EXPERT REVIEWS

Hypnosis in the treatment of anxiety- and stress-related disorders

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Self-hypnosis training represents a rapid, cost-effective, nonaddictive and safe alternative to medication for the treatment of anxiety-related conditions. Here we provide a review of the experimental literature on the use of self-hypnosis in the treatment of anxiety and stress-related disorders, including anxiety associated with cancer, surgery, burns and medical/dental procedures. An overview of research is also provided with regard to self-hypnotic treatment of anxiety-related disorders, such as tension headaches, migraines and irritable bowel syndrome. The tremendous volume of research provides compelling evidence that hypnosis is an efficacious treatment for state anxiety (e.g., prior to tests, surgery and medical procedures) and anxiety-related disorders, such as headaches and irritable bowel syndrome. Although six studies demonstrate changes in trait anxiety, this review recommends that further randomized controlled outcome studies are needed on the hypnotic treatment of generalized anxiety disorder and in documenting changes in trait anxiety. Recommendations are made for selecting clinical referral sources.

Keywords: anxiety • hypnosis • procedural anxiety • self-hypnosis • stress management

Most methods of facilitating hypnosis involve suggestions for relaxation, but the most fundamental component in hypnosis appears to involve facilitating a state of focused attention and concentration, although several other factors are also believed to be involved [1]. Responsiveness to hypnosis has commonly been experimentally defined by an individual's response to a series of suggestions for various hypnosis phenomena (e.g., analgesia or amnesia) of varying difficulty. Responsiveness varies, and a small percentage of individuals are relatively unresponsive to hypnosis. Hypnotic responsiveness is a very stable trait [2], with test–retest reliability after 25 years being approximately 0.7, and responsiveness is not easily modifiable [3]. While clinical experience has shown that a majority of people are sufficiently responsive to hypnosis to obtain anxiety relief, a higher level of responsiveness is needed to experience some hypnotic phenomena, such as profound analgesia or amnesia. However, despite variations in hypnotic response, most patients have sufficient ability to benefit clinically [4]. Nonetheless, most individuals have been found to be more responsive to suggestion after a hypnotic induction has been performed [5]. Although occasionally hypnosis may be used for unconscious exploration, in a large proportion of clinical conditions patients are taught self-hypnosis, which is commonly made easier to learn through making individualized self-hypnosis tapes or CDs for the patient [6].

There are many areas of application for self-hypnosis training, for example in obstetrics and gynecology, gastroenterology, dermatology, asthma, management of chemotherapy side effects, smoking and enuresis. Controlled research, for instance, has established the efficacy of hypnosis in controlling acute and chronic pain [7,8]. This article will review the existing literature on the use of hypnosis and self-hypnosis training in the treatment of anxiety, anxiety-related disorders, stress management associated with conditions that evoke state anxiety, such as test and public speaking anxiety, and various medical and dental procedures.

Anxiety & stress management

Kirsch performed a meta-analysis on 18 studies in which cognitive–behavioral therapy (CBT) with a variety of conditions (pain, insomnia, anxiety, public speaking anxiety, obesity, hypertension, phobia and duodenal ulcer) was compared with the same therapy supplemented or facilitated by hypnosis [9]. The results across

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various conditions found that the addition of hypnosis substantially enhanced the therapy outcome. The average patient receiving cognitive–behaviorally oriented hypnosis demonstrated greater improvement than at least 70% of patients who received nonhypnotic treatment. In the one study of anxiety cited in the review, there was a high effect size of 1.4 standard deviations, indicating that the addition of hypnosis significantly enhanced the efficacy of CBT [10]. In addition, owing to popular conceptions of hypnosis, simply labeling an intervention as hypnosis may increase its efficacy where the only difference between relaxation instructions in a nonhypnotic condition and the 'hypnotic induction' is the use of the term 'hypnosis' [11]. A recent meta-analysis of hypnosis for distress associated with medical procedures found that when the intervention was labeled as hypnosis instead of 'suggestion', they were significantly ($p < 0.002$) more effective [12].

In a randomized controlled study of acute stress disorder in civilian trauma survivors, CBT was compared with identical treatment preceded by a hypnotic induction [13]. Positive outcomes were comparable for the two treatments and hypnosis resulted in a greater reduction in re-experiencing symptoms of post-traumatic stress disorder at the completion of treatment than CBT alone. A 3-year follow-up found that both hypnotically facilitated CBT and CBT were effective [14].

Two other randomized controlled studies have found that when hypnotic treatment was added to CBT, superior effects were found. One study found that the hypnotic CBT treatment produced significantly greater improvements in depressed patients on the Beck Anxiety Inventory (as well as the Beck Depression Inventory, and the Beck Hopelessness Scale) than CBT alone [15]. Another study by Schoenberger examined the effects of a multidimensional CBT of anxiety for public speaking compared with exactly the same treatment in which the relaxation training was referred to as a hypnotic induction and automatic thoughts were referred to as self-suggestions (although some explicit hypnotic suggestions for improvement were also added) [16]. Other than labeling the procedure as hypnotic and adding hypnotic suggestions for improvement, the two procedures were the same. Subjects ($n = 62$) in both conditions improved more than wait-list control subjects. However, calling the treatment hypnosis (and adding a few suggestions) appeared to mildly improve the treatment effectiveness (effect size: 0.4). These studies suggest that simply identifying a treatment as hypnosis may generate greater expectancies for change than nonhypnotic treatments if the individual has favorable attitudes toward hypnosis, and these enhanced expectations can improve overall treatment outcome. As will be discussed later in relation to medical procedures, the findings of the Kirsch meta-analysis are also congruent with two more recent studies involving the use of hypnosis in association with acupuncture [17,18].

