

Review

## Hypnosis for Clinical Pain Management: A Scoping Review of Systematic Reviews

Anupa Pathak<sup>1,\*</sup>, Saurab Sharma<sup>2,3</sup>, Mark P. Jensen<sup>4</sup>

1. Centre for Musculoskeletal Outcomes Research (CMOR), Dunedin School of Medicine, University of Otago, Dunedin, New Zealand; E-Mail: pathak.anupa1@gmail.com
2. Centre for Musculoskeletal Outcomes Research (CMOR), Dunedin School of Medicine, University of Otago, Dunedin, New Zealand; E-Mail: saurabsharma1@gmail.com
3. Department of Physiotherapy, Kathmandu University School of Medical Sciences, Dhulikhel, Kavre, Nepal
4. Department of Rehabilitation Medicine, University of Washington, 325 Ninth Avenue, Seattle, WA, USA; E-Mail: mjensen@uw.edu

\* **Correspondence:** Anupa Pathak; E-Mail: pathak.anupa1@gmail.com

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### Abstract

There is a growing body of research evaluating the effects of hypnosis for the management of clinical pain. A summary of the recent systematic review would help understand the quality of evidence regarding the efficacy of hypnosis, and provide directions for future research. We conducted a scoping review of systematic reviews and meta-analyses on the efficacy of hypnosis for management of clinical pain conditions published after 2013. We searched four databases and two reviewers independently screened studies. We extracted information regarding efficacy of hypnosis, quality of trials reviewed, and author's conclusions from the included reviews. We included 13 systematic reviews or meta-analyses that synthesized results from 77 unique clinical trials published from 1841 to 2017. There



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was a large degree of heterogeneity in the hypnosis interventions evaluated in the trials. Overall, the authors concluded that there was low-quality evidence for beneficial effects of hypnosis in the management of procedural pain, headache and pain associated with breast cancer care. All 13 reviews concluded that higher-quality trials were needed. Hypnosis may be an effective treatment for a variety of clinical pain conditions. However, the efficacy of hypnotic treatment for clinical pain is yet to be verified in high-quality trials. Researchers should follow recommended guidelines, checklists, and tools to avoid the common methodological shortcomings of previously published trials.

### **Keywords**

Hypnosis; hypnotic analgesia; review; pain management

## **1. Introduction**

Both acute and chronic pain remain significant problems worldwide and contribute to suffering and disability. Pain and anxiety are common with many invasive medical procedures [1], and greater exposure to procedural and surgery-related pain can lead to negative long-term outcomes [2, 3]. Chronic pain is also common, with a prevalence rate of 37% to 41% [4]. Given the problems associated with biomedical approaches to pain treatment including limited efficacy and adverse events [5-7], and given the increasing understanding that pain is the end result of multiple biological, psychologic, and social factors, there has been a growing interest in the use of psychosocial interventions for pain treatment [8-10].

One psychological treatment that has the potential to benefit many individuals with both acute and chronic pain is hypnosis. Hypnosis has been defined as “A state of consciousness involving focused attention and reduced peripheral awareness characterized by an enhanced capacity for response to suggestion.” (page 6, [11]). It usually involves several specific components [12-14]. First is a “hypnotic induction” during which the patient or hypnotic subject is invited to focus his or her awareness on a specific object or experience, such as the therapist’s voice, a spot on a wall, or their own breathing. This is sometimes, but not always, followed by suggestions for “deepening” the hypnotic experience. The deepening suggestions, when included as a part of the hypnosis intervention, may involve inviting the subject to experience themselves as riding in an elevator or on an escalator that takes them “down” to “deeper and deeper levels of comfort and awareness.” The induction and deepening are then usually followed by suggestions that target the symptom or presenting problem. These usually invite the subject or patient to experience changes in their emotions (e.g., to experience a sense of calm or joy), sensations (e.g., to experience physical comfort), or behaviors (e.g., to engage in behaviors associated improved health, such as regular exercise). The clinical suggestions can, and often do, also include “post-hypnotic” suggestions that the changes in emotions, sensations, or behaviour will last beyond the session. For example, they might include suggestions for experiencing comfort and relaxation during an upcoming planned medical procedure. Or they might include suggestions for experiencing greater comfort (i.e., less pain) throughout the day outside of the hypnotic sessions. The clinicians might also make an audio

recording of the session and offer the subject or patient to listen to the recording between treatment sessions (e.g., once or twice every day).

A large and growing number of clinical trials have been conducted to evaluate the efficacy of hypnosis for pain management. Moreover, reviews of these trials – including both systematic reviews and meta-analyses (which are considered as providing the highest level of evidence) – have also been published [15-18]. A useful next step would be to perform a review of these reviews in order to summarize the current state of the evidence regarding the overall efficacy of hypnosis for clinical pain, which in turn could potentially inform future research and the clinical application of hypnosis and hypnotic procedures. A good place to start for such a review is a scoping review. Scoping reviews are an ideal form of review to provide an initial summary of the types of available evidence, understand knowledge gaps, and clarify concepts that would all be useful as a precursor to a systematic review [19].

Given these issues, the primary aim of this scoping review of reviews was to better understand: (1) the type of evidence available, (2) the overall quality of that evidence as reported in the reviews, (3) identify critical knowledge gaps with respect to research in this area, and (4) and provide recommendations for future clinical trials and reviews of those trials regarding the effects of hypnosis on clinical pain.

## **2. Materials and Methods**

### **2.1 Overview**

We conducted a scoping review of the literature to identify reviews synthesizing trials on the effectiveness of hypnosis for pain management. Although the study protocol was determined a priori, the review was not pre-registered online. This scoping review was conducted in line with Joanna Brigg's Institute's guidelines for scoping reviews [20] and reported based on the PRISMA Extension for scoping reviews [21]. An initial search of four databases for recent reviews of research evaluating the efficacy of hypnotic treatments for pain was conducted on August 21, 2019. A second (final) search was conducted on December 31, 2019, to identify any reviews that met the review inclusion criteria that were published after August 21, 2019. Here we elected to limit the published reviews to include only those published recently (since January 1, 2014).

### **2.2 Inclusion Criteria**

In this review of reviews, we included systematic reviews or meta-analyses that focused on evaluating the efficacy of hypnosis for any clinical pain condition (i.e., procedural, acute or chronic pain) if they were written in English (based on the author's language proficiencies) and were published on January 1, 2014, or later. Only studies published on or after January 1, 2014, were included in order to ensure that the most recent evidence are captured. We included systematic reviews and/or meta-analyses of both randomized controlled trials (RCTs) and non-randomized studies of effects hypnotic interventions primarily on pain. To be included, the reviews needed to have reported findings on at least one of the following pain outcomes: pain intensity, pain interference, pain affect, use of pain medication, or satisfaction with pain relief.

## **2.3 Exclusion Criteria**

We excluded: (1) reviews that were published on or before December 31, 2013; (2) reviews of the effects of hypnosis on experimental pain; and (3) overviews or umbrella reviews.

