


REVIEW

A scoping review of outpatient interventions to support the reduction of prescription opioid medication for chronic non cancer pain

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Abstract

Background: Prescription opioid use is a global health issue. Previous systematic reviews have not identified that any specific intervention supports prescription opioid reduction effectively. In keeping with the nature of a scoping review, this review details an overview of the existing literature on this topic, with quality of evidence being discussed rather than formally analysed.

Aim: This review aimed to examine and describe outpatient interventions that support the reduction of prescription opioid medication for chronic non cancer pain.

Eligibility criteria: Abstracts were reviewed against the inclusion criteria of outpatient clinical interventions, for the purpose of prescription opioid dose reduction, offered to adults with CNCP.

Sources of evidence: Following a structured review approach an electronic database search, of Medline, Embase, Cochrane, Cinahl, and Proquest and grey literature was undertaken. Search results were screened by title for relevance.

Charting methods: Two reviewers adhering to the PRISMA-ScR checklist charted and assessed studies for quality using Critical Appraisal Skills Programme checklist assessment tools. Extracted data were collated and synthesised for presentation as a tabular and narrative review.

Results: From the initial search of 5089 papers, 19 underwent full-text review and quality appraisal. A variety of interventions were described to support reduction in

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prescription opioid use, however only one study of at least fair quality was able to demonstrate a statistically significant benefit in reducing measured opioid dose compared with a control group. Interventions were implemented in both specialist pain services and in primary care with multidisciplinary and interdisciplinary clinician care. Barriers and facilitators were observed in both settings.

Conclusion and implications for clinical practice: Further rigorous research needs to be conducted to conclusively answer the question of what outpatient interventions support opioid reduction in chronic non cancer pain. This scoping review is the first step of inquiry in the development of a nursing intervention to support reduction of prescription opioids.

KEYWORDS

chronic pain, intervention, nurse led, nurse support, persistent pain, prescription opioids, reduction, tapering, weaning

1 | INTRODUCTION

Opioid use and misuse is a global health issue. Prescription opioid treatment for chronic non cancer pain (CNCN) is characterised by the key elements of: escalating risk of harm with concurrent reduction in benefit, (Sullivan & Howe, 2013) high prescribing rates (Rivat & Ballantyne, 2016) and complex physical and psychoactive effects from the use of opioids (Rosenblum et al., 2008). Current evidence does not support the use of prescription opioids for CNCN (McPherson et al., 2018). Following the 2016 release of prescribing guidelines by the Centre for Disease Control in the United States (Dowell et al., 2016) restricted opioid prescribing for CNCN was recommended by many peak expert bodies including those in Australia (Australian Institute of Health and Welfare, 2018).

Escalating risk of harm along with declining benefit are features of both aberrant and compliant prescription opioid use. Despite this dual negative effect, dose reduction is often challenging for patients and recommendations to reduce opioid dose may result in conflict with prescribers. Prescribers may be reluctant to deprescribe opioids for patients they perceive have a legitimate need for pain medications, particularly if they have limited access to practical and effective pain management alternatives (White et al., 2021). Over 15 million opioid prescriptions are written annually in Australia (Lalic et al., 2019) which has resulted in a 15-fold increase in the last 30 years (Blanch et al., 2014) with poor health outcomes from prolonged prescription opioid use leading to negative economic consequences for the individual and society (Kolodny et al., 2015). Opioids exert a complex effect on the brain that reinforces continuing use (Le Merrer et al., 2009). Reward pathways are expropriated by exogenous opioids, replacing pleasure from natural reward with the desire for opioid effect (Le Merrer et al., 2009). Disruption to executive function in the brain from opioid use alters decision making and memory. This causes positive feelings about opioid use to be favoured and leads to the continued use of opioids against better judgement (van Steenbergen et al., 2019). Structural changes related

What does this paper contribute to the wider global clinical community?

- The review contributes to the evolving body of knowledge surrounding interventions utilised to support prescription opioid reduction in the context of CNCN.
- The review presents an overview of what is currently known about the various types of interventions used to support patients to reduce prescription opioids.
- The literature demonstrates that in the context of chronic non cancer pain, prescription opioid reduction can be achieved without increased level of pain and loss of functional capacity.

to opioid use are visible on imaging in areas of the brain associated with emotional processing and connectivity (Younger et al., 2011).

Despite a wide array of interventions suggested for the purpose (Eccleston et al., 2017; Frank et al., 2017) there is no standard approach to support prescription opioid reduction. Guidelines and protocols help prescribers make decisions about opioid management but are often not well received by individuals established on opioid therapy. Education alone has been demonstrated to be insufficient to bring about behavioural change (Traeger et al., 2018). Inpatient treatment for opioid reduction is costly and disconnects patients from their support systems, responsibilities, and real-world concerns, creating an artificial environment, unable to be sustained upon discharge (National Guidelines for Medically Assisted Treatment of Opioid Dependence, 2014). Multidisciplinary pain treatment programs frequently incorporate opioid tapering, and demonstrate success in prescription opioid dose reduction, without identifying the particular component of the program that facilitates opioid reduction (Eccleston et al., 2017). Decreasing barriers to opioid reduction, through behavioural treatment, (Nicholas et al., 2020)

may help individuals accept and adhere to opioid reduction plans. For practical application an intervention to support prescription opioid reduction needs to be accessible and acceptable to people with CNCP, be cost effective and easily integrated into a multidisciplinary pain service or primary care clinic. These criteria may be met by a nurse-led intervention.

Previous systematic reviews, conducted by Eccleston et al. (2017) and Frank et al. (2017) reported on interventions for the reduction of prescription opioid use. Meta-analyses were not performed in either review due to significant variability in intervention types, and outcomes along with small sample sizes. Both authors concluded there was insufficient quality of evidence to support the recommendation of any specific intervention for prescription opioid dose reduction. An evidence brief undertaken by Peterson et al., (2016) examined complementary interventions for prescription opioid reduction and described the evidence base as extremely limited. Recent systematic reviews of tapering methods by Mathieson et al., (2020) and Sud et al., (2020) comment on the heterogeneous nature of studies. Lieschke et al. (2020) performed a rapid realist review of evidence on prescription opioid tapering in the rural context, and White et al. (2021) conducted a systematic literature review of the feasibility of behavioural interventions to support prescription opioid tapering in CNCP, both found limited evidence to support approaches within these contexts. This scoping review intends to further explore the range of clinical interventions for the purpose of prescription opioid reduction, and provide additional information by identifying key characteristics and gaps in the current knowledge. To provide a broader view of the evidence, studies not ordinarily appraised in a systematic review such as observational studies will be included. Further inquiry into what facilitates prescription opioid reduction in this dynamic and fast moving area of research (Frank et al., 2017) and in the context of harm and cost from long term opioid use, is warranted.

1.1 | Aims

The aim of this scoping review was to examine and describe outpatient interventions for the primary purpose of reducing prescription opioid medication for CNCP by mapping the available literature and identifying the gaps in current knowledge.

2 | METHODS

The five-stage framework proposed by Arksey and O'Mallery (2005) was used to guide the scoping review. This framework consists of identifying the research question, identifying relevant studies, selecting eligible studies, charting the data and collating, summarizing and reporting the results. The sixth optional stage of the framework involving consumer consultation was not conducted due to time and cost constraints. The review adhered to the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for

Scoping Reviews (PRISMA-ScR) checklist (Tricco et al., 2018). The completed checklist is included as File S1. A protocol for this scoping review was developed and is available on Open Science Foundation (<https://doi.org/10.17605/OSF.IO/UBJDS>). A scoping review has a broader reach of the literature to overcome the paucity of evidence from study designs acceptable to other literature review types and address the complexities of reviewing evidence about human behaviour.

2.1 | The research questions

The specific question of identifying which intervention(s) in the context of CNCP support prescription opioid reduction will not be answered by this review. Rather evidence gathered through the review process will guide new directions for evaluating if a nurse-led intervention, underpinned by behavioural change methodology, would be an effective approach to supporting prescription opioid reduction in patients with CNCP in both primary and specialist care settings.

To address the review aim, an investigative approach was developed to map the literature using the following questions. 1. What interventions are studied for the purpose of prescription opioid reduction? 2. Do they demonstrate effectiveness in reducing prescription opioids? 3. Where are these interventions undertaken and who delivers the interventions? 4. Have barriers and facilitators associated with provision of the interventions been identified? 5. What are the gaps in knowledge relating to this evidence?

2.2 | Identifying relevant studies

2.2.1 | Inclusion criteria

Papers included in the review were those that described an original study and included the following criteria: 1. The study population were adults, over the age of 18, with CNCP, defined as pain extending beyond three months (Treede et al., 2015) on prescription opioid medication; 2. The study was of a clinical intervention undertaken for the primary purpose of supporting the reduction of prescription opioid use; 3. The primary outcome for review was the reduction in prescription opioid use either measured as a dose or as an intention to reduce opioid dose using a standardised tool. Secondary outcomes of interest were satisfaction with the intervention and cost of the intervention; and 4. The study was set in an outpatient setting in any country. All original research study designs were considered for inclusion.

2.2.2 | Exclusion criteria

Review exclusions were: 1. Studies set in inpatient locations; 2. Studies of prescription opioid reduction for conditions other than

CNCP; 3. Studies of chronic pain treatment; 4. Studies of opioid monitoring programs, opioid prescribing guidelines or legislative measures to restrict opioids; and, 5. Studies of opioid substitution treatment or adjunct medication therapy to support opioid reduction. Although these are effective methods to limit prescription opioid use evaluating them was not the purpose of the review.

2.2.3 | Search strategy

The literature search comprised of three stages: (1) Identification of relevant key words and MeSH terms related to the key concepts; (2) A complete search of selected databases, grey literature and trial registers using a search strategy developed from the key words and MeSH terms; and (3) Identification of key articles with an additional search of paper reference lists.

