

## REVIEW ARTICLES

# Hypnosis Intervention Effects on Sleep Outcomes: A Systematic Review

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**Study Objectives:** Sleep improvement is a promising target for preventing and modifying many health problems. Hypnosis is considered a cost-effective and safe intervention with reported benefits for multiple health conditions. There is a growing body of research assessing the efficacy of hypnosis for various health conditions in which sleep was targeted as a primary or secondary outcome. This review aimed to investigate the effects of hypnosis interventions on sleep, to describe the hypnotic procedures, and to evaluate potential adverse effects of hypnosis.

**Methods:** We reviewed studies (prior to January 2017) using hypnosis in adults for sleep problems and other conditions comorbid with sleep problems, with at least one sleep outcome measure. Randomized controlled trials and other prospective studies were included.

**Results:** One hundred thirty-nine nonduplicate abstracts were screened, and 24 of the reviewed papers were included for qualitative analysis. Overall, 58.3% of the included studies reported hypnosis benefit on sleep outcomes, with 12.5% reporting mixed results, and 29.2% reporting no hypnosis benefit; when only studies with lower risk of bias were reviewed the patterns were similar. Hypnosis intervention procedures were summarized and incidence of adverse experiences assessed.

**Conclusions:** Hypnosis for sleep problems is a promising treatment that merits further investigation. Available evidence suggests low incidence of adverse events. The current evidence is limited because of few studies assessing populations with sleep complaints, small samples, and low methodological quality of the included studies. Our review points out some beneficial hypnosis effects on sleep but more high-quality studies on this topic are warranted.

**Keywords:** hypnosis, hypnotherapy, nonpharmacological, sleep disturbance, systematic review

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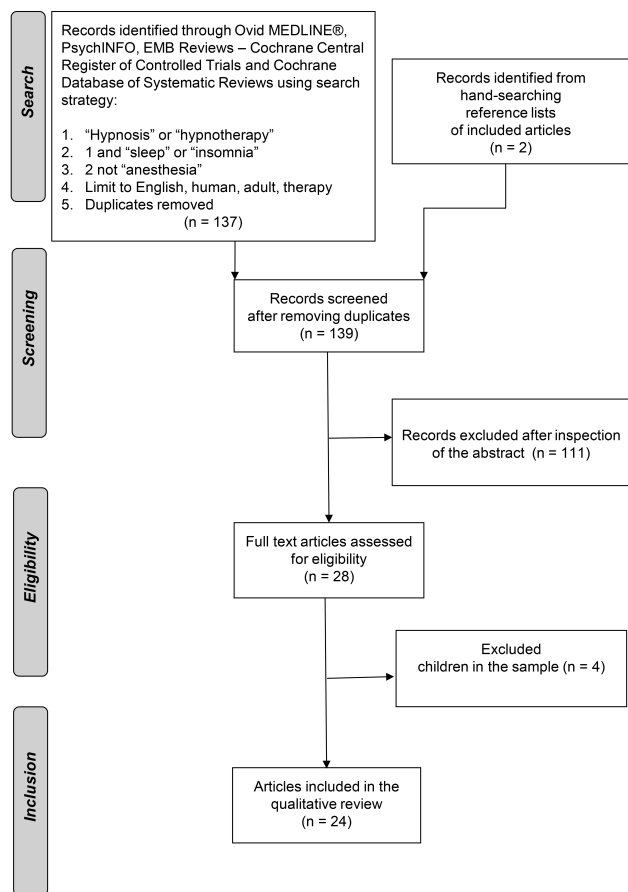
## INTRODUCTION

Up to 35% to 40% of the adult population in the United States suffers from sleep disturbances.<sup>1,2</sup> Sleep problems may be precursors to many health issues, including cardiovascular disease, diabetes, mental health problems, and dementia.<sup>3–6</sup> Therefore, timely treatment of sleep disturbances can contribute to prevention and modification of many health conditions often comorbid with sleep problems.

Conventional methods for treating sleep problems include pharmacological and nonpharmacological approaches. Sedative-hypnotic medications are commonly prescribed for sleep problems<sup>7</sup>; however their long-term effects remain unclear.<sup>8</sup> Among nonpharmacological approaches, cognitive behavioral therapy for insomnia (CBT-I) has been endorsed as a first-line treatment for chronic sleep problems.<sup>8</sup> Despite these choices the general public has a growing interest in pursuing integrative medicine approaches to complement conventional methods for alleviating sleep problems,<sup>9–11</sup> due to a common perception that integrative medicine approaches are safe and cost-effective. One such approach is hypnosis, the state of consciousness that involves focused attention and reduced peripheral awareness and that brings about an enhanced capacity for response to suggestion.<sup>12</sup> Hypnosis is appealing to clinicians and patients because it is typically brief and can provide long-term symptom relief; furthermore, this approach can be tailored to match the health complaint and patient characteristics.

Hypnosis has gained recognition as an effective therapy for managing pain and for relieving cancer treatment side effects and stress-related disorders.<sup>13–16</sup> However, the evidence highlighting specific benefits of hypnosis for sleep problems is scarce.<sup>11,17</sup> The most recent review and meta-analysis assessing the efficacy of randomized controlled trials (RCTs) that evaluated the effect of hypnotherapy on sleep disorders included 13 studies (6 assessing hypnotherapy and 7 assessing autogenic training or guided imagery, comprising 503 participants).<sup>17</sup> Eleven of the included studies were of low methodological quality. This meta-analysis indicated hypnotherapy and hypnotherapy-like treatments shortened sleep latency compared to waitlist but not to sham intervention. Overall, the review and meta-analysis indicated some positive effects of hypnosis interventions on sleep. However, due to low sample size and methodological limitations the authors questioned the generalizability of the positive results and called for more research in this area because of the few rigorous RCTs to provide convincing generalizable evidence.<sup>17</sup>

In addition to RCTs focusing specifically on sleep problems, there has been a growing body of research focusing on conditions often comorbid with sleep problems (eg, pain, posttraumatic stress disorder [PTSD]), in which sleep was included as an outcome measure. This body of research is also of interest in evaluating hypnosis and its effects on sleep. Further, evaluating studies with other prospective designs may be of value to clarify the benefits of hypnotherapy for sleep outcomes.

**Figure 1**—Search strategy and study inclusion.

The objective of this systematic review was to further describe and evaluate the available evidence on hypnosis for sleep improvement. Our goals also included describing the intervention procedures (eg, duration, techniques) and assessing adverse experiences associated with the hypnosis. To reach our objectives, we included RCTs and other study designs that tested hypnosis for sleep problems or a health condition comorbid with sleep problems to gain a more comprehensive perspective on procedures and adverse effects potentially linked to hypnosis.

## METHODS

### Literature Search

Records of Ovid MEDLINE, PsychINFO, EMB Reviews, and Cochrane Central Register of Controlled Trials and Cochrane Database of Systematic Reviews were searched to include the work published before January 12, 2017. The search strategy is described in **Figure 1**.

### Study Selection and Classification

Inclusion criteria were: (1) primary research published in English in a peer-reviewed scientific journal; (2) RCTs or prospective studies with at least 10 subjects; (3) included

adults (18 years or older), regardless of health conditions; (4) outcomes of interest included measurable objective or subjective data reflecting sleep quality; and (5) hypnosis or hypnotherapy studied alone or as a part of a multicomponent intervention. Only interventions defined as “hypnosis,” “hypnotherapy” or “hypnotic” were considered. Approaches such as guided imagery or relaxation methods often used along with hypnosis were not included in this review on their own unless described as “hypnotic” to minimize heterogeneity in intervention approaches and to ensure that the interventions were likely to result in development of a hypnotic state with an increased capacity for response to suggestion inherent in hypnosis definition.<sup>12</sup> The full text of studies meeting the inclusion/exclusion criteria, the relevant review articles, and the articles with insufficient information to determine eligibility from the abstract were retrieved and reviewed by two authors for determination for inclusion in this review (**Figure 1**).

