

Hypnotic Treatment of Chronic Pain

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This article reviews controlled trials of hypnotic treatment for chronic pain in terms of: (1) analyses comparing the effects of hypnotic treatment to six types of control conditions; (2) component analyses; and (3) predictor analyses. The findings indicate that hypnotic analgesia produces significantly greater decreases in pain relative to no-treatment and to some non-hypnotic interventions such as medication management, physical therapy, and education/advice. However, the effects of self-hypnosis training on chronic pain tend to be similar, on average, to progressive muscle relaxation and autogenic training, both of which often include hypnotic-like suggestions. None of the published studies have compared hypnosis to an equally credible placebo or minimally effective pain treatment, therefore conclusions cannot yet be made about whether hypnotic analgesia treatment is specifically effective over and above its effects on patient expectancy. Component analyses indicate that labeling versus not labeling hypnosis treatment as hypnosis, or including versus not including hand-warming suggestions, have relatively little short-term impact on outcome, although the hypnosis label may have a long-term benefit. Predictor analyses suggest that global hypnotic responsivity and ability to experience vivid images are associated with treatment outcome in hypnosis, progressive relaxation, and autogenic training treatments. The paper concludes with a discussion of the implications of the findings for future hypnosis research and for the clinical applications of hypnotic analgesia.

KEY WORDS: hypnosis; chronic pain; clinical trials; control groups.

Interest in hypnotic treatment for pain conditions appears to be on the rise. This may be due to recent evidence that hypnotic analgesia interventions result in substantial cost savings following medical procedures (Lang *et al.*, 2000) as well as an increasing demand for non-pharmacologic therapies that do not carry the same troublesome side effects that many medical procedures do (e.g., Blumstein and Gorevic, 2005). Evidence demonstrating changes in both subjective pain reports and pain-related brain activity following hypnotic analgesia may also be contribut-

ing to the increased interest in hypnosis, to the extent that this research supports demonstrable cortical effects of hypnotic suggestions on pain experience, as opposed to a perhaps more trivial effect on merely a willingness to report pain (Rainville *et al.*, 1997). A third possible contribution to the growing interest in hypnotic analgesia may be the fact that there are now an adequate number of controlled trials of hypnotic analgesia for chronic pain to make meaningful reviews of this literature possible, and the findings appear to be more encouraging as to the efficacy of this approach than they were two decades ago (see Chaves and Dworkin, 1997; Holroyd, 1996; Montgomery *et al.*, 2000; Patterson and Jensen, 2003).

The most recent American Psychological Association's Division 30 (Society of Psychological Hypnosis) definition of hypnosis states that it "...typically involves an introduction to the procedure during which the subject is told that suggestions for imaginative experiences will be presented" and

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that following this introduction "...one person (the subject) is guided by another (the hypnotist) to respond to suggestions for changes in subjective experience, alterations in perception, sensation, emotion, thought, or behavior" (Green *et al.*, 2005, p. 262). While some controversy exists concerning what else an intervention must include in order to be called "hypnosis" (e.g., whether or not term "hypnosis" needs to be used when performing hypnotic procedures, cf., Green *et al.*, 2005; Nash, 2005), a hypnosis treatment usually begins with an "induction" consisting of one or more initial suggestions for changes in behavior or perception (e.g., for focused attention and/or relaxation). Clinicians providing hypnotic analgesia treatment usually then follow this induction with specific suggestions for alterations in how pain is viewed or experienced, although the specific suggestions used tend to vary between clinicians (and between research protocols, see later). Hypnotic treatment for chronic pain often, but does not always, includes post-hypnotic suggestions that are made during the session. These might include the suggestion that the benefits experienced during the session (e.g., a reduction in perceived pain intensity) will last beyond the session, for minutes, hours, or even for days, months and years, or that the patient will be able to easily create a state of comfort after the session after a specific cue (e.g., after taking a deep breath, holding it for a moment, and then letting it go).

The purpose of typical hypnotic protocols is to teach persons with chronic pain an alternative skill (self-hypnosis) that they might use to alter their experience of pain and suffering outside of the treatment sessions. That is, the primary goal is not to alter pain during hypnosis, but to make hypnotic suggestions and teach skills that will alter pain intensity and its impact throughout the patient's daily life. In our clinical experience, some rare individuals seem to be able to learn such a skill and make it "automatic" and seemingly permanent. For these individuals, dramatic benefits of hypnosis treatment seem to occur quickly and to not require significant ongoing effort or practice to last indefinitely. More often, we have found the benefits of hypnosis treatment to come on gradually, and to vary from person to person. With time, some patients seem able to reduce primarily the suffering associated with pain, while others seem able to reduce their experience of both pain intensity and suffering. Many require ongoing practice using audiotapes made of actual treatment sessions to maintain and build upon the

gains made with treatments. There also appears to be a group of patients who seem to derive little direct benefit, at least in terms of their experience of pain, from hypnotic analgesia treatment.

An important and appropriate question that pain clinicians who are considering using hypnotic treatment in their practice might ask is, "How much benefit does hypnotic analgesia treatment provide, especially relative to no hypnosis treatment (i.e., usual care), other pain treatments, or simple attention?" We recently reviewed the complex issues involved in selecting and using control conditions in hypnotic analgesia clinical trials (Jensen and Patterson, 2005). In that review, we discussed the strengths and weaknesses of six different potential control conditions in this research: Baseline (pre-treatment) assessment, standard or usual care, other treatment, hypnosis add-on (to another treatment), attention control, and minimal-effect control conditions. We argued that each of these control conditions can provide important useful information, but that each also has its limitations and weaknesses.

Our purpose in the current review is to evaluate the published controlled trials of hypnotic analgesia for treating chronic pain, organized by the types of control conditions used in these studies, in order to provide a state-of-the-science summary of the efficacy of hypnotic analgesia. Most (13 of 19), but not all, of these trials randomly assigned the subjects to the hypnosis and control conditions. In addition to including some published clinical trials that have not yet been included in previous reviews of this literature, we discuss in this paper two types of analyses that have not been a focus of previous reviews: Component and correlational (outcome predictor) analyses. We conclude the paper with a discussion of the research and clinical implications of the findings from this review.

CONTROLLED TRIALS OF HYPNOTIC ANALGESIA TREATMENT FOR CHRONIC PAIN

We were able to identify 19 studies that used one or more control conditions for evaluating the efficacy of hypnotic analgesia treatments for chronic pain. Many (eight) of these studied headache (Melis *et al.*, 1991; Schlutter *et al.*, 1980; Spinhoven *et al.*, 1992; Anderson *et al.*, 1975; Andreychuk and Skriver, 1975; Friedman and Taub, 1984; ter Kuile *et al.*, 1994; Zitman *et al.*, 1992), but several included other chronic pain conditions such as cancer-related

pain (Spiegel and Bloom, 1983), sickle cell disease (Dinges *et al.*, 1997), fibromyalgia (Hannen *et al.*, 1991), osteoarthritis pain (Gay *et al.*, 2002), low back pain (McCauley *et al.*, 1983; Spinhoven and Linssen, 1989), temporomandibular pain disorder (Simon and Lewis, 2000; Winocur *et al.*, 2002), disability-related pain (i.e., pain as a secondary condition to physical disability, Jensen *et al.*, 2005), and mixed chronic pain problems (Melzack and Perry, 1975; Edelson and Fitzpatrick, 1989; see Table I).

Comparing Hypnosis to Baseline Control

The baseline control experimental condition involves assessing the treatment outcome variables at least twice before treatment begins; usually once before and once after a baseline period. The length of the baseline period varies between studies, and sometimes varies between subjects in the same study. This design recognizes that pain and other outcome variables often change over time for reasons other than treatment, such as regression to the mean (the tendency of outcome domains to decrease in severity over time when initial assessment yields higher-than-average scores) as well as random fluctuation. Without the inclusion of a baseline control condition, it could be argued that any improvement observed during treatment could be attributed to the natural course of pain in the sample. Both the baseline control condition and the standard/usual care control condition (described in the next section) control for the effects of time on outcome. Their primary difference is that the former assesses change in outcome before treatment begins among patients who will later receive treatment (patients act as their own controls), while the latter assesses outcome in two groups: One that receives treatment and a second that does not receive treatment during the same time period. Having at least two measures of outcome separated by a reasonable amount of time before treatment, allows investigators to have some control over this possible confound. Improvement in outcome that exceeds baseline, especially if this is a consistent finding across a number of different studies, provides some evidence that the changes seen with hypnosis are not merely due to the passage of time.

Six studies were identified that assessed outcome during a no-treatment baseline period (Dinges *et al.*, 1997; Jensen *et al.*, 2005; McCauley *et al.*, 1983; Melzack and Perry, 1975; Simon and Lewis, 2000; Spinhoven *et al.*, 1992). In the first of these, Melzack and Perry (1975) examined the effects of hypnosis

and neurofeedback in 24 patients with a variety of chronic pain problems following two baseline (no-treatment) sessions. All participants began the study with the baseline sessions in which the study procedures were described and baseline EEG assessments were performed. Following baseline, patients were randomly assigned to one of three treatment protocols: Four sessions of hypnosis alone, eight sessions of neurofeedback training alone, or both hypnosis and neurofeedback training. The hypnosis treatment consisted of a taped hypnotic induction that focused on suggestions for muscle relaxation, followed by ego strengthening suggestions (e.g., "...feeling stronger and healthier, [having] greater alertness and energy, less fatigue, less discouragement, a feeling of greater tranquility and of being able to overcome things that are ordinarily upsetting and worrying. . .to think more clearly, to concentrate, . . . to be less tense both emotionally and physically"). No direct suggestions for pain control were included in the hypnosis treatment, with the assumption that the "ego strengthening" suggestions used would be enough to impact pain experience. Following treatment, all participants participated in two sessions during which they were asked to practice the pain management procedures they had learned during treatment. The McGill Pain Questionnaire (MPQ), assessing the sensory and affective components of pain, as well as overall pain severity (total Pain Rating Index score), was administered before and after each of the baseline, training, and two post-training practice sessions. Relatively little improvement in pain was found during the baseline sessions (range, 8–29% pre- to post-session decrease in pain across the three MPQ scale scores; median improvement across pain measures = 14%). Although somewhat more improvement was observed during hypnosis training (range, 21–32% improvement; median improvement = 23%), none of the observed changes in either the baseline or hypnosis condition were statistically significant, perhaps due in part to the low sample size and associated low statistical power.