## **2.4 Procedures**

Search Strategy: We conducted a systematic search of four databases PsycINFO (via Ovid), PubMed, Cochrane Review database and SCOPUS using a combination of “hypnosis” (or “hypnot\*”) AND “pain” AND “reviews or meta-analysis”. The initial search was performed in August 21, 2019 and an updated search was conducted on December 31, 2019, to capture any reviews published between August and December 2019. For example, the search term used in PubMed was (((Hypnosis [Title]) OR (Hypnot\*[Title])) AND (Pain [Title/Abstract])) AND (review [Title/Abstract] OR meta-analysis [Title/Abstract]). The search filter was then used to limit studies published on or after January 1, 2014. The search terms and filters were adapted as appropriate for the different databases. We also screened the reference list of included reviews to identify any additional relevant reviews that might not have been captured by the database searches.

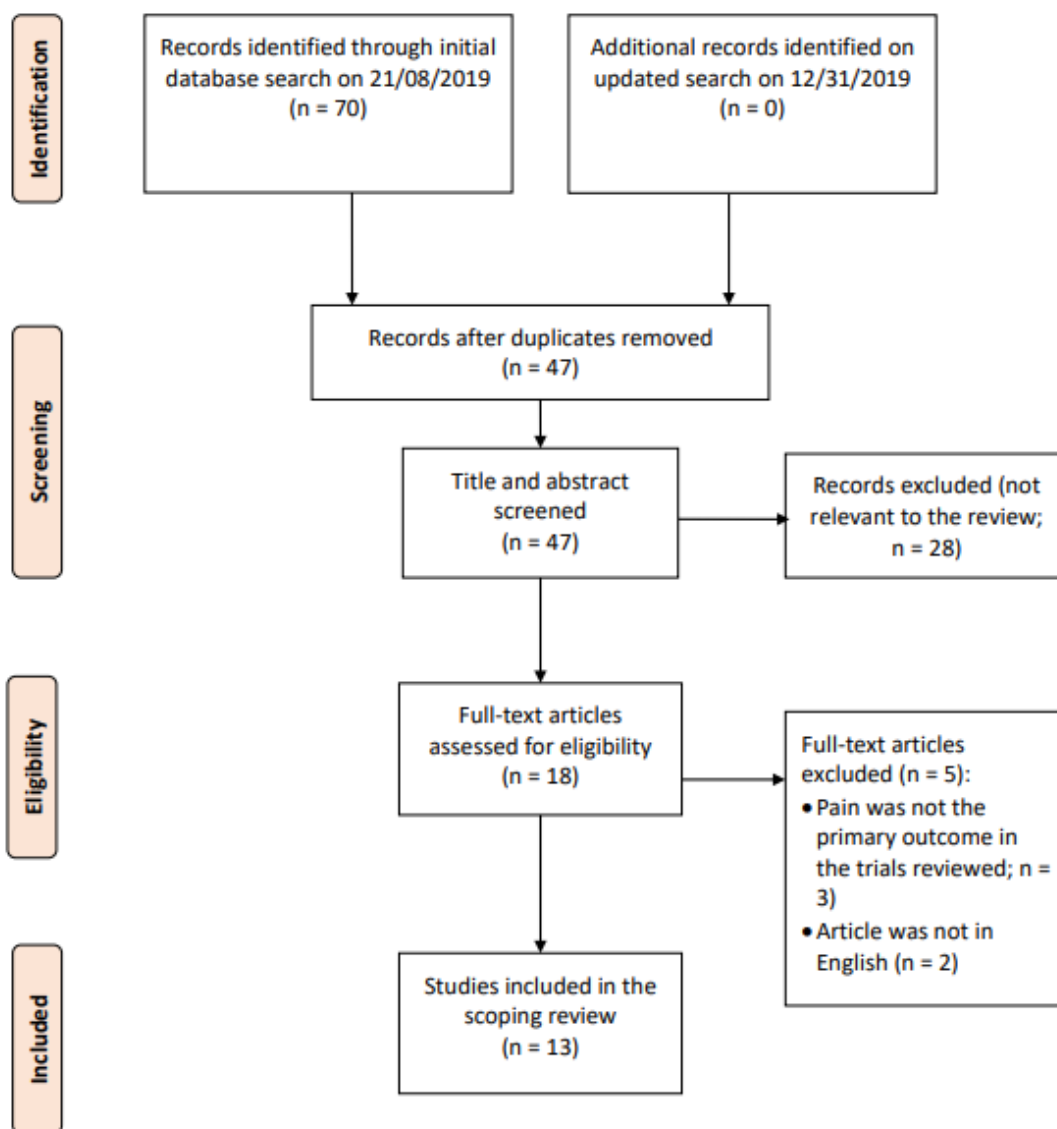
Data extraction and analysis: The lead author independently performed all data charting. The review authors created and approved a data extraction form based on the Joanna Briggs Institute recommendations for reviews [20, 22]. The data extraction form included: author names, publication date, description of the populations studied in the trials that were reviewed, number of studies reviewed, sample size (total number of subjects in all of the trials reviewed combined, as well as the median and range of the number of subjects in the individual trials), quality of the included trials as reported by the review author, the number of studies included in the meta-analysis (for meta-analyses), the key findings of the reviews including information on study heterogeneity, and the authors’ primary conclusions. If there were missing data, we recorded it as such and did not consult the authors or the primary studies or review authors, since the aim of this paper is to provide an overview of the reviews and not of primary sources or clinical trials. We then performed a narrative synthesis of the reviews to describe types of hypnosis used, types of comparator groups, quality of trials within the reviews, and effectiveness of hypnosis for pain management. As this was a scoping review of literature, we did not assess the quality of included reviews [19].

## **3. Results**

### **3.1 Scope of Current Literature**

#### **3.1.1 Search Results**

We retrieved a total of 70 papers from the four databases on August 21, 2019, and then removed 24 duplicates. AP and MJ independently screened the remaining 47 articles – only 18 of these were systematic reviews or meta-analyses. Five of these were excluded from the current scoping review of reviews because they were not written in English (n = 2) [23-25] or did not primarily examine the effects of hypnosis on one of the pain outcomes (e.g., pain intensity, analgesic medication use, etc.; n=2) [26, 27]. We did not identify any new articles with our second search performed on December 31, 2019.



**Figure 1** PRISMA Flow diagram.

Thus, we included a total of 13 systematic reviews or meta-analyses that synthesized results from 99 RCTs or non-randomized clinical trials published from 1841 to 2017 that evaluated the effects of hypnosis on pain [15-18, 28-36]. There were overlapping trials between reviews: overall, there were 77 unique trials that included data from more than 6,882 participants (one review did not report sample sizes [33]). A large proportion of these RCTs were published before January 2009 (70%, n=69) and 38% (n=37) were published before January 2000.

Five of the reviews summarized in this paper reviewed the effects of hypnosis on procedural pain [18, 28, 29, 34, 35], four reviewed studies examining the effects of hypnosis on chronic pain [16, 32, 33, 36], and four reviewed trials that examined the effects of hypnosis on other pain conditions [15, 17, 30, 31]. However, the authors of one of the reviews that sought to evaluate the effects of hypnosis on end-of-life cancer pain were unable to find any trials to review that met their inclusion criteria [31].

### 3.1.2 Hypnosis Interventions and Comparators

There was a great deal of missing information regarding the details of the hypnosis treatments evaluated in the clinical trials reviewed, as well as the comparators used. However, based on the limited information that was provided by the review authors, it was clear that there was a large variation in how hypnosis treatment was provided in the trials reviewed, as well as the comparators used in the 72 trials (see Supplementary Table S1).