### Methodological Quality Assessment

The methodological quality of the included publications was evaluated using the modified Scale for Assessing Scientific Quality of Investigation-Complementary and Alternative Medicine (SASQI-CAM) version.<sup>18</sup> The scale was derived from previous work<sup>19</sup> with several items added for improving the quality of research on CAM and integrative medicine approaches based on expert suggestions.<sup>20,21</sup> This modified 19-item scale has scores ranging from zero to 20, and it is specifically adapted to take into account special features of integrative medicine research (eg, challenges in blinding participants to the study interventions). A SASQI-CAM score higher than 9 is considered to be of sufficient scientific quality.<sup>22</sup> Two reviewers independently assessed the risk of bias of each study in accordance with the guidelines provided for complementary and integrative approaches.<sup>18</sup> Any discrepancies were resolved by consensus.

### Data Extraction and Ratings

Both quantitative and qualitative data related to the study characteristics and outcome measures of interest were extracted for this review. For each study, data were extracted by one of the trained staff and then reviewed by a second member. Again, any discrepancies were resolved by consensus. The following data were collected: type of study, country where study was conducted, medical condition, number of participants, mean age, sex, whether sleep was primary or secondary outcome, hypnosis provider qualifications, hypnosis intervention type, intervention procedures, intervention length, length of trial, control groups, follow-up periods, rate of intervention completion, outcome measures, and results at postintervention and follow-up.

The outcomes were classified as positive when  $\geq 50\%$  of assessed sleep items had values of  $P < .05$  or were described as more effective compared to a control group, mixed when fewer than 50% of measured items were positive; and negative when no group improved or both intervention and control groups improved but were not significantly different from each other.

## RESULTS

### Overview of the Included Studies

We identified 139 studies via searches, of which 24 met our inclusion criteria.<sup>23–46</sup> The data from these publications were synthesized for qualitative analyses. Quantitative analyses and meta-analytical techniques were not applied due to heterogeneity related to the diversity of assessed populations and health conditions, as well as wide variability in hypnosis interventions and outcome measures.

**Table 1** provides more detailed information about the included studies. The included studies were published between 1973 and 2016. More than half of the included studies (54.2%) were conducted in the United States, with the rest conducted in European countries (37.5%) including Denmark, England, France, Spain, and Switzerland; or countries in other regions (8.3%) including Australia, Canada, and Israel. The included studies collectively assessed 1,330 participants. The average study sample size was 55.3 (standard deviation = 43.7) with the range of 14 to 187. The participants' ages ranged from 18 to 83 years (weighted average for the 19 studies where participants' ages were reported was 41.2 years), and typically most of the participants for whom the sex was reported were women (mean = 66.1%, range 21% to 100%). The studies assessed participants with diverse health conditions including insomnia or other sleep complaints (eg, sleep walking or sleep terror), depressive symptoms, PTSD, cancer, chronic pain conditions including low back, orofacial, temporomandibular pain, irritable bowel syndrome, and fibromyalgia. Studies also enrolled participants suffering from hot flashes, as well as healthy participants, including college and medical students. Most of the included studies (66.7%) did not require sleep complaints for study inclusion.

Among the controlled studies (75.0% of all included studies), 72.2% used active control groups (eg, relaxation, sedative-hypnotic medication, therapy, simple monitoring, structured attention, education, stimulus response), 16.7% employed non-active control groups (eg, standard treatment, waitlist), and 11.1% employed both active and nonactive control groups.

Sleep-related outcomes were primary in 50% of the included studies. The outcomes ranged from objective sleep assessment using polysomnography to custom sleep diaries. Most commonly used sleep assessments were the Pittsburgh Sleep Quality Index (PSQI)<sup>47</sup> and the Medical Outcomes Survey (MOS) sleep problem index.<sup>48</sup> Both instruments assess several dimensions of sleep quality (eg, sleep initiation, maintenance, etc.) over the previous month; both PSQI and MOS have been shown to have adequate reliability and validity in various settings and with diverse populations<sup>47,49–53</sup> and are intended to be standardized sleep assessments for clinicians and researchers. The custom instruments used in 29.2% of the included studies were primarily diary-like assessments; however, it is difficult to ascertain the exact nature of the assessed outcomes when such custom instruments have been used.

Forty-five percent of the included studies assessed hypnosis effects not only immediately following the intervention but also included additional follow-up assessments. Follow-up periods ranged from 1 month to 24 months postintervention.

### Methodological Quality Assessment

Of the included studies, 58.3% were RCTs. This review included other controlled trials such as within-subject crossover studies<sup>30,31</sup> (16.7%), pre-post prospective observational studies<sup>32,37,41,42,46</sup> (20.8%), and one RCT in which both arms underwent hypnosis following the completion of other treatments conditions.<sup>26</sup> This RCT was considered pre/post in regard to the hypnosis portion of the intervention.<sup>26</sup>

The mean overall SASQI-CAM score<sup>18</sup> of the included studies was 10 out of 20 possible (standard deviation = 4.3) and the range was 3 to 17. The most commonly missed quality items were SASQI-CAM item 6, related to assessing subject's expectations of benefits from the intervention, with only one publication<sup>33</sup> explicitly describing this, and item 10, which focused on monitoring and reporting side effects and adverse events; this information was included in only 2 publications.<sup>33,39</sup> More recently published work received higher methodological quality scores compared to earlier research (**Table 2**).

### Comparison of Positive, Mixed, and Negative Studies

Of 24 of the included studies, more than half (58.3%) reported a positive effect of the hypnosis intervention on the assessed sleep outcome over time. Mixed results indicating improvements in some but not all sleep outcomes were presented in 12.5% of the included studies. The rest of the publications (29.2%) demonstrated negative results, with no effects of hypnosis or comparable effects of hypnosis and control conditions on sleep outcomes.

**Table 3** presents comparisons of the positive, mixed, and negative studies on several variables. Positive and negative studies had similar average methodological quality scores (presented as mean  $\pm$  standard deviation:  $9.4 \pm 4.7$  and  $9.9 \pm 4.6$ , respectively), average sample size ( $53.6 \pm 43.2$  and  $50.7 \pm 48.4$ , respectively), and average intervention duration ( $3.8 \pm 2.0$  and  $3.6 \pm 2.0$  hours, respectively). Among studies with negative hypnosis effects on sleep outcomes, 85.7% were RCTs and 85.7% used an active control group. Among the studies reporting positive effects, only 50% were RCTs, and an active control group was used in 50% of the positive studies, with 14.3% using a nonactive control group and 35.7% employing no control group. Samples with sleep complaints were recruited in 35.7% of the studies reporting a positive effect of hypnosis on sleep and in 28.6% of the studies reporting negative hypnosis effects on sleep. Next, sleep was the primary outcome in 57.1% of the studies showing benefits of hypnosis for sleep and in 42.9% of the studies showing no hypnosis effect on sleep.

