General Section
Review

OPEN

PAIN REPORTS

Adjunctive use of hypnosis for clinical pain: a systematic review and meta-analysis

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Abstract

Systematic reviews suggest that stand-alone hypnotic suggestions may improve pain outcomes compared with no treatment, waitlist, or usual care. However, in clinical practice, hypnosis is often provided adjunctively with other interventions, which might have different effects than those reported in previous reviews. This systematic review aimed to summarize the analgesic effects of adjunctive hypnosis in adults with clinical pain. Seven databases (MEDLINE, Embase, PsycINFO, Emcare, SCOPUS, CENTRAL, Cochrane) were searched up to January 2024. Randomised controlled trials comparing the analgesic effects of adjunctive hypnosis (hypnosis + primary intervention) with those of the primary intervention alone were included. Meta-analyses (random-effects model) calculated mean differences (MD, [95% confidence intervals]) for pain intensity (0–100). Seventy studies were pooled in meta-analyses (n = 6078). Hypnosis adjunctive to usual care had a small additional analgesic effect (chronic pain: −8.2 [−11.8, −1.9]; medical procedures/surgical pain: −6.9 [−10.4, −3.3]; burn wound care: −8.8 [−13.8, −3.9]). Hypnosis adjunctive to education had a medium additional analgesic effect for chronic pain (−11.5 [−19.7, 3.3]) but not postsurgery pain (−2.0 [−7.8, 3.7]). When paired with psychological interventions, hypnosis slightly increased analgesia in chronic pain only at the three-month follow-up (−2 [−3.7, −0.3]). Hypnosis adjunctive to medicines had a medium additional analgesic effect for chronic pain (−13.2, [−22.5, −3.8]). The overall evidence certainty is very low; therefore, there is still uncertainty about the analgesic effects of adjunctive hypnosis. However, hypnosis adjunct to education may reduce pain intensity for chronic pain. Clarification of proposed therapeutic targets of adjunctive hypnosis to evaluate underlying mechanisms is warranted.

Keywords: Chronic pain, Acute pain, Procedural pain, Hypnosis, Adjunct, Systematic review

1. Introduction

Pain is a complex experience associated with actual or potential tissue damage, or similar to the experience people would feel in the presence of actual or potential tissue damage.[121] Clinically, pain is commonly experienced with physical trauma events, postsurgically, as a symptom itself, or secondary to a medical condition.[107] Despite advances in our understanding of pain and its biological, psychological, social, and cultural contributors,[90] adequate pain control remains challenging across the clinical spectrum (ie, from acute to chronic pain conditions, from nociceptive to neuropathic, or nociplastic mechanisms).[20]

Pain is common in the millions of people who undergo medical/surgical procedures, even with the availability of numerous

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

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Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site (www.painrpts.com).

PR9 9 (2024) e1185

http://dx.doi.org/10.1097/PR9.0000000000001185

analgesic options.[48] More than 50% of patients experience substantial postsurgical pain,[4] and approximately 10% to 20% of people develop chronic pain (ie, pain lasting 3 months or more) after the procedure.[46,130] Pain during medical procedures, such as burn wound care, often remains and is compounded by concurrent distress/anxiety.[30] Chronic pain affects more than 30% of people worldwide,[20] and current stand-alone treatments (eg, pharmacological, procedural interventions) show limited analgesic benefits despite their high costs and adverse effects.[20,39] Insufficient pain control is associated with personal and societal burden, including inability to work, financial problems, increased risk of substance abuse, higher divorce, and suicidal rates.[20]

Enhancing pain relief across the clinical spectrum using safe and cost-effective interventions is now considered a global public health priority.[48] Clinical hypnosis is a common intervention that is used by practitioners in many clinical contexts to reduce pain intensity.[59,82,98,119] Hypnotic suggestion is a relatively inexpensive and safe psychological intervention that reduces pain and addresses psychological factors (eg, low expectations of improvement, pain catastrophising, beliefs of harm, fear beliefs, anxiety, stress) that influence the perception of pain.[65,114,141] Beginning with an induction that guides people to focus their attention,[69,109] clinical hypnosis then involves delivering suggestions to make changes in different aspects of the pain experience, including sensations, emotions, beliefs, and/or behaviors.[23,49] Clinical hypnosis' analgesic effects have been hypothesized to be due to changes in the neurophysiological processes underlying the experience of pain, as well as processes that underlie changes in outcome expectations, coping skills, reductions in unhelpful cognitions, and improvements in helpful pain-related behaviors or emotions.[66]

Across several pain conditions, meta-analyses have shown that hypnosis provided as a stand-alone intervention significantly reduces pain intensity compared with no-treatment controls.[2,98] Given that hypnosis is rarely provided as a stand-alone treatment in clinical settings, understanding its effectiveness when paired with other interventions is important to guide clinical care. Furthermore, meta-analyses of past reviews did not explore the potential differences in analgesic effect of hypnosis across pain conditions. When considering the spectrum of clinical pain, from acute pain associated with surgical procedures, physical trauma, or burn wound care to chronic pain, there are important neurophysiological differences based on pain type and duration.[107,121] These differences may influence the effectiveness of analgesic approaches. Finally, most clinical trials included in prior systematic reviews used "no treatment", "waitlist", or "usual care" as comparisons, which are insufficient to control for the therapist's attention or the patient's expectation of receiving treatment.[98] Even when using "usual care" as a comparison, providing hypnosis results in increased therapist interaction with the patient that does not occur with the "usual care" control group alone; ideally, a sham hypnosis or additional attention control to "usual care" is needed.[47] Thus, with these control groups as currently tested, it becomes difficult to ascertain whether the effect on treatment outcomes is due to the intervention itself or to non-specific factors.

Clinical hypnosis is often provided adjunctively with (in addition to) other pharmacological or non-pharmacological interventions for pain.[76,77,102] Several randomised controlled trials (RCTs) have investigated hypnosis provided adjunctively with medical, physical, educational, and psychological interventions for various pain conditions.[67,102,122,143] However, contemporary reviews on adjunctive hypnosis have limited the investigation to a primary intervention or a particular pain condition[76] and lacked a comprehensive appraisal of the certainty of evidence and clinical utility.[2,98] Given that the effectiveness of clinical hypnosis may depend on the primary intervention with which hypnosis is combined and the target pain condition, a more nuanced review is warranted. To fill this important gap in the literature, we aimed to summarize and critically appraise the effects of hypnosis applied adjunctively with other pharmacological or nonpharmacological interventions on pain intensity, stratifying across varying types of clinical pain (physical trauma, medical/surgical procedures, postsurgical pain, chronic pain).

2. Methods

The protocol was prospectively registered on PROSPERO (CRD42018108791) and is reported according to PRISMA guidelines (Supplementary Material, http://links.lww.com/PR9/A243).[99] All stages were conducted by 2 independent researchers. Disagreements were resolved through discussion or consultation with a third researcher.

2.1. Study selection

Parallel-group RCTs and pilot RCTs, and the first phase of cross-over RCTs were eligible for inclusion. The second phase of cross-over RCTs was not included due to the presence of carryover of the treatment effects, leading to bias towards the null.[56] Studies that compared the effect of adjunctive hypnosis (hypnosis added to another intervention) with the same intervention alone (defined as the primary intervention) on pain intensity in adults (older than 18 years) with any clinical pain condition or pain duration were included. There were no limitations on language or publication date, with multilingual neural machine translation used as necessary. The primary intervention that hypnosis was added to could be any medical/surgical, physical, behavioral, psychological, or educational intervention for pain (eg, usual care, medication, cognitive-behavioral therapy [CBT], pain education). Usual care was defined as the intervention (pharmacological or nonpharmacological) a patient would typically receive for their condition in the clinical setting evaluated. Studies that included usual care as the base intervention had to report explicitly that the hypnosis group *also* received the same usual care intervention. The type of primary intervention was defined according to the authors of the included study, no matter the depth of description. Because of the challenge of defining hypnosis,[28] hypnosis was also defined according to the authors of the included studies, no matter the depth of description (eg, if reported delivering hypnosis with no explanation of induction or suggestions). However, we expected to include studies reporting any hypnotic inductions *and* suggestions for pain management. Studies that explicitly reported using suggestions only were excluded. We also excluded studies that did not evaluate pain intensity, that evaluated hypnosis's effectiveness for pain during childbirth, or that evaluated experimental noxious stimuli, because the research team considered that those situations might differ from the pain conditions of the current study.

2.2. Classification of pain conditions

To provide summative results that hold the most relevance for clinical translation, we classified pain conditions based on differing neurophysiological and psychological features of the condition, as well as the clinical setting and type of pain

management that would be provided for that condition. This resulted in the following classifications (stratified in the analysis): medical/surgical pain, burn wound care pain, chronic pain, and pain from physical trauma.

(1) Medical/surgical pain was defined as a direct consequence of a medical or surgical procedure. Pain during or after medical procedures/surgery typically involves nociceptive pain because of tissue damage and inflammation. It also has a predictable trajectory, generally subsiding as healing progresses. Medical procedures/surgical pain management usually occurs in hospitals or specialised clinics and is managed with intravenous analgesics.[41]

(2) Wound care pain is often an acute increase in pain arising from the management of tissue injury or damage, often the result of burns. This type of pain includes both nociceptive and inflammatory components resulting from the burn and manipulation of the wound. Managing this condition often involves infection control, local anesthetics, and dressings. Wound care can occur in various settings, including hospitals, clinics, and patients' homes. It often involves specialised care.[136] Although technically occurring as part of a medical procedure, wound care often follows the initial treatment of the wounds, and the specialised clinical care and unique pathophysiology of the original injury merits separate consideration.