Dinges *et al.* (1997) asked 37 children and adults with sickle cell disease (SCD) to complete daily diaries during 4 months of baseline and 18 months of treatment that involved weekly (for the first 6 months), bi-monthly (for the next 6 months), and once every 3 weeks (for the final 6 months) of group self-hypnosis training and practice. In the hypnosis treatment, participants were given suggestions for ideomotor responses (e.g., hands moving together, arm becoming lighter and rising) and encouraged to

Table I. Controlled Trials of Hypnotic Analgesia for Chronic Pain

Author(s) and date	Diagnosis (N)	Experimental conditions/ randomized?	Number of sessions; Tx time; practice recommendations	Outcome dimension(s); process variables	Assessment points	Primary finding(s); effect sizes (<i>d</i>) ^a and % change scores associated with pre- to post-Tx changes in pain measures
Anderson <i>et al.</i> (1975)	Migraine headache (47).	Hypnosis (Hyp); Medication management (MM). Randomized.	"6 or more" sessions; Up to 12 months; Told to practice on own (w/o tape) twice a day.	Number of headaches, number of grade 4 headaches, frequency of being headache free; No process variables assessed.	Monthly during 12 months of Tx.	Hyp more effective than MM on all three outcome measures. Effect sizes and percent change could not be computed.
Andreychuk and Skriver (1975)	Migraine headache (33).	Hypnosis (Hyp); Hand temperature biofeedback (T-BF); Neurofeedback (NF). Randomized.	10 sessions; 10 weeks; Told to practice on own (w/o tape) twice a day.	"Headache index" (product of headache duration × headache severity); Hypnotic responsivity (HIP).	Pre-Tx; Last 5 weeks of Tx.	All three interventions equivalent; Hypnotic responsivity associated with percent improvement (highs = 71%; lows = 41% improvement) across treatment conditions, with the largest association among those who received neurofeedback (but differences between groups not tested for significance). Pre-post percent change on headache index: highs/lows: Hyp: 39%/33%; T-BF: 83%/66%; N-FB: 67%/31%. Relative to baseline, there was significant improvement in % days SCD pain, % days other pain, % non-SCD pain days medication taken, and % non-SCD bad sleep nights; but there was also a significant increase in average SCD pain intensity and pain duration. Amount of self-hypnosis practice outside of the treatment sessions not significantly related to % of pain-free days. Effect sizes could not be computed. Relative to BL, there was a 19% increase in SCD pain intensity on those days there was SCD pain.
Dinges <i>et al.</i> (1997)	Sickle cell disease (SCD) (37).	Hypnosis (Hyp); Baseline (BL); 4-mo). Not randomized.	44 Sessions; 18 mos; No clear practice recommendations, but practice monitored	% days SCD pain, % days other pain, average SCD pain intensity, average SCD pain duration, % SCD pain days medication taken, % bad sleep nights on SCD pain days, % bad sleep nights on non-SCD pain days, % days school or work missed; Amount of self-hypnosis practice.	Daily assessments during BL and Tx phases.	Pre-post percent change on headache index: highs/lows: Hyp: 39%/33%; T-BF: 83%/66%; N-FB: 67%/31%. Relative to baseline, there was significant improvement in % days SCD pain, % days other pain, % non-SCD pain days medication taken, and % non-SCD bad sleep nights; but there was also a significant increase in average SCD pain intensity and pain duration. Amount of self-hypnosis practice outside of the treatment sessions not significantly related to % of pain-free days. Effect sizes could not be computed. Relative to BL, there was a 19% increase in SCD pain intensity on those days there was SCD pain.

Edelson and Fitzpatrick (1989)	Various chronic pain diagnoses (27), w/low back (n = 7) the most common.	Cognitive behavior therapy alone; Cognitive behavior therapy following hypnotic induction; (H-CBT); Attention control (AC). Not randomized.	Four sessions; 2 weeks; No practice recommendations.	Walking time, sitting time, reclining time, pain intensity (MPQ-VRS); pain severity (MPQ-PR1); No process variables assessed.	Pre-Tx; post-Tx; 1-mo f/u.	Between group comparisons indicated significantly greater effects (relative to the other conditions) in the CBT group on walking and sitting time, and significantly greater effects (relative to the other conditions) in the H-CBT group on pain intensity and severity. Pre-post effect sizes/percent improvement for: (1) Pain intensity, CBT: 0.72/14%; H-CBT: 1.29/28%; AC: -0.05/-1%; (2) pain severity, CBT: 0.12/7%; H-CBT: 0.82/30%; AC: -0.04/-1%.
Friedman and Taub (1984)	Migraine headache (66).	Hypnosis w/o thermal suggestions (Hyp); Hypnosis w/ thermal suggestions (Hyp-T); Hand temperature biofeedback w/ autogenic suggestions (T-BF); Relaxation response training (RR); Standard care (SC). Randomized.	Three sessions; 3 weeks; Told to practice on own (w/o tape) twice a day and at onset of headache.	Peak headache intensity, number of headaches, medication use; Hypnotic responsiveness (SHSS:A).	Pre-Tx; post-Tx; 6-mo, 9-mo, and 12-mo f/u.	All interventions more effective than the SC condition on all three outcome measures, and equivalent with each other on most outcome measures; Planned comparisons between patients with high vs. low hypnotic responsiveness indicated that highs continued to improve while lows leveled off from 6- through 12-months on peak headache intensity, and highs tended to improve while lows deteriorated some from 6- through 12-months on number of headaches. Effect sizes could not be computed. Pre-post percent improvement in peak headache intensity, Hyp: 26% highs, 9% lows; Hyp-T: 29% highs, 0% lows; T-BF: 20%; RR: 3%.

Table I Continued

Author(s) and date	Diagnosis (N)	Experimental conditions/ randomized?	Number of sessions; Tx time; practice recommendations	Outcome dimension(s); process variables	Assessment points	Primary finding(s); effect sizes (<i>d</i>) ^a and % change scores associated with pre- to post-Tx changes in pain measures
Gay <i>et al.</i> (2002)	Osteoarthritis (36)	Hypnosis labeled as "imagery" (Hyp); Progressive muscle relaxation (PMR); Standard care (SC). Randomized.	Eight sessions; 8 weeks; No instructions for practice given.	Pain intensity, medication use; Hypnotic responsivity (SHSS:C), imagery vividness, belief in treatment efficacy.	Pre-Tx; Mid-Tx; Post-Tx; 3- and 6-mo f/u.	Both interventions more effective than SC on pain intensity and medication use. The two treatment conditions varied in the timing of effects, such that Hyp was effective on pain intensity sooner than PMR was. Hypnotic responsivity was significantly associated with change in pain intensity in Hyp patients at 4 weeks, and in PMR patients at 4 and 8 weeks. Imagery vividness was significantly associated with change in pain intensity in Hyp patients at 8 weeks and 3-mo f/u, and in PMR patients at 4 weeks.
Hannen <i>et al.</i> (1991)	Fibromyalgia (40)	Hypnosis (Hyp); Physical therapy (PT). Randomized	Eight sessions hypnosis/12 sessions physical therapy; 12 weeks; Hyp participants given practice tape and told to practice once a day	Morning stiffness, muscle pain, fatigue, sleep disturbance, patient and physician global assessment of outcome, FM point tenderness; distress (SCL-90), medication use; No process measures assessed	Pre-Tx; post-Tx; 3-mo f/u	Belief in treatment efficacy unrelated to outcome (although how and when assessed was not clear). No process measure was associated with outcome in the control patients. Pre-post effect size/percent improvement, Hyp: 1.20/56%; PMR: 0.60/31%; SC: 0.11/4%. Hyp more effective than PT for measures of muscle pain, fatigue, sleep disturbance, distress, medication use, and self-reported global outcome; treatments equivalent with respect to morning stiffness, physician-reported global outcome, and FM point tenderness. Effect sizes could not be computed. Pre-post percent improvement, Hyp: 35%; PT: 2%.

<p>Jensen <i>et al.</i> (2005)</p>	<p>Pain secondary to disability (spinal cord injury: 13; multiple sclerosis: 10; amputation: 7; cerebral-palsy: 1; postpolio: 1; Charcot-Marie-Tooth: 1).</p>	<p>Hypnosis (Hyp): Baseline (BL) range: 2–27 weeks. Not randomized.</p>	<p>10 sessions; 10–45 days; Post-hypnotic suggestions given to encourage practice on own (w/o tape).</p>	<p>Pain intensity, pain unpleasantness, pain interference (mBPI), depressive symptoms (CES-D), perceived control over pain (SOPA control); Hypnotic responsiveness (mSHCS), treatment outcome expectancy, treatment response during first session, concentration of treatment, diagnostic group.</p>	<p>Pre-Tx; post-Tx; 3-mo f/u</p>	<p>Hypnosis more effective than baseline on measures of pain intensity, pain unpleasantness, and perceived control over pain; hypnosis no more effective than baseline on measure of depressive symptoms or pain interference; Of all process variables, only patient-rated outcome expectancy assessed after, but not before, the first session was significantly associated with treatment outcome ($r = .39, p < .05$). Pre- to post-Tx effect sizes and percent improvement on pain intensity, efficacy analyses (27 patients who completed Tx w/o medical complications unrelated to Hyp Tx): Hyp: 0.53/21%; BL: 0.18/7%.</p>
<p>McCauley <i>et al.</i> (1983)</p>	<p>Low back pain (17)</p>	<p>Hypnosis (Hyp); Progressive muscle relaxation (PMR); Baseline (BL); 1 week; 1 EMG evaluation provided during between BL assessments); Randomized.</p>	<p>Eight sessions; 8 weeks; Told to practice at home.</p>	<p>Pain intensity, pain severity (MPQ-PRI and NWC), pain interference, depression (BDI), sleep latency, physician concern about medication use, activity level (sitting, walking, reclining); No process measures assessed.</p>	<p>Pre-EMG feedback condition; pre-Tx; post-Tx; 3-mo f/u.</p>	<p>Both treatments resulted in significant pre- to post-treatment decreases in pain intensity, pain interference, and depression that were maintained at f/u. Significant pre- to post-treatment decreases in pain severity and sleep latency were observed in hypnosis but not relaxation subject that were maintained at f/u. Physician concern about medication use showed a significant pre- to post-treatment decrease in both treatment groups, but was maintained at f/u only in the hypnosis group. No significant changes were observed in any outcome measure pre- to post-BL. No significant changes were observed in activity level in any condition. Effect sizes could not be computed. Pre-post Tx percent improvement in pain intensity (0–10 numerical scale) and pain severity (MPQ-PRI and -NWC), respectively, Hyp: 31, 25, 25%; PMR: 35, 19, 19%; BL: 0, 9, 5%.</p>