The search strategy was developed in consultation with a senior librarian using the key phrases of 'prescription opioid treatment or therapy for CNCP, chronic pain or persistent pain' and 'intervention, method or support for prescription opioid dose reduction, weaning or tapering'. Subject headings, keywords and keyword phrases were compiled for each of the search concepts and the concepts were combined using the 'AND' operator. The Cochrane Highly Sensitive Search Strategies for identifying randomized trials in MEDLINE (2008 rev.) validated search filter was applied to the Medline search. The search strategy was developed in Medline before being translated to the other databases. The search was limited to human studies and English language citations published after 1999. The date limit was applied in recognition of the timing of research into this topic which followed popularisation of opioid use for CNCP starting in the early 1990s (Holliday et al., 2013).

2.2.4 | Sources of evidence

A systematic search of the Medline, Embase, Cochrane, Cinahl and Proquest databases was conducted in August 2020, supplemented by a grey literature search of the following resources; Med Nar, Open Grey, PsycExtra, Science.gov, World Wide Science Org and Theses and Dissertations Guide. Trial registers including Cochrane Central Register of Clinical Trials (Central), ANZCTR-Australian New Zealand Trails Registry, Clinical Trials.gov, ISRCTN Registry, Centerwatch, WHO International Clinical Trials Registry Platform and EU Clinical Trials Register were also examined for relevant studies.

The literature search comprised of three stages: (1) Identification of relevant key words and MeSH terms related to the key concepts; (2) Complete search of selected databases, grey literature and trial registers using a search strategy developed from the key words and MeSH terms; and (3). Identification of key articles with an additional search of paper reference lists (Appendix 1).

Quality was appraised using the Critical Appraisal Skills Program (CASP) checklists for Randomised Control Trials (RCT), Cohort study

and Qualitative study (Critical Appraisal Skills Programme (CASP) UK, n.d.). CASP appraisal tools were chosen over other quality appraisal tools to accommodate the variety of study designs to be reviewed. The studies were appraised as poor, fair or good quality according to the number of key areas on the CASP checklist that were adequately met. For RCTs key areas included basic study design, methodological soundness, accuracy of results and application to local population. For cohort studies similar questions were asked in addition to whether possible confounders were addressed. Appraisal for qualitative design looked at study design, methodological soundness and accuracy, and value of results and included a question about ethics and the relationship between researcher and participant.

3 | RESULTS

3.1 | Study selection

A total of 5088 articles were retrieved following the initial search, which reduced to 4032 with the removal of duplicates. Papers were initially screened by title looking for keywords and 69 were selected for a full text screening. A further paper was added that had been published after the search was completed, bringing the number of papers reviewed to 70. A total of 51 papers were then excluded with eight being systematic reviews, 10 were studies of pain management programs, five were of prescriber advice or guidelines, eight described trials set in acute or inpatient settings, 14 were trial registrations or protocols and six included populations not part of the entry criteria for this review (mainly of substance abuse treatment). The selection process for studies is shown in detail using the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) flow diagram in Figure 1 (Page et al., 2021).

There were 19 papers that met the inclusion criteria and were independently screened by two reviewers, KN and KI, with the option of further input from HR and GL to resolve any disagreement. Study quality was found to be of moderate to low level and is displayed in Table 1. Randomised control studies and qualitative studies were found overall to be of a higher quality than observational studies. As observed in other reviews sample sizes were noted to be low with 667 study participants contributing data from 16 trials along with 32 individuals providing qualitative data. There was agreement between the review team members to include all papers despite their variable quality, as their relative contributions to advancing knowledge toward the objective of the review was acknowledged. Two papers were based on the same trial with the second paper reporting outcomes three years after the original study and both were included in the review as new data was evaluated.

3.2 | Data charting

A standardised data extraction template based on the Joanna Briggs Institute data extraction template for scoping reviews (<https://>

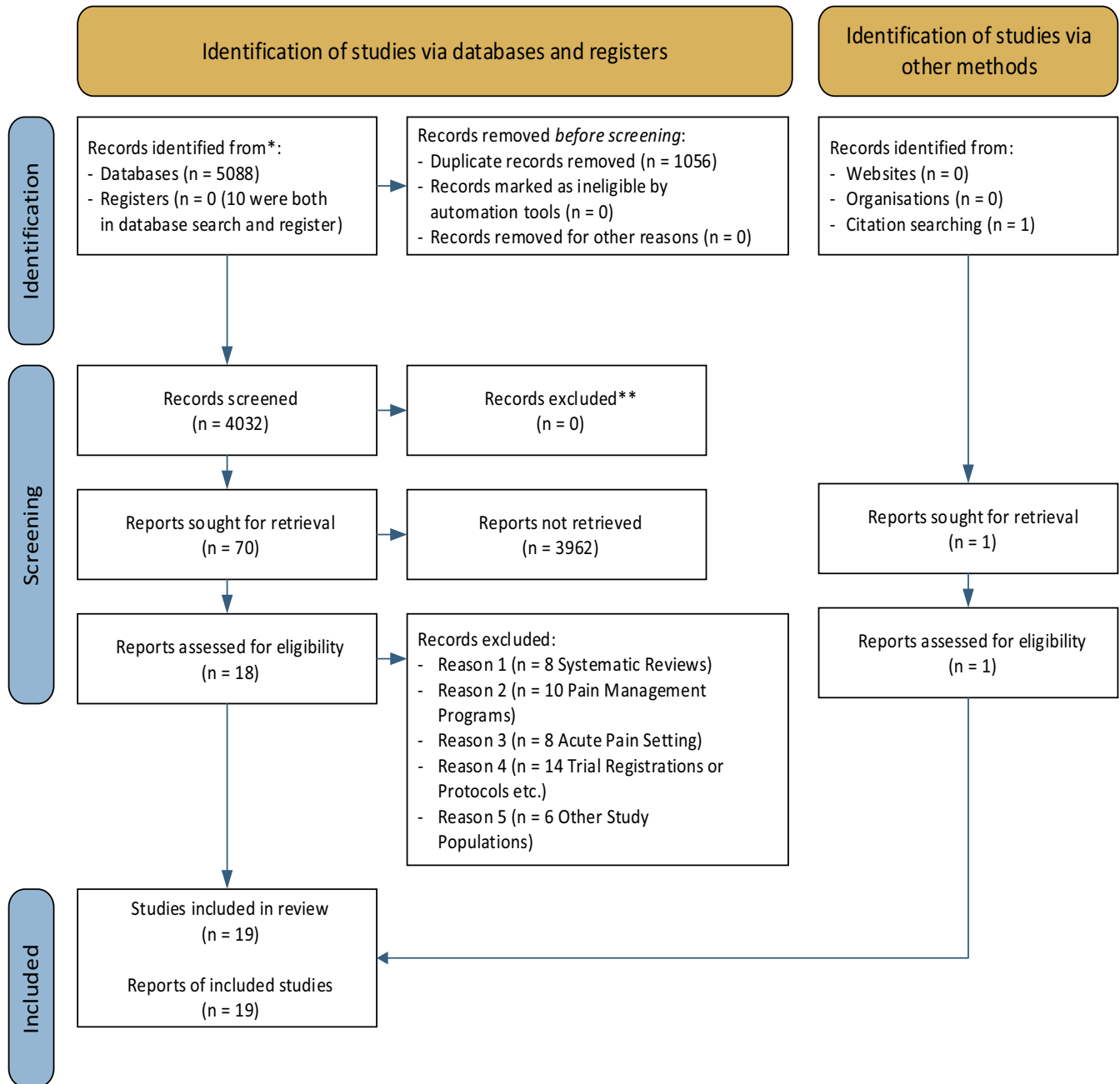


FIGURE 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Flow Diagram. From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. <https://doi.org/10.1136/bmj.n71>. For more information, visit: <http://www.prisma-statement.org/> [Colour figure can be viewed at wileyonlinelibrary.com]

reviewersmanual.joannabriggs.org/display/MANUAL/Chapter+11%3A+Scoping+reviews, 2017) was used to collect data and followed the process outlined by the PRISMA-ScR checklist (Tricco et al., 2018). The template included details of author, publication date, country of study, study design, aims and purpose of the study, population studied and setting, sample size and completion numbers, intervention and clinician description, length of the intervention, primary outcomes, follow up time, key findings and study funding. This information was then used to develop the Scoping Review Table (Table 2). Following charting by two independent reviewers and

discussion with the extended review team findings were corroborated and concepts were developed to answer the study questions and objective.

3.3 | Data collation summary and reporting

The primary objective of the scoping review was to describe outpatient interventions that support prescription opioid reduction for CNCP. The appraisal questions provided the following information.