Based on the information provided in the thirteen reviews, thirty-eight trials examined the effects of self-hypnosis using audio recordings, most often (but not always) after one or more face-to-face hypnosis sessions [15-17, 28, 29, 33, 35, 36]. Five unique trials included in three reviews used audio recordings to teach hypnosis without any face-to-face sessions [17, 18, 35]. Although most trials provided hypnosis treatment to individual patients, the reviewers also reported on some trials that used group therapy for teaching hypnosis [15, 29, 36]. Seven trials included in two reviews used hypnosis combined with visual or thermal imagery [28, 33]. Many of the trials reported on the findings from studies that used hypnosis to provide suggestions for analgesia, although others included non-analgesic hypnotic suggestions [28, 33].

As noted previously, the reviews provided minimal information regarding the details of the hypnosis interventions studied in the clinical trials that were reviewed, perhaps in part because the original trials provided minimal or inadequate information. The review authors used terms such as “live hypnosis” [17, 18, 29], “direct hypnosis” or “indirect hypnosis” [33], “tailored hypnosis” [15, 32], and “standard hypnosis” [15, 29] to describe the hypnosis treatments being studied. The most common hypnotic technique studied in the trials reviewed in the 13 reviews was an adapted version of Rapid Induction Analgesia (also called Barber’s technique; [18, 34, 37]). Other techniques included what the authors referred to as “Ericksonian” hypnosis [18, 28, 32], Jacobson’s hypnosis [16], Gardner’s Technique [18, 28], Enquist’s technique, Elmal’s technique, and Olness’s technique [18].

There were also large differences in the dose (e.g., number and length of sessions) of hypnosis and who provided the hypnotic interventions. Three reviews did not provide any information regarding the dose used in the trials reviewed [28, 30, 33], and only seven reviewers provided some information regarding who provided the hypnosis treatment, including the level of expertise of the clinicians [15, 28-30, 34-36]. Only one review reported on the training and experience of the treatment deliverer [35]. This review noted whether or not the treatment providers were trained. The frequency of hypnosis sessions ranged from just one session (most often in studies evaluating the effects of hypnosis for medical procedure-related pain; [17, 18, 34-36] to as many as fourteen sessions for treatment of chronic conditions such as fibromyalgia [32] and forty-eight sessions for ongoing breast cancer care [29]. A similar variation was also seen in the duration of individual sessions, which varied from 10 minutes [18, 35] to 2 hours [32]. Hypnosis interventions were delivered in the trials by psychologists, hypnotherapists, nurses, medical students, physicians, research assistants and psychotherapists. When hypnosis treatment was offered to treat pain associated with medical procedures, some trials provided hypnosis treatment before the painful procedure, while others provided hypnosis during the procedure [18, 28, 29, 34, 35].

Hypnosis treatment was compared against both active control conditions and standard care in the trials reviewed. Twenty-five trials compared hypnosis to usual care [15-17, 28, 35], nine to relaxation [15-17, 33, 36], six to attention control conditions [28-30], and five each to autogenic

training [16, 32, 33] and to biofeedback [16, 17, 33]. Eleven trials compared hypnosis to no treatment or waiting list [15, 16, 30, 36]. Flynn [33] reported the use of “placebo” in four trials. However, these authors did not describe what the placebo intervention referred to (i.e., whether it was a medication placebo or some other placebo or sham intervention). Trials also studied the effects of hypnosis when combined with other active treatments, such as CBT (versus CBT alone; [32]) or lorazepam (versus lorazepam only) [34].

### 3.1.3 Quality of Evidence

All included reviews, except the one that was unable to identify any trials to include in the review [31] and a recent review by Eason [17], assessed the quality of included trials using a validated tool. Six studies used the Cochrane Risk of Bias tool [15, 28-30, 32, 34], and one each used the PEDro Scale [33], critical appraisal instrument from the Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MASARI) [35] and Jadad Score [18], Downs and Black’s Quality Index [36] and Yates scale [16]. The authors that assessed study quality reported that all or almost all of the trials included in their reviews were of low or moderate quality. Only two reviews rated some clinical trials as being of high quality – the studies reported by Madden and colleagues and Cramer and colleagues [15, 29]. Overall, the clinical trials reviewed in these reviews were viewed as having inadequate reporting of randomization procedures, allocation concealment and blinding of outcome assessor [15, 16, 18, 28-30, 32-36]. The review authors also indicated that they had difficulties with assessing selective outcome reporting due to a lack of trial registration [15, 16, 28, 29, 32-34]. Adachi and colleagues [16] noted the methodological quality of clinical hypnotic intervention studies had remained poor even for the most recently published studies, although there has been a trend for trials to use larger sample sizes. There were also concerns expressed by the reviewers about the potential lack of experience in delivering hypnosis in the study clinicians, potential problems with patient adherence to procedures, and inadequate reporting of missing data [15, 18, 30].

## **3.2 Current Evidence Regarding the Efficacy of Hypnosis**

### 3.2.1 Efficacy of Hypnosis for Procedural Pain

Five reviews including a total of 3172 participants synthesized the effects of hypnosis on procedural pain (see Table 1) [18, 28, 29, 34, 35]. Noergaard and colleagues [35] conducted a systematic review of nine randomized controlled trials and one quasi-experimental study that assessed the effectiveness of hypnosis in adults undergoing minimally invasive medical procedures. The authors were unable to conduct a meta-analysis on effects on pain intensity and use of medication due to large heterogeneity in the outcomes studied. In eight of the studies, there were no significant differences between hypnosis and the control condition in patient-rated pain intensity. However, based on five trials that reported on use of pain medication, the authors of the review concluded that there was a decrease in pain medication consumption by 21% to 86% in the hypnosis groups compared to usual care alone.

**Table 1** Summary of included reviews on hypnosis and pain.

Author, Year	Clinical population	No. Of studies	Total sample size (Range, Median)	Meta-analysis (no. of studies)	Key findings
Noergaard, 2019 [35]	Adults undergoing minimally invasive	10	1364 (26 to 350, 105)	Yes, but not for outcomes procedures of interest	<ul style="list-style-type: none"> <li>• Hypnosis = Usual care [pain intensity] (n= 8)</li> <li>• Less pain medicine consumption in hypnosis group (n=5)</li> </ul>
Eason et al., 2018 [17]	Adults with mixed clinical pain conditions	11	2656 (15 to 1,222, 60)	Yes, but not pain-specific	<ul style="list-style-type: none"> <li>• Self-hypnosis &gt; Other active controls* (n=6)</li> <li>• Self-hypnosis &gt; Standard care (n=2)</li> <li>• Self-hypnosis not useful for labor pain (n=3)</li> </ul>
Flynn, 2018 [33]	Adults with migraine	8	Not Reported	No	<ul style="list-style-type: none"> <li>• Hypnosis &gt; Autogenic training (n=2)</li> <li>• Hypnosis &gt; Biofeedback (n =1)</li> <li>• Hypnosis = Non-hypnotic imagery (n =1)</li> </ul>
Provencal et al., 2018 [34]	Burn patients receiving wound care	6	234 (26 to 61, 31)	Yes (5)	<ul style="list-style-type: none"> <li>• Hypnosis &gt; Attention control and medication conditions [(MD = -8.90, (95% CI -16.28 to -1.52)]**</li> </ul>
Montgomery et al., 2017 [31]	Cancer patients	0	-	-	<ul style="list-style-type: none"> <li>• No studies met inclusion criteria</li> </ul>
Zech et al., 2017 [32]	Adults with fibromyalgia	5	229 (32 to 63, 40)	Yes (9)	<ul style="list-style-type: none"> <li>• Hypnosis = CBT (n=2)</li> <li>• Hypnosis &gt; Physiotherapy and no treatment at 3 months [NNT for 30% decrease in pain= 5 (95%CI, 3 to 50)]</li> </ul>
Madden et al., 2016 [15]	Women in labor	9	2954 (38 to 1,222, 65)	Yes (9)	<ul style="list-style-type: none"> <li>• Hypnosis &gt; Usual care and supportive therapy [RR to use pain relief = 0.73 (95% CI 0.57 to 0.94)] (n=8)</li> </ul>