Table I Continued

Author(s) and date	Diagnosis (N)	Experimental conditions/ randomized?	Number of sessions; Tx time; practice recommendations	Outcome dimension(s); process variables	Assessment points	Primary finding(s); effect sizes (d^a) and % change scores associated with pre- to post-Tx changes in pain measures
Melis <i>et al.</i> (1991)	Tension-type headache (26)	Hypnosis (Hyp); Standard care (SC). Randomized.	Four sessions; 4 weeks; Told to practice once a day with tape.	Number of headache days per week, number of headache hours per week, headache intensity; No process variables assessed.	Pre-Tx; Last week of Tx; 4-week f/u.	Hyp more effective than SC condition on all three outcome measures. Pre-Tx to f/u effect sizes and % improvement statistics based on measurements from figures in the paper, Hyp: 0.30, 31%; SC: 0.00, 0%.
Melzack and Perry (1975)	Various pain diagnoses, including back (10), peripheral nerve injury (4), cancer (3), arthritis (2), phantom limb and residual limb (2), trauma (2), and head pain (1)	Hypnosis alone (Hyp); Neurofeedback alone (NF); Hypnosis plus neurofeedback (Hyp+NF); Baseline (BL); two sessions prior to training). Randomized.	Four to twelve sessions; 2-6 weeks; "All but a few" of the patients who received NF were given a tape of the music they heard when they produced alpha to play at home between sessions.	Sensory pain (MPQ-SEN), affective pain (MPQ-AFF); pain severity (MPQ-PR1); No process variables assessed.	Before and after two baseline sessions, the training sessions, and two post-training practice sessions.	Hyp, NF, and BL not associated with a significant decrease in pain, although Hyp and NF were associated with significant increases in alpha activity. Hyp+NF associated with significant improvement in all three pain outcome measures. Duration of pain relief was 15 min to 4 h after the treatment sessions. Effect sizes could not be computed. Pre-post sessions percent improvement in pain severity, sensory pain, and affective pain, respectively, Hyp: 23, 21, 32%; NF: 9, 21, 32%; Hyp+NF: 34, 33, 48%; BL: 10-16%, 10-4%, 8-29%.
Schlutter <i>et al.</i> (1980)	Muscle contraction headache (48)	Hypnosis (Hyp); EMG biofeedback alone (EMG-BF); EMG biofeedback plus progressive muscle relaxation (EMG-BF+PMR). Randomized.	Four sessions; 4 weeks; No recommendations for practice were given.	Headache hours per week, pain intensity, pain intensity during submaximum effort tourniquet technique; no process variables assessed.	Pre-Tx; post-Tx; 10-14 weeks f/u (for headache hours and intensity only).	All three interventions equivalent on three outcome measures. Effect sizes and percent improvement could not be computed.

Simon and Lewis (2000)	Temporomandibular disorder (23)	Hypnosis (Hyp); Baseline (BL); 1-mo). Not randomized.	Six sessions; 6 weeks; Told to practice daily.	Pain frequency, pain duration, pain intensity; No process variables assessed.	Pre-1-mo baseline; Post-1-mo baseline; Post-Tx; 6-mo f/u.	No significant change on any measure observed during baseline period. Significant pre- to post-Tx improvement observed following Hyp on all outcome measures; improvement was maintained (pain duration, pain intensity), or improved further significantly (pain frequency) to f/u. Pre- to post-Tx effect sizes and percent improvement in pain intensity, Hyp: 1.43/45%; BL: -0.11/-3%. Over the course of 1 year, GT+Hyp was more effective (showed less increase in pain) than GT or SC. Effect sizes and percent improvement statistics could not be computed.
Spiegel and Bloom (1983)	Cancer (54)	Group therapy w/hypnosis (GT+Hyp); Group therapy w/o hypnosis (GT). Standard care (SC).	Weekly sessions; 1 year; Instructions given for use of hypnosis outside of the treatment sessions.	Pain intensity; no process variables assessed.	4-Month intervals.	
Spinhoven and Linsen (1989)	Low back pain (31)	Randomized. Hypnosis (Hyp); Education (Ed). Not randomized.	Six sessions; 6 weeks; Hypnosis subjects given audiotapes to facilitate practice.	Pain intensity, up-time, distress (SCL-90), medication use; No process variables assessed.	Pre-Tx; post-Tx; 2-mo f/u.	The two treatment groups did not differ significantly from one another on any outcome measure; Patients who completed both treatments (in a cross-over design) showed significant pre-Tx to 2-mo f/u improvement in up-time, distress, and medication use; no change noted in pain intensity. Pre-Tx to 2-mo f/u effect size and percent improvement in pain intensity in the patients who completed both treatments were negligible (0.05 and 2%, respectively).

Table I Continued

Author(s) and date.	Diagnosis (N).	Experimental conditions/ randomized?	Number of sessions; Tx time; practice recommendations.	Outcome dimension(s); process variables.	Assessment points.	Primary finding(s); effect sizes (d) ^a and % change scores associated with pre- to post-Tx changes in pain measures.
Spinhoven <i>et al.</i> (1992)	Tension headache (46)	Hypnosis (Hyp); Autogenic training (AT); Baseline (BL). Randomized.	Four sessions; 8 weeks (plus booster sessions given at 2, 4, and 6 mo); Hypnosis group given tape on last session and told to practice twice a day.	Headache intensity, psychological distress (SCL-90), headache relief; Perceived control over pain and pain coping strategy use (CSQ).	Pre-8-week baseline; post-8-week baseline/ pre-Tx; post-Tx; 6-mo f/u.	Hyp and AT more effective than BL, and equivalent to each other on all outcome measures. Analyses indicated that pre- to post-Tx and pre-Tx to f/u perceived control over pain was associated with change in headache intensity and pain relief ratings. Pre- to post-Tx (or pre- to post-BL) effect sizes and % improvement in headache intensity, Hyp: 0.18/18%; AT: 0.42/17%; BL: -0.05 and -0.07/3%, and 3%, participants in the Hyp and AT conditions during baseline periods, respectively. All three conditions equivalent on measures of medication use and psychological distress. Both treatments were more effective than SC on headache index. Analyses including patients who had been assigned to SC and who were then given treatment showed significant decreases in headache index for both Tx groups pre- to post-Tx that were maintained at f/u, with no difference between treatment groups. Referral source did not predict outcome, but patients with higher responsivity scores showed larger improvement than patients with lower hypnotizability scores in both treatment conditions. Pre- to post-Tx effect sizes and % improvement in headache index, C-Hyp: 0.30/17%; AT: 0.56/33%; SC: 0.16/9%.
ter Kuile <i>et al.</i> (1994)	Headache (146)	"Cognitive self-hypnosis" (C-Hyp); Autogenic training (AT); Standard care (SC). Randomized.	Seven sessions; 7 weeks (plus booster sessions given at 2, 4, and 6 mo); Hypnosis group given tape on 6th session and told to practice.	Headache index (intensity \times duration), medication use, psychological distress (SCL-90); Hypnotic responsivity (SHCS), referral group (referred by neurological output clinic, response to community advertisement, response to advertisement in university newspaper).	Pre-Tx; post-Tx; 32-week f/u.	

<p>Winocur <i>et al.</i> (2002).</p>	<p>Myofascial pain disorder.</p>	<p>Hypnotic relaxation (Hyp-R); Occlusal appliance (OA); Education and advice (ED). Not randomized.</p>	<p>Three sessions; 28 days; hypnosis group told to practice self-hypnosis on own (w/o tape) thrice a day.</p>	<p>Current pain intensity, worst pain intensity, voluntary maximal mouth opening, assisted maximal mouth opening, difference between voluntary and assisted mouth opening, masseter, temporalis, and superficial masticatory sensitivity to palpitation; No process variables assessed.</p>	<p>Pre-Tx: post-Tx.</p>	<p>Significant between group differences were found on measures of current pain, worst pain, and both masseter and superficial masticatory sensitivity to palpitation: for current and worst pain, Hyp-R more effective than SC; for muscle sensitivity measures, both Hyp-R and OA more effective than SC. Pre- to post-Tx effect sizes and % improvement on current and worst pain intensity, respectively: Hyp-R: 1.94/57%, 1.93/51%; OA: 1.25/48%, 1.34/33%; SC: 0.31/12%, 0.42/13%.</p>
<p>Zitman <i>et al.</i> (1992).</p>	<p>Tension headache.</p>	<p>Hypnosis (Hyp); Hypnosis not labeled as hypnosis (UL-Hyp); Autogenic training (AT). Randomized.</p>	<p>Four sessions; 8 weeks; Both treatment groups given tape and told to practice daily.</p>	<p>Headache intensity, headache relief, medication use, anxiety symptoms (STAD), depressive symptoms (SDS); therapist.</p>	<p>Pre-Tx: post-Tx; 6-mo f/u.</p>	<p>Analyses indicated improvement on all outcome measures that were maintained at follow-up, with the three interventions equivalent with one another with one exception: Hyp was more effective than AT on headache intensity at f/u. Therapist unrelated to outcome on any measure. Pre- to post-Tx effect sizes and % improvement in headache intensity, Hyp: 0.10/8%; UL-Hyp: 0.30/19%; AT: 0.14/7%.</p>

Note. Tx: Treatment; mo: month; f/u: Follow-up; BDI: Beck Depression Inventory; CSQ: Coping Strategies Questionnaire; CES-D: Center for Epidemiologic Studies-Depression Scale; HIP: Hypnotic Induction Profile; mBPI: Modified Brief Pain Inventory Activity Interference scale; MPQ-AFF: Affective subscale of the McGill Pain Questionnaire; MPQ-NWC: McGill Pain Questionnaire-Number of Words Chosen; MPQ-PR: McGill Pain Questionnaire-Pain Rating Index; MPQ-SEN: Sensory subscale of the McGill Pain Questionnaire; MPQ-VRS: Verbal rating scale of pain intensity from McGill Pain Questionnaire; mSHCS: modified Stanford Hypnotic Clinical Scale; SHCS: Stanford Hypnotic Clinical Scale; SCL-90: Symptom Checklist 90; SHSS-A: Stanford Hypnotic Susceptibility Scale, Form A; SHSS-C: Stanford Hypnotic Susceptibility Scale, Form C; SOPA Control: Control scale from the Survey of Pain Attitudes.