TABLE 1 Quality appraisal table

RCT Studies	Poor	Fair	Good
Garland et al. (2014)		✓	
Garland et al. (2019)		✓	
Guarino et al. (2018)		✓	
Jamison et al. (2010)		✓	
Kurita et al. (2018)		✓	
Naylor et al. (2010)		✓	
Sullivan et al. (2017)		✓	
Zheng et al. (2007)		✓	
Zheng et al. (2019)		✓	
Observational Studies			
Chang et al. (2014)		✓	
Darnell et al. (2018)	✓		
Doolin (2017)	✓		
Goodman et al. (2018)	✓		
Mehl-Madrona et al. (2016)	✓		
Scott et al. (2020)		✓	
Ziadni et al. (2020)	✓		
Quantitative Studies			
Mathias et al. (2017)		✓	
Young and Heinzerling (2017)		✓	

1. Interventions for the purpose of prescription opioid reduction.

The scoping review examined a wide array of interventions described as being for the purpose of prescription opioid reduction. Most aimed to change participant behaviour in some way. Some used a structured program format most commonly based on psychological treatment, including Mindfulness Oriented Recovery Enhancement (MORE) (Garland et al., 2014, 2019), close monitoring and cognitive behavioural substance misuse counselling (Jamison et al., 2010), 'Opioid taper support group' utilising motivational interviewing (Sullivan et al., 2017), group medical visits inclusive of complementary and alternative therapies, (Mehl-Madrona et al., 2016), cognitive behavioural therapy for codeine reduction (Nilsen et al., 2010) and motivational interviewing (Chang et al., 2014). All except one (Chang et al., 2014) were offered in specialist pain service settings. Less structured information and education was provided in a pain service setting where the goal was to sequentially stabilise opioid dose then taper (Kurita et al., 2018) and patient-centred 'Prescription Opioid Tapering' appointments, partnering with the prescribing physician (Darnall et al., 2018; Ziadni et al., 2020). A number of primary care settings also offered a more informal approach with physician-patient discussion of ethical principles and evidence-based practice (Goodman et al., 2018), communication about opioid management for chronic pain (Matthias et al., 2017) and holistic care using self-management principles through the South Gloucestershire pain

review service (Scott et al., 2020). Two trials of electroacupuncture were conducted with pain reduction purported through the gate control theory described by (Melzack & Wall, 1970) thereby reducing the need for opioids (Zheng et al., 2008, 2019) and a core strengthening exercise program (Doolin, 2017). Utilising both psychological treatment and a self-management approach a web-based program 'Take Charge of Pain' (Guarino et al., 2018) and 'Therapeutic Interactive Voice Response' (TIVR) opioid reduction counselling through a telephone service (Naylor et al., 2010) were included. The Harnessing Online Peer Education (HOPE) intervention (Young & Heinzerling, 2017) using social media to support opioid reduction was the final study reviewed. In addition to the last three interventions, where participation was entirely self-directed, many of the structured interventions that encouraged behavioural change also integrated principles of self-management with home practice, journaling or self-directed activity included as a core element of the intervention (Chang et al., 2014; Doolin, 2017; Garland et al., 2014, 2019; Jamison et al., 2010; Naylor et al., 2010).

2. Effectiveness of interventions in reducing prescription opioids.

The majority of studies included for review stated that the trialled intervention helped reduce prescription opioid use. The only study that did not make this claim was that of opioid stabilisation followed by tapering set in a Danish pain service (Kurita et al., 2018). The intervention was described as not feasible for reducing prescription opioids, after a high dropout rate of participants, with only one person from the tapering group providing follow up data. Of the 17 papers that provided quantitative data, nine reported a statistically significant reduction in opioid use in the intervention group, although not all studies included a control group (Chang et al., 2014; Darnall et al., 2018; Garland et al., 2014, 2019; Guarino et al., 2018; Naylor et al., 2010; Nilsen et al., 2010; Ziadni et al., 2020). Most studies that demonstrated a statistically significant benefit from the intervention used a psychological treatment approach (Garland et al., 2014, 2019; Guarino et al., 2018; Jamison et al., 2010; Naylor et al., 2010; Nilsen et al., 2010). Two studies reported statistically significant opioid reduction but noted a similar reduction was evident in the comparator group (Goodman et al., 2018; Sullivan et al., 2017) and a small number of studies showed statistically significant opioid reduction during the intervention period that was not maintained to the final study endpoint (Garland et al., 2014; Zheng et al., 2008, 2019). Participants at specialist pain services started with higher opioid doses with the average starting dose reported as 193mg morphine equivalent dose (MED) (Gurino et al., 2018; Kurita et al., 2018; Naylor et al., 2010; Sullivan et al., 2017; Zheng et al., 2008, 2019; Ziadni et al., 2020) in contrast to the average dose of 85mg MED reported in studies from primary care clinics (Doolin, 2017; Goodman et al., 2018; Mehl-Madrona et al., 2016; Scott et al., 2020).

TABLE 2 Characteristics of included studies Scoping Review Table

Author Publication Year Country	Study design study aim	Population, setting sample size/ number completed	Intervention description including duration, staffing and follow-up	Primary outcomes and key findings for opioid reduction satisfaction/cost	Funding participant incentives
<i>Randomised control trials</i>					
Garland et al. (2014) US	Double blind RCT To demonstrate that Mindfulness Oriented recovery Enhancement (MORE) targets mechanisms underpinning chronic pain and opioid misuse	Chronic pain on prescription opioid medication Tallahassee FL from primary and tertiary clinics 115 randomised 70 completed treatment 52 completed follow up	'MORE' a novel multimodal intervention that integrates mindfulness training, cognitive reappraisal skills, and positive emotion regulation into a therapeutic approach versus Support group care 8 x 2 h weekly sessions + home practice and journaling Masters-level clinical social worker 3 month follow up	Desire for opioids (10 point scale) – MORE participants had significantly less desire for opioids post treatment than study group patients ($\beta = 1.39$, 95% CI [0.22, 2.56], $p = .02$), this was not sustained at follow up Self-reported opioid misuse Current Opioid Misuse Measure (COMM) – There was a 63% reduction in opioid use disorders in the MORE group, compared to 32% in the support group (SG), $p = .05$ Treatment credibility – No significant difference in credibility between treatment groups Cost – not evaluated	National Institute on Drug Abuse
Garland et al. (2019) US	Double blind Stage 2 RCT To conduct a theory-driven mechanistic analysis of the linkage between positive psychological processes and proximal outcomes	Chronic non cancer pain with prescription opioid use Salt Lake UT from primary care and pain clinic 95 randomised 70 completed treatment 48 completed follow up	Integrative therapy of mindfulness training, third-wave cognitive-behavioural therapy, and principles from positive psychology versus active support group care 8 x 2 h sessions weekly + home practice with CD and log journaling Masters-level clinical social worker 3 month follow up	Opioid misuse risk (COMM) – Participation in MORE significantly reduced opioid misuse by enhancing positive psychological mechanisms and decreasing pain severity. Change in opioid misuse risk by 3-month follow-up ($\beta = -.31$, $p = .027$) Satisfaction/cost – not evaluated	Fahs Beck Fund for Research and Experimentation
Guarino et al. (2018) US	Single blind RCT To evaluate effectiveness of web-based behavioural program in reducing aberrant drug related behaviours	Adults with CP on long term opioid therapy with misuse features New York City pain treatment practice 110 randomised, 97 completed	Take Charge of Pain program comprising 27 self-paced web based modules teaching a variety of cognitive-behavioural skills versus treatment as usual (no behavioural component) 12-week program developed by pain experts, pain medicine clinicians with CP patient focus groups consulted. Research staff had regular phone and email contact for technical assistance 3 month follow up	Aberrant Drug Related Behaviours (ADRB) – measured by COMM – Greater reductions in ADRB than patients receiving treatment as usual (6.96-point reduction in mean COMM vs a 2.55, $p = .001$) post intervention. Reductions sustained at 3 month follow-up. Reduction in COMM scores occurred in the treatment period by the four- and eight-week time points Patient engagement – Patients assigned to web-CBT were more likely to report engaging in and benefiting from the eight core CBT skills and activities Cost – Not evaluated	US National Institute on Drug Abuse (NIDA) Participants paid for completing assessments up to \$250 (\$50 for baseline assessment and \$40 for each subsequent assessment)

TABLE 2 (Continued)

Author Publication Year Country	Study design study aim	Population, setting sample size/ number completed	Intervention description including duration, staffing and follow-up	Primary outcomes and key findings for opioid reduction satisfaction/cost	Funding participant incentives
Jamison et al. (2010) US	RCT, 3 arms To determine if close monitoring with cognitive behavioural substance misuse counselling increases compliance with opioid treatment	Patients with back and neck pain on prescription opioids Pain Management Centre Boston 62 randomised 58 completed	Group education sessions with 5 components, monthly electronic diaries, urine screens, opioid compliance checklist, group education sessions and individual motivational compliance counselling + monthly counselling for high risk group versus usual care Treatment for up to 6 months monthly Led by a psychiatrist trained in pain and addiction medicine + individual motivational, compliance counselling led by a clinical psychologist trained in pain and behavioural medicine 6 month follow up	Percent with a positive Drug Misuse Index (DMI) a composite score of self-reported drug misuse, (Prescription Drug Use Questionnaire), physician reported abuse behaviour (Addiction Behaviour Checklist), and abnormal urine toxicology results. 73.7% of high-risk versus control patients demonstrated positive scores on DMI compared with 26.3% of high-risk experimental group and 25.0% of low-risk controls ($p < .05$) Satisfaction – 71.6% satisfied with treatment and electronic diaries particularly helpful Cost – not evaluated	Endo Pharmaceuticals National Institute on Drug Abuse (NIDA) Participants received \$50 gift cards for completing baseline and post-treatment measures
Kurita et al. (2018) Denmark	Phase 2, single-centre, non-blind RCT To evaluate the efficacy of a program where sequentially opioid therapy was stabilised before tapering in patients at a pain clinic	Outpatients aged over 18 years with CNCP at least 7 years of schooling and pain for 6 months, opioid treatment for at least 3 months with daily dose at least 60 mg Multidisciplinary Pain Centre of Rigshospitalet, Copenhagen University Hospital 75 consented 35 randomised 13 completed (1 in taper group)	2 phase intervention stabilisation – 2 assessments. Taper off Group – 7 assessments with planned 10% reduction weekly (or fortnightly) until cessation or 6 months, contact from research nurses for encouragement and reinforcement of dose reduction versus usual care 6 months (242 days mean timeframe of care) Certified pain specialist physicians certified by the Nordic Course in Advanced Pain Medicine and experienced clinical nurses. Psychologist, social worker and physiotherapist available if needed 6 month follow-up	Equivalent dose in Morphine – increased during the stabilisation phase (analysis on first 4 assessments only) Differences between first and second assessments (prior to randomisation) in Opioid dose $n = 38$ Mean = 29.5 SD = 277.9, $p = .017$. Opioid dose increased an average of 29.5 mg of oral morphine equivalents $p = .446$. Effect sizes were not calculated due to the reduced sample size Satisfaction/cost – not evaluated	Danish Agency for Science, Technology and Innovation and Hørslev-Fonden