Cramer et al., 2015 [29]	Women diagnosed with or suspected of having breast cancer	5	671 (20 to 240, 125)	No	<ul style="list-style-type: none"> <li>• Pre-operative hypnosis &gt; Attention (n=1)</li> <li>• Pre-operative hypnosis &gt; Usual care (n=2)</li> <li>• Hypnosis + exercise &gt; Self-education (n=1)</li> <li>• Hypnosis + support group &gt; Usual care and support group only (n=1)</li> </ul>
Zhang et al., 2015 [30]	Adults with temporomandibular disorders	2	64 (25-39, 32)	Yes (2)	<ul style="list-style-type: none"> <li>• Hypnosis &gt; No treatment and attention control [MD= -28.33; (95% CI: -44.67 to -11.99)]**</li> </ul>
Adachi et al., 2014 [16]	Adults with chronic pain	12	669 (22 to 157, 42)	Yes (12)	<ul style="list-style-type: none"> <li>• Hypnosis &gt; Standard care [g =.60, (95% CI 0.03 to 1.17)] (n=4)</li> <li>• Hypnosis = Other psychological interventions† (n=11)</li> </ul>
Birnie et al., 2014 [28]	Children undergoing needle punctures	7	225 (25 to 60, 30)	Yes (5)	<ul style="list-style-type: none"> <li>• Hypnosis &gt; Play, CBT, attention control, and local anesthesia [SMD=1.40 (95% CI 2.32 to 0.48)]</li> </ul>
Bowker et al., 2014 [36]	Adults with chronic disability	10	365 (20 to 66, 34)	Yes (10)	<ul style="list-style-type: none"> <li>• Hypnosis &gt; Waiting list [pain intensity] [ES= 0.53 (90% CI 0.28 to 0.84)]</li> <li>• Hypnosis = CBT, other behavior treatment</li> </ul>
Cheseaux et al., 2014 [18]	Adults and children undergoing medical procedures	13	678 (20 to 200, 36)	No	<ul style="list-style-type: none"> <li>• Hypnosis &gt; Psychological treatments‡ (n=4)</li> <li>• Hypnosis &gt; No treatment (n=3)</li> <li>• Hypnosis = No treatment and other psychological treatments (n= 5)</li> </ul>

\*Biofeedback, pain education, attention control, empathy, sedatives.

\*\*Based on a meta-analysis.

†Autogenic Training (n=4), Relaxation and Visualization (n=2), Progressive muscle relaxation (n=2), CBT (n=1), Supportive Psychotherapy (n=1) and Biofeedback (n=1).

‡ Psychological Interventions used in individual studies not reported by authors.

Note: Only RCTs within reviews that examined the effects of hypnosis on pain are reported. ES= Effect Size, CI= Confidence Interval, MD= Mean Difference, CBT= Cognitive Behavior Therapy, NNB= Number needed to Benefit, RR= Risk Ratio, SMD= Standard Mean Difference.

Provencal and colleagues conducted a systematic review of 6 RCTs published from 1980 to 2017 that compared the use of hypnosis in wound care in adult burn patients [34]. The meta-analysis of 5 trials showed a statistically significant effect of hypnosis on subjective pain intensity among adults undergoing treatment of burns (MD = -8.90 on a 100mm scale, 95% CI -16.28, -1.52) but no effects of hypnosis on the use of analgesic medications. However, due to a small number of studies included in the meta-synthesis, of which four were from the same research group, the authors conclude that results, while promising, need to be interpreted with caution.

Cramer and colleagues [29] also narratively synthesized results of 5 RCTs that examined the effects of hypnosis on pain during breast cancer care (including during a diagnostic biopsy). Of these, three RCTs reported decreases in post-procedural pain compared to standard care, and one of the two RCTs showed significantly lesser pain compared to attention control. The authors recommended that more research is needed to confirm these promising initial findings.

Another review published in 2014 [28] synthesized the findings from nine RCTs examining the effects of hypnosis for decreasing pain and distress during needle procedures in children aged 2-19 years. Five RCTs including 176 participants showed significant effects of hypnosis on self-reported pain intensity (SMD= 1.40 [2.32, 0.48], Z=2.97, p<.01, I<sup>2</sup>=85%) compared to play therapy, attention control, CBT and local anaesthesia. However, based on GRADE ratings, the quality of the evidence from the trials reviewed was deemed to be very low.

Finally, Cheseaux and colleagues [18] reviewed the results of 18 RCTs published before 2012 that evaluated the effects of hypnosis provided before diagnostic or therapeutic medical procedures, such as EMG, surgery, and lumbar punctures among both children and adults. Among 13 trials that reported pain outcomes, eight trials did not find significant effects on pain intensity for hypnosis compared to control conditions, while five reported a significant decrease in pain. However, as with other reviews, the author reported problems with heterogeneity in hypnotic interventions and comparators, as well as a general low methodological quality of the trials they reviewed.

### 3.2.2 Efficacy of Hypnosis for Chronic Pain

We identified four reviews that studied the efficacy of hypnosis in adults with chronic pain [16], disability [36], and fibromyalgia [32] and chronic headache [33]. In the first of these, Adachi and colleagues [16] reviewed results of 12 clinical trials, 6 of which were RCTs and concluded that hypnosis had a moderate effect (Hedges'  $g = .60$ , 95% CI: 0.03–1.17,  $p < .05$ ) on treatment efficacy compared to standard care, but were not significantly more effective than other psychological pain interventions ( $g = .04$ , 95% CI: -0.22–0.30, ns). However, there was moderate to large heterogeneity for both the results. The authors also recommended that authors need to improve methodological quality in future studies.

A review in 2017 by Zech and colleagues [32] synthesized findings from five RCTs that evaluated the effects of hypnosis on pain in adults with fibromyalgia published between 2010 and 2016. The trials reported no difference in results between CBT combined with hypnosis compared to CBT alone (Risk Difference 0.08 (95% CI -0.05, 0.21)). In addition, no significant differences were found in the efficacy of either guided imagery or hypnosis when compared to a control condition for a greater than 50% decrease in pain. However, low-quality evidence with large heterogeneity

suggested that hypnosis was superior to controls when the outcome was a 30% decrease in pain intensity (NNTB= 5, (95% CI 3–50)), suggesting some benefit of hypnosis.