^aThe statistic *d* is computed here as the pre- to post-treatment difference in outcome divided by the standard deviation of the pre-treatment score. It represents change in outcome in standard deviation units.

develop their own metaphors and self-suggestions to use for pain management. A large number of measures were collected from the daily diaries (see Table I for a list of outcome domains), with significant baseline versus treatment phase differences observed on: (1) the percentage of days during which both SCD pain (from 20 to 11 days) and non-SCD pain (from 19 to 6 days) were reported by patients, (2) percentage of days of non-SCD pain that medication was taken (from 6 to 1%), and (3) percentage of “bad sleep nights” on non-SCD pain days (from 8 to 2%). No significant changes were found in the percentage of days of SCD pain that medication was taken, or on the percentage of bad sleep nights on SCD pain days. Also, despite the fact that there was a significant and substantial reduction in the number of SCD and non-SCD pain days, there was a significant *increase* in pain intensity (increase of 19%, on average) and in pain duration (from 1.7 to 2.4 days, on average) for those SCD pain events that occurred during the treatment phase. The authors concluded that the treatment had an overall benefit for reducing the frequency of the less severe pain episodes.

McCauley *et al.* (1983) included what they described as a “minimal EMG feedback” session prior to treatment in a trial comparing hypnosis and relaxation training for low back pain. This baseline was essentially an EMG assessment session, and treatment outcome measures were obtained 1 week before this session and then during the latter part of this session, before treatment began. No significant change in any outcome measure was observed during the 1-week baseline period (percent improvement in a 0–10 numerical rating scale of pain intensity and the MPQ Pain Rating Index and Number of Words Chosen scores were 0, 9, and 5%, respectively, over the baseline period). However, patients given hypnosis treatment (and also relaxation training, see the section comparing different treatments to hypnosis, later) reported significant pre- to post-treatment (percent improvement in the three pain measures were 31, 25, and 25%, respectively) and pre-treatment to 3-month follow-up improvement on the majority of outcome measures in this study.

Spinhoven *et al.* (1992) treated 46 patients with tension headache with either hypnosis or autogenic training following an 8-week baseline period. The hypnosis intervention consisted of three sessions that included suggestions for relaxation, inattention, pain displacement, plus a fourth session during which an individualized practice tape (that included suggestions for future-oriented imagery) was

made and given to the patient for practice. The autogenic treatment condition consisted of suggestions for hand heaviness, hand warming, and a pleasant coolness of the forehead during the first three sessions. The fourth autogenic session consisted of instructions for practice (without a practice tape) after treatment. Among the patients given hypnosis, significantly greater improvement was observed in all outcome measures (average headache intensity, rating of change in headache activity, and psychological distress) following treatment than following baseline.

Spinhoven *et al.* (1992) is the first study to be cited in this review so far that allows for an estimate of effect size, which is a standardized way of representing change in an outcome variable (Cohen, 1988). This statistic, *d*, is the average difference between the pre- and post-treatment scores, divided by the standard deviation of the pre-treatment score. It therefore represents the change in outcome in terms of standard deviation units. For the purposes of this paper, and to make effect sizes comparable between studies, we only report on pre- to post-treatment effect sizes for measures of pain intensity or severity. Cohen interprets effect sizes of .20 as representing “small” effects, .50 as “medium” effects, and .80 or larger as “large” effects. The effect sizes associated with improvement in headache intensity in the Spinhoven *et al.* (1992) study were 0.18 (a “small” effect) following hypnosis and -0.05 (representing a very small increase in pain intensity) during the baseline period. Associated pre- to post-treatment percent improvement in headache activity were 18% following hypnosis and -3% during the baseline period.

Simon and Lewis (2000) examined the effects of hypnosis on pain reports in 23 patients with temporomandibular pain disorder relative to a 1-month no-treatment baseline. The three outcome measures (pain intensity, duration, and frequency) were assessed pre-baseline, post-baseline/pre-treatment, post-treatment, and at 6-month follow-up. The hypnosis intervention consisted of a single session of education about hypnosis followed by five sessions that involved an eye closure induction, relaxation imagery, suggestions for limb catalepsy (i.e., inhibition of voluntary movement), metaphors (“to induce automatic or unconscious bodily responses”), hypnotic analgesia and anesthesia suggestions, and suggestions to use muscle tension or pain as a cue for muscle relaxation. The last session added post-hypnotic suggestions for relapse prevention, as well as a recommendation that the patient practice self-hypnosis daily with audio-taped recordings of

the hypnotic treatment. Simon and Lewis (2000) found no significant changes in any outcome measure during the baseline period, but significant and substantial reductions in all outcome measures pre- to post-treatment that were either maintained (pain duration and pain intensity) or improved significantly further (pain frequency) at the 6-month follow-up assessment point. The effect size and percent change associated with the pain intensity measure used in this study indicated a slight increase in pain intensity during the baseline period (effect size, -0.11 ; percent improvement, -3%), and substantial improvement following hypnosis treatment (effect size, 1.43 , almost twice the size of a “large” effect, Cohen, 1988; percent improvement, 45%).

Finally, Jensen *et al.* (2005) enrolled 33 patients with chronic pain secondary to a disability into a case series examining the effects of 10 sessions of standardized hypnotic analgesia treatment on pain intensity, pain unpleasantness, depression, and perceived control over pain. Outcome measures were assessed before baseline and again after a baseline period (which ranged from 2 to 27 weeks, depending on when treatment could be scheduled after a minimum 2-week baseline period). The hypnosis intervention in this study consisted of a standard induction followed by five specific suggestions (for direct diminution of pain, relaxation, imagined analgesia, decreased pain unpleasantness, and replacement of pain with other nonpainful sensations), as well as post-hypnotic suggestions for daily practice and that the benefits of treatment will last beyond the session. Patients in this study were encouraged to practice outside of the session as often as they chose, but were not given any practice tapes prior to the 3-month follow-up assessment. Analyses among the 27 (of 33 enrolled) participants who completed treatment, provided complete data, and who did not develop medical complications unrelated to hypnosis (i.e., an “efficacy” analysis), as well as among the 30 participants who provided complete data (even if they did not complete treatment or developed a medical condition, i.e., an “intent to treat” analysis) indicated significant pre- to post-treatment improvement in pain intensity, pain unpleasantness, and perceived control over pain (but not depressive symptoms) over and above change that occurred during the baseline period. Improvement was also maintained at the 3-month follow-up. Pre- to post-treatment effect sizes and percent decrease in pain intensity in the efficacy analysis sample were 0.18 and 7% improvement (baseline), and 0.53 (representing a “medium” effect

size, Cohen, 1988), and 21% improvement (hypnosis), respectively.

Comparing Hypnosis to Standard or Usual Care

The standard care treatment condition is similar to the baseline condition, in that in both assess outcomes in participants who do not receive hypnotic treatment. However, a benefit of the standard care condition over the baseline condition is that patients assigned to this simultaneous control group condition have outcome data assessed during the same time that patients who participate in the hypnosis condition do. In addition, the length of the baseline period may, or may not, be the same length as the treatment period. As a result, a no hypnosis treatment standard or usual care condition provides better control for length of time (i.e., patients assigned to both conditions have outcome assessed over the same time period), as well as for other factors related to time that could potentially impact outcome (e.g., historical confounds such as time of year and associated changes in activity levels that sometime accompany changes in season, cf. Campbell and Stanley, 1966) than a baseline no-treatment control condition does. Using such a control condition, investigators simply administer to the control patients the measures that are administered to the hypnosis patients; the only difference between the two groups is the presence or absence of hypnosis treatment.

Five of the studies identified for this review included a simultaneous standard or usual care condition as one of the control conditions (Friedman and Taub, 1984; Gay *et al.*, 2002; Melis *et al.*, 1991; ter Kuile *et al.*, 1994; Spiegel and Bloom, 1983). Spiegel and Bloom (1983) assigned 54 women with chronic cancer pain from breast carcinoma to either standard care ($N=24$) or to a group receiving weekly group therapy for up to 12 months ($N=30$). The women in group therapy were, in turn, assigned to groups that either did or did not have brief (5–10 min) self-hypnosis training as a part of their group therapy treatment. The hypnosis intervention consisted of suggestions that patients do not fight pain, but rather “filter out the hurt” of any sensations by imagining competing sensations in the affected areas. Patients were also given instructions for using these skills outside of the group therapy sessions. These investigators found that, over the course of 1 year, the women who received group therapy plus hypnosis treatment

reported less increase in pain than those who received only standard care.

In another relatively early study, Friedman and Taub (1984) assigned 66 patients with chronic migraine headaches to one of five different experimental conditions: Two hypnotic analgesia interventions, a hand temperature biofeedback condition, a relaxation training condition, and a 3-month standard care control condition. Participants in one of the hypnosis conditions were "instructed in self-hypnosis." Those in the second hypnosis condition were given the same instructions as those in the first condition, but also given a hypnotic suggestion to visualize putting their hands in bowls of warm water. All of the participants in the two hypnosis conditions were also divided into high and low hypnotic suggestibility groups based on their Stanford Hypnotic Susceptibility Scale, Form A, scores. During the hypnotic inductions, highs were instructed to "enter hypnosis" following a shoulder-tap signal, whereas lows were instructed to "simulate entering hypnosis" after the same signal. All treatment subjects received three sessions of weekly treatment, and outcome was assessed pre- and post-treatment, as well as at 6-, 9-, and 12-month follow-up. The three outcome measures were peak headache pain intensity, number of headaches, and medication use, computed from data taken from 3-week periods of headache diaries completed just before each assessment point; standard care patients completed diaries for 3 months prior to being assigned to a treatment condition. Their results indicated that patients in both hypnosis groups showed greater decreases in all three outcome measures than these patients did during their 3-month period of standard care (comparisons between hypnosis conditions are discussed in the component analysis section, later).