(Continues)

TABLE 2 (Continued)

Author Publication Year Country	Study design study aim	Population, setting sample size/ number completed	Intervention description including duration, staffing and follow-up	Primary outcomes and key findings for opioid reduction satisfaction/cost	Funding participant incentives
Naylor et al. (2010) US	RCT To examine whether a telephone-based automated enhancement program can help to reduce opioid and NSAID use	Patients with CP on prescription opioids who had completed 11 weeks of cognitive Behavioural Therapy (CBT) group coping pain skills MindBody Medicine Clinic, Vermont 51 (32 on opioids), randomised 51 completed	Therapeutic Interactive Voice Response (TIVR) 4 components through phone interaction (via touch tone keypad) with a computer for 4 months – daily self-monitoring questionnaire didactic review of skills, guided behavioural rehearsal of skills, versus standard care Monthly therapist feedback message 8 month follow up	Self-reported medication intake – Decrease in mean opioid dose at 4 month follow up ($p = .03$), and 8 month follow up ($p = .05$) in the experimental group. Increase in opioid dose at 8 month follow up in control group ($p = .045$) Satisfaction – all subjects who used (TIVR) 50% or more reported the TIVR was useful. One felt four months was too long. Cost – not evaluated	National Institute of Drug Addiction, National Institute of Arthritis, Musculoskeletal and Skin Diseases and National Institute on Alcohol Abuse and Alcoholism
Sullivan et al. (2017) United States	Pilot, non blind RCT To demonstrate feasibility and effectiveness of a pilot prescription opioid taper support intervention for patients receiving moderate- or higher-dose long term opioid use (LtOT) for CNCP with no evidence of current substance abuse	Patients with CP on prescription tapering opioids interested in Medicine Center for Pain Relief in Seattle, Washington 35 randomised 18 completed treatment (3 years to recruit) 32 completed follow up	Taper Support intervention using motivational interviewing assessment, education, identifying barriers and seeking commitment +17 weekly 30-min sessions about different topics and x3 booster phone calls versus usual care Duration 22 weeks An experienced pain medicine/psychiatry physician evaluated patient for medication and supervised the study. A physician assistant (PA) trained by two clinical psychologists in motivational interviewing led intervention 34 week follow up	Opioid dose Morphine Equivalent dose (MED) – At 22 weeks, opioid dose reduced from baseline in both groups with no significant difference between groups (adjusted mean difference = -42.9 mg (MED); or in percent reduction from baseline in dose (mean, 43% vs 19%; adjusted mean difference = -0.25). At 34 weeks, opioid dose reduced from baseline with no significant difference between groups (adjusted mean difference = -26.7 mg (MED) or in percent reduction from baseline in daily dose Satisfaction – Of 16 participants in taper support at 22-week assessment – 13 (81%) rated the intervention as very or extremely helpful, 11 at 34 weeks Cost – not evaluated	National Institute on Drug Abuse Participants received \$15 for completing baseline assessment, \$30 for 22-week follow-up, and \$50 for 34-week follow-up

TABLE 2 (Continued)

Author Publication Year Country	Study design study aim	Population, setting sample size/ number completed	Intervention description including duration, staffing and follow-up	Primary outcomes and key findings for opioid reduction satisfaction/cost	Funding participant incentives
Zheng et al. (2007) Australia	Pilot single blind RCT To evaluate the effect of Electro acupuncture on consumption of opioid like medication	CP patients using prescription OLM Barbara Walker Centre for Pain Management, St. Vincent's Hospital, Melbourne 35 enrolled 23 completed follow up	Electro acupuncture (EA) twice a week for 6 weeks versus sham EA EA was provided by registered acupuncturists 3-month follow up	Opioid dose in Morphine Equivalents – From baseline to the 8th week, the opioid like medication (OLM) was significantly reduced in both treatment groups ($F(2, 66) = 18.4, p < .001$). The reduction was 39% in the real EA group, and greater than 25% in the sham EA group. The group difference in the changes over time was not statistically significant but indicated a trend toward a more rapid reduction of OLM in the REA group ($F(2, 66) = 3.0, p = .056$). Intervention group participants increased OLM dose more rapidly than sham group after 8 weeks Satisfaction – Over 90% of participants were willing to refer the treatment to others Cost – not evaluated	Faculty of Life Sciences and Australian Acupuncture and Chinese Medicine Association.
Zheng et al. (2019) Australia	Multicentre RCT with 3 arms, single blind To evaluate the efficacy of EA in reducing opioid consumption	CP patients on prescription opioid medication Pain Services Unit, Royal Melbourne Hospital, Caulfield Pain Management and Research Centre, Caulfield Hospital, Sunshine Hospital, RMIT Clinical Trial Laboratory, and one site in Geelong 108 randomised 90 finished treatment 67 followed up	Electro acupuncture twice a week; 3 arms, EA vs sham with a battery-operated electroacupuncture instrument connected to the handles of four needles in the main acupuncture points in the extremities versus sham EA versus Pain and Medication Management Education (PMM) 10-week duration EA was provided by registered acupuncturists with at least three years of clinical experience. PMM was delivered by pain specialists 3-month follow up	Opioid dose in morphine equivalents – Opioid dosage, was reduced by 20.5% ($p < .05$) and 13.7% ($p < .01$) in the two acupuncture groups and by 4.5% in the education group at the end of the treatment phase, but without any group difference. Paired <i>t</i> tests showed a statistically significant reduction in opioid medication in the EA (20.5% reduction, mean reduction = 95.1 mg, 95% CI = [49.3, 140.8], $t_{47} = 4.18, p < .001$) and the sham EA groups (13.7% reduction, mean reduction = 85.3 mg, 95% CI = [35.5, 135.0], $t_{28} = 3.52, p < .002$), but not in the PMM group (4.5% reduction, mean reduction = 39.2 mg, 95% CI = [-34.3, 112.6], $t_{30} = 1.09, p = .285$). No statistically significant difference at 3 month follow up in the EA or SEA groups; PMM not included in analysis Satisfaction/cost – not evaluated	National Health and Medical Research council and Helen McPherson Smith trust PMM education group offered EA after study completion

(Continues)

TABLE 2 (Continued)

Author Publication Year Country	Study design study aim	Population, setting sample size/ number completed	Intervention description including duration, staffing and follow-up	Primary outcomes and key findings for opioid reduction satisfaction/cost	Funding participant incentives
<i>Observational and qualitative studies</i>					
Chang et al. (2014) US	Pre- and post- design To test the effect of office-based motivational interviewing (MI) on prescription opioid adherence in older adults with chronic pain	Patients on opioids for CNP rated as at risk for prescription opioid misuse by Screener and Opioid Assessment for Patients with Pain (SOAPP; ≥ 7) A primary care office and a pain management clinic in Buffalo, New York. 33 recruited 30 completed	MI intervention consisted of one face-to-face session (15 to 20 min) in week 1 and three weekly phone sessions (each lasting 10–15 min) during weeks 2 to 4, using a manualised and client-centred, yet directive, motivation enhancement intervention followed by participant diarising pain and medication-taking Weekly phone call for 3 weeks One doctorally prepared researcher and two doctorally prepared nurse practitioners in psychiatric mental health with MI training and experience. 1 month follow up	Self-efficacy for Appropriate Medication Use (SEAMS) – Participants in MI intervention showed a significant reduction in the risk of prescription opioid misuse post-test ($p < .000$) and 1-month follow-up ($p < .000$). Satisfaction – Participants reported a high level of satisfaction post-test (mean = 10.1, $SD = 4.1$) regarding the usefulness of MI Cost – not evaluated	Patricia H. Garman Behavioral Health Nursing Endowment Fund Award, The State University of New York, and the University at Buffalo School of Nursing
Darnell et al. (2018) United States	Cohort study Evaluation of prescriber reduction of long-term opioid dosages in a setting without behavioural services	CP patients on prescription opioids Community setting 82 enrolled 51 followed up	Education about the benefits of opioid reduction (reduced health risks without increased pain) by their prescribing physician who voluntarily partnered with patients to facilitate dose reduction Patients could control pace or discontinue reduction 4-month follow up	Opioid MEDD – After 4 months, median MEDD was reduced to 150 (IQR, 54– 248) mg ($p = .002$) Satisfaction/cost – not evaluated	National Institutes of Health, National Center for Complementary and Integrative Health
Doolin (2017) United States	Quasi-experimental design To track daily prescribed opioid dosage throughout intervention period.	Male inmates with chronic low back pain A California correctional facility 51 enrolled 41 followed up	Daily self use of core stabilisation exercises from a WebMD Pain Coach application, with fortnightly checks that the exercises were correctly done. 2-month intervention Nursing staff from correctional service	Opioid dose – Core muscle strengthening exercises for chronic low back pain decreased opioid use ($t = 11.227$, $p =$.000) over 60 days Opioid use was decreased by an average of 72% (95% CI, [59,85]) Satisfaction – not evaluated Cost – from study intervention found to be less than from ongoing opioid treatment	None declared

TABLE 2 (Continued)