(3) Chronic pain is usually characterized by prolonged pain duration (more than 12 weeks) and is caused and maintained by nociceptive, nociplastic, and/or neuropathic mechanisms. The persistence of chronic pain also often involves psychosocial contributors. Chronic pain management comprises pharmacological and nonpharmacological interventions often delivered by a multidisciplinary pain management team in tertiary care settings.[107]

(4) Pain caused by physical trauma arises from the initial injury or trauma, such as a fall or accident. The management of this condition often involves positioning and medication in emergency departments.[34]

2.3. Data sources and management

The Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, MEDLINE, Embase, PsycINFO, Emcare, SCOPUS, Web of Science, and Google Scholar were searched from inception to January 2, 2024. Terms related to hypnosis, pain, adjunctive, and RCT/systematic review were combined (eTable 1, http://links.lww.com/PR9/A243). Search results were uploaded to Covidence (Veritas Health Innovation; Melbourne, Australia), where duplicates were removed. Following title/abstract screening, full texts of potentially eligible studies were retrieved. Reference lists from retrieved systematic reviews and full texts were hand searched to identify additional eligible studies. Content experts were consulted to identify additional eligible studies. Authors of trial protocols were contacted to determine data availability.

2.4. Primary outcome

Pain intensity at treatment completion, assessed through self-report, was selected as the primary outcome due to being a core outcome for acute and chronic pain conditions.[144] For medical procedures/wound care, pain intensity during the procedure was used (when relevant), given its greater clinical importance.[136] Secondary outcomes included pain intensity at later follow-up (eg, 3 months), pain-related medication use, and other pain-related or psychological/well-being outcomes (eg, pain interference, anxiety) at treatment completion.

2.5. Data extraction

Piloted, customised forms were used, extracting the following: publication date; study design; recruitment method; participant characteristics (pain type/location/duration, baseline pain intensity, hypnotizability); treatment characteristics (session type/duration/frequency/number/method for primary intervention, adjunctive hypnosis intervention, and hypnosis control condition, if relevant); outcome assessment (pain intensity scale, timing); treatment effects (mean, uncertainty estimation); funding sources; and conflict-of-interest statements. If insufficient pain data were provided, authors were contacted a maximum of 3 times before data were considered irretrievable; these studies were retained for narrative synthesis.

2.6. Evidence quality assessment

Risk of bias (selection, performance, detection, attrition, reporting, other potential biases) was assessed using a modified Cochrane Risk of Bias tool.[54] Certainty of evidence was evaluated using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) system.[7,52] GRADE ratings for interventions comparisons involving only one study were automatically downgraded to very low certainty of evidence.

2.7. Data synthesis and analysis

Studies were grouped by primary intervention (eg, usual care) and then subgrouped by clinical pain type (chronic pain, acute procedure–related/surgery-related pain, acute burn wound care pain, acute pain from physical trauma). Pain intensity data were converted to a common 0 to 100 scale.[12] Meta-analyses were conducted using RevMan 5.4 software using a generic, inverse variance, random-effects model to calculate a mean difference (MD) and 95% confidence interval (CI). If standard deviations (SDs) were unavailable, data were imputed using established methods.[56] Postintervention data were used, or when unavailable, change from baseline.[54] For studies with more than one pain intensity measure, the most common measure across included trials was selected.

When studies had 2 eligible comparisons, both were included with appropriate sample size reductions for the adjunctive hypnosis group.[54] When multiple studies used the same data set, the most recent and comprehensive data were used. Effect size magnitude for MDs (0–100 scale) was interpreted as follows: large (>20); moderate (>10–20); small[5–10]; ineffective (95% CI crosses zero).[18] Between-study heterogeneity was considered statistically significant when χ^2 had $P < 0.10$ and substantial when $I^2 > 50\%$.[56] Publication bias was assessed through visual inspection of funnel plot asymmetry for analyses with ≥10 studies.[54]

2.8. Sensitivity analyses

Analyses evaluated whether certain factors influenced pooled results[56]: (1) presence of data imputation/extraction from figures; (2) high/unclear risk of bias for randomisation; and (3) unclear description of usual care (ie, where the elements of usual care were not standardized or reported in the study).

2.9. Exploratory analyses

Analyses explored whether (1) effects of adjunctive hypnosis on pain were robust to nonspecific effects of time/attention from hypnosis (removing studies with no control for hypnosis alongside the primary intervention); (2) associations existed between dosage (number of hypnosis sessions) and treatment effect estimates (pain MDs); (3) associations existed between hypnotizability and postintervention pain; (4) subgroup analysis to evaluate the effects of 8 or more sessions and the effects of fewer than 8 sessions of adjunctive hypnosis. Meta-regression would be considered to investigate the predictive role of hypnotizability on pain intensity if there were at least 10 observations (ie, 10 trials in a meta-analysis),[55] using the "metafor" package for R.[145] The subgroup analysis on the number of sessions was determined based on a previous meta-analysis, suggesting that stand-alone hypnosis programs consisting of 8 or more sessions are more effective than those with fewer sessions for chronic pain.[82]

3. Results

The search identified 11,112 records. After removing duplicates, 8857 titles/abstracts were screened, with 345 full texts assessed for eligibility. Eighty-eight studies (n = 7356 participants) were included; 70 studies (68 comparisons, n = 6078) were included in meta-analyses (**Fig. 1**). The reference list of studies only included in the meta-analysis is provided in the Supplementary materials, http://links.lww.com/PR9/A243.

Samples ranged from 16 to 350 participants, evaluating chronic pain (31 studies, n = 2156), acute pain from medical procedures/surgery (45 studies, n = 4413), wound care for burns (7 studies, n = 287), or physical trauma (2 studies, n = 169). The average (SD; range) participant age was 49.6 (9.30; 18–92) years. There were 4709 females, 2097 males, 3 transgender individuals, and 1 "gender queer" individual (eTable 2, http://links.lww.com/PR9/A243).

Hypnosis included live verbal delivery with (n = 22) or without (n = 42) supplemental audio recordings or supplemental self-hypnosis through webtool (n = 1), audio recordings only (n = 18), virtual reality (n = 4), and digital video with audio recording (n = 1) (eTable 3, http://links.lww.com/PR9/A243 summarizes hypnosis session(s) characteristics). The median (range) number and duration of hypnosis sessions were 7 (1–30), lasting 33.8 (7.5–90) minutes for chronic pain; one (1–8), lasting 20 (4–90) minutes for procedure/surgery pain; and one (1–4), lasting 25 (15–40) minutes for burn wound care. Hypnosis control conditions included equal time elapsing (n = 3), equivalent therapist contact/attention (n = 15), music (n = 6), relaxation (n = 17), white noise without hypnotic suggestions (n = 1), placebo hypnosis (n = 1), or no control (n = 32).

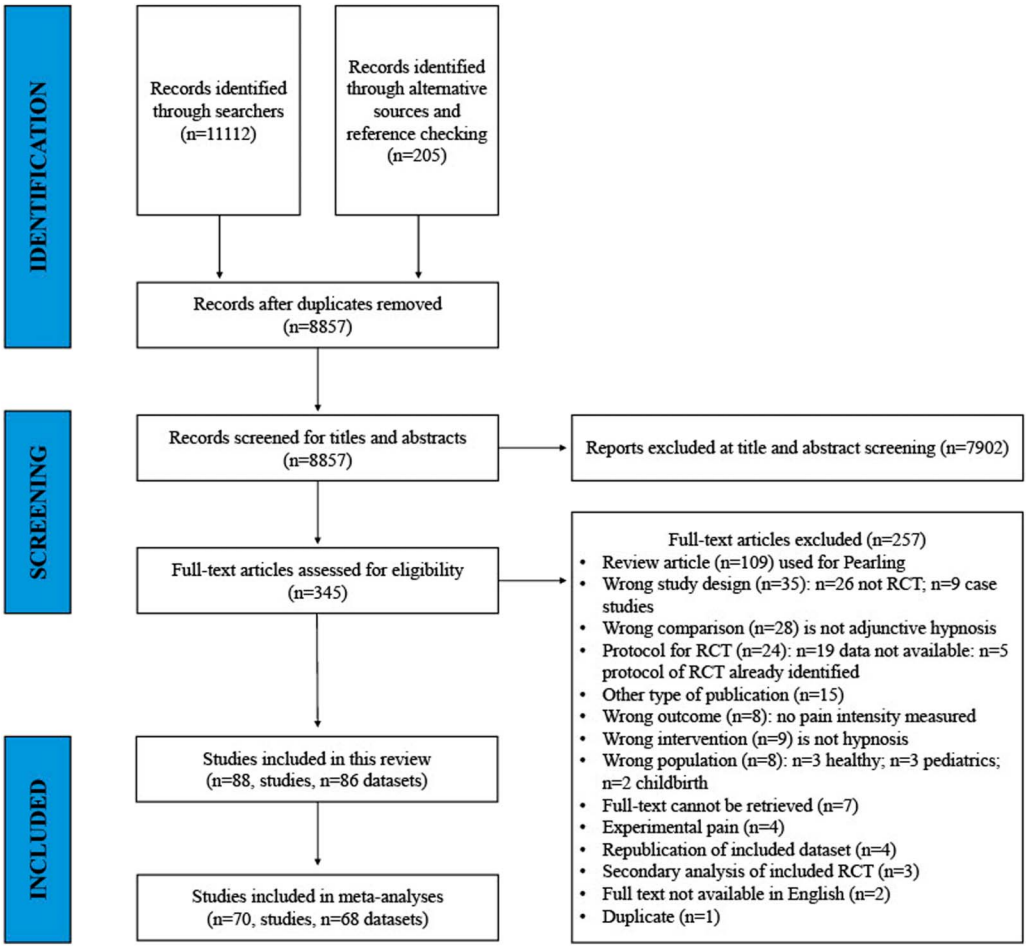

Figure 1. PRIMSA Flow Chart. PRISMA flowchart of search and study selection process.