Melis *et al.* (1991) had 26 patients with chronic tension headaches undergo 4 weeks of assessment before treatment, and then randomly assigned them to either 4 weekly 1-h sessions of hypnosis supplemented by a home practice tape, or 4 weeks of no hypnosis treatment. The hypnosis intervention was described as including suggestions for visualizing the headache as an image, and then altering that image, as well as suggestions for moving the pain to other areas of the body (pain displacement). The hypnosis group reported significantly more improvement on measures of headache intensity, headache duration, and number of headache days than did the standard care control group. Melis *et al.* (1991) provided pre-treatment means and standard deviations of the

outcome measures, but did not provide the specific means of the outcome measures at post-treatment and follow-up, making computations of effect sizes and percent changes difficult. However, it is possible to estimate post-treatment outcome means in this study by measuring the distance from the abscissa in graphs of the outcome measures that were published in the article. Using these estimates, the pre-treatment to 4-week follow-up effect sizes and improvement in headache intensity were 0.00 and 0% for the standard care condition and 0.30 (representing a small effect size, Cohen, 1988) and 31% for the hypnosis condition.

ter Kuile *et al.* (1994) randomly assigned 146 patients with recurrent headaches to an intervention that contained both self-hypnosis training and cognitive-behavioral therapy (CBT), an autogenic training intervention, or a standard care condition. Outcome (headache index, which is a composite measure of pain intensity and pain duration, medication use, and psychological distress) variables were assessed at pre- and post-treatment for patients in the three treatment conditions, and at 6-month follow-up for patients who received hypnosis/CBT and autogenic training. Patients assigned to the standard care condition were subsequently assigned to one of the two intervention conditions at post-treatment. The first four sessions of the hypnosis/CBT intervention condition consisted of hypnotic suggestions for relaxation, inattention, pain displacement and transformation, and hypnotic analgesia, as well as training in thought monitoring. Session five focused on cognitive-restructuring and did not include hypnosis. A tailored audiotape of both future-orientated hypnotic suggestions and "more adequate cognitions" was made in session six, and given to the participants for home practice. Session seven focused on discussion about progress and instructions for home practice. The autogenic intervention consisted of six sessions of suggestions for: "arm heaviness, arm warming, steady and regular heart beat, easy breathing, pelvic warming and relaxation, and comfortable coolness of the forehead." As with the hypnosis/CBT group, the seventh and last autogenic session focused on a discussion of progress and instructions for continued practice (but without a practice tape). Relative to the standard care control condition (pre- to post-treatment effect size and percent improvement in headache index: 0.16 and 9%, respectively), patients in the hypnosis/CBT group showed significantly larger improvement in the headache index measure (effect

size/percent improvement: 0.30/17%), but did not differ significantly from the standard care condition on medication use or psychological distress.

Gay *et al.* (2002) randomly assigned 36 patients with osteoarthritis pain to one of three conditions: Hypnosis, relaxation training, and a no-treatment/standard care control condition. The hypnosis intervention consisted of eight weekly sessions that began with a standard relaxation induction followed by suggestions for imagining a pleasant vacation memory as well as a memory from childhood that involved joint mobility; no direct suggestions for analgesia nor for post-hypnotic effects were given, although, of course, there was an implicit suggestion for experiencing no pain in the memory suggestion. The subjects in the standard care control condition were administered the outcome measures for as long as the trial lasted (6 months), and were offered treatment after their last follow-up assessment. Patients in the hypnosis treatment showed a substantial and significant decrease in pain intensity after 4 weeks of treatment (large effect size = 1.20; 56% decrease), which maintained through 3 months of follow-up, but appeared to increase slightly in the direction towards pre-treatment scores at the 6-month follow-up point. Patients in the no-treatment control condition reported little (and not significant) change in pain during the 6 months of this trial (pre- to post-treatment effect size = 0.11, percent change = 4%). However, although significant differences between the hypnosis and the standard care control condition were found at mid-treatment (4 weeks after treatment started; with hypnosis patients reporting lower pain intensity levels than the standard care patients), post-treatment, and at the 3-month follow-up, the differences in pain between the hypnosis and standard care conditions at 6 months were not statistically significant. The lack of significant differences at 6 months may have been related to the slight increase in pain intensity from 3 to 6 months in the hypnosis patients, as well as the increased variability in pain intensity in both groups at 6 months compared with variability in outcome at 3 months, and perhaps the low sample size in this study, which can limit the power to detect significant differences.

The findings from the 11 studies that use either baseline or standard care control conditions, reviewed above, show a generally consistent result. In each study, little or no change in outcome measures was observed during the no-treatment baseline period or standard care conditions (which ranged from 1 week to 4 months). On the other hand, in all but

one study significant pre-treatment to post-treatment changes were observed in pain intensity, and sometimes other pain-related outcomes, following hypnosis treatment. The single study that did not show significant effects with hypnosis provided only four sessions of a taped hypnosis intervention that focused primarily on “ego strengthening” suggestions, and did not include any specific suggestions for analgesia (Melzack and Perry, 1975).

Examining the Effects of Hypnosis When It Is Added to Another Treatment

A third type of control condition is non-hypnotic treatment that is itself thought to provide benefit for patients, but which could potentially be made more effective with the addition of hypnosis. Comparisons of treatments given with and without hypnosis can indicate if hypnosis provides benefit beyond that of the control treatment, or as we shall see, might possibly interfere to some degree with the effects of that treatment. Although their analysis did not include studies on chronic pain, Kirsch and colleagues reported in a meta-analysis that adding hypnosis to cognitive behavior treatments enhanced treatment outcome in most studies, with their most conservative estimate of this effect being a 0.5 standard deviation unit (Kirsch *et al.*, 1995).

Three clinical trials were identified that examined the impact of adding hypnosis treatment to another treatment for chronic pain (Edelson and Fitzpatrick, 1989; Melzack and Perry, 1975; Spiegel and Bloom, 1983). In the first of these, cited above with respect to comparisons of hypnosis to baseline, Melzack and Perry (1975) randomly assigned patients with a variety of pain problems to hypnosis alone, neurofeedback training alone, or both hypnosis and neurofeedback. For purposes of this section, we are interested in whether adding hypnosis to neurofeedback might be more effective than neurofeedback alone. The four-session taped hypnosis intervention used in this study was described above. The neurofeedback training component consisted of eight sessions of alpha enhancement (alpha feedback) training, using EEG measures from electrodes placed over the occipital area. Increases in alpha bandwidth activity were followed by taped flute music, and patients in this treatment condition were asked to maximize the amount of time that the music played. Patients who received alpha feedback training alone showed a marginal (9%) and nonsignificant

improvement in overall pain severity (as assessed by pre- to post-session changes in the MPQ Pain Rating Index during training). However, patients who received both hypnosis and neurofeedback reported a larger (34%) and statistically significant improvement over the training period, suggesting that adding hypnosis to alpha feedback training is more effective than the neurofeedback training alone.

Edelson and Fitzpatrick (1989) randomly assigned 27 patients with various chronic pain problems (back pain being the most frequent) to four 1-h sessions of an attention control (supportive, non-directive discussions), cognitive-behavioral therapy alone, or a CBT plus hypnosis treatment. The CBT intervention used in this study focused on encouraging the participants to: (1) avoid using the “pain” label to describe their sensations; (2) reinterpret pain sensations as “numbness” through the use of imagery (this component of the CBT treatment might be considered as hypnosis or a hypnotic-like intervention by many clinicians); and (3) modify maladaptive self-talk. The hypnosis/CBT condition was identical to the CBT intervention, except that it was preceded by a standard hypnotic induction. Interestingly, adding the hypnotic induction appeared to alter the effects of the CBT treatment, such that CBT treatment *without* the induction had a greater effect on pain behaviors (increased walking effect size and percent change: 0.74 and 50%, respectively; decreased sitting time effect size and percent change: 0.81 and 27%, respectively) than CBT provided with a hypnotic induction. In fact, the effect sizes associated with the CBT intervention are in the large range (Cohen, 1988) for improvement in walking time and sitting time, while there was an actual worsening in walking time (i.e., decrease) and in sitting time (i.e., increase) in the patients who received CBT following a hypnotic induction (associated effect sizes and percent worsening were 0.08 and 0.29, 8 and 10%, walking and sitting time, respectively). On the other hand, the patients in the CBT/hypnosis treatment condition reported greater decreases in self-reported pain experience than the patients who received CBT without the induction. The effect sizes associated with these outcome variables were 1.29 and 0.82 (percent decrease 28 and 30%) for pain intensity (MPQ pain intensity rating scale) and pain severity (MPQ Pain Rating Index), respectively. Patients in the CBT alone group also reported decreases in pain, but these changes were not statistically significant, and were not as large as those observed in the CBT/hypnosis patients (percent decrease in pain, 14 and 7% for

pain intensity and severity, respectively). While this was a single study with a relatively small sample, the findings suggest the possibility that the presence or absence of a hypnotic induction has an impact on different outcome variables in patients given CBT.

As described above, in a study on cancer pain, Spiegel and Bloom (1983) assigned 30 women who were receiving group therapy to participate in group therapy alone, or group therapy plus a brief 5–10 min session of group self-hypnosis intervention that included suggestions for replacing pain sensations with competing nonpainful sensations (such as a cold numbness or warm tingling sensations). After 1 year of treatment, the women assigned to the combined treatment condition reported lower increases in pain intensity than the women who received group therapy alone.