Author Publication Year Country	Study design study aim	Population, setting sample size/ number completed	Intervention description including duration, staffing and follow-up	Primary outcomes and key findings for opioid reduction satisfaction/cost	Funding participant incentives
Goodman et al. (2018) United States	Retrospective review of pre- test and post- test results with a comparator group To examine the efficacy of a primary-care intervention in reducing opioid use among patients who have chronic non- cancer pain	Participants with CNCP for at least 6 months and current use of opioid medication over 16 years of age Family practice 41 recruited 40 followed up	Initial discussion of ethical principles, evidence-based practice, and current published guidelines. Following discussion, patients self-selected to participate with their FP in a continuing tapering program versus medical pain clinic (MPC) care One off contact with ongoing appointments/family physician 6-month follow-up	Medication level in Morphine Equivalents - Paired t tests indicated significant differences between baseline and 6-month average daily narcotic doses in morphine equivalents for the Taper Group. No significant difference between baseline and 6- month daily morphine equivalents for the MPC group. Taper Mean = 15.94 SD = 30.79 [5.58,24.12] $p = .003$ MPC Mean = 134.2 SD = 155.11 SD = 163.66 [-42.88, 120.368], $p = .324$ Satisfaction/cost – not evaluated	None declared
Mathias et al. (2017) United States	Case study To understand communication processes related to opioid tapering, to identify best practices and opportunities for improvement	Patients at least 18 years of age with chronic musculoskeletal pain currently taking a prescribed opioid for pain. Participating primary care physicians (PCP) Conducted in 4 of the 9 primary care clinics at an academic, safety-net hospital serving primarily low-income patients 9 PCPs, 37 patients. 31 interviews analysed (9 PCP, 22 patient)	Patient and PCP communication. Duration not noted PCP appointments Up to 20 months	Qualitative data from patient and PCP interviews. Four themes revealed different aspects of patient- provider communication that appeared central to the tapering process: (1) explaining reasons for tapering, (2) negotiating the tapering plan, (3) managing difficult conversations and (4) assuring patients that they will not be abandoned. Satisfaction/cost – not evaluated	Funded by the National Institute on Drug Abuse of the National Institute of Health
Mehl-Madrone et al. (2016) United States	Matched case controlled To determine if complementary or alternative therapies help opioid reduction in a rural setting	Patients attending Group medical visits (GMV) Medical practice in rural New England. 84 recruited 42 followed up Initially no one volunteered for treatment intervention and study had to be redesigned	GMV inclusive of complementary and alternative medicine therapies. Education about non- pharmacological methods for pain management including mindfulness techniques, movement, guided imagery, relaxation training, yoga, <i>qigong</i> , and <i>t'ai chi</i> versus conventional care Family doctor with training in behavioural health, a nurse and a behavioural health specialist Up to 2 years	Opioid MED – Those who stayed in the practice did not increase dose. Patients who left GMVs before six months did not statistically significantly reduce opiate use. Eighteen people reduced their dose, and eight people stopped opiates altogether; average reduction was 0.19 95% CI [0.12, 0.60], $p = .01$. In conventional care, no patients reduced opiate use and 48.5% increased dose over the two years of follow- up. Satisfaction – not evaluated Cost – Determined to be the same as usual care	Coyote Institute, Inc.

(Continues)

TABLE 2 (Continued)

Author Publication Year Country	Study design study aim	Population, setting sample size/ number completed	Intervention description including duration, staffing and follow-up	Primary outcomes and key findings for opioid reduction satisfaction/cost	Funding participant incentives
Nilsen et al. (2010) Norway	Pre-post design (case series) To examine whether a brief CBT intervention helped to withdraw codeine in chronic non-malignant pain patients having problematic opioid use	CNCP patients aged 18–70 years, referred due to problematic opioid (codeine) use Multidisciplinary Pain Centre at St Olavs University Hospital in Trondheim or the Department of Physical Medicine and Rehabilitation at Aalesund Central Hospital 17 enrolled 11 followed up	CBT during an agreed gradual codeine taper. 6 subsequent 1-h sessions over 8 weeks. Two specifically trained physicians with 15 years of specific clinical experience with pain patients trained by CBT therapist 3-month follow-up	Codeine dose in mg – Mean (SD), codeine dose at pre-, mid- and post-treatment and follow-up assessment points were 237.3 (65.0), 120.0 (40.3), 45.0 (66.1) and 47.7 (64.6). There was a significant reduction from pre-treatment to follow-up (t 5 11.7, p < .001). There was 80% reduction at group level and six of the 11 patients ceased at 3-month follow up. At 3-month follow-up, five patients were not using codeine or other opioids, while one had started again with one tablet. Of the remaining five patients, none had increased the medication Satisfaction/cost – not evaluated	None declared
Scott et al. (2020) United Kingdom	Prospective cohort study To evaluate the service and its potential impact on opioid use, health and well-being outcomes and quality of life	Patients eligible for inclusion had received ≥ 3 opioid painkiller prescriptions in a 3-month period, had taken opioids for ≥ 3 months (long-term opioid use), and were not using illicit drugs or receiving end-of-life care. Pain Review Service in 2 GP practices in South Gloucestershire 34 enrolled 18 followed up	A comprehensive and holistic assessment exploring medical and psychosocial factors involved in opioid use, with an individual pain management plan including setting daily goals, developing a relaxation plan, introducing gentle exercise, dealing with low mood, and improving sleep. Access to alternative care and support options available, including physiotherapy and relaxation groups Median duration 7.7 months/6 appointments 2 GP project workers	Opioid dose in daily morphine equivalent – median prescribed opioid dose reduced from 90 mg (IQR 60, 240) at baseline to 72 mg (IQR 30, 160) at follow-up (p < .001). 15 service users (44%) reduced dose, 3 (8.8%) reduced to zero, 19 maintained the same dose (55.9%) and 0 increased dose. Of those prescribed >120 mg per day at baseline, 4/14 (28.6%) dropped below 120 mg by follow-up. Satisfaction/cost – not evaluated	National Institute for Health Research Collaboration Health Protection Research Unit, British Heart Foundation, Cancer Research UK, Economic and Social Research Council, Medical Research Council, the Welsh Government, and Wellcome Trust, under auspices of UK Clinical Research Collaboration

TABLE 2 (Continued)

Author Publication Year Country	Study design study aim	Population, setting sample size/ number completed	Intervention description including duration, staffing and follow-up	Primary outcomes and key findings for opioid reduction satisfaction/cost	Funding participant incentives
Young and Heinzerling (2017) United States	Qualitative interviews To determine the feasibility and acceptability of using social media to reduce complications of opioid use among patients experiencing chronic pain specifically in reducing addiction and overdose.	Adults ≥ 18 years with chronic pain who met DSM-IV criteria for opioid dependence being treated with buprenorphine also interviewed. 5 staff from UCLA clinic were interviewed. University of California, Los Angeles (UCLA) Health System patients 10 recruited 10 completed	The Harnessing Online Peer Education (HOPE) intervention is a peer-led behavioural intervention delivered via social media Follow-up time not stated	Qualitative data from participant and clinician interviews. Three main themes were identified: (1) respondents saw online social support as important for reducing pain and improving outcomes; (2) offline social support interventions (e.g. alcoholics anonymous or narcotics) were seen as valuable but had notable limitations; and (3) a tailored, online peer support intervention would be desirable and might improve clinical outcomes. Participants asked how online peer-led communities might benefit them. Satisfaction/cost – not evaluated	National Institute on Drug Abuse. Participants received a \$20 online gift card after completing the interview. Staff did not receive payment.
Ziadni et al. (2020) United States	Prospective cohort study 2–3 year follow up of data from a voluntary opioid tapering study	Patients with CNCP taking long-term opioids Community suburban and rural pain clinics in Colorado 82 enrolled 51 completed 23 followed up 21 in analysis	Education about the benefits of opioid reduction (reduced health risks without increased pain) by their prescribing physician who voluntarily partnered with patients to facilitate dose reduction Patients could control pace or discontinue reduction. 4-months duration and up to 3 year follow-up	Opioid MEDD – the reduction in MEDD from 4 months (mean = 147.04, SE = 25.86) to 2 to 3 years (mean = 66.59, SE = 19.94) was significant ($p = .012$). Since baseline, 20 of 21 (95%) reduced MEDD by 3-year follow-up, and 15 of 21 (71%) further reduced MEDD at 3-year follow-up. Satisfaction/cost – not evaluated	National Institutes of Health, National Institute on Drug Abuse

Abbreviations: CBT, Cognitive behaviour therapy; CI, Confidence interval; CNCP, Chronic non-cancer pain; COMM, Current Opioid Misuse Measure; GP, General Practice; IQR, Inter Quartile Range; MEDD, Morphine Equivalent Daily Dose; MED, Morphine Equivalent Daily Dose; RCT, Randomised controlled Trial; SD, Standard deviation.