When the behavioral therapy technique of progressive muscle relaxation was compared with self-hypnosis training it was found that both treatments produced physiological improvements associated with reduced anxiety, increasing skin temperature and reducing pulse rate [19]. In another study, however, the authors found that behavioral progressive relaxation may produce greater hypnoidal effects than hypnosis among individuals with low hypnotic responsiveness, and the phenomenological effects were roughly comparable to those produced with hypnosis among highly hypnotizable individuals [20].

O'Neill and colleagues compared self-hypnosis training (which simply consisted of reading through written instructions several times and then practicing for 15 min) with the behavioral therapy technique of progressive muscle relaxation in a randomized study with 'stressed, anxious, worried' patients attending a psychology clinic [21]. At a 1-month follow-up, both groups showed similar significant improvement on the Beck Anxiety Inventory and in both state and trait anxiety (State–Trait Anxiety Inventory). However, cognitive changes and perceptions of treatment efficacy were greater for self-hypnosis than for relaxation. The subjects using self-hypnosis reported higher expectations of success than those using progressive relaxation exercises, demonstrating a greater belief that they could now do something to manage their anxiety. Similarly, comparable success of self-hypnosis in comparison to 'relaxation response'-style medication was also reported by Benson's group in a randomized study with 'anxiety neurosis' patients on 8-week follow-ups [22].

Autogenic training (which is a structured German form of self-hypnosis) was facilitated in a group by Houghton for stress management with teachers for achieving reduced pulse rates [23]. Over a 14-week period these self-hypnotic exercises allowed all of the teachers to reduce their pulse rates with significant ($p < 0.0001$) consistency. Their success was found to be unrelated to gender or behavioral characteristics, such as Type-A behaviors, speed, impatience, job involvement or being hard driving. Two studies demonstrated improved heart rate variability profiles showing improved autonomic function, reduced sympathetic activity and enhanced parasympathetic activity following hypnosis [24,25].

Kanji and coworkers compared eight sessions of autogenic training with attentional control and no treatment groups in a randomized study [26]. Significant reductions ($p < 0.001$) in both state and trait anxiety resulted from autogenic training compared with both other groups. Significant reductions were also seen in systolic ($p < 0.01$) and diastolic ($p < 0.05$) blood pressure and pulse rate ($p < 0.002$). Autogenic training has also been successfully used to reduce anxiety with patients undergoing coronary angioplasty in a study where 59 patients were randomly assigned to receive either standard care or autogenic training added to standard care, during which small groups learned autogenic training for 60 min [27]. Compared with the standard care control group, the hypnosis group demonstrated lower ($p < 0.001$) state anxiety at 2 and 5 months following this brief group treatment and lower trait anxiety at 2 months ($p < 0.001$) and after 5 months ($p < 0.04$). Four sessions of hypnotic relaxation was also shown to reduce anxiety (as well as anger and to produce increases in self-esteem) when used in a study using a repeated measures design with patients with traumatic brain injuries, stroke or multiple sclerosis [28]. Importantly, a significantly reduced trait, as well as state, anxiety was demonstrated in this study.

Stress associated with test anxiety & immune function

A number of investigations have examined the effects of hypnosis on immune function and have included measures of anxiety in their studies. Undoubtedly, every reader has experienced test anxiety and the stress of midterm and final examinations. Sapp compared hypnosis with a Hawthorne control group and demonstrated a decrease in test anxiety and improvements in achievement for the hypnosis group, which were maintained on 6-week follow-up [29]. Stanton randomly assigned 40 high school students who were matched on sex and anxiety scores to either a self-hypnosis training group that met for two 50-min sessions, or to a control group who had two 50-min sessions in discussing ways to reduce test anxiety [30]. Students were retested after two sessions and 6 months later. Anxiety scores were significantly reduced only for the self-hypnosis group at both evaluation times. Schreiber similarly examined the effects of group self-hypnosis training on midterm and final examination grades in comparison with two control conditions [31]. Students trained in self-hypnosis had significantly higher scores on final examinations than controls, but not on midterm exams.

Several sophisticated research studies have examined not only the influence of self-hypnosis training in reducing stress, but also its impact on enhancing immune function. Whitehouse and colleagues evaluated the effects of self-hypnosis in relieving stress and moderating immune system reactivity to medical school examination stress in a 19-week prospective study [32]. In total, 21 first-year medical students who were identified as moderate-to-high in responsiveness to hypnosis were trained in self-hypnosis, encouraged to practice regularly and to keep daily records of mood, sleep, physical symptoms and frequency of practice. A total of 14 control subjects received no training, but kept daily ratings. Self-report measures and blood samples were obtained at the time of orientation, late in the semester, at an examination period, and post-semester. As one would expect, significant increases in fatigue and stress were discovered during the examination period paralleled by increases in B lymphocytes and activated T lymphocytes, phytohemagglutinin-induced and pokeweed mitogen-induced blastogenesis and natural killer (NK) cell cytotoxity. There were no decreases in immune measures. The self-hypnosis subjects reported significantly less anxiety and distress than control subjects, but there was no difference between groups in immune function. However, in students using self-hypnosis it was found that their relaxation ratings predicted both the number of NK cells and NK activity. It is believed that stress connected with academic demands influences immune function, but that immune suppression is not inevitable. The authors concluded that the use of self-hypnosis reduces stress without differential immune effects overall, but individual responses to self-hypnosis do seem to predict immune effects. Other studies have concluded that self-hypnosis training for stress reduction before college examinations can have sizeable influences on cell-mediated immunity, which has implications for illness prevention and for patients with compromised immunity [33,34].