Flynn [33] conducted a systematic review of 8 RCTs evaluating the effects of hypnosis in adults with migraine or chronic headache disorders. Of these, four studies used hypnosis in conjunction with visual imagery and five studies used self-hypnosis techniques. Of the 8 studies included, five out of six studies reported significant decreases in headache activity in participants who received hypnosis compared to those who received other psychological interventions. Four studies found no significant differences between hypnosis treatment when compared to “placebo” (specific placebos used not specified in the review) treatment.

Bowker and colleagues [36] conducted a meta-analysis of studies examining the effectiveness of hypnosis for chronic pain in adults with long-term disabling conditions such as fibromyalgia, osteoarthritis or spinal cord injury. The authors found evidence in favour of hypnosis, with a medium weighted effect size of 0.53 (CI = 0.28–0.84) in comparison to no-treatment or education-only control conditions (n = 6 studies). They also found, however, that hypnosis treatment was not significant more effective than cognitive or behavioral pain interventions (n=6). Five studies also showed greater reductions in pain medication use among the participants who received hypnosis at 3 to 6 months, compared to control conditions which included no treatment, relaxation, or physical therapy.

### 3.2.3 Efficacy of Hypnosis for Other Pain Conditions

A recent systematic review by Eason and colleagues [17] reviewed 22 RCTs to assess the clinical uses of self-hypnosis. Only eight of the included RCTs assessed efficacy of self-hypnosis in the management of painful conditions which included chronic pain (n=3, one of which also included in [16]), labor pain (n=3, all studies also included in [15]) and procedural pain (n= 2, one of which also included in [29]). In all the eight studies reviewed, training in hypnosis followed by self-hypnosis was more effective for reducing pain than control conditions such as biofeedback, structured attention, relaxation, empathy, sedatives, and standard care.

Montgomery and colleagues [31] conducted a systematic search of five databases for RCTs published before November, 2016 that reported data regarding the effects of hypnosis for treating patients with cancer at the end-of-life. Specifically, they looked for outcomes related to pain, fatigue, dyspnoea, appetite loss or sleep disturbance. However, the authors were unable to find any relevant studies and concluded that hypnosis had not yet been rigorously tested in end-of-life cancer patients.

A Cochrane review performed in 2016 synthesized findings from 9 RCTs including 2954 patients that evaluated the effects of hypnosis for labor pain [15]. In eight of the studies, hypnosis training was provided during the antenatal period. In one study, the hypnosis intervention was provided during labor. The authors found that women in hypnosis group were less likely to use pharmacological pain relief or analgesia than those in the control groups, (average risk ratio (RR) 0.73, 95% CI 0.57 to 0.94, eight studies, 2916 women; very low-quality evidence; random-effects model; substantial statistical heterogeneity), but there was no effect on epidural use. There were no significant differences between the hypnosis group and control groups for satisfaction with pain relief either.

Finally, Zhang and colleagues [30] reviewed two RCTs that evaluated the efficacy of hypnosis compared to no treatment and attention control in patients with temporomandibular disorders. Based on data from the trials, there was very low-quality evidence that hypnosis was comparable to the control groups for reduction in overall pain (MD= -9.16 mm on 100 mm scale; 95% CI: -23.47 to 5.14; P = .21) but may have some benefit for reduction in maximal pain (mean difference on 100 mm scale = -28.33; 95% CI: -44.67 to -11.99; P =.007).

#### **4. Discussion**

The results of this scoping review provide important summary information regarding our current knowledge about the efficacy of hypnosis for clinical pain, as well as the current state of the quality of research in this area. The findings may be useful to clinicians who are considering using hypnosis in their practice, as well as to future researchers. In this section, we discuss the implications of the findings with respect to three specific areas: issues related to the heterogeneity of “hypnosis”, recommendations for improving the quality of research, and conclusions regarding treatment efficacy.

##### **4.1. The Heterogeneity of “Hypnosis”**

The review findings made clear that hypnosis treatments can vary a great deal across a large number of characteristics. Hypnosis treatment can vary with respect “dose” (number and length of face-to-face sessions), frequency of hypnosis treatments, the training and experience of the clinicians providing the treatment, whether or not and the extent to which participants practice hypnosis on their own between sessions (with or without audio recordings to assist them with home practice), and the specific content of the hypnotic inductions and suggestions. Moreover, there is a great deal of heterogeneity with respect to the types of pain conditions examined in this literature [38]. For example, acute pain differs in many important ways from chronic pain, and different chronic pain conditions can differ to a great extent with respect to both type and etiology [39].

Researchers would do well to keep the heterogeneity of hypnosis in mind when designing and conducting hypnosis trials. First, they should carefully consider each component of the hypnosis intervention they plan to test (i.e., dose, treatment frequency, use of experienced clinicians, participant practice, use of audio recordings, and content of the suggestions), perhaps balancing feasibility against the need to maximize efficacy. If the trial authors do not make efforts to maximize efficacy by, for example, providing a minimal number of treatment sessions, encouraging and facilitating between-session practice, and using clinicians with adequate training and experience, it could be difficult to conclude if a null finding is due to a lack of efficacy of hypnosis in general or because of problems with the way that hypnosis treatment was delivered. Also of great importance, researchers should carefully and clearly describe each of these components of the hypnosis treatment tested. This could be done either in the text of the paper that presents the findings, or as supplementary materials (e.g., as a study treatment manual used by the study clinicians and that could be provided to readers who request it). Checklists such as the Template for Intervention Description and Replication (TiDieR) can be useful resources for describing the hypnotic treatments evaluated in the trials [40].

By providing this level of detail, future investigators who perform reviews of the literature could then classify each clinical trial with respect to each of these domains, and then evaluate the level of efficacy (e.g., pain reduction) as a function of each factor. They may learn, for example, and that for certain pain conditions, maximum benefit occurs with at least four 60 minute sessions of hypnosis provided by clinicians supervised by very experienced clinicians and that includes suggestions both for pain reduction and for changing the meaning of sensations, but that regular practice at home does not provide any additional benefits. Providing detail regarding the hypnotic treatment being evaluated would also be very important for reviewers to be able to understand when (and for whom) hypnosis has no, minimal or large benefits.

In addition, some research suggests that trait hypnotizability – that is, the tendency of an individual to respond to hypnotic suggestions – might potentially moderate the efficacy of hypnosis for pain management [41,42,43]. These moderation effects appear to be more pronounced in laboratory-based settings than studies of patients with clinical pain [44]. However, this issue was rarely addressed in the reviews we summarized in the current study, perhaps in part because researchers tend to not evaluate these effects in clinical trials. We recommend that not only should trials evaluate whenever possible, using one of the several measures of hypnotizability that are available [45], but that future reviews should include a section discussing this issue, specifically.

Another important issue to consider is whether review authors should perform meta-analysis when significant heterogeneity is found in the clinical trials being reviewed. When there is a variety of different treatments (i.e., in this case, different types of hypnosis treatments) and different comparators, it is recommended that the meta-analysis should consider each combination separately [46]. Moreover, meta-analyses should also exclude studies with high risk of bias [46]. Each of the seven meta-analyses included in the current scoping review reported a high level of heterogeneity in the trials reviewed, and some reported additional publication bias. Each of these factors suggests that it may be too early to use a meta-analytic approach to summarize the findings from hypnosis studies. A greater number of high-quality clinical trials that evaluate similar hypnotic approaches and compare them to similar control conditions will be needed before a meta-analyses of this literature will likely be useful.