### Description of the Subset of Studies Targeting Sleep

Only one-third of the reviewed studies had inclusion criteria requiring participants to have sleep disturbances. Considering only the studies recruiting samples with sleep problem, most of them (62.5%) reported positive findings, 12.5% reported mixed results, and 25.0% reported negative results. All except one of these studies were controlled, and two studies focused on mechanistic aspects of hypnosis for sleep outcomes rather than efficacy. **Table 4** shows comparisons of the positive, mixed, and negative studies that enrolled samples with

**Table 1—Description of the included studies.**

Source Author(s), Year, Country	Study Design and Control Condition(s)	Study Population Age, % Female, Sample Size, Previous Insomnia Treatments	Hypnosis Intervention and Procedures	Follow-Up Period	Hypnosis Provider	Sleep Outcome Measures: 1 <sup>o</sup> or 2 <sup>o</sup>	Completion Rate (Reasons for Stopping)	Findings
<b>Studies enrolling samples with sleep problems</b>								
Abramowitz, Barak, Ben-Avi, Knobler, 2008, Israel	2-arm RCT with Zolpidem (10 mg for 14 days) control	Combat veterans with PTSD suffering from insomnia, moderately hypnotizable, mean age 31.7 (12–40 range), sex not specified, n = 32, psychotherapy and SSRIs (mean treatment duration 9 months)	Two individual 1.5-hour sessions per week for 2 weeks (6 hours overall) Intervention included age-regression to earlier periods with normal restorative sleep, ego-strengthening suggestions and symptom-oriented hypnotic suggestions. Sleep hygiene instructions to all participants	Following 2 weeks of treatment and 1 month posttreatment	Psychiatrist experienced and certified in hypnosis	Daily monitoring questionnaire assessing sleep: 1 <sup>o</sup> outcome	Hypnosis: 100% Control: 93.8% (adverse reaction to study drug)	Significant improvement in PTSD symptoms and sleep variables (quality of sleep, number of night awakenings, ability to concentrate upon awakening, morning sleepiness) in the hypnosis group compared to control, all Ps < .01
Anderson, Dalton, Basker, 1979, England	Crossover RCT for first 4 weeks with Mogadon and placebo, following 4 weeks of RCT with Mogadon and placebo hypnosis training was administered to both groups in pre-post design	Patients suffering from insomnia for 3 or more months, mean age 46.1 (29–60 range), 11.1% female in completers, n = 18, no previous treatment reported	At least 4 individual sessions of treatment included hypnosis for insomnia using a short-term approach with ego-strengthening and suggestions. Autohypnosis training was also provided	Following a 10-week treatment	Experienced hypnotists	Daily custom measure assessing time to sleep, sleep duration, quality of sleep, waking state averaged over 2 weeks: 1 <sup>o</sup> outcome	100% during hypnosis phase of the study	Reports of longer and better sleep after autohypnosis than other treatments
Barabasz, 1976, United States	4-arm RCT with cerebral electrotherapy (CET), CET + placebo, CET + hypnosis, placebo + hypnosis groups	Adult psychiatric patients with mild depressive neurosis reporting sleep disturbances; ages, sex not specified, n = 60, no previous treatment reported	Two individual sessions with sleep-specific suggestions	Following treatment completion time frame not specified	Not specified	Custom scale rating progress in therapy specific to sleep quality: 1 <sup>o</sup> outcome	Not reported	Passive hypnosis with CET benefited treatment of sleep disturbance in mildly depressed patients, P < .05
Borkovec, Fowles 1973, United States	4-arm RCT with hypnotic relaxation, progressive relaxation, self-relaxation, and wait-list controls	College students with self-reported sleep disturbances, ages, sex not specified, n = 37, no previous treatment reported	Three individual 1-hour hypnosis sessions spaced a week apart with direct suggestions for relaxation. Home practice of learned technique encouraged twice daily	One week after the 3-week treatment	Male graduate students in clinical psychology	Custom measure of items: minutes before falling asleep, number of awakenings, number of time awoken and difficulties falling asleep, difficulty to fall asleep, and feeling rested upon awakening during previous week: 1 <sup>o</sup> outcome	Hypnosis: 90% (missed appointment) Progressive relaxation: 90% (missed appointment) Self-relaxation: 90% (missed appointment) Waitlist: 100%	Hypnotic and relaxation groups were equally effective in improving sleep, numbers of awakenings, and feeling rested in the morning compared to wait-list control, Ps < .05
Galovsky, Mott, Blain, Elwood, Gloth, 2016, United States	2-arm RCT with hypnosis or symptom-monitoring control prior to trauma-focused CPT	Assault survivors with PTSD with significant sleep impairment, mean age 36.87, (18–70 range), 100% female, n = 108, therapy excluding CPT, pharmacological treatments	Three weekly 1-hour individual session of standardized and scripted sleep-directed hypnosis specifically targeted sleep impairment	Following completion of 3-week sleep intervention and at 2 weeks and 3 months posttreatment	PhD and Masters level therapists trained in sleep-directed hypnosis	PSQI, ISI: 2 <sup>o</sup> outcome	Hypnosis: 50% Control: 44.6% (psychosocial stressors including logistics, illness for both groups)	Hypnosis condition prior to CPT showed significantly greater improvement in sleep and depression compared to control group, P < .05. After CPT both condition demonstrated significant benefit for sleep and PTSD and hypnosis did not augment gains in PTSD recovery during the trauma-focused intervention
Graham, Wright, Toman, Mark, 1975, United States	Prospective controlled study with hypnosis and relaxation control	Student volunteers with self-reported difficulties to fall asleep, age and sex not specified, n = 22, no previous treatment reported	Four 30-minute sessions of self-hypnosis training on general relaxation, total intervention time 2 hours, home practice encouraged	At the end of the semester following treatment completion and 4 months after that	Not specified	Custom measures of sleep problem rating, time to sleep: 1 <sup>o</sup> outcome	Hypnosis: 82% Control: 91% (failed to complete sleep data in both groups)	Hypnosis group failed to show improvements in self-reported incidence of insomnia compared to relaxation group who improved
Hurwitz, Mahowald, Schenck, Schluter, Bundlie, 1991, United States	Pre-post	Patients with sleep walking and sleep terror, mean age 29 (18–51 range), 29.6 % female, n = 27, previous treatment not specified	One to six individual hypnosis with visualizing self in a film sleeping peacefully through the night, instruction in self-hypnosis, audio recording provided for home practice	Variable follow-up times (6–56 months range)	Psychiatrist experienced in sleep medicine and clinical hypnosis	Custom self-reported scale assessing sleep problems, PSG: 1 <sup>o</sup> outcome	100%	74% of patients indicated improvement after hypnotic training, 26% reported no change, and 0% reported worsening of parasomnia after intervention
Stanton, 1989, Australia	3-arm RCT with hypnotic relaxation, stimulus control and placebo control	People with insomnia, mean age 23–67 range, 57.8% female, n = 45, previous treatment not specified	Four weekly 30-minute sessions of hypnotic relaxation with visualizations including relaxing scenes, special place etc. Sleep hygiene instructions to all participants	Following completion of 4-week treatment.	Not specified	Sleep diary reports averaged over one week: 1 <sup>o</sup> outcome	100%	Only hypnosis group experienced a significantly decreased sleep onset latency, P = .01, lower than the stimulus control or placebo group P < .05

Green shaded = studies reporting positive results. Gray shaded = studies reporting mixed results. CBT = cognitive behavioral therapy, CET = cerebral electrotherapy, CPT = cognitive processing therapy, IBS = irritable bowel syndrome, ISI = Insomnia Sleep Index, MOS = Medical Outcomes Study, PSG = polysomnography, PSQI = Pittsburgh Sleep Quality Index, PTSD = posttraumatic stress disorder, QLQ-C30 = Quality of Life Questionnaire for Cancer, QOL = quality of life, RCT = randomized controlled trial, SD = standard deviation, SSRI = selective serotonin reuptake inhibitor, SWS = slow wave sleep, VMWH = Valencia Model of Waking Hypnosis.

