al delivered the CBT intervention over 4 weeks for a total of 120 minutes post-operatively[26] and found a small effect at 1 month (d=0.42) and a large effect at 6 months (d=1.74). Riddle et al delivered their intervention over 8 sessions, 4 delivered pre-operatively and 4 post-operatively[27] and found a medium effect at 2 months (d=0.50).

In the studies examining the effects of pain neuroscience education, the intervention was delivered in one 30-minute dose pre-operatively.[29,30] Louw, Puentedura et al found a small effect at 1 and 6 months (d=0.31 and d=0.26, respectively) post op with a medium effect at 3 months. Louw, Zimney et al found a small effect (d=0.27) post intervention. The isometric quadricep intervention was delivered post-operatively and patients were instructed to perform exercises twice daily.[31] They found a small effect 3 weeks post-op (d=0.38). The intervention examining the effects of an activity diary was delivered post-operatively and individuals participated in OT 40 minutes per day.[32] They found a medium effect (d=0.74) at 1-month post-op. The hypnotic recording intervention was delivered peri-surgically with individuals self-dosing[33] and found a small effect at 1 month (d=0.28) and a large effect at 6 months post op (d=1.42).

Discussion

To our knowledge, this is the first systematic review to focus on reductions in pain catastrophizing in TKR patients using any type of intervention. Our related aims included: (1) to compare the effect of different interventions on pain catastrophizing and (2) to systematically review and describe clinical trials that measure catastrophizing in TKR patients peri-surgically. Our study included 10 peer-reviewed articles representing 574 subjects who were pre or post TKR. While all included pain catastrophizing as an outcome, only five targeted pain catastrophizing as a primary outcome. This is likely the product of pain catastrophizing mainly being viewed as a process variable that explains the experience of pain, rather than a primary outcome variable. However, all studies did calculate change in pain catastrophizing. Most studies found a moderate effect, indicating that targeting pain catastrophizing is a potentially efficacious strategy to reduce the incidence of chronic pain following TKR. This finding reflects the extant literature that has consistently found pain catastrophizing to be a modifiable characteristic in other surgical populations.[14]

The largest effect was found at 6 months post-surgery for both CBT and hypnotic therapy, which may be due to the nature of these interventions. CBT and hypnotic therapy are unique in that they seek to provide people with skills that

translate to medium-term changes in behavior. Specifically, CBT works to alter maladaptive interpretations of pain experiences through cognitive restructuring, which promotes healthy emotional and behavioral shifts in response to pain.[35] Hypnotic therapy aims to promote cognitive flexibility and adaptive pain responses through increased awareness of pain sensations and promotion of relaxation.[36] These results indicate that interventions that focus on shifting pain appraisals and behavioral responses may lead to longer term changes in pain catastrophizing.

Comparison of the interventions was challenging due to the disparate approaches and limited number of studies available on this topic. A greater number of high-quality RCTs are needed to test variations in design to better inform clinical decision-making. Key variables center on intervention methods including: dosage, follow-up time period, along with the mode of delivery and the training required to successfully deliver the intervention. The results from this review can be used to guide these choices. Specifically, dosage among CBT studies varied from 120 to 270 minutes with delivery methods including telephone, telehealth (video chat), in person and hybrid models. We found no clear evidence that a greater dosage of CBT was associated with a greater effect of intervention but the differences in delivery method confound any conclusion regarding either duration or the method of delivery. Moreover, one CBT intervention was delivered by a psychologist, 2 were delivered by physiotherapists, one was delivered by both a psychologist and physiotherapist and one did not mention who delivered the intervention. The studies that included psychologists in their delivery method (2 out of 5) had moderate to large effect sizes while those delivered by physiotherapists only had small to moderate effect sizes. This suggests that a CBT-based intervention requires significant training in psychological science prior to delivery. Interestingly, the study that delivered the intervention with a physiotherapist and a psychologist found the largest effect of the included studies. Given the challenge of implementing CBT in a clinical sample, it is not surprising that psychologists were most successful – particularly when paired with a physiotherapist. It may be that the delivery method can be modified, eg, telephone, telehealth, and app-delivery, to allow for efficient delivery of CBT concepts from psychologists as a means to support the work of physiotherapists. Lastly, 5 out of 10 studies included follow-up periods of 1 month or less. In our study, the greatest effect sizes were found at 6-month following the intervention. This may be because recovery following TKR, including return to activities of daily living and functional range of motion, can take up to 6 months.[37] It may be that the full impact of intervention can only be gauged following full recovery from TKR and the point at which the experience of pain is at its lowest.

Early research on pain catastrophizing scores suggests that absolute PCS scores in excess of 30 are representative of pain catastrophizing in the upper 75% percentile.[34] In the present review, 2 out of the 3 studies that recruited participants whose baseline PCS scores were greater than 30 demonstrated effect sizes that were moderate to large.[26,28] In contrast, two studies screened for moderate PCS values (PCS > 16 and 22), but did not show appreciably larger effects than those that did not screen for PCS scores. Taken together, these findings suggest that individuals with higher PCS scores may be more responsive to intervention in this population, if recruited at a sufficiently high level of PCS. Given the high risk for ongoing pain and disability associated with high pain catastrophizing, future intervention research should consider targeting this risk category.

The methodological quality of the included articles was generally fair. The primary concern was for selection bias and internal validity. For example, while it is not possible to blind participants in an intervention study of this nature, few of the studies using active controls made attempts to blind the researchers who were assessing study outcomes. Further, there were insufficient descriptions of potential confounders. Specifically, usage of pain relieving medications and assistance from caregivers may be confounding factors in assessing effect of psychosocial interventions on the pain experience in this population.

Pain catastrophizing is a complex topic that has been shown to be critical in both acute and chronic pain experiences. The fear-avoidance model views pain catastrophizing as a variable that limits progress towards recovery.[6] TKR appears to be a useful model to examine interventions that target pain catastrophizing. With the rates of TKR procedures and prevalence of chronicity on the rise,[38] it is critical to find clinically meaningful interventions to treat pain catastrophizing for this population. Moreover, in comparison to low back pain, TKR provides a population of patients seeking an acute, surgical intervention for a condition that has caused chronic pain. This would be expected to provide more control and the perception of positive outcomes. Despite this, the effects for these studies were similar to other work with chronic pain and surgical populations. In a systematic review conducted on patients with chronic non-cancer pain, Schütze et al

found modest effects on PC by CBT, multimodal treatments and Acceptance and Commitment Therapy.[18] Similarly, Gibson and Sabo found physiotherapy and CBT to be effective at reducing PC in surgical populations, however these findings lack clinical significance.[14]

Conclusion

Our review demonstrates that pain catastrophizing is modifiable in TKR patients, with multiple interventions showing medium to large effects. Despite this, more research is needed to aid in clinical decision-making for this population. Interventions are most likely to produce benefits when they screen for high levels of pain catastrophizing, are implemented by or in conjunction with psychologists, and follow patients for the full, 6 months of post-surgical recovery. This review can offer less guidance on the duration and method of the intervention as there were no clear pattern of effects. That said, it does seem that the use of CBT is likely to be efficacious. Future research should focus on identifying a clear duration and dosage of treatment, along with efficient and scalable delivery methods to better inform the design of clinical interventions.

Disclosure

The authors report no conflicts of interest in this work.

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