In summary, and although data are available from only three studies, the findings concerning pain intensity are consistent. When added to other treatments, hypnotic analgesia results in greater pain reduction relative to other treatments provided without hypnosis (see also Kirsch *et al.*, 1995). An intriguing finding (but perhaps a spurious one that needs replicating) from a single study suggests the possibility that hypnotic treatment might interfere with the effects of cognitive-behavior therapy on reducing pain behaviors.

Comparing Hypnosis to Other Treatments

The most common control condition in hypnotic clinical trials is the alternative treatment control condition. Thirteen of the 19 studies identified for this review include at least one such condition. The treatments that have been compared to hypnotic analgesia include physical therapy (Hannen *et al.*, 1991), medication effects (Anderson *et al.*, 1975), the use of an occlusional appliance (for temporomandibular myofascial pain; Winocur *et al.*, 2002), education (Spinhoven and Linssen, 1989; Winocur *et al.*, 2002), biofeedback (Andreychuk and Skriver, 1975; Friedman and Taub, 1984; Melzack and Perry, 1975; Schlutter *et al.*, 1980), and autogenic or other relaxation training (Friedman and Taub, 1984; Gay *et al.*, 2002; Spinhoven *et al.*, 1992; ter Kuile *et al.*, 1994; Zitman *et al.*, 1992).

Hypnosis Compared with Physical Therapy

Hannen *et al.* (1991) randomly assigned patients with fibromyalgia to groups that received either

eight 1-h sessions of hypnotherapy (supplemented by a self-hypnosis home practice tape) over a 3-month period, or 12–24 h of physical therapy (that included massage and muscle relaxation training) for 3 months. Outcome was assessed pre-treatment, post-treatment, and at 3-month follow-up. The hypnosis intervention began with an arm levitation induction and included standard ego strengthening suggestions as well as suggestions for general relaxation, improved sleep, and “control of muscle pain.” Physical therapy included both massage and “training in muscle relaxation.” These investigators found larger improvements in the patients who received hypnosis than those who received physical therapy on measures of muscle pain, fatigue, sleep disturbance, distress, and patient overall assessment of outcome. These differences were maintained through the 3-month follow-up assessment. The average percent decrease in pain among patients who received hypnosis (35%) was in the high end of the range of improvement seen in most of the hypnosis studies, while the percent decrease in the patients who received physical therapy was marginal (2%).

Hypnosis Compared with Medication Management

Anderson *et al.* (1975) randomly assigned 47 patients with migraine headaches to receive either hypnosis or medication management for migraine headaches. The participants assigned to the medication management condition received a prophylactic dose of prochlorperazine (5 mg) four times a day for 1 month and then twice a day for 11 more months. They were also given Ergotamine which was to be taken at the first sign of a migraine. Participants assigned to the hypnosis condition were given “at least” six sessions of hypnosis by experienced hypnotherapists every 10–14 days for 12 months. The specific hypnotic inductions used by the clinicians in this study were not standardized, although similar post-induction suggestions were given to all patients, and included ego strengthening suggestions for “less tension, anxiety, and apprehension” and for “being more alert, determined, persistent, or less dependent, affected, and so on.” Participants were asked to practice self-hypnosis twice daily at home using the same suggestions given in the treatment sessions. Outcome was assessed on a monthly basis throughout the 12 months of the study. Patient recall of number of headaches per month in the 6 months prior to treatment was substantially and significantly higher than

number of headaches per month reported by the hypnosis group during the 12 months of treatment (a decrease from 4.5 headache days in the 6 months prior to treatment to 1.0 in the first 6 months of treatment and to 0.5 in the second 6 months of treatment) compared to the medication management group (a decrease from 3.3 to 2.8 and 2.9, respectively). There was also a statistically significantly greater decrease in the number of patients in the hypnosis group who reported a Grade 4 (“blinding and totally incapacitating”) headache (a decrease from 13 to 4 and 5, during each 6-month epoch, respectively) compared to the medication management group (an increase from 10 to 13 and 14, respectively), as well as differences in the percent of patients who reported a complete remission of headache activity in the last 3 months of therapy (44% hypnosis, 13% medication management). Means and standard deviations of the outcome measures were not reported in this study, so effect sizes and percent improvement in pain intensity could not be computed. Also, there was no follow-up performed in this study; all measures were obtained either before or during treatment, so the relative long-term efficacy of the two treatments after treatment ended could not be determined.

Hypnosis Compared with an Occusal Appliance and/or Education

Winocur *et al.* (2002) assigned 40 patients with temporomandibular myofascial pain to three sessions of one of three conditions: “Hypnorelaxation”, the use of an occusal appliance, or an education and advice condition. The hypnorelaxation intervention included both progressive muscle relaxation and self-hypnosis training directed towards relaxation of facial muscles. Participants were asked to practice these procedures three times every day during treatment. Patients in the occusal appliance condition received a full-coverage, hard acrylic appliance constructed to fit the maxillary arch. Patients assigned to the education and advice condition met with a senior faculty member to discuss their pain problem, and were provided with recommendations regarding how to manage activities and diet in order to better manage pain. Measures of pain intensity (current and worst), mouth opening, and facial muscle sensitivity (to palpitation) were administered before and after treatment. Patients in the hypnosis condition (but not the occusal appliance condition) reported significantly greater decreases in pain intensity (effect

size and percent change: 1.94 and 57% for current pain intensity, and 1.93 and 51% for worst pain intensity) than patients in the education condition (effect size and percent change: 0.31 and 12%, and 0.42 and 13%, for current and worst pain intensity, respectively); occlusal patients did not differ significantly from education patients (effect size and percent change: 1.25 and 48%, and 1.34 and 33%, respectively), although they also did not differ significantly from hypnosis patients on these measures. No significant differences were noted between the three treatment conditions on objective measures of mouth opening, but patients in both the hypnosis and the occlusal conditions reported significantly greater decreases in muscle sensitivity (in the masseter and superficial masticatory muscles) to palpitation than did patients in the education condition.

Spinhoven and Linssen (1989) also included an educational control condition in a cross-over study of the effects of education and hypnosis on low back pain. The 45 patients who were recruited into this study were assigned to receive one of the two treatments, first, followed by 2 months of no-treatment/follow-up, then the treatment that they had not yet received, followed by another 2-month follow-up period. The outcome domains assessed included pain intensity, up-time (from daily diaries), distress (psychoneuroticism and depression scales of the SCL-90), and medication use. Patients in the hypnosis condition received training in self-hypnosis using a variety of suggestions (relaxation, imaginative inattention, pain displacement, pain transformation, future-orientated imagery) and in the fifth session participants were given an individualized audiotape to facilitate self-hypnosis practice after treatment. Patients in the education condition received lectures and facilitated discussion all geared "...to induce an attitude that pain can be controlled by the patients themselves." A number of patients dropped out of this study as it progressed, but data were available for 31 patients who participated in the first phase (and therefore received one of the two treatments) of this study and who provided 2-month follow-up data following their first treatment. Analyses showed no significant differences between the two treatment conditions on any measure. Data available from 24 patients who completed both phases of the study (and therefore received both treatments) showed significant pre-treatment to 2-month follow-up improvement (after the second phase of the study) on all outcome measures *except* pain intensity. In fact, the effect size

and percent change in this variable for these patients who received both treatments was very low (0.05, 2% improvement), despite the fact that all of the patients whose data were available participated in 12 sessions of treatment, six of them being hypnosis.

Hypnosis Compared with Biofeedback- and Nonbiofeedback-Assisted Relaxation Training

Nine studies were identified that examined the effects of a hypnosis treatment relative to one or more relaxation training interventions (Andreychuk and Skriver, 1975; Friedman and Taub, 1984; Gay *et al.*, 2002; McCauley *et al.*, 1983; Melzack and Perry, 1975; Schlutter *et al.*, 1980; Spinhoven *et al.*, 1992; ter Kuile *et al.*, 1994; Zitman *et al.*, 1992). In one of the first such studies reported, Andreychuk and Skriver (1975) assigned 33 patients with migraine to one of three treatments: Hypnosis, hand temperature biofeedback, or neurofeedback (alpha enhancement training). Participants received each intervention once a week for 10 weeks. The hypnosis condition involved a taped training in self-hypnosis, with suggestions for relaxation, visual imagery, "verbal reinforcers," and "direct suggestions for dealing with pain." The hand temperature biofeedback condition included both biofeedback and autogenic relaxation instructions; the latter usually consist of hypnotic-like suggestions for relaxation and (non-painful) sensations, although the specific autogenic suggestions used in this study were not described. Participants in the neurofeedback condition received reinforcement for increasing alpha bandwidth activity as measured from the right and left occipital areas (with right ear as common ground) after "relaxation instructions" were given. All participants were asked to practice twice every day on their own (without a practice tape) between sessions. The single outcome measure in this study was a headache index score, which is a composite measure of headache duration and headache severity as assessed from daily diaries, and was assessed prior to treatment and during the last 5 weeks of treatment. Participants in all three treatment conditions showed improvement, and there were no statistically significant differences between the treatment conditions.

As discussed above, Melzack and Perry (1975) included a neurofeedback condition (8 sessions of alpha enhancement training) in their pre-session to post-session analysis of the effects of hypnosis and neurofeedback on chronic pain. In this study,

there was a trivial and nonsignificant difference between the neurofeedback alone and hypnosis alone conditions.

Schlutter *et al.* (1980) randomly assigned 48 patients with muscle contraction headache to one of three treatment conditions: Hypnosis, frontalis EMG biofeedback training, and EMG biofeedback training plus progressive muscle relaxation. Patients in the hypnosis condition received an induction that included eye fixation, progressive relaxation suggestions, and suggestions for drowsy, comfortable feelings. Suggestions were then given for alternative (nonpain) sensations and pleasant imagery. Study participants were given four sessions of the treatment they were assigned to. Outcome measures included number of headache hours per week, pain during a submaximum effort tourniquet test, and overall head pain intensity. Number of headache hours and headache intensity were also assessed at 10–14 week follow-up. All three measures showed significant pre- to post-treatment decreases, and this improvement was maintained for the two outcome measures assessed at follow-up. No differences between the treatment conditions were found.