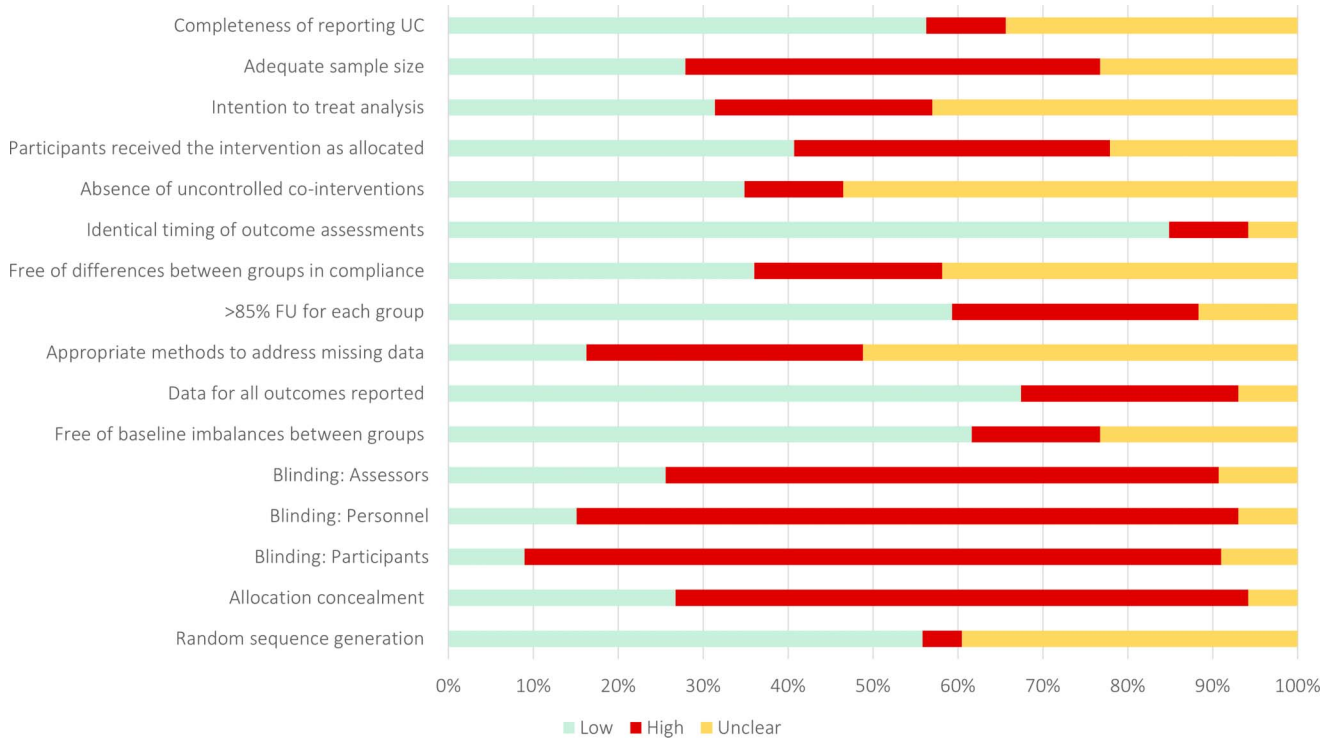

Figure 2. Risk of bias of included studies. Graph showing the percentage of included studies with low, unclear, and high risk of bias for each risk of bias assessment criteria. For the criteria "completeness of reporting UC", this only includes those studies that used usual care as their primary intervention. FU, follow-up; UC, usual care.

3.1. Evidence quality

There was high/unclear risk of bias for most domains (**Fig. 2**; eTable 4, http://links.lww.com/PR9/A243). Randomisation methods were unclear for 34 studies (40%), and inadequate for 4 (5%). Most studies had high risk of bias for allocation concealment (n = 58, 67%), and blinding of participants (n = 73, 82%), personnel (n = 67, 78%), or assessors (n = 56, 65%). All comparisons had very low certainty evidence, except for education plus hypnosis in people with chronic pain, which had low certainty evidence (eTable 5, http://links.lww.com/PR9/A243). The funnel plot suggests no evidence of publication bias (Supplement eFigure 1, http://links.lww.com/PR9/A243).

3.2. Effectiveness of adjunctive hypnosis

Summative results are provided below, with full details provided in Supplementary Material, http://links.lww.com/PR9/A243. In the Supplement, eTable 6, http://links.lww.com/PR9/A243 summarizes the immediate postintervention pain intensity results in full for studies unable to be pooled, with eTable 7, http://links.lww.com/PR9/A243 providing detailed pain intensity results at midintervention time points (if measured and multiple hypnosis sessions were delivered) and at all follow-up time points. eTable 8, http://links.lww.com/PR9/A243 summarizes medication use and other secondary outcomes.

3.2.1. Usual care (60 studies, 67 comparisons)

Chronic pain[1,5,10,25,36,50,62,75,88,89,105,111,124,134,138,142,147,151]: Hypnosis adjunctive to usual care for chronic pain had a small effect on postintervention pain (MD: −8.2, −11.8 to −4.6, I^2 = 88%, n = 929, 15 studies, 16 comparisons; **Fig. 3**). Of studies unable to be pooled, 2 had findings consistent with meta-analytical results[5,142]; 2 found no benefit.[10,147] The beneficial effect was maintained at 3 months (MD: −8.5, −15.7 to −1.30, n = 425, I^2 = 86%, 5 comparisons) but not at 12 months (MD: −6.4, −18.5 to 5.7, n = 142, 3 studies) (Supplement, eTable 7, http://links.lww.com/PR9/A243). Six studies evaluating medication use were unable to be pooled: 2 found benefit and 4 found no effect. There was a benefit of adjunctive hypnosis for depression and irritable bowel syndrome (IBS) overall symptom score postintervention, but not for anxiety, quality of life, diarrhoea, constipation, or pain interference (Supplement, eTable 8, http://links.lww.com/PR9/A243).

Medical/surgical pain[3,17,21,27,29,31,32,35,38,42,44,45,51,57,61,71–73,78–81,87,91–94,96,100,101,103,104,108,118,125,129,133,139,140,146]: Hypnosis adjunctive to usual care had a small effect on pain intensity during (6 comparisons) or following (30 comparisons) medical procedures/surgery postintervention (MD: −6.9, −10.4 to −3.3, I^2 = 83%; n = 2975, 30 studies; **Fig. 3**). Eleven additional studies evaluated the effects on pain intensity but were unable to be pooled and had mixed findings.[17,21,29,35,38,44,71,73,81,96,146] Intraprocedural (MD: −1.6, −2.8 to −0.3, n = 555, 6 studies) and postprocedural medication usage were significantly lower for hypnosis adjunctive to usual care postintervention (number of tablets: MD: −1.8 tablets, −2.7 to −0.9, n = 210, 3 comparisons; dose: MD: −6.0 mg, −11.2 to −0.9, n = 352, 4 comparisons) (Supplement, eTable 8, http://links.lww.com/PR9/A243). There was a benefit of adjunctive hypnosis for nausea, fatigue, anxiety, and pain distress but not for psychological well-being, comfort, satisfaction, or perceived control (Supplement, eTable 8, http://links.lww.com/PR9/A243).

Burn wound care pain[40,63,113,116,148,153]: Adjunctive hypnosis for usual care during burn wound care had a small effect on pain (MD: −8.8, −13.8 to −3.9, I^2 = 0%, n = 252, 6 studies; **Fig. 3**). There was no effect on medication use (MD: −0.4 morphine