3. Setting and delivery of interventions for opioid reduction.

Of the reviewed studies, data came from specialist pain services, (Darnell et al., 2018; Guarino et al., 2018; Jamison et al., 2010; Kurita et al., 2018; Naylor et al., 2010; Sullivan et al., 2017; Zheng et al., 2008; Ziadni et al., 2020) primary care clinics, (Goodman et al., 2018; Mathias et al., 2017; Mehl-Madrona et al., 2016; Scott et al., 2020; Young & Heinzerling, 2017), a combination of both (Chang et al., 2014; Garland et al., 2014; Garland et al., 2019; Zheng et al., 2019) and one was conducted in a medical service of a correctional centre (Doolin, 2017). Structured psychological care was more likely to be undertaken in a specialist pain service (Garland et al., 2014; Garland et al., 2019; Jamison et al., 2010; Nilsen et al., 2010; Sullivan et al., 2017) as was the development of internet and telephone-based techniques (Guarino et al., 2018; Naylor et al., 2010). The studies that used a RCT design were conducted in specialist pain services with only one including data collected in conjunction with a primary care clinic (Zheng et al., 2019). Most RCTs were conducted in services located in US cities with the exceptions of one study from Denmark (Kurita et al., 2018), one from Norway (Nilsen et al., 2010) and the two trials of electroacupuncture (Zheng et al., 2008, 2019) in Australia. Structured psychological programs were all trialled in city locations (Garland et al., 2014; Garland et al., 2019; Jamison et al., 2010; Naylor et al., 2010; Nilsen et al., 2010; Sullivan et al., 2017). In contrast interventions trialled in primary care settings were studied in both city and non-metropolitan sites (Chang et al., 2014; Goodman et al., 2018; Mehl-Madrona et al., 2016; Scott et al., 2020). Specialist pain services were able to provide care from a range of clinician specialties. mindfulness training, cognitive reappraisal skills, and positive emotion regulation 'MORE' was delivered by a masters-level clinical social worker (Garland et al., 2014; Garland et al., 2019). 'Take charge of Pain' was developed by pain specialist clinicians with help from chronic pain patient focus groups (Guarino et al., 2018). Close cognitive behavioural substance misuse counselling was run by a psychiatrist trained in pain and addiction medicine and a clinical psychologist trained in pain and behavioural medicine was utilised to monitor participants (Jamison et al., 2010). A pain specialist physician led the stabilisation and tapering intervention (Kurita et al., 2018) and a group therapist monitored participant use of 'Therapeutic Interactive Voice Response', which followed eleven weeks of cognitive behavioural therapy treatment with a trained clinician (Naylor et al., 2010). A pain medicine/psychiatry physician provided weekly care using motivational interviewing for a taper support group (Sullivan et al., 2017) and registered acupuncturists provided electroacupuncture for two trials (Zheng et al., 2008, 2019). In contrast, primary care interventions were of an interdisciplinary nature, most commonly delivered by the primary care physician (Goodman et al., 2018; Mehl-Madrona et al., 2016; Scott et al., 2020) with two exceptions. Motivational interviewing (Chang et al., 2014) was conducted by two nurse practitioners specialising in psychiatric mental health. The nurse practitioners received training in the technique and were supported by a doctorally prepared researcher. Core strengthening exercises were supervised by a correctional service nurse (Doolin, 2017).

4. Barriers and facilitators associated with provision of the interventions.

Few barriers to intervention participation were noted in studies conducted in specialist pain services except for the sequential stabilisation and taper intervention (Kurita et al., 2018) where high drop-out rates were reported in response to the mandated opioid taper. This was despite noting that those who progressed to the taper component of the intervention experienced better outcomes such as feeling more rested. Adverse effects resulting from the study were reported in two papers; one from the second electroacupuncture trial which was reported as mild (Zheng et al., 2019) and a severe drug reaction during the 'Opioid Taper Support Group' which was unrelated to the intervention (Sullivan et al., 2017). Primary care studies noted that patients were often reluctant to reduce opioids and this affected their ongoing participation in the intervention (Goodman et al., 2018; Mehl-Madrona et al., 2016) and that primary care providers were fearful of losing patients if they stopped providing opioid prescriptions which influenced intervention provision (Goodman et al., 2018).

Intervention facilitation could be inferred from participant satisfaction. Satisfaction, engagement and benefit were reported from participation in a number of interventions, (Chang et al., 2014; Guarino et al., 2018; Jamison et al., 2010; Naylor et al., 2010; Sullivan et al., 2017) along with the agreement to recommend the intervention to others (Zheng et al., 2008). Incentives to remain in the intervention for the purpose of the study were provided to participants in a number of trials (Guarino et al., 2018; Jamison et al., 2010; Sullivan et al., 2017; Young & Heinzerling, 2017) and the intervention itself was offered to the control arm of one trial after the study was completed (Zheng et al., 2019). Credibility of treatment was a secondary outcome in one study of psychological treatment (Garland et al., 2014). The cost benefit from utilising the intervention rather than regular treatment was reported in two studies (Doolin, 2017; Mehl-Madrona et al., 2016). The change in expert recommendations regarding opioid prescribing caused primary care physicians to reduce opioid prescribing in one study, which led directly to increased patient participation in the opioid reduction intervention (Mehl-Madrona et al., 2016).

5. Gaps in knowledge relating to this evidence.

The gap in current knowledge regarding outpatient interventions to support prescription opioid reduction in CNCP is attributable to limited evidence and is linked to study heterogeneity and variable study quality. Of the nine RCTs (Garland et al., 2014, 2019; Guarino et al., 2018; Jamison et al., 2010; Kurita et al., 2018; Naylor et al., 2010; Sullivan et al., 2017; Zheng et al., 2008, 2019) none were appraised as being of higher quality than fair, and of the seven observational trials (Chang et al., 2014; Darnall et al., 2018; Doolin, 2017; Goodman et al., 2018; Mehl-Madrona et al., 2016; Nilsen et al., 2010; Scott et al., 2020; Ziadni et al., 2020) and two qualitative studies (Mathias et al., 2017; Young & Heinzerling, 2017) four were rated as fair and two as low quality.

Although the study populations were uniformly described as individuals experiencing CNCP a number of studies restricted participant eligibility to specific criteria, such as aberrant medication use (Chang et al., 2014; Jamison et al., 2010; Young & Heinzerling, 2017), and specific chronic pain conditions (Doolin, 2017; Naylor et al., 2010; Nilson et al., 2010) making aggregation of data more difficult. Only half of the studies used a control arm or comparator group in the study (Garland et al., 2014; Garland et al., 2019; Goodman et al., 2018; Guarino et al., 2018; Jamison et al., 2010; Kurita et al., 2018; Naylor et al., 2010; Sullivan et al., 2017; Zheng et al., 2008, 2019) and outcome measures were of opioid use with nearly half of all studies not objectively measuring opioid dose (Chang et al., 2014; Garland et al., 2014, 2019; Guarino et al., 2018; Jamison et al., 2010; Mathias et al., 2017; Young & Heinzerling, 2017). In most studies where opioid dose was measured (Darnall et al., 2018; Doolin et al., 2017; Goodman et al., 2018; Kurita et al., 2018; Naylor et al., 2010; Nilsen et al., 2010; Scott et al., 2020; Sullivan et al., 2017; Zheng et al., 2008; Zheng et al., 2019; Ziadni et al., 2020) data came from patient self-report with no documented corroboration. Sample sizes were low in all studies with numbers between 10 and 115 enrolled in each trial. Sample size calculations were provided in six studies only (Garland et al., 2014; Guarino et al., 2018; Jamison et al., 2010; Kurita et al., 2018; Sullivan et al., 2017; Zheng et al., 2008) and most studies reported that validity of findings was hampered by low study numbers. One study assigned treatment and comparator groups retrospectively as participants moved from one group to the other (Goodman et al., 2018) and another modified the study design as participants were initially unwilling to join the treatment intervention group (Mehl-Madrona et al., 2016). There were few external influences noted to bias study quality with only one study having received industry funding (Jamison et al., 2010).

4 | DISCUSSION

This scoping review aimed to examine and describe outpatient interventions for the primary purpose of reducing prescription opioid medication for CNCP. The wide array of treatment approaches indicated the diversity of prescription opioid effects and the lack of reported efficacy from any single treatment type. Although not all interventions included a component of psychological treatment, the objective of all was to bring about a change in behaviour. Most studies reported success in reducing prescription opioid use with studies of psychological treatment showing the most measurable benefit (Chang et al., 2014; Garland et al., 2014, 2019; Jamison et al., 2010; Naylor et al., 2010; Nilsen et al., 2010). However, only one study of at least fair quality was able to demonstrate a statistically significant reduction in measured prescription opioid dose compared to a control group (Naylor et al., 2010).

Interventions were trialled in both specialist pain service settings with multidisciplinary clinicians, and primary care clinics using an interdisciplinary approach. Studies set in specialist services were conducted using more rigorous study techniques (Garland et al., 2014,

2019; Guarino et al., 2018; Jamison et al., 2010; Kurita et al., 2018; Naylor et al., 2010; Sullivan et al., 2017; Zheng et al., 2008, 2019), reported manualised or comprehensively described interventions (Garland et al., 2014, 2019; Guarino et al., 2018; Jamison et al., 2010; Kurita et al., 2018; Naylor et al., 2010; Sullivan et al., 2017; Zheng et al., 2008, 2019) and demonstrated greater benefit in reducing prescribed opioid use (Garland et al., 2014, 2019; Guarino et al., 2018; Jamison et al., 2010; Naylor et al., 2010; Nilsen et al., 2010), than observational or qualitative studies which were mainly conducted in primary care clinics (Chang et al., 2014; Darnall et al., 2018; Ziadni et al., 2020). There was no reported advantage or disadvantage from the use of any clinician speciality in facilitating opioid reduction and the cost of care from specialist clinicians was not discussed. Of particular interest, the use of nurses to deliver motivational interviewing in primary care demonstrated statistically significant benefit in reducing opioid use (Chang et al., 2014) and the provision of core strengthening exercises by correctional facility nursing staff reduced cost per patient compared with previous opioid treatment (Doolin, 2017).