Friedman and Taub (1984) included a relaxation response training (Benson, 1975) and a hand temperature biofeedback condition in their trial studying the effects of hypnosis treatment of migraine. This relaxation response intervention involved “step-by-step” instruction in obtaining a relaxation response through mental repetition of a single word (the hypnosis intervention used in this study was described above). Their hand temperature biofeedback condition, like that of Andreychuk and Skriver (1975), included standard hypnotic-like autogenic suggestions. Three sessions of hypnosis treatment were no more effective, on average, than three sessions of either relaxation response training or the hand temperature biofeedback training condition on the measures of peak headache intensity, number of headaches, and medication use.

Spinhoven *et al.* (1992) randomly assigned 46 patients with tension headache to four sessions of hypnosis or to autogenic relaxation training. The hypnosis treatment involved suggestions for relaxation training, imaginative inattention, and pain displacement and transformation. At the end of the final hypnosis session, a tape recording of that session was given to the patient for use in daily practice. The autogenic relaxation training intervention consisted of suggestions for hand heaviness, hand warming, and coolness of the forehead. Instructions for

practice were given (without a tape) in the last session. Analysis indicated improvement in all three outcome measures (headache pain intensity, pain relief, and psychological distress) from pre- to post-treatment that were maintained at 6-month follow-up. No significant differences in outcome were found between hypnosis and autogenic relaxation training in this study. These findings were essentially replicated in a larger follow-up study comparing a larger number of sessions (seven, instead of four) of these same two treatments (ter Kuile *et al.*, 1994). A third similar study also showed no significant differences in outcome between patients with tension headache who received autogenic training and patients who received a hypnosis intervention involving suggestions that they imagine themselves in a future situation in which pain reduction has been achieved (Zitman *et al.*, 1992).

Gay *et al.* (2002) compared hypnosis to a progressive muscle relaxation treatment condition (and to a no-treatment control condition; see above) in 36 patients with osteoarthritis pain. The hypnosis treatment, involving relaxation suggestions for the induction and then suggestions for pleasant memories involving the use of the joint when it was not painful, was described above. The relaxation condition was eight sessions of standard progressive muscle relaxation training. In this study, both interventions were more effective than no-treatment, and there were no significant differences in outcome between the two active interventions overall. However, hypnosis did show a trend to be more effective than relaxation (56% average pre- to post-treatment improvement versus 31% improvement), and the difference in improvement between the two treatments was statistically significant at the mid-point (4 weeks after treatment began) of treatment. Patients in both treatment conditions also reported similar decreases in medication use over the course of treatment that were not observed in the no-treatment condition.

McCauley *et al.* (1983) assessed a large number of outcome measures before treatment, after treatment, and at 3-month follow-up in 17 patients with low back pain who were randomly assigned to receive either a hypnosis or relaxation training intervention. The patients assigned to the hypnosis intervention received 8 weekly sessions that included one of six hypnosis suggestions (one new suggestion was given at each session, in order of patient preference) from the following list: Age regression, disassociation, fantasy, change in pain image, glove anesthesia, and hypnoplasy. Patients

in the relaxation condition were given standard progressive relaxation training for the first five sessions. Starting in the sixth session, they were taught a “differential relaxation” technique in which they went through some common activities while learning to sense and then eliminate muscle tension. Patients in both treatment conditions were encouraged to practice at home regularly. Significant pre- to post-treatment improvement was noted in a number of outcome measures, including pain intensity, pain interference, depressive symptoms, and physician concern about patient medication use (blindly rated by three physicians who reviewed each subject’s medication regimen), in patients in both the hypnosis and relaxation treatment conditions. These improvements were maintained in both treatment groups with one exception: In patients in the relaxation treatment condition, physician concern about medication use increased by the 3-month follow-up point and was no longer significantly different from pre-treatment levels. Pain severity, as assessed by the MPQ Pain Rating Index and Number of Words Chosen scales, improved pre-treatment to post-treatment in the hypnosis patients, but not in the relaxation patients. By 3-months follow-up, however, both treatment groups were significantly different from pre-treatment levels on the MPQ scores. Only the hypnosis patients showed significant pre-treatment to post-treatment improvement in sleep latency, and this improvement was maintained at follow-up. Interestingly, while there may have been a tendency for the hypnosis patients to show greater gains on some of the measures pre-treatment to post-treatment than the relaxation patients, on all of the outcome measures besides sleep latency, the relaxation patients caught up with the hypnosis patients by the 3-month follow-up assessment.

In summary, hypnosis appears to be superior to some common pain treatments, including physical therapy for fibromyalgia, medication management for headache, an occusal device for temporomandibular myofascial pain, and education/advice for myofascial pain and headache. On the other hand, with few exceptions, hypnotic treatment was no more effective than biofeedback-assisted and nonbiofeedback-assessed relaxation training. However, as clinicians who provide hypnotic analgesia treatment, we were struck with how “hypnotic-like” the relaxation treatments in these controlled studies were. For example, autogenic training usually includes a number of suggestions for alterations in the experience of sensations, and therefore meets

the American Psychological Association’s Division 30 definition of hypnosis, cited earlier. Similarly, relaxation response training asks patients to repeat a single word, which presumably would result in an increase in focused attention, and focused attention is considered by some an essential component of hypnosis (e.g., Spiegel and Spiegel, 2004). To be fair, clinicians who teach relaxation skills to patients with chronic pain might be struck how “relaxation-like” hypnosis treatments are (cf., Edmonston, 1991). In any case, there does appear to be significant overlap in the content, and effects, of treatments labeled as “hypnosis” and treatments labeled as “relaxation training.” In the few instances where differences do emerge, however, hypnosis was more effective than relaxation training in terms of speed of effects (one study) and improvement in sleep latency and physician ratings of concern about medication use (a second study), suggesting the possibility that hypnosis might in some populations and for some measures be superior to relaxation training.

Comparing Hypnosis to Attention Control

Although attention control conditions are fairly common in the psychotherapy treatment literature, we could identify only one hypnotic analgesia study with chronic pain that used such a comparison. As mentioned above, Edelson and Fitzpatrick (1989) compared a CBT treatment administered to patients with various chronic pain problems following a hypnotic induction (as well as a CBT intervention administered without hypnosis) to patients who participated in an attention control condition. Patients in the attention control condition did not show any significant change in any outcome measure, pre-treatment to post-treatment, while the patients in the CBT plus hypnosis condition reported significant pre- to post-treatment decreases in both pain intensity and pain severity.

Comparing Hypnosis to Minimal-Effect Control Conditions

We have previously argued (Jensen and Patterson, 2005) that a particularly useful control condition for hypnotic analgesia research is a “minimal” effect treatment that would: (1) control for the amount of time in treatment spent with a therapist (i.e., if the hypnosis intervention is eight sessions, then this

condition would be eight sessions), (2) be viewed by patients as being as logical and potentially effective as the hypnosis intervention, but (3) is known or thought to have minimal specific effects on pain intensity. A condition of this nature can control for the time and expectancy effects. By including such a condition in an experimental design (as well as a manipulation check to verify that the control condition was indeed viewed as equally credible as the hypnosis intervention), the differences between hypnosis and this control treatment can be attributed to the effects of hypnosis over and above effects of time and patient expectancy (see Jensen and Patterson, 2005). In spite of such advantages, we were unable to identify a single study that used such a control condition when studying the effects of hypnosis on chronic pain.

OTHER DESIGNS AND ANALYSES

Knowledge about the effects and mechanisms of hypnotic analgesia can also be gained by performing component and process analyses. Component analysis designs can assign patients to hypnosis treatments that differ in content (e.g., different inductions or suggestions) or dose (e.g., number of treatment sessions). To the extent that differences are found between altered hypnosis conditions, conclusions can be drawn about the relative effects of the different components.

Process analyses, on the other hand, are used to identify the predictors or covariates of treatment outcome, and can be used to help develop and test different theories of hypnosis treatment effects. For example, some theorists contend that specific mechanisms underlie hypnosis, such as hypnotic suggestibility (Hilgard and Hilgard, 1994), motivation (Patterson and Ptacek, 1997), relaxation (Edmonston, 1991), expectations (Kirsch, 1985), social cognitive/contextual variables (Chaves, 1993), automaticity (Miller and Bowers, 1993), and disassociation (Freeman *et al.*, 2000). To the extent that moderators or mediators predict or covary with treatment outcome, respective support can be obtained for these models.

Component Analyses

We could find only two studies of hypnotic analgesia of chronic pain that used component analyses (Friedman and Taub, 1984; Zitman *et al.*, 1992). Friedman and Taub (1984) included two hypnosis

treatment conditions in their study of patients with migraine headache: As described above, one group received general instructions in self-hypnosis, and the second received these same instructions plus specific suggestions for hand warming (imagining one's hands being dipped in bowls of warm water). Similar pain change scores were observed in the patients assigned to these different hypnosis conditions (see Table I), indicating that adding a suggestion for hand warming in a hypnotic treatment of migraine headache did not contribute significantly to the effects of the hypnotic treatment.

Zitman *et al.* (1992) performed a study in which their hypnosis intervention (future-oriented imagery) was not presented as hypnosis to one of group patients, but was later explicitly labeled as hypnosis to another group in a second phase of their study. Similar pre- to post-treatment differences were found in both hypnosis conditions on all outcome measures. However, at 6-month follow-up, the group that had been told that the intervention was hypnosis showed continued decreases in a measure of headache pain intensity, whereas the patients who received the same treatment but had not been told it was hypnosis showed a post-treatment to follow-up increase in average headache pain.

Process/Predictor Analyses

A number of predictors of hypnotic analgesia treatment have been examined in chronic pain outcome studies, with the most common being hypnotic suggestibility (Andreychuk and Skriver, 1975; Friedman and Taub, 1984; Jensen *et al.*, 2005; ter Kuile *et al.*, 1994). Other predictors include: attributions and coping (Spinhoven *et al.*, 1992), referral source (ter Kuile *et al.*, 1994), therapist (Zitman *et al.*, 1992), frequency of self-hypnosis practice (Dinges *et al.*, 1997), as well as patient-rated outcome expectations, initial treatment response, concentration of treatment sessions, and diagnostic group (Jensen *et al.*, 2005; see Table I).