It is well known that anxiety and stress can evoke herpes outbreaks. A follow-up study examined the effects of self-hypnosis training using dynamic imagery (rather than just passive relaxation imagery) with chronic and severe herpes simplex virus genital herpes [35]. Immune measures were performed prior to and following 6 weeks of self-hypnosis practice. Self-hypnosis reduced anxiety and depression, and it almost cut in half the recurrence rate or herpes, benefiting 65% of patients.

Anxiety-related conditions & anxiety associated with medical or dental procedures

Tension headaches & migraines

Melis *et al.*, in a single-blind study of chronic tension headaches, compared hypnosis with a wait-list control condition on 4-week follow-up, finding not only significantly fewer headaches, but also significantly lower anxiety [36]. Van Dyck *et al.* investigated the relative efficacy of autogenic training and of self-hypnosis training with tension headaches, finding both equally effective in reducing anxiety and headaches [37]. A review has documented a large volume of controlled research on self-hypnosis training for migraine and tension headaches, which was shown to be statistically superior to or equivalent to commonly used medication treatments [38]. Furthermore, this literature review found that simply teaching the use of self-hypnotic relaxation and imagery techniques for daily self-hypnosis practice is as effective as more complex hypnotic techniques in the relief of headaches.

Obstetrics & gynecology

Obstetrics and gynecology are specialties where hypnosis and self-hypnosis training have been used extensively, not only for the relief of pain with childbirth, but also for anxiety and relief of hyperemesis gravidarum [39]. Mairs, for instance, used four 1-h self-hypnosis training sessions with pregnant women (28 primigravida women compared with 27 primigravida women not receiving hypnosis training, where there were no significant demographic differences between groups) [40]. Prebirth questionnaires asked for ratings of anticipated levels of pain and anxiety, and post-birth questionnaires were completed. Postbirth, those who received self-hypnosis training reported statistically significant ratings that were lower for both pain and anxiety than untrained women, and when Caesarean section patients were excluded the differences were even more significant. Self-hypnosis also helped alleviate even the unexpected and unprepared anxieties of Caesarean sections.

Irritable bowel syndrome & ulcers

A prominent anxiety-mediated medical condition is irritable bowel syndrome (IBS). A variety of research studies have demonstrated that teaching patients self-hypnosis skills proves of considerable value for patients with IBS [41–45]. These studies by Whorwell's group have found long-term follow-up success rates of 95% with classical, refractory IBS cases (who had previously failed with an average of six types of treatment), 43% with atypical cases and 60% with cases exhibiting significant psychopathology. Patients over 50 years of age responded more poorly (25% success), but patients below 50 years of age with classical IBS had a 100% success rate.

Galovski and Blanchard obtained Whorwell's cooperation so that they were able to apply his exact treatment protocol to systematically replicate his work [46]. Although worried about how hypnosis would

be accepted by a US population, they found that hypnosis was highly acceptable, with no applicant declining treatment, and "in fact, patients were seen to be readily amenable to hypnotherapy" [45]. Patients who were taught self-hypnosis (in 12 sessions utilizing an eye fixation and progressive relaxation hypnotic induction followed by imagery) improved significantly more than a symptom-monitoring wait-list control group. In total, 82% of self-hypnosis patients improved (and 27% were symptom free) compared with 0% of control patients, and when the wait-list patients crossed over to hypnotic treatment, 67% of them significantly improved. Furthermore, on 2-month follow-up, the effects of treatment were relatively enduring. Significant decreases were also found in not only state, but also trait anxiety from pre- to post-treatment. The improved physiological symptoms included abdominal pain, constipation, bloating and flatulence. Although on the Stanford Hypnotic Susceptibility Scale, Form A, the scores ranged from 2 (very low overall hypnotic responsiveness) to 12 (high responsiveness), there was not a significant relationship between formally measured hypnotizability and treatment outcome. The authors concluded that the results "bode well for this form of therapy in general. Many of the subjects in the current study reported many positive side effects to this form of therapy. *Hypnotherapy thus appears to be beneficial over and above the effect seen on the gastrointestinal symptoms*." (emphasis added) [45]. They conclude that the high outcomes and lack of drop-outs make self-hypnosis training a viable treatment option.

An audit was taken of the first 250 IBS patients treated on a unit in England specifically established to provide 12 sessions of self-hypnosis training over a 3-month period [47]. Marked improvement was seen in all of the symptom measures, quality of life, anxiety and depression (all probabilities $p < 0.001$), in keeping with previous studies. This study clearly demonstrated that self-hypnosis training is an extremely effective treatment for IBS and should prove more cost effective as new, more expensive drugs come on the market.