Table 1 continues on the following page

Table 1 (continued)—Description of the included studies.

Source Author(s), Year, Country	Study Design and Control Condition(s)	Study Population Age, % Female, Sample Size, Previous Insomnia Treatments	Hypnosis Intervention and Procedures	Follow-Up Period	Hypnosis Provider	Sleep Outcome Measures: 1 <sup>o</sup> or 2 <sup>o</sup>	Completion Rate (Reasons for Stopping)	Findings
<b>Studies enrolling samples without sleep problem requirement</b>								
Abrahamsen, Zachariae, Svensson 2009, Denmark	2-arm RCT with hypnotic intervention and simple relaxation control	Patients with temporomandibular disorders, mean age 38 (SD = 10.8), 100% female, n = 43, no previous treatment reported	Four 1-hour individually-tailored hypnosis with suggestions for controlling pain perception, audio recording for home practice provided	After all treatment sessions, time frame not specified	The dentist with special training in hypnosis	PSQI: 2 <sup>o</sup> outcome	Hypnosis: 95.2% (psychiatric admission unrelated to treatment) Control: 90.9% (serious private problems)	Hypnosis benefited primary outcome pain. Both groups exhibited decrease in number of awakenings due to pain, $P < .006$
Abrahamsen, Baad-Hansen, Svensson 2008, Denmark	2-arm RCT with hypnosis and simple relaxation control	Patients with persistent idiopathic orofacial pain, mean age 56, (SD = 1.9), 85.4% female, n = 44, no previous treatment reported	5 planned sessions with individually-tailored hypnosis with suggestions for controlling pain perception and dissociation from pain, audio recording for home practice provided	Following completion of 5-week treatment.	The study clinician	PSQI: 2 <sup>o</sup> outcome	Hypnosis: 86.4% (felt better, felt treatment sufficient) Control: 86.4% (private problems, unsure of treatment benefit)	Statistically and clinically significant reductions in primary outcome pain with hypnosis. Improvement in sleep quality from baseline to the last treatment with no differences between hypnosis and control groups
Castel, Cascon, Padrol, Sala, Rull 2012, Spain	3-arm RCT with CBT, CBT+ hypnosis and standard of care control	Patients with fibromyalgia, mean age 49.6 (SD = 6.8), 96.8% female, n = 93, conventional pharmacological treatment for chronic pain	One 2-hour individual session of using analgesic self-hypnosis training with analgesic suggestions, hypnosis exercises, audio recording for home practice provided	Posttreatment, at 3- and 6-month follow-up visits	Psychologist	MOS sleep scale: 2 <sup>o</sup> outcome	CBT+ hypnosis: 93.1% CBT: 91.2% Control: 96.7% (reasons for not completing treatments not specified)	Adding hypnosis to CBT enhanced the efficacy of CBT for psychological distress $P < .0001$ . CBT+ hypnosis group showed significant effects on improving sleep, the effects persisted through 6 months posttreatment and were similar to CBT-alone group
Cordi, Schlarb, Rasch 2014, Switzerland	Crossover placebo controlled with within-subject conditions: hypnosis with deep sleep suggestions, hypnosis with shallow sleep suggestions, learning text and simulated hypnosis controls	Generally healthy young women; mean age 23.27 (SD = 3.17), 100% female, n = 70, no previous treatment reported	13-minute hypnosis recording with hypnosis focusing on suggestions for deeper sleep using a metaphor of a fish swimming deeper in the ocean	Following a single hypnosis session	Not specified	PSG assessed SWS: 1 <sup>o</sup> outcome	100%	Hypnotic suggestions to sleep deeper in healthy highly susceptible females resulted in significant increase in SWS amount, $P = .013$ , Cohen $d = .77$ , increased slow wave activity due to hypnosis, $P = .03$ correlated with time spent in SWS
Cordi, Hirsiger, Merillat, Rasch 2015, Switzerland	Crossover placebo controlled study with within-subject conditions: hypnosis with suggestions for deep sleep and neutral text control	Healthy elderly, mean age 67.1 (SD = 4.26), 100% females, n = 42, no previous treatment reported	Hypnosis recording focusing on suggestions for deeper sleep using a metaphor of a fish swimming deeper in the ocean	Following a single hypnosis session	Not specified	PSG assessed SWS: 1 <sup>o</sup> outcome	100%	Highly hypnotizable older women showed 57% SWS increase after hypnosis recording compared to control recording, $P = .036$ , and shorter latency to SWS, $P = .039$ , and increase in prefrontal SWS power, $P = .044$
Crawford et al. 1998, United States	Pre-post study	Patients with chronic low back pain, mean age 29 (range 19–43), sex not specified, n = 17, no previous treatment reported	Three 1-hour sessions separated by 1 week with hypnosis with suggested analgesia (total intervention 3 hours), home practice encouraged	Minimum 1 week after completing 3 weeks of the study	Researcher, not specified	Custom sleep quality questionnaire: 2 <sup>o</sup> outcome	88.2% (schedule conflict, head injury during the study, inadequate EEG recording for pain assessment)	Following hypnosis patients reported reduced time to fall asleep, $P < .001$
Elkins et al. 2008, United States	2-arm RCT with hypnosis and no treatment control	Breast cancer survivors with hot flashes, mean age 56.5, 100% female, n = 60, no previous treatment reported	Five weekly 50-minute individual hypnosis sessions with mental imagery and suggestions for relaxation and coolness, audio recording for home practice provided	After completing 5 weeks of treatment.	Clinician with a doctoral degree in psychology trained in hypnotherapy	MOS sleep scale: 2 <sup>o</sup> outcome	Hypnosis: 90% Control: 80% (too busy, personal reasons, not reachable for both groups)	Significant improvements in primary outcomes (hot flash frequency and severity) and benefits for sleep in hypnosis intervention group, $P < .005$
Elkins, Fisher, Johnson, Carpenter, Keith 2013, United States	2-arm RCT with hypnosis or structured-attention control	Post-menopausal women with hot flashes, mean age 55 (39–75 range), 100% female, n = 187, no previous treatment reported	Five weekly 45-minute sessions of individualized hypnosis with suggestions for coolness, safe place imagery, and relaxation, audio recording for home practice provided	Following 5-week treatment period at weeks 6 and 12	Therapists trained in clinical hypnosis	PSQI: 2 <sup>o</sup> outcome	Hypnosis: 93.5% Control: 96.8% (did not provide outcome data for both groups)	Hypnosis group significantly improved on primary outcome (hot flashes reduction) compared to control, $P < .001$ , sustaining the benefit at 12-week follow-up. Hypnosis group also significantly improved on sleep quality compared to control, $P < .001$
McCauley, Thelen, Frank, Willard, Callen 1983, United States	2-arm RCT with hypnosis and relaxation control	Patients with chronic low back pain, mean age 40.8 (17–73 range), 76.5% female, n = 22, all reasonable medical treatments for pain tried and unsuccessful	Eight weekly 50-minute individual self-hypnosis training sessions teaching hypno-analgesic techniques (age regression, dissociations, fantasy, change in pain image, glove anesthesia, hypnoplasty)	1 week and 3 months after completing 8-week treatment	Psychiatrist, clinical psychologist and clinical psychology grad student	McGill Pain Questionnaire (sleep-related reporting): 2 <sup>o</sup> outcome	Hypnosis: 90% Control: 66.7% (equivocal motivation)	Both self-hypnosis and relaxation were effective but no one was superior to another. Self-hypnosis group reported less time to sleep onset over time, $P < .01$ , and their medication use rate was less problematic