Study or Subgroup	Usual care plus Hypnosis Mean	SD	Total	Usual care alone Mean	SD	Total	Weight	Mean difference IV, Random, 95% CI
1.1.1 Chronic Pain								
Abrahamsen 2009 | time and therapeutic control	29	24	20	39	15	20	1.6%	-10.00 [-22.40 , 2.40]
Eaton 2023 | time and attention control	44.9	21.1	49	45	19.5	46	2.1%	-0.10 [-8.26 , 8.06]
Ferrando 2012 | no control	29.2	20.3	30	52.4	26.1	29	1.6%	-23.20 [-35.16 , -11.24]
Grøndahl 2008 | no control	-7.1	10.9	7	7.9	15.1	8	1.5%	-15.00 [-28.22 , -1.78]
Hosseinzadegan 2017 | no control	37	17	30	55	17	30	2.0%	-18.00 [-26.60 , -9.40]
Khazraee 2023 | no control	27.7	20.4	18	69.7	13	16	1.7%	-42.00 [-53.37 , -30.63]
Lindfors 2012 | no control	61.4	20	25	60	24.3	23	1.5%	1.40 [-11.25 , 14.05]
Lores 2023 | no control	8.2	12.5	12	22.2	24.1	20	1.5%	-14.00 [-26.71 , -1.29]
Moser 2013 | time and attention control	35.7	23.5	46	41.9	24.2	42	1.9%	-6.20 [-16.18 , 3.78]
Paredes 2019, 2021 | no control	41.3	10.9	8	38.1	15.1	10	1.6%	3.20 [-8.83 , 15.23]
Roberts 2006 | no control	-21.2	22.1	29	-6.8	19.6	24	1.7%	-14.40 [-25.63 , -3.17]
Soriano 2021 | no control	40.4	18.6	12	51.4	18.6	13	1.3%	-11.00 [-25.59 , 3.59]
Syrjala 1992 | no control	38.9	33.4	6	33.5	29.9	10	0.4%	5.40 [-27.12 , 37.92]
Syrjala 1992 | time and attention control	38.9	33.4	6	37.9	24	12	0.5%	1.00 [-28.98 , 30.98]
Williams 2022 | time and attention control (edu)	-6.1	2.9	55	-5.7	2.9	110	2.8%	-0.40 [-1.34 , 0.54]
Williams 2022 | time and theraputic control (mind)	-6.1	2.9	55	-8.5	2.9	108	2.8%	2.40 [1.46 , 3.34]
Subtotal (95% CI)			**408**			**521**	**26.7%**	**-8.19 [-11.76 , -4.62]**
Heterogeneity: Tau² = 23.39; Chi² = 129.87, df = 15 (P < 0.00001); I² = 88%								
Test for overall effect: Z = 4.50 (P < 0.00001)								
1.1.2 Acute pain: Procedure-related or surgery-related								
Amraoui 2018 | no control	10	15.7	77	7.5	11.9	71	2.6%	2.50 [-1.97 , 6.97]
Efsun 2019 | no control	16.4	22.5	11	38.2	36.6	11	0.6%	-21.80 [-47.19 , 3.59]
Etienne 2021 | music control	46	29	12	53	26	23	0.9%	-7.00 [-26.55 , 12.55]
Etienne 2021 | no control	46	29	11	64	29	23	0.9%	-18.00 [-38.84 , 2.84]
Evans 1988 | no control	23.9	20	19	26.5	25.4	20	1.4%	-2.60 [-16.91 , 11.71]
Garcia 2020 | time and therapeutic control	40	22	56	55	18	57	2.2%	-15.00 [-22.42 , -7.58]
Ginandes 2003 | no control	31.7	5.2	3	22.5	26.3	4	0.6%	9.20 [-17.24 , 35.64]
Ginandes 2003 | time and attention control	31.7	5.2	3	38.3	22.3	5	0.9%	-6.60 [-27.01 , 13.81]
Gullo 2023 | no control	20.4	18.2	50	26.2	24.2	50	2.1%	-5.80 [-14.19 , 2.59]
Hizli 2015 | time and attention control	10	14	32	30	17	32	2.2%	-20.00 [-27.63 , -12.37]
Hoslin 2019 | no control	11	17	77	26	25	71	2.3%	-15.00 [-21.95 , -8.05]
Joo 2021 | no control	37	14	19	55	17	19	1.9%	-18.00 [-27.90 , -8.10]
Lang 2000 | no control	23.4	25.4	41	21.9	26.9	79	1.9%	1.50 [-8.28 , 11.28]
Lang 2000 | time and attention control	23.4	25.4	41	20.8	23.6	80	1.9%	2.60 [-6.74 , 11.94]
Lang 2006 | no control	11.6	20.8	39	11.6	19.5	76	2.1%	0.00 [-7.86 , 7.86]
Lang 2006 | time and attention control	11.6	20.8	39	8.1	15.7	81	2.2%	3.50 [-3.87 , 10.87]
Lang 2008 | no control	12	18	33	20	25.5	70	2.0%	-8.00 [-16.57 , 0.57]
Lang 2008 | time and attention control	12	18	33	14.1	20	65	2.1%	-2.10 [-9.93 , 5.73]
Lemoine 2022 | no control	19	23	78	16	21	82	2.3%	3.00 [-3.83 , 9.83]
Mackey 2009, 2018 | music control	25.7	14.8	46	39.7	14.5	54	2.4%	-14.00 [-19.77 , -8.23]
Marc 2007 | no control	7	20	14	19	22	15	1.3%	-12.00 [-27.29 , 3.29]
Marc 2008 | time control	14.3	19.5	172	16.2	20.3	174	2.6%	-1.90 [-6.09 , 2.29]
Markovits 2022 | time and attention control	34	14	31	36	17	33	2.2%	-2.00 [-9.61 , 5.61]
Monolo 2023 | no control	14.4	20.6	25	16	18	25	1.8%	-1.60 [-12.32 , 9.12]
Montgomery 2002 | no control	14.1	3.8	10	42.8	6.4	10	2.6%	-28.70 [-33.31 , -24.09]
Montgomery 2007 | time and attention control	22.4	25.4	105	47.8	30.8	95	2.1%	-25.40 [-33.27 , -17.53]
Moreno Hernández 2022 | time control	-15	15.4	20	-12.5	19.2	20	1.8%	-2.50 [-13.29 , 8.29]
Nilsson 2001 | music control	20	14	15	20	17	30	1.9%	0.00 [-9.34 , 9.34]
Nilsson 2001 | no control	20	14	15	20	12	28	2.1%	0.00 [-8.36 , 8.36]
Portel 2022 | no control	24	28	30	36	28	28	1.4%	-12.00 [-26.42 , 2.42]
Rousseaux 20/22 no VR | no control	45	30	18	46	28	22	1.0%	-1.00 [-19.14 , 17.14]
Sanchez-Jauregui 2019 | music control	7	22	57	15	18	58	2.2%	-8.00 [-15.35 , -0.65]
Snow 2012 | no control	29	15.4	41	34.1	15	39	2.3%	-5.10 [-11.76 , 1.56]
Tellez 2016 | music control	7.5	39	12	-6.5	32	20	0.6%	14.00 [-12.15 , 40.15]
Tellez 2016 | no control	7.5	39	12	22	33.1	18	0.6%	-14.50 [-41.35 , 12.35]
Tezcan 2021 | time and attention control	77	15	45	84	12	45	2.4%	-7.00 [-12.61 , -1.39]
Subtotal (95% CI)			**1342**			**1633**	**64.4%**	**-6.85 [-10.38 , -3.33]**
Heterogeneity: Tau² = 83.97; Chi² = 204.21, df = 35 (P < 0.00001); I² = 83%								
Test for overall effect: Z = 3.81 (P = 0.0001)								
1.1.3 Acute pain: Wound care (burns, physical trauma)								
Frenay 2001 | time and therapeutic control	32	26.5	11	41	31	15	0.8%	-9.00 [-31.17 , 13.17]
Jafarizadeh 2018 | time and therapeutic control	50	14.8	30	54.6	18.6	30	2.1%	-4.60 [-13.11 , 3.91]
Patterson 1992 | no control	45	27.2	5	69	25.6	10	0.5%	-24.00 [-52.64 , 4.64]
Patterson 1992 | time and therapeutic control	45	27.2	5	66	23.2	10	0.6%	-21.00 [-48.84 , 6.84]
Patterson 1997 | time control	48.5	23.9	30	62.6	23.7	30	1.6%	-14.10 [-26.14 , -2.06]
Wiechman-Askay 2007 | time and therapeutic control	25.4	21.9	27	35.4	23.1	19	1.5%	-10.00 [-23.27 , 3.27]
Wright 2000 | no control	28	11.6	15	35	15.5	15	1.9%	-7.00 [-16.80 , 2.80]
Subtotal (95% CI)			**123**			**129**	**8.9%**	**-8.83 [-13.75 , -3.91]**
Heterogeneity: Tau² = 0.00; Chi² = 3.66, df = 6 (P = 0.72); I² = 0%								
Test for overall effect: Z = 3.52 (P = 0.0004)								
Total (95% CI)			**1873**			**2283**	**100.0%**	**-7.77 [-10.10 , -5.45]**
Heterogeneity: Tau² = 49.51; Chi² = 454.34, df = 58 (P < 0.00001); I² = 87%								
Test for overall effect: Z = 6.56 (P < 0.00001)								
Test for subgroup differences: Chi² = 0.49, df = 2 (P = 0.78), I² = 0%								

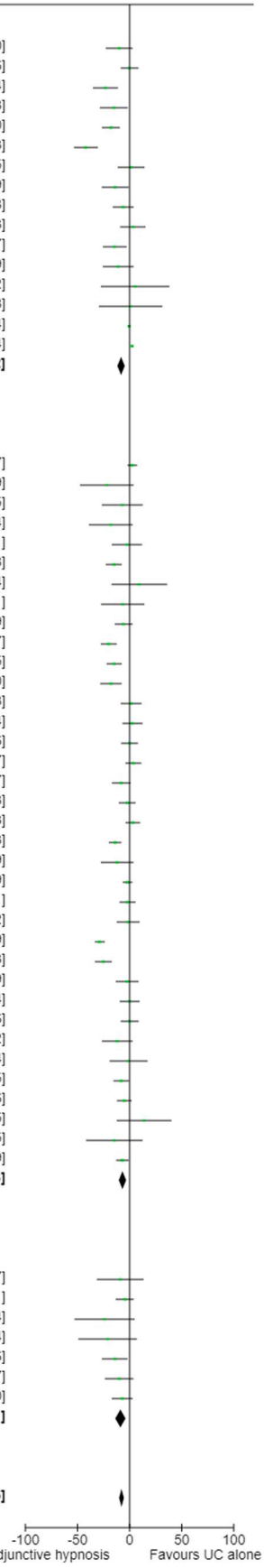

Figure 3. Meta-analysis of adjunctive hypnosis for usual care. Forest plots demonstrating the mean difference in post-intervention pain intensity scores for usual care plus hypnosis vs usual care alone for chronic pain, acute pain from procedures and surgery, and acute pain from wound care (burns, physical trauma). Hyp, hypnosis; No control, studies in which only usual care was provided, with no additional time or attentional control for hypnosis; VR, virtual reality; UC, usual care.

equivalents, −1.1–0.3, n = 147, 4 comparisons) or anxiety (Supplement, eTable 8, http://links.lww.com/PR9/A243).