The mechanism of improvement in the self-hypnotic treatment of IBS had not been ascertained in previous studies. Therefore, two studies evaluated possible physiological and psychological mechanisms [48]. Patients with severe IBS received seven biweekly self-hypnosis training sessions and used self-hypnosis audiotapes at home. Rectal pain thresholds and smooth-muscle tone were measured with a barostat before and after treatment in 18 patients in the first study, and treatment changes in heart rate, blood pressure, skin conductance, finger temperature and forehead electromyographic (EMG) activity were assessed in 24 patients in the second study. Somatization, anxiety and depression were also measured. All central IBS symptoms improved substantially from treatment in both studies. Rectal pain thresholds, autonomic functioning (except for electrodermal response) and rectal smooth-muscle tone were unaffected by the hypnotic treatment, but somatization and psychological distress showed large decreases. It was concluded that the practice of self-hypnosis improves IBS symptoms through reductions in anxiety, psychological distress and somatization, since improvements were unrelated to changes in the physiological parameters measured.

Controlling anxiety associated with medical procedures

Two recent studies examined the use of hypnosis in association with acupuncture. An intervention involving 20 min of hypnosis while acupuncture needles were in place was evaluated for the treatment of chronic pain in children [17]. After six sessions, pain was not only improved as rated by both parents and children, but anticipatory anxiety also declined significantly. A somewhat similar study compared the effects of acupuncture after receiving an hypnotic induction versus pure acupuncture treatment of angina pectoris (AP) [18]. A total of 40 patients with AP received hypnosis with acupuncture, and 31 received pure acupuncture therapy for 4 weeks (six sessions per week) in a Tibet hospital. When hypnosis was involved, the result was superior to pure acupuncture treatment in reducing both anxiety and depression in the treatment of AP.

As early as 1982, Zeltzer and LeBaron found that anxiety was significantly reduced by hypnosis, but not by distraction, in a randomized study of children undergoing bone marrow aspiration or lumbar puncture [49]. The use of self-hypnosis for relaxation to reduce the need for intravenous sedation during radiological procedures was evaluated by Lang's group [50]. A total of 14 patients were randomly assigned to a control group, while 16 were randomly assigned to the experimental group. In total, 30 out of 33 patients invited to participate were willing to do so, suggesting a great public openness to this alternative medicine, nonpharmacologic intervention. All patients had the capacity to administer patient-controlled analgesia. Self-hypnosis training included teaching the patients to use relaxation and imagery of a pleasant place for hypnotic induction and deepening. If something unpleasant was experienced, patients were taught to allow an image to form representing the feeling, and then to transform the image to neutralize the emotion. When a possibly painful experience was anticipated (e.g., contrast medium injection) patients were told to imagine a competing feeling (e.g., numbness, coolness). Often only 5–10 min were spent with a patient during sterile preparation and administration of local anesthesia, followed by a few minutes at a later time to deepen self-hypnotic relaxation, prepare the patient for potentially painful stimuli or to obtain reports (e.g., pain or anxiety scores). In comparison to controls, the self-hypnosis patients required less drugs (0.28 vs 2.01 drug units; $p < 0.01$) and experienced less pain (median rating 2 vs 5 on a 0–10 scale; $p < 0.01$). Control patients exhibited oxygen desaturation and/or required interventions for hemodynamic instability significantly more often. Anxiety ratings were approximately half those of control patients. As noted in other studies already reviewed, benefits were unrelated to hypnotizability, indicating that a high level of hypnotic talent is not necessary for this level of intervention focused on relaxation.

In order to determine how patients' underlying anxiety affects their experience of distress, use of resources and responsiveness toward nonpharmacologic analgesia adjunct therapies during invasive procedures, Schupp *et al.* worked with 236 patients undergoing vascular and renal interventions [51]. Patients were randomly assigned to receive structured empathic attention or self-hypnotic relaxation during standard care treatment, and were divided into two groups: those with low state anxiety scores on the State–Trait

Anxiety Inventory and those with high state anxiety scores. All patients had access to patient-controlled analgesia with fentanyl and midazolam. Every 15 min during the procedure, patients were asked to rate their anxiety and pain on a scale of 0–10 (0: no pain/anxiety at all; 10: worst possible pain/anxiety). Effects were assessed by analysis of variance and repeated-measures analysis, and it was found that patients with high state anxiety levels required significantly greater procedure time and medication. Empathic attention, as well as self-hypnosis, reduced procedure time and medication use for all patients. These nonpharmacologic treatments also provided significantly better pain control than standard care for patients who had low anxiety levels. Anxiety was found to decrease over the time of the procedure and patients with high state anxiety levels experienced the most significant decreases in anxiety with both interventions, whereas patients with low state anxiety levels coped relatively well under all conditions. Thus, patients' state anxiety level was a predictor of trends in procedural pain and anxiety, need for medication, and procedure duration, but both low and high state anxiety groups profited from self-hypnosis, although those with high state anxiety levels benefitted the most.