#### **4.2. The Low Quality of the Existing Evidence**

Despite the large and growing body of research evidence on the efficacy of hypnosis for clinical pain, all of the reviewers noted that the quality of the clinical trials that have been published is low. Moreover, one review [16] noted that although more recent studies include larger sample sizes, the quality of the evidence has not tended to improve over the years.

In order for the conclusions regarding the efficacy of hypnosis treatments to be more definitive, improving the quality of the research evidence should be given a high priority. Researchers could use any one of a number of research quality rating tools (e.g., [47-49]) as a guide to help ensure that their trials meet the highest possible quality standards. As noted in the results section of this scoping review, the problems noted most often by the reviewers of the hypnosis literature include a lack of detail regarding randomization procedures, a lack of treatment allocation concealment, a lack of blinding of the individual(s) performing the outcomes assessments, and a lack of registration of the trial prior to study enrollment.

However, although it is possible (and important) to blind the research staff who perform the outcomes assessment to treatment condition, it is extremely challenging to blind treatment providers and study participants to treatment allocation when evaluating the efficacy of behavioral interventions [50, 51], including hypnosis. Requiring this level of blinding of clinical trials in this area for a study to be viewed as being of high quality would by definition mean that a high-quality hypnosis clinical trial is next to impossible. Given this, special design features for behavioral clinical trials are needed. These include, for example, the use of multiple (active treatment) comparison conditions, use of “dual-blind” designs in which participants are blind with respect to the treatment condition that is the focus of the trial, and the development of special treatment conditions that control for the non-specific effects of the behavioral intervention, but do not include the components of the treatment thought to have specific effects [52, 53].

Moreover, it may make sense to use tools for rating research quality that do not require that the study participant be blind to treatment conditions in order to deem a study as being of high quality. One example of such a tool was introduced in 2005 [54]. This tool focuses on 13 design features that are specific and unique to trials of psychological interventions for pain management. Thus, it emphasizes the importance of design features important and necessary for such trials (e.g., clinician experience and training, strategies to engage participants in treatment), while placing less emphasis on design features that are of less importance to the design and conduct of studies evaluating the efficacy of psychological interventions (e.g., allocation blinding). It is also more comprehensive than many of the other existing tools. Trialists would do well to consider using this tool as a guide when designing hypnosis trials, and reviewers should consider using this tool (or others that might also be developed specifically for evaluating psychological interventions) when rating the quality of hypnosis clinical trials.

#### **4.3 The Efficacy of Hypnosis for Pain Management**

The conclusions made by the authors of the 13 reviews we identified regarding the efficacy of hypnosis as a treatment for pain here were inconsistent. Hypnotic treatments were found beneficial in some studies for pain associated with medical procedures such as burn wound care, cancer treatments, and needle puncture. The findings also suggest the possibility that hypnotic treatments can be effective for chronic headache conditions and labor pain. In contrast, other systematic reviews [16, 35, 36] reported hypnosis was as good as usual care or other psychological interventions for treatment of procedural pain and chronic pain. However, in no case was hypnosis found to be worse than any control condition. In short, the evidence indicates that hypnosis as a treatment for clinical pain remains promising, but not yet proven effective. Strong recommendations for or against the use of medical hypnosis cannot, therefore, be made at this time.

### **5. Conclusions**

Hypnosis may be an effective treatment for a large variety of clinical pain conditions, but the efficacy is yet to be verified in high-quality trials. Hypnosis appears to be promising as an intervention compared to no treatment for the pain associated with burn wound management, cancer treatments, needle injections, and a variety of chronic pain conditions. Hypnosis also appears to be as effective as other psychological pain treatments. There is a consensus from the

systematic reviews that the quality of the trials on efficacy of hypnosis for pain management remains low. Trialists performing research in this field should use recommended guidelines and checklist(s) while planning and reporting their trials. This will allow other researchers to replicate their findings and also allow reviewers to use this information when determining the factors that impact the effects of hypnosis in future studies.

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N/A

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AP, MJ and SS were all involved in designing the protocol of the review. AP and MJ conducted the screening independently, AP conducted the data extraction and all AP, MJ and SS were involved in drafting and editing the manuscript.

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### **Competing Interests**

One of the team members, Mark P. Jensen, PhD, has published books on hypnosis, and receives royalties for the sales of these books.

### **Additional Materials (if any)**

The following additional materials are uploaded on the page of this paper.

1. Table S1 Description of the hypnosis interventions evaluated in the trials reviewed (as reported by trial authors).

First author, year	Hypnosis Intervention	Comparator(s)	Hypnosis dose	Delivered by
Noergaard et al., 2019 (Review of trials evaluating the efficacy of hypnosis for minimally invasive procedures) [35]				
<i>Hilzi, 2015</i>	"Hypnosis"	Usual care	NR	Physician
<i>Norgaard, 2013</i>	Guided self-hypnotic relaxation + attentive behaviour + usual care	1) Usual care	NR	Nurse
<i>Shenefelt, 2013</i>	Hypnotic induction + self-guided imagery during procedure + usual care	1) Usual care 2) Recorded hypnotic induction ( group not included in review)	1 (10 min) session	Physician
<b>Slack, 2009</b>	Self-hypnosis using audio recording only	Usual care + audio recording of patient education booklet	1 (20 min) session	N/A (recordings)
<i>Marc, 2008</i>	Hypnotic relaxation + usual care	Usual care	1 (20 min) session	Hypno-therapist
<i>Lang, 2008</i>	Self-hypnotic relaxation with empathic attentive behavior + usual care	1) Usual care 2) Empathic attentive behaviour ( group not included in review)	NR	Research assistant
<i>Marc, 2007</i>	Hypnotic relaxation + usual care	Usual care	1 (20 min) session	Hypnotist practitioner
<b>Lang, 2006</b>	Self-hypnotic relaxation with empathic attentive behaviour + usual care	1) Usual care 2) Empathic attentive behaviour ( group not included in review)	NR	Research assistant
<b>Lang, 2000</b>	Self-hypnotic relaxation with empathic attentive behavior + usual care	1) Usual care 2) Empathic attentive behaviour ( group not included	NR	"Additional person"