3.2.2. Psychological interventions (10 studies, 11 comparisons)

Chronic pain[11,14–16,68,95,135]: Hypnosis adjunctive to psychological interventions did not provide additional pain reduction postintervention than psychological interventions alone for chronic pain (MD: −0.6; −4.1 to 2.9, I^2 = 0%, n = 387, 6 studies; **Fig. 4**). One study unable to be pooled reported a benefit of adjunctive hypnosis.[135] There was a small effect of adjunctive hypnosis on pain at 3 months (MD: −2.0, −3.7 to −0.3, n = 156, 2 studies) but not at 6 months (MD: −0.9, −2.6 to 1.0, n = 305, 4 comparisons) or 12 months (MD: −2.7, −6.8 to 1.4, n = 296, 4 comparisons) (Supplement, eTable 7, http://links.lww.com/PR9/A243). There were no effects on medication use, depression, anxiety, sleep quality/problems, fatigue, pain interference, or sensory pain quality. However, there was a benefit of adjunctive hypnosis for ratings of pain effect and "impact" of fibromyalgia (Supplement, eTable 8, http://links.lww.com/PR9/A243).

Medical/surgical pain[126,127]: One study showed that hypnosis adjunctive to virtual reality (targeting relaxation) did not provide additional pain reduction than virtual reality alone in people undergoing surgical procedures (MD: −15.0, −35.2 to 5.2, n = 30) but did provide benefits on anxiety, fatigue, and relaxation postintervention.[126]

Physical trauma[149]: One study found that hypnosis adjunctive to virtual reality (distracting and relaxing) compared with the virtual reality alone for people with trauma injuries did not provide additional pain reduction (MD: −5.8, −13.9 to 2.3, n = 114), and there were no effects on anxiety, quality of life, or psychological distress postintervention.[149]

Burn wound care pain[115]: A final study (unable to be pooled; n = 11) found that those receiving hypnosis adjunctive to virtual reality for posttrauma burn wound care (involving distraction in visual scene with relaxing music) had pain reductions from baseline, whereas those receiving virtual reality only reported pain increases.[115]

3.2.3. Education (6 studies, 7 comparisons)

Chronic pain[60,120,122]: The pooling of 2 studies showed that hypnosis adjunctive to education had a medium effect on pain intensity in chronic pain at postintervention (MD: −11.5, −19.7 to −3.3, I^2 = 0%, n = 109; **Fig. 5**) but not after 3 months (MD: −6.9, −16.9 to 3.2, n = 109, 2 comparisons). Another study reported beneficial effects,[60] but an effect estimate could not be calculated. There was no benefit of adjunctive hypnosis on postintervention medication use, pain interference, sleep, anxiety, depression, coping, function, fear of movement, pain catastrophizing, beliefs, or knowledge (Supplement, eTable 8, http://links.lww.com/PR9/A243). However, one study reported benefits for the worst pain postintervention and at 3 months, and disability and patients' impression of change postintervention.[122]

Medical/surgical procedures[53,86,137]: Hypnosis adjunctive to education did not provide greater pain reduction postsurgery than education alone (MD: −2.0, −7.8 to 3.7, n = 341, 3 studies, 4 comparisons, I^2 = 63%; **Fig. 5**). There were no effects on medication use, anxiety, or depression (Supplement, eTable 8, http://links.lww.com/PR9/A243).

3.2.4. Pharmacological intervention (4 studies)

Chronic pain[26,110,132]: The pooling of 3 studies showed that hypnosis adjunctive to pharmacological interventions had a medium effect on postintervention pain intensity in chronic pain (MD: −13.2, −22.5 to −3.8, I^2 = 17%, n = 102; **Fig. 6**). There was a benefit of adjunctive hypnosis on the postintervention impact of fibromyalgia, depression, anxiety, overall health, and dysmenorrhea (Supplement, eTable 8, http://links.lww.com/PR9/A243).

Burn wound care pain[33]: One study[33] showed that hypnosis adjunctive to lorazepam did not provide greater pain reduction than lorazepam alone for burn wound care postintervention (MD: 3.7, −21.1 to 28.5, n = 16).

3.2.5. Other interventions (2 studies)

Chronic pain[117,143]: One study[143] showed that hypnosis adjunctive to transcutaneous electrical nerve stimulation (TENS) did not provide additional pain reduction than TENS alone for mixed chronic pain conditions postintervention (MD: −1.1, −11.3 to 8.9, n = 70). There was no effect on the quality of life. One additional study[117] found that hypnosis adjunctive to diet for people with IBS did not provide additional pain reduction than diet alone postintervention (MD: −1.0, −16.6 to 14.6, n = 49). There was no effect on anxiety, depression, quality of life, or IBS symptoms.

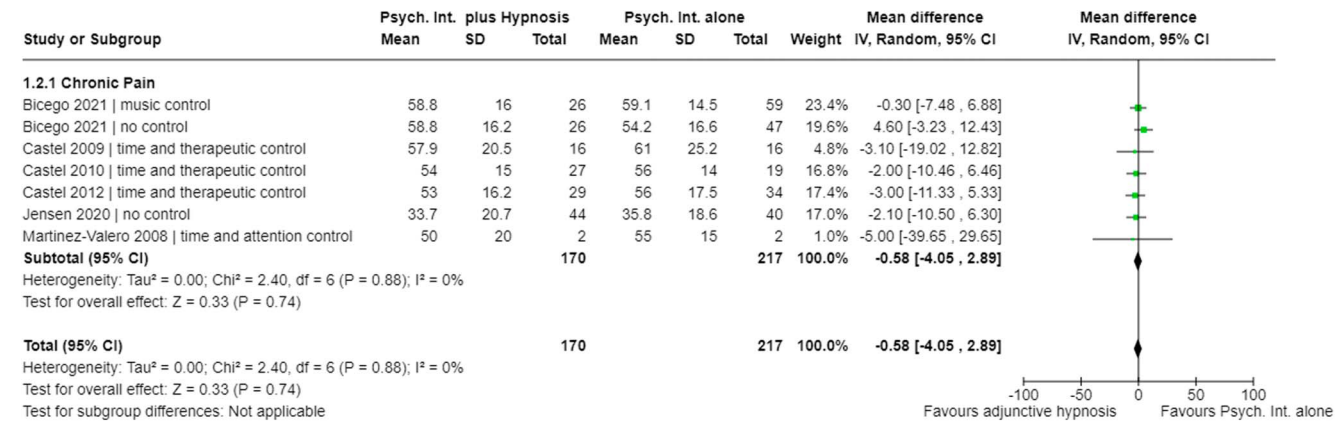

Figure 4. Meta-analysis for adjunctive hypnosis for psychological interventions. Forest plot demonstrating the mean difference in postintervention pain intensity scores for psychological interventions plus hypnosis vs psychological interventions alone for chronic pain. Hyp, hypnosis; Int., intervention; No control, studies in which only usual care was provided, with no additional time or attentional control for hypnosis; Psych., psychological.

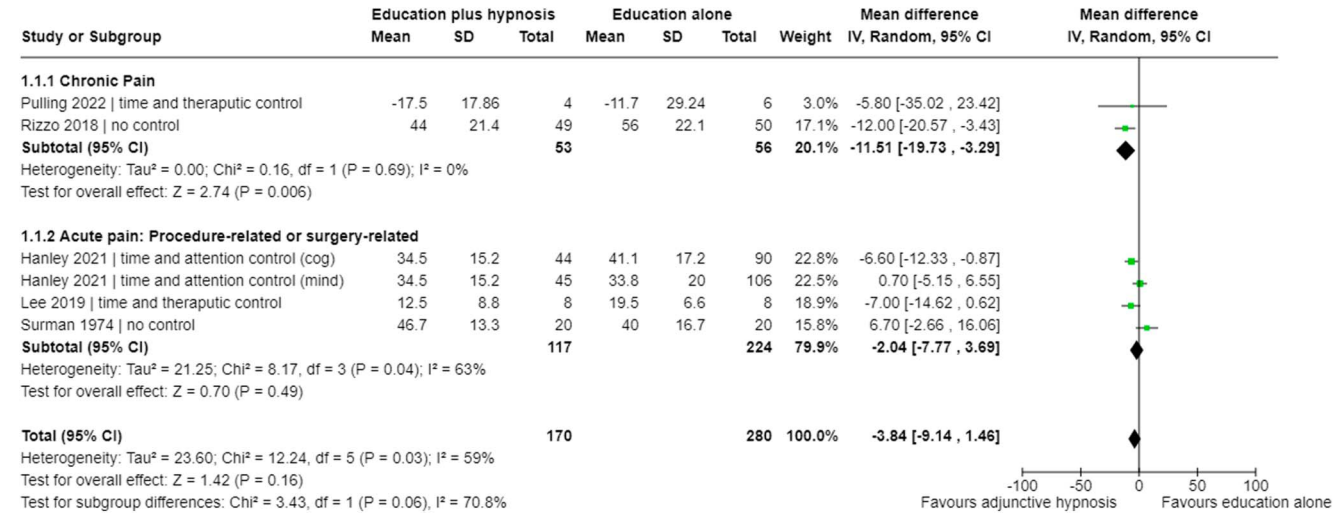

Figure 5. Meta-analysis for adjunctive hypnosis for education interventions. Forest plot demonstrating the mean difference in post-intervention pain intensity scores for education interventions plus hypnosis vs education interventions alone for chronic pain and for acute pain from procedures and surgery. Cog, cognitive control comparison; Hyp, hypnosis; Mind, Mindfulness control comparison; No control, studies in which only education was provided, with no additional time or attentional control for hypnosis.