A randomized controlled comparison evaluated hypnosis versus CBT or standard care in 30 pediatric cancer patients undergoing bone aspirations [52]. Hypnosis and CBT were equally effective in reducing pain in comparison with standard care. However, hypnosis was significantly more effective than CBT in reducing anxiety ($p < 0.0002$) and observed distress ($p = 0.0025$). The same authors subsequently found training in self-hypnosis was effective in reducing anxiety and pain associated with pediatric cancer patients undergoing regular lumbar punctures in comparison to attentional controls or standard medical care groups [53]. A further randomized, blinded study with the same population evaluated the efficacy of an analgesic cream, versus hypnosis and analgesic cream, versus analgesic cream and attention [54]. The addition of hypnosis significantly reduced both anticipatory anxiety and procedural anxiety (as well as pain) in comparison with the cream alone ($p < 0.001$) and attentional controls ($p < 0.001$). Furthermore, benefits from self-hypnosis training were maintained at 6-month follow-up. A parallel blinded study by this group found that the addition of brief, 15-min self-hypnosis training to the use of a local anesthetic was significantly superior to local anesthetics alone or local anesthetic with attentional control, in reducing anticipatory anxiety and procedure-related anxiety (and pain) with pediatric cancer patients undergoing venopuncture for blood sampling [55]. Results were maintained during two follow-up venopunctures. As an added bonus, the parents of the children who had been briefly trained in self-hypnosis also experienced less anxiety during their childrens' procedures.

A meta-analysis of 26 randomized controlled trials (with 2342 patients) of hypnosis associated with medical procedures found that 82% of patients receiving hypnosis experienced lower levels of emotional distress [56]. The effect size for hypnosis was 0.88 and it was found that children (who as a group have higher hypnotic responsiveness [57]) benefited more, but adults still had a medium effect size. Hypnosis was found to be most effective when at least part of the hypnotic procedure was performed in person (versus audio recording) and when at least part of the hypnosis occurred prior to the beginning of the medical procedure. Hypnosis appeared equally effective when compared with standard care or an attentional control group, demonstrating that benefits from hypnosis are not simply due to receiving attention.

A randomized study of the impact of a combination of hypnosis and CBT versus standard care in breast cancer radiotherapy patients found significantly lower levels ($p = 0.0007$) of negative affect and significant levels ($p = 0.0035$) of positive affect in the hypnosis and CBT group [58]. Trait anxiety significantly decreased following the treatment, which consisted of brief hypnosis and provision of a hypnosis CD to listen to at home, as well as 30 min of CBT instruction and provision of a CBT workbook for home study.

Another study compared hypnosis with distraction in severely ill children undergoing painful medical procedures [59]. A sample of high and low hypnotizable children ($n = 27$) of diverse ethnic backgrounds and suffering from blood or cancer disorders were trained, along with their parents, to use both self-hypnosis and distraction for pain and anxiety reduction. Pain and anxiety measures were obtained from parents and children, and independent raters estimated the distress from videotapes. Data were then collected during painful medical procedures for baseline, self-hypnosis and distraction conditions. Children who were hypnotizable demonstrated significantly lower pain, anxiety and distress scores when hypnotized compared with low hypnotizable children. Distraction produced significant positive effects only for observer ratings of distress in the low hypnotizable condition.

One randomized prospective study with out-patient EMG procedures compared a 20-min hypnosis audio program with a 20-min education about the EMG audio program. Lower anxiety was reported in the hypnosis condition, but it did not reach statistical significance [60].

A total of 20 min of hypnosis prior to the start of a first-trimester abortion was found, in a randomized study, to significantly reduce anxiety ($p < 0.0001$) at the time of suction evacuation and to reduce needs for subsequent intravenous sedation [61].

Hypnosis for surgical anxiety

Anxiety is a problem for patients anticipating surgery, with more than half of them fearing anesthesia or not waking up after surgery [62]. A randomized controlled study with children found that preoperative hypnotic guided imagery resulted in significantly less pain and state anxiety, and shorter hospital stays [63]. In a randomized, placebo controlled study on the effects of 'relaxation and guided imagery' on knee strength, reinjury anxiety and pain in anterior cruciate ligament knee surgery patients it was shown that the hypnotic imagery/relaxation patients had significantly greater knee strength and significantly less reinjury anxiety and pain at 24 weeks post-surgery than either attentional placebo or control group participants [64].

Hypnosis was evaluated as an adjunct to conscious sedation for plastic surgery by Faymonville *et al.* [65]. In a study of 337 patients undergoing minor and major plastic surgery under local anesthesia and conscious intravenous sedation, they divided patients into three groups: intravenous sedation ($n = 137$) using only midazolam and alfentanil; hypnosis ($n = 172$), during which relaxation age

regression was used; and relaxation (n = 28), consisting of patients where a rapid hypnotic induction was performed, but without much depth. In all three groups, midazolam and alfentanil were titrated to achieve patient immobility, in response to patient complaints and to maintain hemodynamic stability. Intraoperative anxiety in the hypnosis group and in the brief hypnotic relaxation group were significantly ($p < 0.001$) less than in the intravenous sedation group. Pain scores during surgery were also significantly greater in the intravenous sedation group than in the hypnosis group ($p < 0.001$) and the rapid self-hypnotic relaxation group ($p < 0.01$). In addition, midazolam requirements were significantly less in the hypnosis group ($p < 0.001$) and in the relaxation group ($p < 0.01$) compared with the sedation group. Alfentanil requirements were significantly decreased in the hypnosis group and postoperative nausea and vomiting were reported by 1.2% of the patients in the hypnosis group, 12.8% in the relaxation group and in 26.7% in the intravenous sedation group. Greater patient satisfaction with the anesthetic procedure and greater surgical comfort were also found in the hypnosis group. Thus, even a very brief hypnotic induction was found to be helpful, but a deeper level of hypnosis was even more beneficial.