<b>Lang, 1996</b>	Hypnosis using relaxation and guided imagery + usual care	in review) Usual care	NR	“Dedicated practitioner”
Eason et al., 2018 (Review of trials evaluating the effects of self-hypnosis)[17]				
<b>Downe, 2015</b>	Live + self-hypnosis using audio recordings	Usual care	2 (90-min) sessions, 3 weeks apart	NR
<b>Tan, 2015</b>	Live hypnosis with or without self-hypnosis + self-practice	Biofeedback	8 sessions (time NR) w/ or w/o practice or 2 sessions	NR
<b>Werner, 2013</b>	Self-hypnosis using only audio recordings	1) Mindfulness, body awareness training and relaxation 2) Usual care	3 (time NR) sessions	NR
<b>Jensen, 2011</b>	Live + self-hypnosis using audio recordings	1) Cognitive restructuring 2) Education	4 (time NR) sessions	NR
<b>Jensen, 2009b</b>	Live + self-hypnosis using audio recordings	EMG biofeedback	10 (time NR) sessions	NR
<b>Lioffi, 2006</b>	Live + self-hypnosis + EMLA	1) EMLA + attention 2) EMLA only	3 (time NR) sessions	NR
<b>Lang, 2006</b>	Live-hypnosis before procedures	1) Empathy 2) Usual Care	1 (time NR) session	NR
<b>Lang, 2000</b>	Live-hypnosis before Procedures	Conscious sedation	1 (time NR) session	NR
<b>Lang, 1996</b>	Live-hypnosis before Procedures	Conscious sedation	1 (time NR) session	NR
<b>Harmon, 1990</b>	Live + self-hypnosis Once/day	Audio-recordings with active engagement	6 (time NR) sessions	NR
<b>Olness, 1987</b>	Live + self-hypnosis twice/day	Propranolol	5 (time NR) sessions	NR

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Flynn, 2018 (Review of trials evaluating the efficacy of hypnosis for chronic headache)[33]

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<i>Nolan, 1995</i>	Hypnosis + visual imagery + self-hypnosis	1) Non-hypnotic imagery 2) "Placebo"	NR	NR
<b><i>ter Kuile, 1994</i></b>	Live + self-hypnosis	Autogenic training	NR	NR
<i>Spanos, 1993</i>	Hypnosis + visual imagery	"Placebo"	NR	NR
<b><i>Spinhoven, 1992</i></b>	Hypnosis + visual imagery + self-hypnosis	Autogenic training	NR	NR
<i>Melis, 1991</i>	Hypnosis + visual imagery + self-hypnosis	NR	NR	NR
<i>Levinthal, 1987</i>	Direct + indirect hypnosis	Relaxation training	NR	NR
<i>Friedman, 1984</i>	Hypnosis + Thermal Imagery	1) Biofeedback 2) Relaxation	NR	NR
<i>De Fazzano, 1980</i>	Self-hypnosis	"Placebo"	NR	NR

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Provençal et al, 2018 (Review of trials evaluating the efficacy of hypnosis for pain associated with burn injury wound care)[34]

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<i>Askay, 2007</i>	Adapted RIA+audio recordings	Attention control	NR	NR
<i>Frenay, 2001</i>	"Permissive suggestion"	Stress reduction strategy	NR	NR
<i>Wright, 2000</i>	Adapted RIA	Usual care	1 (15 min) session	NR
<b><i>Patterson, 1997</i></b>	Adapted RIA	Attention Control+education	1 (25 min) session	NR
<i>Everett, 1993</i>	Adapted RIA	1) Attention control 2) Lorazepam + hypnosis 3) Lorazepam only	1 (25 min) session	NR
<b><i>Patterson, 1992</i></b>	Adapted RIA	1) No treatment 2) Attention control + education	1 (25 min) session	Psychologist

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Zech et al, 2017 (Review of trials evaluating the efficacy of hypnosis for fibromyalgia)[32]

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<b><i>Picard, 2013</i></b>	Tailored Hypnosis	Waiting list	5 (60 min) sessions	NR
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<i>Castel, 2012</i>	“Traditional” hypnosis +CBT	CBT	14 (120 min) sessions, 1 session/week	NR
<i>Castel, 2009</i>	“Traditional” hypnosis + CBT	CBT	12 (90 min) sessions, 1 session/week	“Therapist”
<i>Rucco, 1995</i>	“Ericksonian” hypnosis	Autogenic Training	“Variable”	NR
<b>Haanen, 1991</b>	“Traditional” hypnosis	Physiotherapy	8 (60 min) sessions	NR
Bowker et al, 2016 (Meta-analysis of trials evaluating the efficacy of hypnotherapy for disability-related pain)[36]				
<b>Picard, 2013</b>	Individual hypnosis + daily self-hypnosis	Waiting list	5 (60 min) sessions over 9 weeks	Psychologist
<b>Jensen, 2011</b>	Individual hypnosis and Cognitive restructuring +Daily self-hypnosis	1)Education 2) Cognitive restructuring alone	4 (30 min) sessions	Clinicians
<b>Jensen, 2009a</b>	Individual hypnosis+daily self-hypnosis	Progressive muscle relaxation	10 (time NR) sessions	Clinicians
<b>Jensen, 2009b</b>	Individual hypnosis + daily self-hypnosis	EMG biofeedback relaxation	10 (40 min) sessions	Clinicians
<i>Castel, 2007</i>	Individual hypnosis	Progressive Muscle relaxation	1 (20 min) session	Researcher
<i>Jensen, 2005</i>	Individual hypnosis	No treatment	10 (time NR) sessions	Clinicians
<i>Rickard, 2004</i>	Individual hypnosis	Waiting list	5 (60 – 90 min) Sessions	NR
<b>Gay, 2002</b>	Individual hypnosis	1)Waiting list 2) Jacobson’s relaxation	8 (30 min) session	Psychologist+Students
<i>Horton, 2000</i>	Group therapy + Self-hypnosis	1)Waiting list 2) Relaxation	10 (90 min) sessions, once per week	NR
<b>Haanen, 1991</b>	Individual hypnosis	Physical therapy	8 (60 min) sessions over 3 months	Hypno-therapist
Madden et al, 2016 (Review of trials evaluating the efficacy of hypnosis for labour pain)[15]				
<b>Downe, 2015</b>	Group therapy+Self-hypnosis	Usual care	2 (90 min) sessions	NR

<b>Werner, 2013</b>	with audio recordings Group therapy + Self-hypnosis with audio recordings	1) Relaxation 2) Usual care	3 (60 min) sessions	NR
<i>Cyna, 2011</i>	Group therapy+Self-hypnosis using audio recordings	No treatment	3 (time NR) sessions	Hypnotherapist or a nurse with-out hypnosis training
<i>Fisher, 2009</i>	Hypnobirthing course (group)	Usual Care	NR	NR
<i>Mehl-Madrona, 2004</i>	Individual hypnosis	Supportive psychotherapy	NR	Author
<i>Martin, 2001</i>	Individually tailored hypnosis treatment	Supportive counselling	4 (time NR) sessions	NR
<b>Harmon, 1990</b>	Group session once + audio recordings	Control audiorecording (content unspecified)	7 (time NR) sessions	NR
<i>Freeman, 1986</i>	Individual hypnosis	Usual care	Variable: weekly (time NR) sessions from 32nd week of pregnancy	NR
<i>Rock, 1969</i>	“Standard” hypnosis	Usual care	NR	Medical student
Cramer et al, 2015 (Review evaluating the efficacy of hypnosis for pain associated with breast cancer treatment and evaluation procedures)[29]				
<i>Butler, 2009</i>	Hypnosis + Supportive expressive therapy	Self-directed education	48 (time NR) sessions, 1/week for 12 months	Physician or psychologist
<i>Montgomery, 2007</i>	Live standardized hypnosis	Attention control	1 (time NR) session	NR
<b>Lang, 2006</b>	Live standardized hypnosis	1) Usual care 2) Attention control	1 (time NR) session	Student or physician
<i>Montgomery, 2002</i>	Live standardized hypnosis	Usual care	1 (time NR) session	Clinical psychologist
<i>Spiegel, 1983</i>	Self-hypnosis +Psychological support group	1) Psychological Support group 2) Usual Care	48 (time NR) sessions, 1/week for 12 months	Counsellors
Zhang et al, 2015 (Review evaluating the efficacy of hypnosis for temporomandibular disorders)[30]				