3.3. Sensitivity analyses

When studies with unclear intervention descriptions of usual care for chronic pain were removed, the pooled result became nonsignificant. When studies with high/unclear RoB for randomisation were removed, there was no longer a benefit of hypnosis adjunct to pharmacological interventions on pain intensity for chronic pain. All other findings were unchanged (Supplement, eTable 9, http://links.lww.com/PR9/A243).

3.4. Exploratory analyses

When considering only studies with time/attention control(s) for hypnosis, there was no longer an effect of hypnosis adjunctive to usual care for chronic pain (MD: 0.10, −2.4 to 2.6, n = 569; **Fig. 7**); all other comparisons were unchanged. There was no consistent association between pain relief and dose sessions (number of sessions; Supplement, eFig. 2, http://links.lww.com/PR9/A243) or hypnotizability (Supplement, eTable 10, http://links.lww.com/PR9/A243). Exploratory subgroup analyses showed no difference in the effect estimate between studies that delivered 8 or more sessions and studies with fewer than 8 (number of sessions; Supplement, eFig. 3, http://links.lww.com/PR9/A243). Meta-regression to investigate whether hypnotizability affects the treatment effect was not conducted due to the small number of trials included in the same meta-analyses: hypnosis plus usual care for acute pain (n = 5), hypnosis plus usual care for chronic pain (n = 5), hypnosis plus education for acute pain (n = 1), hypnosis plus education for chronic pain (n = 1), hypnosis plus psychological intervention for acute pain (n = 1), and hypnosis plus psychological intervention for chronic pain (n = 2). Moderation analysis for hypnotizability was not conducted due to data unavailability; there were not enough studies reporting data for each comparison (Supplement, eTable 10, http://links.lww.com/PR9/A243).

4. Discussion

This review, appraising data from 7356 individuals, is the first systematic evaluation of the analgesic effects of adjunctive hypnosis considering a range of primary interventions and pain types. Evidence had low or very low certainty, indicating the possibility that the true effect may be different than that identified from our review. Hypnosis has been delivered adjunctively to both pharmacological and nonpharmacological treatments to reduce or control pain intensity in a variety of pain conditions and clinical settings, including pain during burn wound care and medical/surgical procedures, chronic pain, and pain from physical trauma. Analyses revealed that when added to usual care, hypnosis offers a small additional analgesic benefit postintervention for all pain conditions. Apart from when used in burn wound care, hypnosis does not provide additional short-term analgesic benefit when paired with psychological interventions for chronic pain, medical/surgical pain, or pain from physical trauma but does show a small

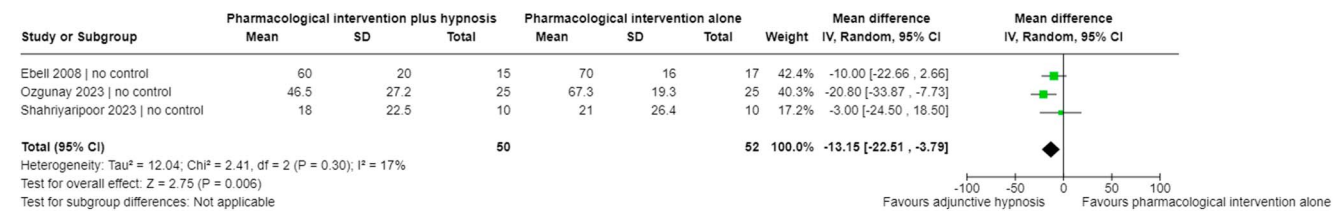

Figure 6. Meta-analysis for adjunctive hypnosis for pharmacological interventions. Forest plot demonstrating the mean difference in post-intervention pain intensity scores for pharmacological interventions plus hypnosis vs pharmacological interventions alone for chronic pain. Hyp, hypnosis; No control, studies in which only the pharmacological intervention was provided, with no additional time or attentional control for hypnosis.

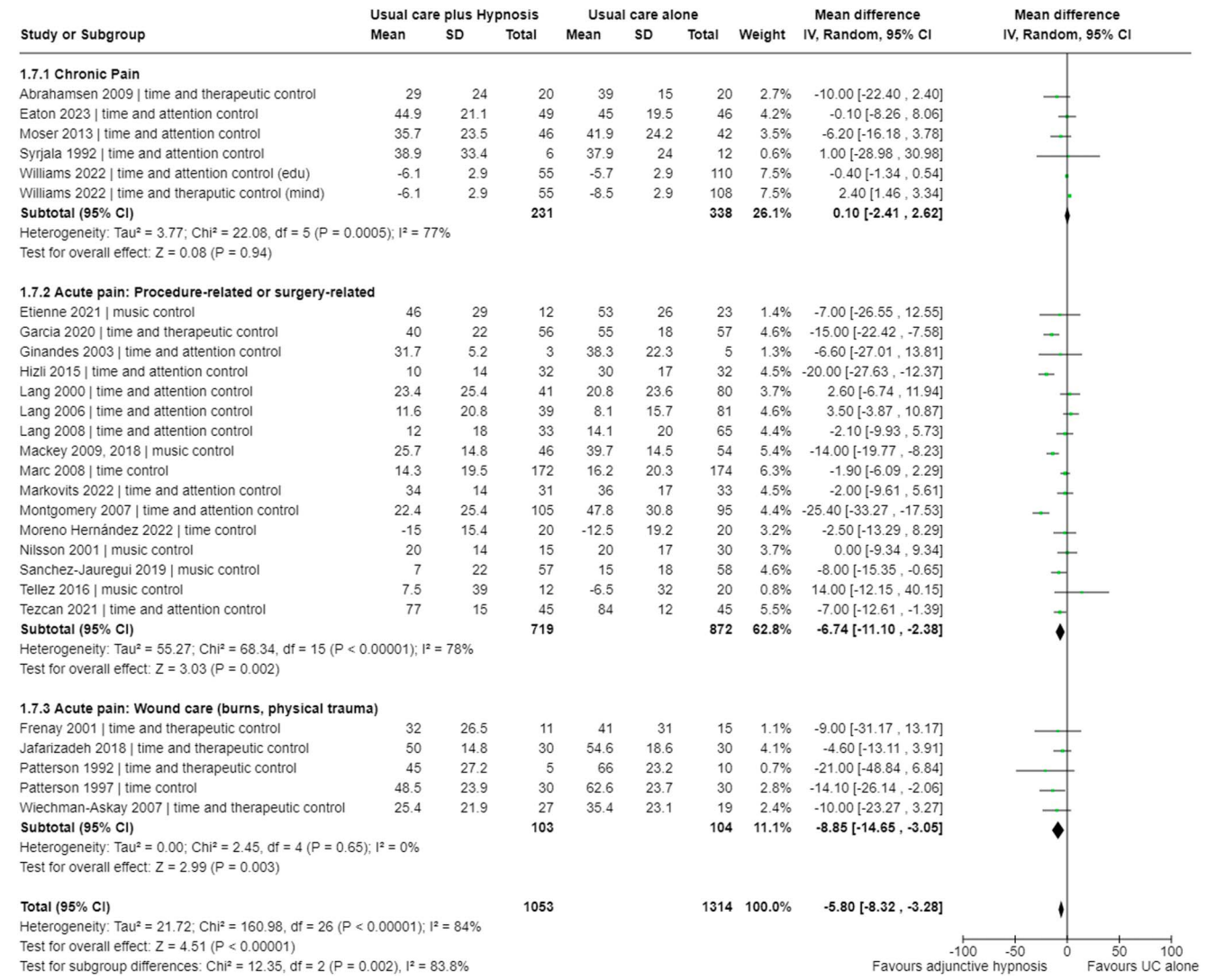

Figure 7. Pooled effects for only those studies using time and attention controls for hypnosis in the primary intervention group: (A) usual care; (B) psychological interventions; (C) education. Forest plot demonstrating the mean difference in postintervention pain intensity scores for usual care plus hypnosis vs usual care alone on pain intensity for chronic pain, acute pain from procedures and surgery, and acute pain from wound care (burns, physical trauma) when only studies that include a time and attention control in the primary intervention are included (A). Forest plot demonstrating the mean difference in postintervention pain intensity scores for psychological interventions plus hypnosis vs psychological interventions alone on pain intensity for chronic pain, when only studies that include a time and attention control in the primary intervention are included (B). Forest plot demonstrating the mean difference in postintervention pain intensity scores for education plus hypnosis vs education alone on pain intensity for acute pain from surgery and procedures when only studies that include a time and attention control in the primary intervention are included (C). Hyp, hypnosis; Int, intervention; Psych, psychological; UC, usual care.

analgesic benefit for chronic pain at later time points post-intervention. Finally, when paired with education or pharmacological treatments, hypnosis provides a moderate additional analgesic benefit for chronic pain but not for medical/surgical procedures (education) or burn wound care (pharmacological). With the exception of where hypnosis was delivered adjunct to usual care, the limited number of studies and participants (ranging from 1 to 6 pooled studies, and 16–387 participants) for most interventions that were paired with hypnosis precludes strong conclusions.