In a later randomized controlled study with 60 plastic surgery patients, this same group found that hypnosis was associated with less peri- and post-operative anxiety and pain, even though there was a significant reduction in intraoperative needs for midazolam and alfentanil in the hypnosis group [66]. The patients in the hypnosis group also felt a greater sense of intraoperative control than the control group, and experienced significantly less nausea and vomiting than the other patients. Hypnotized patients demonstrated fewer signs of discomfort and pain.

In yet another study, 130 patients undergoing elective colorectal surgical procedures were randomly assigned to routine procedure or guided imagery tape groups [67]. The latter patients listened to hypnotic type imagery tapes for 3 days before surgery, during the induction of anesthesia, intraoperatively, in the recovery room and for 6 days following surgery. Anxiety levels, pain perceptions and narcotic medication were assessed. Patients in the experimental group experienced considerably less pre- and post-operative anxiety and pain, and required almost 50% less narcotic medications than the control group.

Schnur *et al.* randomly compared excisional biopsy patients (n = 90) receiving a 15-min presurgical hypnosis session versus a 15-min presurgical attentional control session (empathic listening) [68]. The hypnosis group had significantly ($p < 0.0001$) less anxiety, depressed mood ($p < 0.02$) and emotional upset ($p < 0.001$) and greater relaxation ($p < 0.001$) than controls at post-intervention and presurgical evaluations. Similarly, a randomized comparison of hypnosis (n = 26) and attentive listening and support without hypnotic suggestions (n = 26) versus standard care found significantly less ($p = 0.0008$) preoperative anxiety with hypnosis compared with the other groups in ambulatory surgery patients [69]. On entering the operating room, the hypnosis group patients had a 56% decrease in anxiety, while the attentional control group experienced a 10% increase and the standard care group a 47% increase in anxiety ($p = 0.001$).

Lang's group conducted a prospective randomized controlled study of simple self-hypnotic relaxation, standard care or structured empathic attention in 236 women undergoing large core-needle breast biopsy [70]. The women receiving only standard care experienced a significant increase in anxiety ($p > 0.001$), while anxiety did not change in the empathy group, and decreased significantly in the self-hypnosis group ($p < 0.001$). Pain increased significantly ($p < 0.001$) in all three groups, although less steeply with hypnosis and empathy than standard care. It was concluded that self-hypnosis more powerfully relieved anxiety without undue cost. Another randomized study by the same group of 201 patients receiving pericutaneous tumor surgeries found that patients receiving hypnosis experience significantly less state anxiety (pain and medication) than those receiving standard care or empathic communication [71].

In a randomized study of coronary artery bypass patients, de Klerk *et al.* found that 2 h of preoperative hypnotic 'ego-strengthening' (n = 50) significantly reduced anxiety (and depression) compared with a standard-care control group (n = 25), and changes were maintained on 6-week follow-up [72]. Hypnosis has also been found to significantly ($p < 0.01$) reduce cardiac sympathetic activity and myocardial ischemia during pericutaneous transluminal angioplasty [73].

One placebo-controlled study compared midazolam and hypnosis for reducing preoperative anxiety in children and found that hypnosis was just as effective as midazolam in its effects preoperatively (but, of course, without the risks associated with medication), and hypnosis was more effective ($p < 0.05$) in reducing anxiety during the induction of chemical anesthesia [74].

All of these results can still be reasonably summarized by the findings of a 2002 meta-analysis of 20 studies (1624 patients) that found that an average of 89% of surgical patients benefited from the inclusion of hypnosis relative to patients in control conditions, with a high effect size (1.07) for the reduction of negative affect (anxiety and depression) [56].

Dental anxiety & oral surgery

Dental anxiety is relatively common, but has been shown to be significantly improved with self-hypnosis training [75]. Hypnosis has also been used effectively in oral surgery. Dyas found that hypnosis prior to sedation (midazolam and fentanyl) resulted in a significantly ($p < 0.001$) lower heart rate, and much less ($p < 0.001$) intravenous sedation than was required compared with a standard sedation procedure [76]. Outcomes in control patients were not as positive and they required more intravenous medication, and one patient required conversion to a full general anesthetic. Enqvist and Fischer compared a control group with patients who used a presurgical self-hypnosis tape prior to surgical removal of molars [77]. Hypnosis patients experienced significantly less anxiety and required significantly less analgesic medication. In another study, listening to an 18-min self-hypnosis tape prior to maxillofacial surgery was found to result in significantly less postsurgical edema ($p < 0.000$), pyrexia ($p < 0.006$) and use of anxiolytics ($p < 0.003$) postoperatively in comparison with matched controls [78].

Eitner examined anxious and nonanxious patients during oral/maxillofacial (dental implant) surgery, finding that hypnosis significantly reduced anxiety and physiologically monitored parameters on the day of surgery [79]. Findings were even more significant in highly anxious patients.