Barriers and facilitators are recognised to play a significant role in engagement with behavioural treatment. Key barriers to intervention participation were reported to be the mandated reduction of prescription opioids which was characteristic of interventions that were delivered by prescribers. These interventions usually comprised information provision and education about opioid use and the studies reported difficulty recruiting participants and higher rates of attrition (Goodman et al., 2018; Kurita et al., 2018; Mehl-Madrona et al., 2016). Involving participants in their own treatment plans may improve satisfaction with less desirable interventions and enable mandated reductions to be better tolerated. This is borne out in qualitative interviews where participants indicated that they wanted information about planned opioid dose reduction and the capacity to negotiate about the regime, and feared abandonment if not included (Matthias et al., 2017). Having the choice to be able to continue prescription opioids during the intervention was a powerful facilitator and this was indicated by high satisfaction ratings and participant retention (Chang et al., 2014; Guarino et al., 2018; Jamison et al., 2010; Naylor et al., 2010; Sullivan et al., 2017; Zheng et al., 2008). Novel interventions, which were primarily offered by specialist pain services, were also noted to have high participation and study completion rates (Garland et al., 2014; Garland et al., 2019; Guarino et al., 2018; Jamison et al., 2010; Naylor et al., 2010; Zheng et al., 2008; Zheng et al., 2019) suggesting that choice and perceived benefit are significant factors in intervention acceptability. Perceived benefit toward participating in the intervention changed as participants became aware of the benefits that complementary therapies offered for pain reduction in lieu of opioid medication (Mehl-Madrona et al., 2016). Intervention credibility reported after participation in a randomised psychological treatment group was found to be no different to that of the comparator support group and was not predictive of treatment outcome (Garland et al., 2014) and qualitative data suggests that both formal and informal models of support were viewed as potentially being helpful (Young & Heinzerling, 2017). The key to encouraging participation in prescription opioid reduction

interventions may be through tailoring intervention type, duration, and location to meet the varied expectations of participants.

Barriers to treatment from distance, comorbidities or other commitments were not reported. Interventions involving structured treatment were predominantly conducted in specialist pain services which were located in cities (Garland et al., 2014, 2019; Guarino et al., 2018; Jamison et al., 2010; Kurita et al., 2018; Naylor et al., 2010; Zheng et al., 2008, 2019), providing a barrier to rural dwelling patients requiring specialist levels of care. The lack of health care services providing pain treatment in rural areas is well documented (Lieschke et al., 2020). Internet and phone-based treatment requires reliable infrastructures and participant motivation and if accessible, could be a feasible way of supporting patients in rural and remote locations through prescription opioid reduction.

Resource cost to conduct interventions in terms of development, clinician training and running costs, was not considered. Most structured psychological interventions required specialist clinician involvement (Chang et al., 2014; Garland et al., 2014, 2019; Guarino et al., 2018; Jamison et al., 2010; Kurita et al., 2018; Naylor et al., 2010; Sullivan et al., 2017; Zheng et al., 2008, 2019) and were run over time frames of between six to twenty four weeks with the longest being six months of TIVR (Naylor et al., 2010), offered only after the completion of eleven weeks of cognitive behaviour therapy. This level of psychological support is unlikely to be feasible outside of a specialist pain service. In contrast primary care clinics set in both city and non-metropolitan areas adopted simple education and psychological strategies which could be offered in any primary care practice and provide possible financial benefit to the service from its implementation (Doolin, 2017; Mehl-Madrona et al., 2016). Partnering of tertiary and primary tier healthcare services to provide opioid reduction support is likely to mean that knowledge and resources, such as web-based programs, are shared. This would ensure a more equitable and tailored approach to supporting complex and vulnerable individuals with CNCP during opioid reduction.

The gap in knowledge about what supports prescription opioid reduction results from the lack of endorsement for any particular intervention(s) and limited research into key determinants of intervention success including acceptability and accessibility. Previous systematic reviews on the topic have commented on low study quality and the quality appraisal generated from this review corroborates those reports. (Eccleston et al., 2017; Frank et al., 2017; White et al., 2020). Eccleston et al., (2017) identified sample size as the most significant factor affecting study quality, recommending that future studies have a sample number of at least 100 in both treatment and control arms. Further research with adequately powered studies over longer timelines, may provide a clearer view of this challenging topic.

5 | LIMITATIONS OF THE REVIEW

This scoping review is limited by review type in which a wide range of study designs have been included. The aim of the review was to examine and synthesise evidence, rather than provide a conclusive answer

through meta-analysis of data, given the small number of studies available on prescription opioid reduction and study heterogeneity restricting interpretation of data. Most studies were conducted in the US and in large cities. This may not be indicative of the legislative restrictions that patients and clinicians experience in other countries nor does it adequately represent the experiences of rural populations with CNCP.

6 | IMPLICATIONS OF THE REVIEW AND RECOMMENDATIONS FOR FUTURE PRACTICE

The lack of evidence regarding effective and acceptable treatment approaches to promote prescription opioid reduction leads to the quandary of what support can be offered to those on long term therapy who either elect to or are mandated by their prescriber to reduce or cease prescription opioids. Overcoming the challenges associated with reducing prescription opioids is complex. What is evident from the limited literature in the context of chronic non cancer pain is that reduction can be achieved without increased level of pain and loss of functional capacity (Frank et al., 2017). This is particularly evident when patients are well-supported, involved in the development of deprescribing plans and where interventions are underpinned by behavioural change approaches. There is a burgeoning need for well-designed, adequately powered prospective implementation studies to evaluate novel models of care that seek to integrate treatment approaches, provide longitudinal data on patient outcomes and examine cost-effectiveness. There are several clinical trials currently registered that are aimed at determining effective ways to reduce prescription opioid medications. These include the 'Improving the Wellbeing of people with Opioid Treated CHronic pain' (I-WOTCH) study in Warwick, UK Clinical Trials Unit ISRCTN (<https://clinicaltrials.gov/show/nct03454555>, 2019) and the 'Effective Management of Pain and Opioid-Free Ways to Enhance Relief' (EMPOWER) trial in Stanford, US (<https://clinicaltrials.gov/show/nct03308188>, 2017).

7 | CONCLUSION

This scoping review contributes to the evolving body of knowledge surrounding interventions utilised to support prescription opioid reduction in the context of CNCP. The review presents an overview of what is currently known about the various types of interventions used to support patients to reduce prescription opioids, the settings in which they are typically implemented, and the barriers and enablers often encountered by clinicians and researchers in this challenging area of practice and research. As previous reviews have found demonstrating the efficacy of approaches previously used is hampered by challenges associated with recruitment and retention of participants in studies, the heterogeneity of the studies undertaken, and the variable quality of study designs available to review. The current body of literature suggests the increased uptake of behavioural management

approaches being utilised to support prescription opioid de-prescribing, and the increasing engagement of nursing staff to help deliver these approaches are probable cost-effective alternatives, both within specialist pain services and primary care settings. The potential utility of these approaches could be explored in prospective well-designed studies.

8 | RELEVANCE TO CLINICAL PRACTICE

There are significant clinical implications resulting from this review. Opioid dose reduction may be achieved through a variety of clinical interventions targeting behavioural change that are offered in both specialist pain services and primary care settings. Barriers to participation in treatment may be minimised by ensuring participant concerns are addressed and facilitating active partnerships between intervention providers and participants. Ensuring interventions are accessible to complex and vulnerable CNCP populations including those in rural and remote areas is important and this may be best served through internet-based applications and telehealth models. A low cost, holistic and effective prescription opioid reduction intervention making greater utilisation of nursing support may be easily integrated into a multidisciplinary pain service or primary care clinic. Expanding the scope of future studies to include Indigenous peoples, rural/regional populations and other disadvantaged and vulnerable populations would provide a more comprehensive view of this topic.

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CONFLICT OF INTEREST

The authors declare no competing interests in this work.

AUTHOR CONTRIBUTIONS

KN, GL, HR and KL contributed to the concept and design of the review. AS developed and translated the search strategies. KN and KL analysed and interpreted the data. KN drafted the main manuscript. All authors were involved in reviewing the manuscript drafts and give approval for this version to be published.

DATA AVAILABILITY STATEMENT

Data openly available in a public repository that issues datasets with DOIs: The data that support the findings of this study are openly available in the reference list.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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APPENDIX 1

DATA BASE SEARCH STRATEGY

Medline search strategy

Database: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily <1946 to March 06, 2019>

Search Strategy:

-
1. Chronic Pain/(11353).
 2. Pain, Intractable/(6091).
 3. Back pain/or Low back pain/or Headache/or Musculoskeletal pain/or Neck pain/or Neuralgia/or Pelvic pain/(85794).
 4. Sciatica/(4873).
 5. Arthritis/or Arthritis, rheumatoid/or Osteoarthritis/(147511).
 6. Fibromyalgia/(7889).
 7. ((chronic or persistent or intractable or noncancer or non-cancer) adj3 pain*).ti,ab,kw,kf. (68578) 8 1 or 2 or 3 or 4 or 5 or 6 or 7 (298719).