Hypnosis provided adjunctively to usual care (in various methods) was the only analysis to demonstrate consistent evidence of analgesic benefit across all pain conditions (spanning chronic pain, medical/surgical pain, pain from burn wound care). For chronic pain, adding hypnosis to usual care produced a similar magnitude of analgesia than that provided by hypnosis alone (ie, when hypnosis is compared with no-treatment control[59,98,119]), supporting an additive, but not synergistic, adjunctive effect. For medical/surgical pain, usual care was typically associated with an increase in pain during the procedure, whereas adjunctive hypnosis either mitigated this increase or decreased pain (Supplement, eTable 7, http://links.lww.com/PR9/A243). Across pain conditions, when hypnosis was provided adjunctively to usual care, the 95% CIs of pooled effects included what is commonly seen as clinically meaningful pain reduction (difference between groups of ≥10 points on a 101-point scale).[37] If the adjunctive effect was not greater than the effect of the primary intervention alone, there would be little impetus to use hypnosis clinically due to more time and resources. Given that hypnosis has minimal side effects and provides a clinically meaningful pain reduction, such findings support the potential clinical merit of using hypnosis adjunctively with usual care.

The consistent analgesic effect of hypnosis adjunctive to usual care both within/across pain types and across the various

Table 1

Limitations of the current evidence, implications, and recommendations for future studies.

Limitations of current studies	Implications	Improvements needed for future research
Absence of prospective trial registration	**Potential for publication bias.** Unpublished studies are not captured in search strategies of systematic reviews; without preregistration, this results in potentially relevant data being missed. **Potential for reporting bias.** Without preregistration, it cannot be determined if the trial reported data from the primary outcomes as originally intended or whether primary outcomes were chosen based on statistical significance.	Prospectively register the trial on a recognised clinical trial registry (and lock the protocol if using Open Science Framework) and clearly report any deviations from protocol that have occurred in the trial.[84]
Insufficient reporting of hypnosis intervention details	**Insufficient reporting hampers replication testing** and prevents future investigation into the features of hypnosis that are associated with the treatment effect or lack thereof. This includes information on dosage, delivery format, type of suggestions, and type of induction.	Use of TIDieR criteria[58] to improve intervention reporting. For example, report details on the active targets of the intervention, the entire hypnosis script, how hypnosis was combined with the primary intervention, how many practitioners provided the intervention, practitioner experience/training, and whether individualisation was allowed.
Insufficient theoretical detail provided regarding how hypnosis is meant to adjunctively enhance the effect of the primary intervention	**Inability to evaluate causal pathways.** Without sufficient theory behind adjunctive mechanisms, future investigation of *how* the hypnosis intervention influences the outcome (eg, using mediation analysis) is limited.	Provide a clear rationale for the intended target for the adjunctive hypnosis intervention and why this method is thought to enhance the effect of the primary intervention. For example, studies should detail if hypnosis is targeting pain relief directly through suggestions for analgesia or through changes in anxiety or other potential mediators. Assess potential mediators after the intervention and before the expected changes in the primary outcome for future evaluation of the mechanism of the intervention.[13] Undertake head-to-head comparisons to evaluate the effect of hypnosis type/delivery mode formally.
Minimal (or inadequate) use of control conditions for hypnosis	**Inability to differentiate between hypnosis-specific effects versus contextual effects on clinical outcomes.** Potential premature dismissal of adjunctive hypnosis when selected control conditions exert their influence on pain through similar causal pathways as adjunctive hypnosis.	Reflect on the potential active ingredients of adjunctive hypnosis and include a comparison to control for nonspecific effects. For example, using time or attentional controls for hypnosis paired with the primary intervention, use of a credible control intervention for hypnosis designed to have minimal influence on the mechanisms by which adjunctive hypnosis is proposed to work.[43] Adequate reporting of the control condition is also relevant, ensuring clear identification of the standardised control components that were delivered.
Small sample sizes	Premature dismissal of adjunctive hypnosis because of **insufficient power** to detect differences between the groups.	Perform and report an *a priori* sample size calculation to ensure that trials are adequately powered.
High risk of bias	**Premature and/or inappropriate recommendation for clinical use of adjunctive hypnosis.** Trials with high risk of bias are more likely to show positive effects that are not replicated in trials with low risk of bias, suggesting that nonspecific effects relating to bias underpin the therapeutic effect.	Use of risk of bias guidelines (eg, Cochrane Collaboration[54]) and clinical trial reporting guidelines (eg, SPIRIT, CONSORT[131]) to plan, conduct, and report trials. Focus on low risk of bias procedures (both adequate implementation and reporting[58]) for randomisation, allocation concealment, blinding of participants (when possible), blinding of personnel (when possible), and blinding of assessors is warranted given their known contribution to clinical effects. Formal assessment of blinding outcome success is suggested. Using sham/attentional controls for hypnosis paired with the primary intervention will aid blinding of the participants. For therapist blinding, because of the nature of the intervention, the only way to blind the hypnosis practitioner to active/sham hypnosis is through the use of audio-recordings, which may have reduced efficacy compared with real-life hypnosis provision. However, use of factorial design[9] of active/sham adjunctive hypnosis and active/sham primary interventions may allow blinding of the hypnosis practitioner (who provides the intervention in person) to the primary intervention. Finally, the use of digital outcome assessment (eg, online through tablet vs verbal ratings) may partially facilitate outcome assessor blinding.

methods of applying hypnosis might relate to the features of the usual care control group. For chronic pain, usual care typically involves instructing patients to continue their existing medical treatments.[112] For medical/surgical procedures or burn wound care, usual care involves common standardised medical practices.[78] This usual care often does not involve significant time with or attention from medical professionals. However, if hypnosis is provided alongside the usual care, the medical time and attention provided would be increased. Our exploratory analysis showed a reduced analgesic effect of hypnosis added to usual care for chronic pain when only studies using attentional/time control(s) for hypnosis as part of the usual care group were included. This same reduced analgesic effect was found when we only included studies that provided a clear, comprehensive description of the usual care protocol, which likely involved more time with and/or attention from the medical professionals vs when usual care was not/poorly defined. Together, these exploratory findings suggest that contextual factors may contribute to the analgesic effects of hypnosis, especially in managing chronic pain conditions. Mediation studies have shown that for some acute pain conditions, patient expectations may also be important for the analgesic effects of hypnosis[97,103]; however, no studies have investigated whether there is a mediating effect of expectation on the analgesic effects of hypnosis in chronic pain. Understanding the potential role of expectation in analgesia for chronic pain could provide key guidance for adapting or enhancing components of the hypnosis interventions to maximise the analgesic benefit. Therefore, in future RCTs, using standardised usual care protocols with attentional/time controls is critical to expand our understanding of the mechanisms underpinning hypnotic analgesia. This should be prioritised in both chronic and acute pain (from medical/surgical procedures and/or burn wound care) given that the mechanistic targets may differ across pain conditions.

The analgesic benefit of hypnosis adjunctive to education interventions was less consistent, with the most promising evidence for chronic pain conditions. For people with chronic back pain, adding hypnosis to education provided a medium additional reduction in pain intensity; however, adding hypnosis to education did not offer an additional reduction for postsurgery pain intensity. All these studies provided direct hypnotic suggestions for analgesia. As the studies were similar in the pain-focussed hypnosis component used, this suggests that the different findings across pain conditions may be related to the nature of the educational interventions delivered. The studies considering chronic pain used pain neurophysiology education, which highlights the ability of various factors (such as thoughts and beliefs) to contribute to the experience of pain. However, the studies considering pain related to surgical procedures varied in the education they delivered. For instance, a brief simple education about the specific surgery,[137] or about the potential for chronic postsurgical pain and the role of psychological well-being in recovery,[86] showed null results. By contrast, when a biopsychosocial education was delivered using cognitive restructuring techniques and teaching the link between pain and emotional states, an education program similar to the ones delivered in the chronic pain studies, there was a significant additional analgesic benefit of adjunctive hypnosis on post-surgical pain,[53] a finding similar to the analgesic benefit of adjunctive hypnosis for chronic pain.[122] Previous work highlights that following pain neurophysiology education, people with chronic pain often expect to receive brain-targeted interventions, such as hypnosis, as an opportunity to change or retrain the function of the pain system.[123] Taken together, this suggests that the nature of the education may be important in facilitating the adjunctive benefits of hypnosis—such that teaching how thoughts and behaviour can be associated with pain experiences, and how hypnosis may be a method to help change such thoughts, behaviour and neuropsychological processess, may be important educational components.

A further consideration is that differences in the nature of pain (acute pain during/after surgery vs chronic pain) may influence the ability of hypnosis to enhance any analgesic benefit of education. In the context of surgery, pain is predominantly nociceptive, and psychological factors may be contributing to pain, such as anxiety and/or distress.[30] This contrasts with the context of chronic pain, where pain-related beliefs,[70] heightened sensitivity generated by central nervous system adaptations that occur as pain persists,[83] and attentional hypervigilance to the pain experience[22] are more relevant contributors to pain experiences.[64] Therefore, the relevant targets of education and hypnosis are likely to differ between acute and chronic pain contexts. Future focus on the specific content and targets of education and hypnosis, and how this varies across pain conditions, is needed to understand under which circumstances hypnosis could be delivered adjunctively to maximise analgesia.