Patients who have a history of drug dependence often experience considerable anxiety regarding surgical sedation. Lu and coworkers found hypnotic augmentation of standard sedation to be very beneficial in 18 such patients where previous attempts at oral surgery had proven unsuccessful because of their fears [80]. Hypnotic induction preceded use of intravenous sedation (midazolam or diazepam plus methohexital), but followed intramuscular sedation (meperidine plus promethazine). Treatment outcomes were good or excellent in 11 out of 18 of these refractory patients. When the treatment outcome was poor or fair it was found that five out of seven patients had the possibility of tolerance or crosstolerance between their drug of abuse and the sedative agent, while this possibility was only found in one out of 11 patients having good or excellent outcomes. It was concluded that hypnosis can be used to augment sedation in drug-dependent patients, but it is important to use sedatives where tolerance is unlikely.

Burn patients

Burn patients not only experience pain, but also a great deal of anxiety, especially in anticipation of dressing changes. A prospective randomized study compared hypnosis against another stress-reducing strategy (SRS) for controlling peri-dressing-change pain and anxiety in severely burned patients [81]. A total of 30 patients with a total burned surface area of 10–25%, requiring a hospital stay of at least 14 days, were randomly selected to receive either self-hypnosis training or SRSs adjunctively to routine intramuscular pre-dressing-change analgesia and anxiolytic drugs. Visual analogue scale (VAS) scores for anxiety, pain, pain control and patient satisfaction were recorded at 2-day intervals throughout the 14-day study period, before, during and after dressing changes. The psychological interventions were provided on days 8 and 10 after hospital admission. The comparison of the two treatment groups indicated that VAS anxiety scores significantly decreased before and during dressing changes when the hypnotic technique was used instead of SRS. No differences were observed for pain, pain control and satisfaction, although VAS scores were always better in the hypnosis group.

Anxiety in cancer patients

When someone receives a diagnosis of cancer, anxiety naturally increases. Laidlaw and Willett studied the outcome from using self-hypnosis tapes in 27 cancer patients versus breathing techniques in a randomized study [82]. Outcome measures included incidence of acute anxiety episodes and ratings of both positive and negative emotions, which were collected prior to and post-intervention. Patients showed significant improvement in both incidence of acute anxiety attacks and in experiencing more positive and less negative mood states.

Another study explored the use of autogenic training to increase coping ability in patients diagnosed with cancer [83]. It was believed that reduction in arousal and anxiety could help cancer patients to perceive their environment as less hostile and threatening, improve coping ability, relieve symptoms and increase the overall sense of wellbeing. Each of the 18 subjects completed a Hospital Anxiety and Depression Scale and the Profile of Mood States questionnaire before and after a 10-week training course. Patients experienced a statistically significant reduction in anxiety and an increase in fighting spirit compared with before training, with an improved sense of coping and improved sleep being other apparent benefits.

One study randomly assigned 50 advanced cancer patients to receive either standard palliative medical care with supportive cognitive existential counseling or to receiving four group self-hypnosis training sessions along with standard medical care [84]. The self-hypnosis group was found to result in significantly better overall quality of life measures ($p < 0.01$), less psychological distress ($p < 0.01$), less physical distress ($p < 0.01$) and lower levels of anxiety ($p < 0.01$) and depression ($p < 0.01$) compared with standard care. Thus, even in terminally ill cancer patients, self-hypnosis training appears effective in reducing anxiety and distress.

Conclusion

This review has demonstrated that the inclusion of hypnosis with other treatment modalities (e.g., CBT or acupuncture) commonly improves the outcomes obtained by the other therapeutic modalities alone. It has been further shown that self-hypnosis training and practice results in improvements in physiological measures (e.g., heart rate) and has the potential to enhance immune function as it reduces stress. Hypnosis has also been shown to have comparable effects in comparison with well-established treatments, such as progressive relaxation.

Considerable evidence exists that training in self-hypnosis not only reduces generalized stress, but is also effective in reducing anxiety associated with public speaking, test taking and coping after being diagnosed with cancer, as well as in reducing anxiety experienced by burn patients and those going through childbirth. The evidence is especially compelling regarding the ability of hypnosis to significantly reduce anxiety associated with a variety of surgical, medical and dental procedures (e.g., incisional biopsy, venepuncture, having radiological and imaging procedures, dentistry or oral surgery). Self-hypnosis training has been documented to produce improvements in stress related medical conditions, such as tension headaches, migraines and IBS, and in reducing the frequency of anxiety-provoked herpes outbreaks. Results also demonstrate that the process of learning self-hypnosis commonly increases self-esteem and perceptions of self-efficacy from having developed a self-mastery skill. However, despite the fact that this review has identified extensive evidence from randomized controlled studies for the value of hypnosis in reducing state anxiety associated with a large variety of stressful conditions, and that significant improvements occur in anxiety-related disorders after self-hypnosis training, only six studies of self-hypnosis or autogenic training have adequately documented outcomes of reduced trait anxiety [20,23–25,41,56]. It was surprising not to have uncovered more studies focused on generalized anxiety disorder. Thus, while the available scientific evidence is very supportive of the value of hypnosis and self-hypnosis training with problems of anxiety associated with many things, this review

has also documented that a need exists for further controlled studies focused on generalized anxiety disorder and that also include measures of trait anxiety. When the State–Trait Anxiety Inventory is used in research it is recommended that outcomes on both the state and trait measures be reported, rather than overall State–Trait Anxiety Inventory improvements.