<i>Angelone, 2008</i>	Hypnosis + Deep relaxation	Attention Control	NR	Psychotherapist
<i>Winocus, 2002</i>	Hypno-relaxation	No treatment	NR	Hypno-therapist
Adachi et al, 2014 (Review evaluating the efficacy of hypnosis for chronic pain)[16]				
<i>Abrahamsen, 2009</i>	Hypnosis + self-hypnosis using audio recordings	Relaxation and visualization	4 (60 min) sessions	NR
<b><i>Castel, 2009</i></b>	Hypnosis + CBT + self-practice using audio recordings (in group)	1) CBT 2) Usual care	12 (90 min) sessions	NR
<b><i>Jensen, 2009a</i></b>	Hypnosis + self-hypnosis using audio recordings	Progressive muscle relaxation	10 (time NR) sessions, frequency varied	NR
<b><i>Jensen, 2009b</i></b>	Hypnosis + self-hypnosis using audio recordings	Biofeedback	10 (time NR) sessions, frequency varied	NR
<i>Abrahamsen, 2008</i>	Hypnosis + self-hypnosis using audio recordings	Relaxation and visualization	3 to 6 sessions (time NR)	NR
<i>Jones, 2006</i>	Hypnosis + self-hypnosis using audio recordings	Supportive psycho-therapy	12 (30 min) sessions	NR
<b><i>Gay, 2002</i></b>	Jacobson's hypnosis	1) Progressive muscle relaxation 2) No treatment	8 (30 min) sessions, 1/week	NR
<i>Palsson, 2002</i>	Hypnosis + self-hypnosis using audio recordings	Waiting List	7 (45 min) sessions, 2/week	NR
<b><i>ter Kuile, 1994</i></b>	Hypnosis + self-hypnosis using audio recordings twice daily	1) Autogenic training 2) Waiting List	7 (60 min) sessions, 1/week	NR
<b><i>Spinhoven, 1992</i></b>	Hypnosis + self-hypnosis using audio recordings twice daily	Autogenic training	4 (45 min) sessions, 2/week	NR
<i>Zitman, 1992</i>	Future-oriented hypnotic imagery + audio Recordings (49 hrs of self-practice)	1) Future oriented imagery 2) Autogenic training	8 (300 min total), sessions, frequency NR	NR

<i>van Dyck, 1991</i>	Future-oriented hypnotic imagery + audio recordings (25hrs of self-practice)	Autogenic training	4 (150 min total) sessions, frequency NR	NR
Birnie et al, 2014 (Review of trials evaluating the efficacy for procedural pain in children and adolescents)[28] (Note: data for two studies not provided by reviewers)				
<i>Huet, 2011</i>	Three-step “Ericksonian” procedure (during procedure)	Standard Care	NR	Hypno-therapist
<i>Liossi, 2009</i>	Hypnosis using visual imagery and analgesic suggestion + self-hypnosis training using Gardner’s model + EMLA	Attention control + EMLA	NR	NR
<b><i>Liossi, 2006</i></b>	Hypnosis using visual imagery and analgesic suggestion + self-hypnosis training + EMLA	Attention control + EMLA	NR	NR
<i>Liossi, 2003</i>	Analgesic or non-analgesic	Usual care + attention hypnotic suggestion before control and during procedure	NR	NR
<b><i>Liossi, 1999</i></b>	Hypnosis using visual imagery and analgesic suggestion + usual care	Usual care	NR	NR
<i>Kuttner, 1988</i>	Hypnotic suggestion using child’s favourite story	1) Distraction 2) Usual care	NR	Therapist
<i>Katz, 1987</i>	Training for self-hypnosis based on active imagery tailored to the child’s interest (pre-treatment)	Play session	NR	Psychologist
Cheseaux et al, 2014* (Review of trials evaluating the efficiency of hypnosis for pain associated with medical procedures)[18]				
<b><i>Slack, 2009</i></b>	Audio recorded hypnosis	Active control	1 (20 min) session	NR

<b>Montgomery, 2007</b>	Live hypnosis	Active control	1 (15 min) session	NR
<b>Montgomery, 2002</b>	Live hypnosis	Inactive control	1 (10 min) session	NR
<i>Ghoneim, 2000</i>	Audio recorded hypnosis	Inactive control	“Several” (time NR) sessions	NR
<b>Liossi, 1999</b>	Live hypnosis	Active control	2 (30 min) sessions	NR
<i>Enqvist, 1997</i>	Audio recorded hypnosis	Inactive control	20 min sessions, number of sessions NR	NR
<i>Enqvist, 1997</i>	Audio recorded hypnosis	Inactive control	“Several” (20 min) sessions	NR
<b>Patterson, 1997</b>	Live hypnosis	Active control	1 (25 min) session	NR
<i>Lambert, 1996</i>	Live hypnosis	Active control	1 (30 min) session	NR
<b>Everett, 1993</b>	Live hypnosis	Active control	1 (25 min) session	NR
<b>Patterson, 1992</b>	Live hypnosis	Both	1 (25 min) session	NR
<i>Wall, 1989</i>	Live hypnosis	Active control	2 (time NR) sessions	NR
<b>Katz, 1988</b>	Live hypnosis	Inactive control	2 (20 to 30 min) sessions	NR

Note: Trials listed with the first author and date **in bold face text** are trials that have been included in more than one review.

NR= Not reported, EMG= Electromyography; EMLA = Eutectic Mixture of Local Anaesthetics; RIA = Rapid Induction Analgesia ([37]); CBT= Cognitive Behavioural Therapy;

\* Cheseaux et al, 2017- Reviewer’s note: For types of hypnosis intervention used, 4 RCTs used Barber’s RIA technique [37], 3 used Rhue’s technique ([55]), and one each used techniques described by the authors as Ericksonian [56], Enqvist’s [57], Elmal’s [58], Olness and Gardner’s technique [59]. 7 RCTs described hypnosis intervention in detail but they were not based on a particular model or approach. Active comparators included non-directive empathetic listening, attention support, CBT, discussion about medical procedures. For inactive comparators, 5 RCTs used no intervention.

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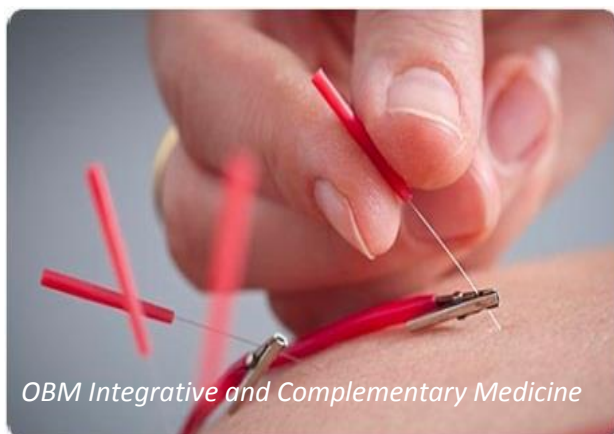
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