Green shaded = studies reporting positive results. Gray shaded = studies reporting mixed results. CBT = cognitive behavioral therapy, CET = cerebral electrotherapy, CPT = cognitive processing therapy, IBS = irritable bowel syndrome, ISI = Insomnia Sleep Index, MOS = Medical Outcomes Study, PSG = polysomnography, PSQI = Pittsburgh Sleep Quality Index, PTSD = posttraumatic stress disorder, QLQ-C30 = Quality of Life Questionnaire for Cancer, QOL = quality of life, RCT = randomized controlled trial, SD = standard deviation, SSRI = selective serotonin reuptake inhibitor, SWS = slow wave sleep, VMWH = Valencia Model of Waking Hypnosis.

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Mendoza et al. 2016, United States	2-arm crossover RCT with VMWH-CBT and education control	Cancer patients, mean age 61 (SD = 12.2), 89% female, n = 44, no previous treatment reported	Four 1-hour sessions with training in self-hypnosis, home practice encouraged	Following completion of 4-week treatment and 4 weeks and 3 months after that	Study clinician	MOS sleep problem index: 1 <sup>o</sup> outcome	100% for initial treatment	This study supports the beneficial effects of the experimental intervention relative to a control condition, with significant improvements in sleep problems, fatigue and average pain intensity, $P_s < .001$ . The treatment gains remained stable at 3-month follow-up
Picard et al. 2013, France	2-arm RCT with hypnosis wait-list control	Patients with fibromyalgia, mean age 48.7, 100% female, n = 62, no previous treatment reported	Five 1-hour individual custom sessions directed towards enhancing competence and mastery in managing pain and stress	At 3 and 6 months post-randomization	Psychologist qualified in hypnotherapy	MOS sleep scale: 2 <sup>o</sup> outcome	Hypnosis: 96.8% (did not expect benefit) Control: 93.5% (joined physical rehabilitation program)	Compared to control, hypnosis group reported better improvements in sleep at 6-month follow-up, $P_s \leq .01$
Plaskota et al. 2012, England	Pre-post	Patients with cancer receiving palliative care identified with anxiety, median age 60, (range 46–80), 72% female, n = 21, previous treatment not specified	Four individually-tailored sessions including self-hypnosis training, visualization, anchor installation, immune system visualization	After 2 and 4 hypnosis sessions	Certified experienced hypnotherapist	Actigraphy and Verran and Snyder-Halpern Scale for self-reported sleep quality: 2 <sup>o</sup> outcome	52.4% (death, deterioration of health, medication side effects unrelated to treatment)	After hypnosis there was a statistically significant improvement on all measures (including sleep disturbance, $P = .0081$ ) but not actigraphy outcomes. Hypnotherapy can reduce anxiety and improve sleep in palliative care patients
Smith 2006, England	Pre-post	Patients with IBS, median age 37.1 (range 18–64), 73.3 % female, n = 75, previous treatment not specified	Five to seven 30-minute gut-directed hypnotherapy visualization and ego strengthening exercises, self-hypnosis training, audio recording for home practice provided	3 months after treatment	Study nurse	Health-related QOL sleep score: 2 <sup>o</sup> outcome	100%	Gut-directed hypnotherapy had a positive impact on several health-related QOL measures including sleep, $P < .001$
Tan et al. 2015, United States	4-arm RCT with groups: 8-session hypnosis training, 8-session hypnosis training + recording, 2-session hypnosis training + recording, and 8-week biofeedback control	Veterans with chronic low back pain, mean age 55 (range 25–83), 21% female, n = 159, previous treatment not specified	Two or eight group sessions utilizing self-hypnosis training with individualized suggestions focused on deep relaxation, sensory substitution, pain intensity reduction, imagined anesthesia, decreased pain unpleasantness, managing breakthrough pain and post-hypnotic suggestions for effective self-hypnosis, audio recording for home practice provided for some groups	Following treatment completion and 6 months posttreatment	Therapist	PSQI: 2 <sup>o</sup> outcome	All hypnosis: 62.0% (health problems, transportation problems, advised not to participate by practitioner, side effects related to treatment) Control: 65.8% (health problems, transportation problems, missed appointments, did not want to be in control group)	Over half of the participants who received hypnosis reported clinically meaningful ( $\geq 30\%$ ) reductions in pain intensity, and they maintained these benefits for at least 6 months after treatment. Sleep quality was improved over time, $P < .001$ , but there were no differences between groups on sleep quality
Whitehouse et al. 1996, United States	2-arm RCT with hypnosis or no-treatment control	Medical students, mean age 24.8, 60% female, n = 35, previous treatment not reported	Weekly group sessions for one semester of self-hypnosis training for coping with stress, daily home practice encouraged	Follow-ups at the end of semester, exam and recovery periods	Psychiatrists with extensive experience in clinical hypnosis	Daily sleep diary with results averaged over weekdays for each week: 2 <sup>o</sup> outcome	60% (not specified)	Self-hypnosis reduced distress without significant immune effects or effects on sleep
Younus, Simpson, Collins, Wang 2003, Canada	Pre-post	Patients with history of hot flashes (healthy volunteers and cancer patients), age not reported, 100% female, n = 14, previous treatment not specified	Four weekly 1-hour group sessions with suggestions to reduce and block hot flashes symptoms	Sessions 2 and 4 during the treatment and 1 month posttreatment	Physician with the help of registered nurse	Primary outcome was QLQ-C30 questionnaire with sleep, subscale: 2 <sup>o</sup> outcome	100%	Participants showed a significant reduction of primary outcome (frequency, duration, and severity of hot flashes, all $P_s < .0001$ ). Insomnia was also improved $P = .012$

Green shaded = studies reporting positive results. Gray shaded = studies reporting mixed results. CBT = cognitive behavioral therapy, CET = cerebral electrotherapy, CPT = cognitive processing therapy, IBS = irritable bowel syndrome, ISI = Insomnia Sleep Index, MOS = Medical Outcomes Study, PSG = polysomnography, PSQI = Pittsburgh Sleep Quality Index, PTSD = posttraumatic stress disorder, QLQ-C30 = Quality of Life Questionnaire for Cancer, QOL = quality of life, RCT = randomized controlled trial, SD = standard deviation, SSRI = selective serotonin reuptake inhibitor, SWS = slow wave sleep, VMWH = Valencia Model of Waking Hypnosis.

sleep disturbances. Average sample sizes were  $36.4 \pm 14.7$ ,  $108.0 \pm 0$ , and  $29.5 \pm 7.5$  for positive, mixed, and negative studies, respectively. Average probability of bias based on SASQI-CAM scoring appeared similar and high for studies reporting benefit of hypnosis on sleep and studies reporting no benefits of hypnosis on sleep outcomes ( $6 \pm 3.2$ , and  $6 \pm 3.0$ , respectively). Treatment duration averaged  $2.5 \pm 2.5$  for positive and  $2.5 \pm 0.5$  for negative studies. Most of the studies enrolling samples with sleep problems assessed sleep with

subjective assessments, except one study reporting positive outcomes of hypnosis on sleep.