Chambless *et al.* established the following criteria to obtain the status of a well-established treatment in clinical psychology [85]. First, there must be at least two experiments that show efficacy through demonstrating that it is superior statistically to another treatment or to a pill or psychological placebo, or that it is "equivalent to an already established treatment in experiments with adequate sample sizes." Alternatively, a treatment may be considered to be well established through "a large series of single case design experiments (n > 9) demonstrating efficacy" that must have used good experimental designs and compared the treatment to another intervention. Furthermore, a well-established treatment must have been conducted with a treatment manual, must clearly specify the characteristics of the client samples and the positive outcomes must have been demonstrated by at least two different investigators or research teams.

According to these standards for judging efficacy of psychological treatments, hypnosis with anxiety that is associated with medical procedures and of hypnosis utilized presurgically has been demonstrated to be statistically superior or equivalent in comparison to commonly used medication treatments and CBT, and in comparison to attentional control conditions that could be considered as an equivalent of a placebo-control condition. Thus, it can be said that hypnosis meets the criteria for being a well-established treatment that is both efficacious and specific.

Six studies of hypnosis in association with trait anxiety, which we might judge to be fairly synonymous with a diagnosis of generalized anxiety disorder, have also demonstrated its effectiveness.

Expert commentary

Perspective is provided by comparing self-hypnosis training with other treatment options. CBT has proven effective in reducing anxiety, but may often require a larger number of sessions to accomplish the objective. Medication treatment is widely used, but clearly has limitations. A review of the research on 13 anxiety medications found that psychopharmacologic treatment was superior to a placebo less than half of the time (48%) [86], while, as noted previously, hypnosis has been documented as superior to placebo and at least equivalent to medication in numerous studies of procedural or surgical anxiety. Similarly, an independent analysis of drug company research obtained from the US FDA through the Freedom of Information Act found that antidepressants on average only have an 18% effect over and above placebo effects [87], while another review found an average drug versus placebo difference of only 16.8% in randomized controlled trials [88]. Such findings have been referred to as the 'dirty little secret' in the pharmaceutical literature and with the FDA [89].

In comparison to medication treatment, self-hypnosis training offers patients a method for rapidly self-administering what we may think of as a naturalistic tranquilizer. Advantages of self-hypnotic treatment of anxiety include freedom from adverse side effects and drug interactions, lack of addictive risks and problems with drug withdrawal, and the fact that it increases the patient's sense of mastery and self-efficacy, knowing that he or she possesses a self-management skill. Once learned, this skill may be used to cope with general stress, anxiety associated with specific situations (e.g., public speaking, fear of flying, medical and dental procedures) and to assist in managing insomnia, irritable bowel symptoms and headaches or migraines. Hypnosis has proven cost effective in healthcare, commonly requiring only three to five office visits or less for self-hypnosis training for generalized anxiety, and as little as 10–20 min in association with medical/dental procedures [90–92]. However, clinicians do not have to think in either/or terms. The choice does not have to be to either use self-hypnosis training or other treatments, such as medication, biofeedback or CBT. Particularly in patients with more severe problems, self-hypnosis training may be very easily combined with other forms of treatment.

Caution must be exercised, however, in identifying competent referral sources for hypnosis services because of the large number of unlicensed lay hypnotists. Therefore, it is recommended that referral only be made to licensed healthcare professionals who are also trained in hypnosis. Such individuals may be identified through contacting the American Society of Clinical Hypnosis [101] or the Society for Clinical and Experimental Hypnosis [102], both of which also provide hypnosis training to licensed professionals.

Five-year view

Although hypnosis has been a treatment modality for more than 200 years it has been underutilized owing to misconceptions among professionals about the nature of hypnosis. However, interest in and openness to alternative and complementary medicine techniques has rapidly increased at the same time that the public has become increasingly dissatisfied with and wary of reliance on only medication treatment. Studies cited have shown that the vast majority of the public have an openness to the use of hypnosis as part of treatment. These factors combined with increasing healthcare costs and unfavorable economic conditions create a climate in which a rapid and cost-effective treatment modality, such as self-hypnosis training, will become increasingly appealing. Economic factors reinforce the importance of the principle of parsimony in guiding treatment selection – utilizing the least complex and most rapid methods of treatment first, and only turning to invasive or more time-consuming treatments in the more chronic or complex cases where less complicated methods have not proven sufficient. When offered by licensed healthcare professionals as a psychotherapy procedure, services are also usually reimbursable.

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Key issues

- Hypnosis has been shown to be effective in reducing state anxiety associated with cancer, surgery, burns and a variety of medical/dental procedures.
- Self-hypnosis training has also been demonstrated to effectively treat anxiety-related disorders, such as tension headaches, migraines and irritable bowel syndrome.
- Six studies have demonstrated changes in trait anxiety from self-hypnosis training, but further randomized controlled outcome studies would be desirable on the hypnotic treatment of generalized anxiety disorder and in further documenting changes in trait anxiety.
- Self-hypnosis training has been demonstrated to be a rapid, cost-effective, nonaddictive, side-effect free and safe alternative to medication for the treatment of anxiety-related conditions, and the public has been shown to be open to hypnosis treatment.
- Economic factors reinforce the importance of the principle of parsimony in guiding treatment selection – utilizing the least complex and most rapid methods of treatment first and only turning to invasive or more time-consuming treatments in the more chronic or complex cases where less complicated methods have not proven sufficient.
- In patients with more severe problems, self-hypnosis training may very easily be combined with other forms of treatment.
- Caution must be exercised in identifying competent referral sources for hypnosis services because of the large number of unlicensed lay hypnotists.

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