9. exp Analgesics, Opioid/(109059).
10. (opioid* or opiate* or papaver).ti,ab,kw,kf. (98669).
11. (morphine or meperidine or methadone or buprenorphine or fentanyl or hydrocodone or oxycodone or codeine).ti,ab,kw,kf. (71004).
- 12 9 or 10 or 11 (177281).
13. exp Psychotherapy/ (184909).
14. ((psychotherap* or cogniti* or behavior* or family or psycho-social* or psycho-social*) adj5 (therap* or intervention*)).ti,ab,kw,kf. (84644).
15. (counsel* or cope or coping).ti,ab,kw,kf. (172328).
16. exp Physical Therapy Modalities/ (141451).
17. exp Mind-Body Therapies/ (48089).
18. ((physical adj therap*) or physiotherap*).ti,ab,kw,kf. (44552).
19. (multidisciplinary or multi-disciplinary or interdisciplinary or inter-disciplinary).ti,ab,kw,kf. (109165).
20. (biofeedback* or massage or acupuncture or electroacupuncture or "therapeutic interactive voice response").ti,ab,kw,kf. (37746).
21. (effluerage or anma or aquatic bodywork or bowen technique or craniosacral therapy or lomilomi or manual lymphatic drainage or myofascial release or postural integration or reflexology or shiatsu or structural integration or tui na or watsu).ti,ab,kw,kf. (1346).
22. (tai chi or taichi or tai ji or taiji or taijiquan or shadow boxing).ti,ab,kw,kf. (1646).
23. yoga.ti,ab,kw,kf. (4082).
24. Pastoral care/ or Spirituality/ (9726).
25. Adaptation, Psychological/ (89410).
26. (wellbeing or well-being or relax* or accept* or meditat* or spiritual*).ti,ab,kw,kf. (662435).
27. exp Rehabilitation/ (283395).
28. rehabilitat*.fs. (188600).
29. (wean* or cessation or cease* or taper* or reduc* or stop* or abstain* or abstinen* or withdraw* or discontinue* or detox* or terminat* or remove* or substit*).ti,ab,kw,kf. (3990690).
- 30 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 (5257210).
31. Randomized controlled trial.pt. (477139).
32. Controlled clinical trial.pt. (92944) 33 random*.ti,ab. (1031829).
34. placebo.ti,ab. (201098).
35. drug therapy.fs. (2087825) 36 trial.ti,ab. (533855).
- 37 groups.ti,ab. (1911649).
- 38 31 or 32 or 33 or 34 or 35 or 36 or 37 (4639466).
- 39 8 and 12 and 30 and 38 (3783).
- 40 exp animals/ not humans.sh. (4553712) 41 39 not 40 (3361).
42. limit 41 to (english language and yr="2008 -Current") (2090).
43. limit 42 to (case reports or clinical conference or comment or editorial or letter or news) (165) 44 42 not 43 (1925).

Database: Embase <1947 to present>Search Strategy:

-
1. chronic pain/(54419).
 2. intractable pain/(5080).

3. exp musculoskeletal pain/(138498).
 4. pelvic pain/(5368) 5 headache/(206932).
 6. neuralgia/(9629).
 7. sciatica/(1813).
 8. arthritis/or osteoarthritis/or rheumatoid arthritis/(317679).
 9. fibromyalgia/(18685).
 10. ((chronic or persistent or intractable or noncancer or non-cancer) adj3 pain*).ti,ab,kw. (103255) 11 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (743278).
 12. exp narcotic analgesic agent/ (325515).
 13. (opioid* or opiate* or papaver).ti,ab,kw. (136769).
 14. (morphine or meperidine or methadone or buprenorphine or fetanyl or hydrocodone or oxycodone or codeine).ti,ab,kw. (98986).
 15 12 or 13 or 14 (376044).
 16. exp psychotherapy/(255854).
 17. ((psychotherap* or cogniti* or behavior*r* or family or psychosocial* or psycho-social*) adj5 (therap* or intervention*)).ti,ab,kw. (120574).
 18. (counsel* or cope or coping).ti,ab,kw. (239130).
 19. physiotherapy/ (86555).
 20. ((physical adj therap*) or physiotherap*).ti,ab,kw. (76574).
 21. alternative medicine/(41439).
 22. (biofeedback* or massage or acupuncture or "therapeutic interactive voice response").ti,ab,kw. (52751).
 23. (effluerage or anma or aquatic bodywork or bowen technique or craniosacral therapy or lomilomi or manual lymphatic drainage or myofascial release or postural integration or reflexology or shiatsu or structural integration or tui na or watsu).ti,ab,kw. (1924).
 24. (tai chi or taichi or tai ji or taiji or taijiquan or shadow boxing).ti,ab,kw. (2378).
 25. yoga.ti,ab,kw. (5954).
 26. (multi-disciplinary or multidisciplinary or inter-disciplinary or interdisciplinary).ti,ab,kw. (172062).
 27. pastoral care/(236).
 28. spirituality/(64687).
 29. adaptive behavior/(53836).
 30. exp rehabilitation/(378825).
 31. (wellbeing or well-being or relax* or accept* or meditat* or spiritual*).ti,ab,kw. (864376).
 32. (wean* or cessation* or ceas* or taper* or reduc* or stop* or abstain* or abstinen* or withdraw* or discontinue* or detox* or terminat* or remove* or substitui*).ti,ab,kw. (5350095).
 33 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 (6968011).
 34 crossover-procedure/or double-blind procedure/or randomized controlled trial/or single-blind procedure/or (random* or factorial* or crossover* or cross over* or placebo* or (doubl* adj blind*) or (singl* adj blind*) or assign* or allocat* or volunteer*).tw. (2142398).
 35 11 and 15 and 33 and 34 (3919).
 36 (animal/or nonhuman/) not human/(5742265) 37 35 not 36 (3852).

38. limit 37 to (english language and yr="2008 -Current") (2703).
 39. limit 38 to (books or chapter or conference abstract or conference paper or "conference review" or editorial or letter or note) (856).

40 38 not 39 (1847).

Cochrane.

Search Name: Kathie Nickerson2.

Date Run: 08/03/2019 06:08:04.

Comment:

ID	Search Hits		
#1	MeSH descriptor: [Chronic Pain] this term only	1759	
#2	MeSH descriptor: [Pain, Intractable] this term only	1703	254
#3	MeSH descriptor: [Back Pain] this term only		
#4	MeSH descriptor: [Low Back Pain] this term only	3186	
#5	MeSH descriptor: [Headache] this term only	2137	363
#6	MeSH descriptor: [Musculoskeletal Pain] this term	only	
#7	MeSH descriptor: [Neck Pain] this term only	1003	
#8	MeSH descriptor: [Neuralgia] this term only	973	
#9	MeSH descriptor: [Pelvic Pain] this term only	446	
#10	MeSH descriptor: [Sciatica] this term only	1356	
#11	MeSH descriptor: [Arthritis] this term only		
#12	MeSH descriptor: [Arthritis, Rheumatoid] this term only	5130	
#13	MeSH descriptor: [Osteoarthritis] this term only	3289	
#14	MeSH descriptor: [Fibromyalgia] this term only	1124	
#15	((chronic or persistent or intractable or non-cancer or non-cancer) Next/3 pain):ti,ab	10622	
#16	#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15	26345	
#17	MeSH descriptor: [Analgesics, Opioid] explode all trees	6771	
#18	(opioid* or opiate* or papaver):ti,ab	14405	
#19	(morphine or meperidine or methadone or buprenorphine or fetanyl or hydrocodone or oxycodone or codeine):ti,ab	15439	
#20	#17 or #18 or #19	25897	
#21	MeSH descriptor: [Psychotherapy] explode all trees	21288	
#22	((psychotherap* or cogniti* or behavior* or behaviour* or family or psychosocial* or psycho-social*) Next/5 (therap* or intervention*)):ti,ab	22269	
#23	(counsel* or cope or coping):ti,ab	18932	
#24	MeSH descriptor: [Physical Therapy Modalities] explode all trees	22256	

#25 MeSH descriptor: [Mind-Body Therapies] explode all trees 5645.

#26 (physical therap* or physiotherap*):ti,ab 19822.

#27 (multidisciplinary or multi-disciplinary or interdisciplinary or inter-disciplinary):ti,ab 4884.

#28 (biofeedback* or massage or acupuncture or electroacupuncture or "therapeutic interactive voice response"):ti,ab 14706.

#29 (effluerage or anma or aquatic bodywork or bowen technique or craniosacral therapy or lomilomi or manual lymphatic drainage or myofascial release or postural integration or reflexology or shiatsu or structural integration or tui na or watsu):ti,ab 661.

#30 (tai chi or taichi or tai ji or taiji or taijiquan or shadow boxing or yoga):ti,ab 2666.

#31 MeSH descriptor: [Pastoral Care] this term only 12.

#32 MeSH descriptor: [Spiritualism] explode all trees 5.

#33 MeSH descriptor: [Adaptation, Psychological] this term only 3916.

#34 (wellbeing or well-being or relax* or accept* or meditat* or spiritual*):ti,ab 51875.

#35 MeSH descriptor: [Rehabilitation] explode all trees 31398.

#36 (wean* or cessation or cease* or taper* or reduc* or stop* or abstain* or abstinen* or withdraw* or discontinue* or detox* or terminat* or remove* or substit*):ti,ab 336389.

#37 #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36 431950.

#38 #16 and #20 and #37 with Cochrane Library publication date Between Jan 2008 and Feb 2019, in Cochrane Reviews, Cochrane Protocols, Trials 1102.

PROQUEST SEARCH

S1	mesh(Chronic pain) OR mesh(Pain, Intractable) OR ti("chronic pain" OR "persistent pain" OR "intractable pain" OR "noncancer pain" OR "non-cancer pain") OR ab("chronic pain" OR "persistent pain" OR "intractable pain" OR "noncancer pain" OR "non-cancer pain")	Nursing & Allied Health Database	11019
S2	mesh(Analgesics, Opioid) OR ti(opioid* OR opiate* OR methadone OR buprenorphine OR fentanyl OR hydrocodone OR oxycodone OR codeine) OR ab(opioid* OR opiate* OR methadone OR buprenorphine OR fentanyl OR hydrocodone OR oxycodone OR codeine)	Nursing & Allied Health Database	26806
S3	ti(wean* OR cessation OR cease* OR taper* OR reduc* OR stop* OR abstain* OR abstinenc* OR withdraw* OR discontinue* OR detox* OR terminat* OR remove* OR substit*) OR ab(wean* OR cessation OR cease* OR taper* OR reduc* OR stop* OR abstain* OR abstinenc* OR withdraw* OR discontinue* OR detox* OR terminat* OR remove* OR substit*)	Nursing & Allied Health Database	689391
S4	mesh(Randomized controlled trial) OR mesh(Controlled clinical trials) OR ti(random* OR placebo OR trial OR groups) OR ab(random* OR placebo OR trial OR groups)	Nursing & Allied Health Database	924311
S5	S1 AND S2 AND S3 AND S4	Nursing & Allied Health Database These databases are searched for part of your query.	213