Eighty percent of the positive studies from this subset recruited samples with psychiatric comorbidities such as PTSD, anxiety, or depression; none of the studies reporting negative results indicated significant comorbidities in their participants. Sleep was the primary outcome in 62.5% of the studies showing benefits of hypnosis for sleep and in both of the studies showing no hypnosis effect on sleep.

## Description of the Subset of Studies with SASQI-CAM Scores Indicating Lower Risk of Bias

Twelve of the included studies received a score higher than 9 on SASQI-CAM, indicating adequate study quality and lower risk of bias.<sup>22</sup> The patterns observed for this subsample of the reviewed publications paralleled those observed for the full sample. Seven studies (58.3%) demonstrated an overall positive effect of the hypnosis intervention on the assessed sleep outcome. Two studies (16.7%) showed mixed results, indicating improvements in some but not all sleep outcomes. The remaining three studies (25%) demonstrated negative results, with no beneficial effects of hypnosis or comparable effects of hypnosis and control conditions on sleep outcomes.

**Table 5** presents comparisons of the positive, mixed, and negative studies scoring higher than 9 on SASQI-CAM on several variables. Positive and negative studies had similar average sample size ( $71.0 \pm 48.9$  and  $79.7 \pm 56.1$ , respectively), but average intervention duration was  $2.9 \pm 2.2$  hours for positive studies and  $4.7 \pm 0.5$  hours for negative studies. Except for two crossover placebo-controlled studies reporting positive results, the rest of the high-quality studies were RCTs. All high-quality studies used a control group, with most including active controls. Samples with sleep complaints were recruited in one of the studies reporting a positive effect of hypnosis on sleep and in none of the studies reporting negative hypnosis effects on sleep. Next, sleep was the primary outcome in 57.1% of the studies showing benefits of hypnosis for sleep and in none of the studies showing no hypnosis effect on sleep.

## Hypnosis Intervention Procedures

Hypnosis is an approach that can be easily customized and adapted to a client with the choice of specific hypnosis techniques and individualized suggestions, and it also can be added to another therapy. This flexibility is one of the attractive features of this therapeutic approach. In most included studies (79.2%), hypnosis was used as a stand-alone intervention and the remaining studies combined hypnosis with another therapeutic intervention (eg, cognitive behavioral therapy, cognitive processing therapy). Few of the included studies (8.3%)<sup>25,43</sup> reported using sleep hygiene instructions along with hypnosis training. The studies varied greatly in the lengths of hypnosis intervention: from 13-minute audio recordings with hypnosis for deep sleep to 8 sessions of hypnosis, each lasting 1 hour. Most of the studies (83.3%) used individual hypnosis sessions. Two of the included studies (8.3%) used group hypnosis sessions<sup>45,46</sup> and the remaining 8.3% of the studies used an audio recording only.<sup>30,31</sup> The number of sessions averaged  $4 \pm 1.2$  (range, 1 to 8), with the total time spent in intervention averaging  $3.6 \pm 1.9$  hours (0.23- to 8-hour range).

Home practice was encouraged in 54.2% of the included studies, with most of these studies offering audio recordings for such a practice. Adherence to the home practice instructions was not typically assessed.

One included study<sup>44</sup> compared different hypnosis treatment packages and their effects on pain and sleep quality outcomes. The findings indicated no significant effect of hypnosis on sleep outcomes but showed that after hypnosis participants had a significantly greater reduction in the study primary outcome

**Table 2**—Methodological quality of the included studies.

Study (author, year)	Study Type	Score (range 0–20)
Abrahamsen et al. 2009	RCT	13
Abrahamsen et al. 2008	RCT	15
Abramowitz et al. 2008	RCT	11
Barabasz 1976	RCT	4
Castel et al. 2012	RCT	15
Elkins et al. 2008	RCT	11
Elkins et al. 2013	RCT	16
Galovsky et al. 2016	RCT	17
McCauley et al. 1983	RCT	7
Mendoza et al. 2016	RCT crossover	13
Picard et al. 2013	RCT	11
Stanton 1989	RCT	6
Tan et al. 2015	RCT	15
Whitehouse et al. 1996	RCT	7
Borkovec and Fowles 1973	Controlled trial	9
Cordi et al. 2015	Controlled trial crossover	15
Cordi et al. 2014	Controlled trial crossover	14
Graham et al. 1975	Controlled trial	3
Anderson et al. 1979	Pre-post for hypnosis part	5
Crawford et al. 1998	Pre-post	7
Hurwitz et al. 1991	Pre-post	3
Plaskota et al. 2012	Pre-post	8
Smith 2006	Pre-post	8
Younus et al. 2003	Pre-post	8

RCT = randomized controlled trial.

(pain intensity) than after control biofeedback treatment. Interestingly, there was no significant difference among the three hypnosis conditions (8 self-hypnosis group training sessions with audio recordings for home practice, 8 self-hypnosis group training sessions without recordings, or 2 self-hypnosis group training sessions with audio recordings for home practice and weekly reminder telephone calls). The authors concluded that two sessions of self-hypnosis with audio recordings for home practice may be as effective as 8 sessions of hypnosis treatment for pain management. It is of interest to assess the optimal number of sessions of sleep-focused hypnotherapy for individuals with sleep problems.

The hypnosis interventions described in the review targeted sleep disturbance (25%), pain symptoms (29.2%), and immune system (4.2%), focused on increase of relaxation and reduction stress (12.5%), symptoms associated with hot flashes (12.5%), and the remaining studies provided no specific intervention focus.

For studies specifically targeting insomnia symptoms, hypnosis approaches involved using a metaphor of a fish going deeper into the water for deeper sleep, using an age-regression technique prompting the participant to focus on his or her earlier memories of periods when restorative sleep could be easily achieved, providing directions for relaxation with visualizations including relaxing scenes, and delivering ego-strengthening suggestions.

**Table 3**—Comparisons between positive, mixed, and negative studies.

Characteristic	Reporting Positive Findings (n = 14)	Reporting Mixed Findings (n = 3)	Reporting Only Negative Findings (n = 7)
Sample size, mean (SD)	53.7 (41.7)	74.0 (46.5)	50.7 (48.4)
Populations with sleep complaints, number of studies	5	1	2
Samples with known psychiatric history (eg, depression, PTSD), number of studies	4	2	0
Samples with chronic pain issues, number of studies	2	1	4
Bias score, mean (SD)	9.4 (4.7), range 3–16	13.3 (4.7), range 8–17	9.9 (4.6), range 3–15
RCT, number of studies	7	2	6
Active control present, number of studies	7	2	6
Nonactive control only, number of studies	2	0	0
No control, number of studies	5	1	0
Studies with primary sleep outcome, number of studies	8	0	3
Treatment duration, treatment hours, mean (SD)	3.8 (2.0)	3.0 (1.0)	3.6 (2.0)
Objectively measured sleep outcome, number of studies	4	1	0
Location, number of studies			
United States	7	1	5
Europe	5	2	2
Other	2	0	0

PTSD = posttraumatic stress disorder, RCT = randomized controlled trial, SD = standard deviation.