Our review found that hypnosis was typically delivered adjunctive to psychological interventions to chronic pain populations, with only single studies evaluating analgesic effects on medical/surgical pain, burn wound care pain, or pain from physical trauma. Our review found no analgesic benefit of hypnosis adjunctive to psychological interventions for any pain condition in the short term. That we found more studies considered chronic pain populations likely reflects the greater use of psychological interventions (eg, cognitive behavioural therapy) in managing chronic vs acute pain. However, as previous work shows that meditation and mindfulness can reduce acute pain,[152] our review identifies a clear research gap in exploring how these psychological interventions may have their individual analgesic benefits enhanced by hypnosis in acute pain contexts. Our review did discover that for chronic pain, when added to other psychological interventions, hypnosis may not offer additional analgesic effects immediately after the treatment program but that there may offer a small pain reduction (of possible clinical relevance) at 3 months posttreatment. Such findings may be attributed to the efficacy of the psychological interventions used in the control group[150]: the psychological treatments alone may be already quite effective, making the additional impact of hypnosis less pronounced or noticeable in comparison. However, the longer-term benefit does suggest that certain components of clinical hypnosis may add some value to these effective psychological interventions. Indeed, new chronic pain treatments have recently used components of clinical hypnosis, such as visualisations and suggestions, to specifically target expectations of positive results and emotions to enhance the treatments efficacy.[6] Taken together, this suggests that hypnosis delivered adjunctively may be able to target various psychosocial mediators of psychological interventions, but there is a need for a nuanced evaluation to identify the meaningful mediators, their relevance, and time courses of effect.

Similar to the evidence available for hypnosis adjunctive to psychological interventions, the available evidence for hypnosis adjunctive to pharmacological care was limited to chronic pain populations, with only one study (null finding) evaluating burn wound care pain.

Our findings suggest potentially clinically-relevant adjunctive analgesic effects for chronic pain when hypnosis is added to a pharmacological intervention (medium magnitude of effect). It is

well established that psychological factors are important mediators for the analgesic effect of interventions on chronic pain.[85] In this way, it is possible that hypnotic suggestions for chronic pain may target psychological mediators of analgesia that are not addressed by pharmacological interventions, and thus, adjunctive hypnosis can provide an additional analgesic effect. Given the common use of pharmacological management across a variety of settings for acute pain conditions, further work is warranted to understand whether adjunctive hypnosis may also provide additional analgesic benefits in acute pain conditions.

In the present literature, adjunctive hypnosis often involved similar generic hypnotic inductions[8] and suggestions[24] regardless of the pain condition or the type/rationale of intervention it was paired to. This assumes a "one size fits all" approach and may explain the lack of beneficial effects observed in certain contexts, such as when hypnosis is paired with psychological interventions. However, the delivery of hypnosis varied widely, from in-person sessions to at home audio-recordings or virtual reality. Although the nature of currently available data precludes formal comparison of hypnosis delivery methods, there is merit in considering the potential of novel technology methods that have the potential to be used in a variety of contexts (eg, hospital, at home), such as audio-recordings incorporated into a mobile app and virtual reality.[125,127] The use of virtual reality to deliver hypnosis was limited to use in acute pain situations (and with only 3 studies), showing an additional analgesic benefit when adjunctive to virtual psychological intervention for burn wound care pain but not for pain related to medical/surgical procedures or physical trauma. That virtual reality has not been evaluated as a method of delivering hypnosis in chronic pain populations merits consideration, given that virtual reality could support immersive self-hypnosis in home environments. Similarly, therapeutic hypnosis incorporated into a mobile device has not been investigated as an adjunctive intervention for chronic pain conditions. Furthermore, it may be important to expand our understanding of the impact of hypnosis dosage, particularly in the context of chronic pain, where treatments are often ongoing. A recent meta-analysis showed that stand-alone hypnosis with 8 or more sessions provided superior effects on chronic pain compared with programs with fewer than 8 sessions.[82] Our exploratory subgroup analyses showed that programs of adjunctive hypnosis with 8 or more vs 1 to 7 sessions may have similar effects on pain intensity. However, these were not head-to-head comparisons (ie, low vs high dose within the same recruited population), which suggests caution in interpreting any differences in analgesic effects. Regardless of the delivery method, perhaps different and/or more tailored hypnotic inductions and/or suggestions could result in greater benefit.[68,122] Indeed, evidence suggests that the treatment rationale and its concordance with the adjunctive intervention can influence the effect of these adjunctive interventions.[128]

Our results suggest that hypnosis adjunctive to usual care may provide benefits in other outcomes, as reported in the meta-analyses of our supplementary materials, including nausea, fatigue, pain unpleasantness, and anxiety for procedure-related pain. The benefits in other contexts are less apparent or lack investigation.

4.1. Limitations

Comprehensive searching of trial registration platforms was not undertaken. However, from our searches, some studies that had recently completed data collection were excluded because we could not confirm eligibility.[19] Therefore, we may have missed data from recent but unpublished trials. Furthermore, adjunctive hypnosis varied in both type and delivery method across studies in our review, and this may have contributed to heterogeneity of our findings. Future work is warranted to undertake head-to-head comparisons to formally evaluate the effect of hypnosis type/delivery mode. Finally, many studies evaluating hypnosis adjunctive to usual care did not have pain as their primary outcome, and for many comparisons, only limited evidence was available meaning that our results require cautious interpretation.

4.2. Future research directions

Overall evidence certainty was low to very low, suggesting that future studies may change effect estimates. Most studies had poor methodological quality, meaning that beneficial effects of adjunctive hypnosis cannot be clearly distinguished from potential bias. We identified 6 methodological issues in the RCTs included in our systematic reviews that might affect our confidence in the findings or interfere the interpretation in the results: (1) absence of prospective trial registration; (2) insufficient reporting of hypnosis intervention details; (3) insufficient theoretical detail provided regarding how hypnosis is meant to adjunctively enhance the effect of the primary intervention; (4) minimal (or inadequate) use of control conditions for hypnosis; (5) small sample sizes; and (6) high risk of bias. Although recommendations for the assessment of efficacy of clinical hypnosis applications have been published elsewhere,[74] the limitations, implications on the confidence of the findings, and complementary recommendations for future work are detailed in **Table 1**. In addition, hypnosis was not paired with interventions recommended in clinical practice guidelines, such as exercise or graded-exposure therapy,[106] that may share complementary mechanisms with hypnosis (eg, decreasing fear and/or anxiety), warranting future exploration.

5. Conclusions

Despite low levels of evidence certainty, adjunctive hypnosis appears promising when combined with usual care for both acute (medical procedures/surgery and burn wound care) and chronic pain. Furthermore, a clinically relevant reduction in pain intensity was also seen for chronic pain when hypnosis was paired with education. Hypnosis adjunctive to psychological interventions for chronic pain may not provide additional pain reduction immediately posttreatment, but may have shorter-term benefits (3 months posttreatment). Incomplete reporting of included studies precludes any conclusions regarding which aspect(s) of hypnosis hold the most importance as an adjunctive analgesic. In future studies, greater detail about the type (eg, induction, suggestions) and targets of hypnosis is needed to better understand the mechanisms underlying any adjunctive effects.

Disclosures

R.R.N.R. has received fees from the 2021 Allied Health Cross Boundary Grant Stream to deliver a workshop about pain education and clinical hypnosis. F.A.B. has received support to attend meetings and travel from the International Society for the Study of Pain, the Australian Pain Society, the European Pain Federation, the South Australian Association of Internal Medicine, the Australian Podiatry Association, the Australian Physiotherapy Association, the San Diego Pain Summit, and internal grants from her institutions. G.L.M. has received support from Reality Health, Connect Health, Institutes of Health California, AIA Australia,

Workers' Compensation Boards in Australia, Europe and North America, the International Olympic Committee, various professional organisations and learned societies. He receives royalties for several books on pain and speakers' fees for talks on pain and rehabilitation. M.P.J. is the author of 2 books, is the editor of 6 others, and facilitates workshops related to the topic of this paper. He received royalties from the sales of the books and sometimes receives fees for the workshops he facilitates. In addition, M.P.J. owns equity in a company that is developing products to teach hypnosis to individuals to improve their quality of life. T.R.S. has received funding for lectures on pain and rehabilitation and has received royalties for books on pain and rehabilitation. All other authors declare that they have no conflicts of interest.

Acknowledgments

The authors thank Sarah McQuillen, librarian at the University of South Australia, for her time and effort in developing the search strategy for this review.

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. R.R.N.R. was supported by the University of New South Wales School of Health Sciences Postgraduate Research Scholarship and a NeuRA PhD. Candidature Supplementary Scholarship. B.W.P. was supported by a University President's Scholarship from the University of South Australia, by a PhD scholarship from Arthritis Australia, and from a National Health & Medical Research Council (NHMRC) of Australia project grant (ID1161634). F.A.B. was supported by the John Stuart Colville Fellowship (Arthritis Foundation of South Australia). A.R.G. was supported by President's Scholarships from the University of South Australia, and a post-graduate research scholarship from the Rural Doctors Workforce Agency of South Australia. J.H.M. was supported by a NHMRC Leadership Investigator Grant (ID2010128). G.L.M. was supported by NHMRC Leadership Investigator Grant (ID1178444). T.R.S. was supported by a NHMRC Career Development Fellowship (ID1141735). These fundings sources had no role in the study design, collection, analysis, or interpretation of the data, writing the manuscript, or decision to submit the paper for publication.

Data availability: The data that support the findings of this study are available on request from the corresponding author (T.R.S.).

Supplemental digital content

Supplemental digital content associated with this article can be found online at http://links.lww.com/PR9/A243.

Article history:
Received 20 October 2023
Received in revised form 17 June 2024
Accepted 12 July 2024
Available online 10 September 2024

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