**Table 4**—Information about the subset of studies enrolling samples with sleep complaints.

Characteristic	Reporting Positive Findings (n = 5)	Reporting Mixed Findings (n = 1)	Reporting Only Negative Findings (n = 2)
Sample size, mean (SD)	36.4 (14.7)	108 (0.0)	29.5 (7.5)
Samples with known psychiatric history (eg, depression, PTSD), number of studies	4	1	0
Bias score, mean (SD)	6 (3.2), range 3–11	17(0.0)	6 (3.0), range 3–9
RCT, number of studies	3	1	1
Active control present, number of studies	3	1	1
Studies with primary sleep outcome, number of studies	5	0	2
Treatment duration, treatment hours, mean (SD)	2.5 (2.5)	3.0 (0.0)	2.5 (0.5)
Objectively measured sleep outcome, number of studies	1	0	0
Location, number of studies			
United States	2	1	2
Europe	1	0	0
Other	2	0	0

PTSD = posttraumatic stress disorder, RCT = randomized controlled trial, SD = standard deviation.

In the studies targeting pain symptoms, suggestions included instructions for dissociating from pain, controlling pain perception, imagined analgesia, decreased pain unpleasantness, and managing breakthrough pain. Hypnoanalgesic techniques taught in the studies included age regression, dissociations, fantasy, changing pain image, glove anesthesia, and hypnoplasty. Hypnosis for reducing hot flashes symptoms incorporated suggestions for relaxation and coolness. Also commonly included were suggestions for relaxation, safe place imagery, coping with stress, and suggestions for effective hypnosis practice. Several studies (20.8%) specified that the sessions were individually tailored with customized suggestions.

Hypnotic susceptibility was assessed and reported in 37.5% of the included studies. In these studies, the assessment was completed with the Harvard Group Scale of Hypnotic Susceptibility<sup>54</sup> (55.6%), Stanford Hypnotic Susceptibility Scale<sup>55,56</sup> (33.3%), or the Hypnotic Induction Profile<sup>57</sup> (11.1%). Some studies found that only highly susceptible participants benefitted from hypnotic suggestions for sleep improvement and those with low hypnotic susceptibility did not.<sup>30,31</sup> The authors of one study indicated that participating in hypnotic susceptibility assessment prior to intervention might have influenced the participants' expectations for success in hypnosis.<sup>36</sup> The other studies reported no effect of hypnotic susceptibility on sleep outcomes. Most of the studies assessed in this review did



**Table 5**—Information about the subset of studies with lower risk of bias (SASQI-CAM score higher than 9).

Characteristic	Reporting Positive Findings (n = 7)	Reporting Mixed Findings (n = 2)	Reporting Only Negative Findings (n = 3)
Sample size, mean (SD)	71.0 (48.9)	100.5 (7.5)	79.7 (56.1)
Populations with sleep complaints, number of studies	1	1	0
Samples with known psychiatric history (eg, depression, PTSD), number of studies	1	1	0
Samples with chronic pain issues, number of studies	1	1	2
Bias score, mean (SD)	13.1 (1.8), range 11–16	16.1 (1.0), range 15–17	14.3 (0.9), range 13–15
RCT, number of studies	5	2	3
Active control present, number of studies	3	1	3
Nonactive control only, number of studies	2	1	0
Studies with primary sleep outcome, number of studies	4	0	0
Treatment duration, treatment hours, mean (SD)	2.9 (2.2)	2.5 (0.5)	4.7 (0.5)
Objectively measured sleep outcome, number of studies	2	0	0
Location, number of studies			
United States	3	1	1
Europe	3	1	2
Other	1	0	0

PTSD = posttraumatic stress disorder, RCT = randomized controlled trial, SD = standard deviation.

not include the assessment of hypnotic susceptibility or tested its relation to the study outcomes.

### Adverse Event Reporting

One of the goals of this review was to assess adverse events in the published studies utilizing hypnosis. Hypnosis is typically described as the form of treatment with low or no associated side effects<sup>58</sup>; however, the practitioners of hypnosis are often cautioned that hypnosis may cause unpleasant side effects that may include dizziness, confusion, unpleasant somatic symptoms, false memories, or panic attacks in some people.<sup>59</sup> The risk of moderate to severe after-effects of hypnosis was previously estimated to be 7% in research and clinical samples but it is believed that adverse events due to hypnosis may be underreported in clinical settings because these complications are typically short-lived.<sup>60</sup> Therefore, the true incidence of such adverse events is not clear. The evidence from this review suggests that few studies utilizing hypnosis interventions report monitoring or assessing adverse experiences. Only two reviewed studies<sup>39,61</sup> totaling 231 participants mentioned some form of monitoring of adverse events. All reported no adverse experiences associated with hypnosis. One study,<sup>36</sup> though not specifically assessing adverse experiences, reported that some people in the hypnosis group showed general dissatisfaction with the procedure.

## DISCUSSION

### Overview of the Qualitative Analyses

Overall, more than half of the included studies indicated some positive effects of hypnosis on sleep outcomes. However, the body of evidence, in general, was of variable methodological quality. The studies reporting positive findings had a similar

average methodological quality and sample sizes compared to those reporting negative hypnosis effects. However, on the one hand, more than 80% of the negative studies were controlled trials and a similar percentage had an active control group compared to only half of the positive studies having an RCT design and using an active control group. On the other hand, the studies reporting positive effects of hypnosis on sleep outcomes were more likely to have a sample with sleep problems and focus on a sleep outcome as a primary outcome measure. The results regarding outcomes were similar when only a subgroup of studies with samples experiencing sleep problems was considered. Furthermore, when only a subset of studies with higher SASQI-CAM scores indicating sufficient quality of the study was considered, the patterns were similar to those observed in the whole sample.

The hypnosis interventions were primarily delivered as separate treatment programs in several individual sessions with increasing interest in using tailored suggestions. Using sleep hygiene instructions along with hypnosis was reported in few hypnosis interventions for sleep improvement. For the studies targeting sleep and conditions affected by sleep (pain, stress, hot flashes) home practice was encouraged in most of the included studies, though adherence to such practice and its influence on the outcomes was rarely assessed. In studies that reported hypnosis provider, the interventions were delivered by a trained clinical professional with training and expertise in clinical hypnosis. The adverse event rate was very low given that more than 200 participants from two RCTs reported no adverse events; however, the information about adverse events was not reported in most studies.

### Implications for Clinical Practice

A recent review assessing efficacy, safety, and applications of medical hypnosis did not list sleep problems among the

suggested potential applications of medical hypnosis in daily clinical practice.<sup>58</sup> The reason for this may be that, to date, rigorous research evaluating hypnosis interventions for sleep disturbances is lacking. Our review indicates that hypnosis may be a promising approach for sleep improvement that merits further investigation.

Several attractive features of hypnosis supported by the presented evidence should be highlighted. First, successful hypnosis interventions for sleep may be relatively short. Our review indicates that on average, 3 to 4 sessions were sufficient to obtain benefits for sleep outcomes in the studies reporting positive effects of hypnosis on sleep. The minimum number of sessions needed for an effective treatment remains open for debate and may depend on individual tailoring, with evidence leaning towards multiple (3 to 5) sessions with an individually tailored treatment plan. Though most of the studies reporting benefits of hypnosis on sleep were using individual sessions, benefits of hypnosis were also observed in studies utilizing group sessions and audio recording only, highlighting that sleep improvements can be achieved with more efficient interventions. The research also suggests that home practice supported by audio recordings of sessions may boost the efficacy of treatment and reduce the number of treatment sessions.

Second, hypnosis is a flexible approach with a big toolbox of techniques that can be tailored to the specific individual and their symptoms. Our review indicates that beneficial hypnosis for sleep improvement included sleep-specific suggestions, suggestions for relaxation and stress reduction, and age regressions. Another promising strategy for hypnosis treatment for sleep improvement may be an inclusion of ego-strengthening suggestions in the treatment sessions. These suggestions that are not focusing on specific sleep symptoms may be beneficial for improving therapeutic alliance, achieving heightened insight and better self-esteem in the patients and thus optimizing the treatment effects from hypnosis.<sup>62</sup> Sleep hygiene instructions may also be included in a hypnosis treatment program for sleep improvement. Though inclusion of sleep hygiene instructions was not commonly reported in the studies included in the review, sleep hygiene may boost treatments targeting sleep.<sup>63</sup>

Next, though hypnotic susceptibility is believed to be important in how people respond to hypnosis, few included studies assessed it. The data are not conclusive about the role of hypnotic susceptibility in the success of the hypnotic interventions. Only some studies showed the importance of hypnotic susceptibility for the success of the intervention<sup>30,31</sup> whereas others failed to show it or did not assess it. It was also suggested that patients in the midrange of hypnotic susceptibility may be the most appropriate clients for hypnosis treatments for some health conditions,<sup>25</sup> but this aspect needs further investigation.

Further, hypnosis appears to be an approach with a low incidence of adverse effects. Though only a few studies reported adverse event monitoring in this review, those that included this information reported no adverse events. Additionally, a high rate of completion of the hypnosis interventions observed in the included studies (**Table 1**) suggests general acceptance of this modality by patients and study participants. Sleep problems are typically treated with sleep medications that have

known unpleasant side effects and have an unknown efficacy for long-term use.<sup>2,7</sup> These may be some of the reasons why those affected by sleep problems are likely to seek alternative approaches for management of insomnia.<sup>11</sup> Empirical evidence from published research indicates either a beneficial effect of hypnosis interventions on sleep or hypnosis effects comparable to those of control interventions with a low rate of adverse experiences from hypnosis. Therefore, this approach may be important to explore further for its utility for treating sleep problems especially in populations in which using pharmacological treatments may be undesirable (eg, children, elderly, patients with multiple comorbidities, etc.)

Currently, a nonpharmacological approach of choice for treating insomnia is CBT-I.<sup>8,64</sup> A recent systematic review and meta-analysis evaluating cognitive behavioral therapies for treatment of insomnia indicated that CBT-I is efficacious for some but not all dimensions of sleep problems.<sup>64</sup> Though CBT-I has been considered a reliable treatment for chronic insomnia for the past 25 years, some limitations noted in the recent work include the need for 5 or more sessions of therapy to observe most optimal response and a shortage of trained therapists to provide the CBT-I.<sup>8,64</sup> Hypnosis can be provided by any clinician (physician, nurse, psychologist) trained in hypnotherapy, and diverse patient populations can be trained to induce beneficial changes in health using self-hypnosis without the presence of a clinician as demonstrated in previous research assessing hypnosis for other health issues.<sup>33,65–69</sup> Further, hypnosis is extremely flexible and can be performed in different settings (not just as individual, group, or on-line sessions similar to CBT-I but also as audio recorded sessions); the studies included in this review indicate that a beneficial effect can be obtained in four or fewer sessions with hypnosis; however, the optimal number of sessions for best results is yet to be determined. To date, the rigorous research directly comparing efficacy and cost-effectiveness of CBT-I and hypnotherapy for sleep is scarce. Of interest, few studies evaluating interventions combining cognitive therapy approaches with hypnosis indicate beneficial synergistic effects,<sup>29,39,70</sup> suggesting that hypnosis might be a useful adjunct therapy for other psychotherapy approaches.

Our review indicates that research on using hypnosis for sleep problems is still in the early stages. Because of several attractive features of hypnosis previously described and promising research to date showing potential benefits of hypnosis in the absence of serious adverse events, hypnosis for sleep disorders deserves further evaluation.

## Limitations

The review is limited in several respects. The included studies assessed relatively small samples of predominantly middle-aged female participants who may or may not have sleep complaints. Therefore, it is not clear how these results can be applied to the general population of individuals experiencing sleep problems.

Our selection procedures included filtering results based on language (English only). Furthermore, we allowed hypnosis interventions to focus on conditions other than sleep as long as sleep outcomes were included in the data. All of these issues

may have affected the generalizability of these results to the general population with sleep problems.

Another limitation is the methodological diversity of the studies and the extent of bias of the included studies. Our review search strategy cast a broad net to include studies that reported at least one sleep-related outcome. Overall the quality of the included research was modest, with only half of the included studies receiving a score higher than 9, indicating lower risk of bias on SASQI-CAM. Only one-third of the studies included in this review recruited samples with sleep problems. Further, hypnosis intervention focused on sleep improvement in only a portion of the included studies; and several studies used interventions focused on pain, immune system, or hot flashes symptoms. We also included studies of different designs in addition to RCTs. Therefore, there was considerable heterogeneity in the included studies related to study samples, outcome measures, and clinical interventions, which complicates the qualitative analyses and interpretation of the results.

Additionally, though SASQI has been specifically designed for evaluating integrative medicine approaches and has been increasingly used in systematic reviews assessing efficacy of integrative approaches,<sup>18,22,71</sup> its reliability and validity have yet to be formally assessed, thus potentially limiting objectivity of the study quality assessment.

Some limitations are specific to integrative medicine approaches such as hypnosis; for example, formal blinding of participants and clinicians to treatment arms is not always possible in trials assessing mind-body approaches. Thus, the extent to which the awareness of the group assignment affected the study outcomes is difficult to predict.

### Recommendations for Future Research

Important future directions related to hypnosis include determining minimal effective dose (ie, the length of treatment) and delivery method (individual versus group versus recording), as well as the optimal combination of suggestions and techniques for sleep improvement hypnosis. Another important topic to explore is determining specific populations who would most likely benefit from hypnosis and specific populations for whom hypnosis is not an optimal intervention. Future studies must consider symptomatology, hypnotic susceptibility, expectancy, adherence to treatment, and other patient characteristics. Methodological quality of future research could be enhanced by careful selection of control conditions; assessment of participant expectancy of improvement; use of reliable sleep assessments; reporting adverse events; monitoring provider adherence to intervention protocols; reporting participant adherence to the intervention; providing detail on clinician qualifications in hypnosis; and use of longer follow-up periods to assess outcomes.

### CONCLUSIONS

Despite the limitations associated with the current review and the overall state of research, hypnotherapy for sleep problems appears to be a promising treatment to explore with little evidence of any adverse events.

### ABBREVIATIONS

CAM, complementary and alternative medicine  
 CBT, cognitive behavioral therapy  
 CBT-I, cognitive behavioral therapy for insomnia  
 CET, cerebral electrotherapy  
 CPT, cognitive processing therapy  
 IBS, irritable bowel syndrome  
 ISI, Insomnia Sleep Index  
 MOS, Medical Outcomes Survey  
 PTSD, posttraumatic stress disorder  
 PSG, polysomnography  
 PSQI, Pittsburgh Sleep Quality Index  
 QLQ-C30, Quality of Life Questionnaire for Cancer  
 QOL, quality of life  
 RCT, randomized controlled trial  
 SASQI, Scale for Assessing Scientific Quality of Investigation  
 SASQI-CAM, Scale for Assessing Scientific Quality of Investigation-Complementary and Alternative Medicine  
 SD, standard deviation  
 SSRI, selective serotonin reuptake inhibitor  
 SWS, slow wave sleep  
 VMWH, Valencia Model of Waking Hypnosis

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