Andreychuk and Skriver (1975) administered the Hypnotic Induction Profile (HIP) to the 33 subjects in their study that compared the efficacy of 10 sessions of hypnosis, hand temperature biofeedback, and neurofeedback (alpha enhancement) training. They found that HIP scores predicted treatment outcome in all three treatment groups, with patients scoring higher on the HIP ("highs") more likely to show improvement (71% improved) than those

scoring low (“lows;” 41% improved), although patients in both groups showed improvement. Interestingly, the differences in treatment outcome as a function of hypnotic responsivity seemed to be greater among those who received neurofeedback (67% for highs versus 31% for lows) and hand temperature biofeedback (that also included hypnotic-like autogenic suggestions, 83% for highs versus 66% for lows) than among those who received hypnosis alone (39% for highs versus 33% for lows).

Friedman and Taub (1984) divided the patients in their study who received hypnosis treatments into those with high versus low scores on the Stanford Hypnotic Susceptibility Scale, Form A, and compared these patients on the three outcome measures of their study: Peak headache activity, number of headaches, and medication use. They found similar outcomes between highs and lows across the three measures in the first 6 months following treatment, but some interesting differences from the 6- to the 12-month assessment points. During the later follow-up period, highs, but not lows, tended to improve further on the measure of peak headache intensity. Also, highs reported a continued decrease in number of headaches during this period, while lows reported a slight increase in number of headaches from the 6- to the 12-month period.

In their study of headache pain, ter Kuile *et al.* (1994) examined referral source (from three sources: A neurological outpatient clinic, self-referred from the community, and self-referred from a university) and hypnotic responsivity (as assessed by the Stanford Hypnotic Clinical Scale) as predictors of treatment outcome in patients who received hypnosis or autogenic training. Referral source was unrelated to outcome, but hypnotic suggestibility was significantly associated with changes in the headache index score in patients in both treatment conditions, such that patients with higher hypnotizability scores showed larger improvement than patients with lower scores in both treatment conditions.

Zitman *et al.* (1992) included therapist as an independent variable in their analyses of the effects of hypnosis and autogenic training in a sample of patients with tension headache (although they did not describe the different therapists, so differences in terms of such variables as age, gender, and experience, are unknown). They found no differences among the therapists with respect to treatment outcome. Dinges *et al.* (1997) assessed frequency of self-hypnosis practice during the 18 months of group hypnosis training, and found that this variable was not

significantly associated with change in percent work pain-free days from baseline to treatment.

Jensen *et al.* (2005) examined a number of predictors of treatment outcome in their study of hypnotic analgesia treatment for disability-related pain, including hypnotic responsivity (as assessed by the Stanford Hypnotic Clinical Scale), treatment outcome expectancy (assessed by a four-item measure assessing beliefs about the logic of the treatment for treating pain as well as patient confidence of its success for eliminating or decreasing pain) administered before and after the first treatment session, change in pain intensity from before to after the first treatment session (reflecting “initial treatment response”), concentration of treatment (range, 10 sessions administered as often as once a day to once every 4–5 days), and diagnostic group (for the groups that had seven or more subjects: Spinal cord injury, multiple sclerosis, and amputation). Only one of these predictors, treatment outcome expectancy assessed after, but not before, the first session, was significantly associated with pre- to post-treatment change in average pain ($r = .39, p < .05$). The weak ($r = .16$) and nonsignificant association between hypnotic suggestibility and outcome was somewhat surprising in this study, given the general consistency with which this variable has been found to be associated with treatment outcome in other studies (Patterson and Jensen, 2003).

Gay *et al.* (2002) correlated change in pain intensity with hypnotic suggestibility, belief in the efficacy of treatment, and pre-treatment patient ratings of imagery vividness, in their controlled study of hypnosis treatment for osteoarthritis pain. Hypnotizability was assessed with the Stanford Hypnotic Susceptibility Scale, Form C, and imagery vividness was assessed using a 5-point rating scale (ranging from 0, ‘no image’ to 4, ‘as vivid as reality’) during suggestions for visual imagery. Both hypnotizability and imagery vividness were assessed pre-treatment. However, neither the specific measure used to assess outcome expectancy nor the timing of this assessment (e.g., pre-treatment versus some other time during the study) were described. Pre-treatment hypnotic suggestibility showed moderate to strong associations (r s range, $-.24$ to $-.48$) with change in pain from pre-treatment to mid-treatment, post-treatment, 3-month follow-up, and 6-month follow-up assessment points among the patients who received hypnosis. Despite the low power associated with the very low sample size, one of these associations (that associated hypnotic suggestibility with

pre-treatment to mid-treatment change in pain) was statistically significant. The association between hypnotic responsivity and change in pain intensity among the relaxation patients was more variable across the four assessment points (r s range, $-.14$ to $-.66$), but two of these were statistically significant; those associated with pre- to mid- and pre- to post-treatment changes in pain. All of these coefficients between hypnotic responsivity and change in pain were weak (range, $-.05$ to $-.10$) and nonsignificant in the patients who received no treatment. Similarly, vividness of imagery during hypnotic suggestions for imagery assessed at pre-treatment tended to show moderate to strong associations with change in pain among the patients who received hypnosis (r s range, $-.43$ to $-.74$) and relaxation (all but one of four coefficients r s range, $-.27$ to $-.70$); two and one of these coefficients reached statistical significance in the hypnosis and relaxation patients, respectively. All of these associations were weak (r s range, $-.21$ to $.21$) and nonsignificant in the control patients. On the other hand, none of the associations between belief in efficacy of treatment and change in pain were reported to be statistically significant, although, as indicated above, the measure used to assess treatment outcome expectancy, and when this measure was administered, was not described in the manuscript.

Using analysis of covariance, Spinhoven *et al.* (1992) examined the association between change in pain attribution, coping strategies, and treatment outcome in a group of patients who were given hypnosis and autogenic treatment for tension headache. Composite scores from the Coping Strategies Questionnaire that represented Active Coping and Helplessness were not associated with treatment outcome. However, pre- to post-treatment and pre-treatment to 6-month follow-up changes in a composite score representing perceived control over pain were associated with both decreases in headache pain intensity and with percent of pain relief reported with treatment.

To summarize the findings from component and process analyses, labeling a treatment as “hypnosis” may have had a slight benefit (over not giving the same treatment the label as “hypnosis”) in the long-term effects of hypnosis treatment for headache pain, but including or excluding a suggestion for hand warmth did not appear to alter outcome in a headache pain trial. Often, but not always, hypnotic suggestibility was associated with treatment outcome to both hypnosis as well as relaxation treatments (but not to outcome in patients who received stan-

dard care). In the one study that it was examined, patient-rated imagery vividness was associated with treatment outcome in response to hypnosis as well as relaxation training. Another study found that changes in perceived control over pain covaried with treatment outcome. Treatment outcome expectancy assessed after the first treatment session was found to be associated with treatment outcome in one study, although treatment outcome expectancy prior to the first session was not. A number of other variables were not found to be associated with treatment outcome, including: Referral source, therapist, frequency of self-hypnosis practice, initial treatment response (reduction in pain during the first treatment session), concentration of treatment, and diagnostic group (spinal cord injury, amputation, multiple sclerosis).

DISCUSSION

Summary of Findings from the Review

There are now a sufficient number of published controlled trials to allow for some initial conclusions concerning the efficacy of hypnotic analgesia treatment of chronic pain. Based on the 19 articles identified for this review, we found that for all but one study that included a no-treatment condition (see Melzack and Perry, 1975), the hypnotic treatments resulted in more pain reduction than did no treatment. The magnitude of pain reduction varied across studies, although in some the changes in pain were substantial. Moreover, when longer-term outcomes are examined, decreases in chronic pain tend to maintain through 3-month (e.g., Jensen *et al.*, 2005), 6-month (e.g., Zitman *et al.*, 1992), 8-month (e.g., ter Kuile *et al.*, 1994), and even 12-month (e.g., Friedman and Taub, 1984) follow-up. The efficacy of hypnotic analgesia for different chronic pain diagnoses or conditions (e.g., neuropathic versus musculoskeletal pain; low back versus headache pain) cannot be determined given the relatively small number of studies and the many different diagnostic groups studied. However, in every diagnostic pain group studied to date, there appear to have been individuals who have benefited from hypnosis.

Comparisons between hypnosis and other treatments that differ in important ways from hypnosis (e.g., medication management, physical therapy, education) suggest that hypnosis is often

superior to other treatments for producing changes in pain reports. This body of studies suggests that the effects of hypnotic analgesia are not necessarily solely attributable to expectancy, since each of these alternative treatments also presumably enlisted patient expectancy. However, it could also be argued that hypnosis might be particularly effective for enlisting patient expectancies; perhaps more so than many or most other treatments (Kirsch, 1985). Studies that include effective means for controlling and assessing expectancy (e.g., minimally effective control conditions) are still necessary to address this key issue about one potential mechanism of hypnotic analgesia.

Comparisons between hypnosis and treatments that tend to include hypnotic-like suggestions (e.g., relaxation, progressive muscle relaxation training, autogenic training) tend to show similar results. In the very rare case that significant differences do emerge between hypnosis and other relaxation-type treatment conditions, hypnosis treatments tend to be superior (e.g., Gay *et al.*, 2002; McCauley *et al.*, 1983). Interestingly, in studies that have examined predictors of outcome, general hypnotic suggestibility tends to predict outcome in patients who receive hypnosis as well as either relaxation training or autogenic training, yet hypnotizability is not associated with outcome in patients who received standard care (see Table I). Similarly, imagery vividness also predicts outcome to both hypnotic analgesia treatment and relaxation (Gay *et al.*, 2002). As a group, these findings provide preliminary support for the notion that treatments labeled as “hypnosis”, “relaxation training,” and “autogenic training” are perhaps more similar than they are different, and in fact may operate through some shared mechanism(s).

Not enough studies have compared the effects of pain treatments with and without hypnosis to draw firm conclusions about the relative benefit of adding hypnosis to other treatments. The few studies that have been performed suggest that treatments with hypnosis appear to result in greater decreases in pain than treatments without hypnosis (Edelson and Fitzpatrick, 1989; Spiegel and Bloom, 1983). However, there is also some preliminary evidence to suggest that hypnosis might interfere with the beneficial effects of some treatments on some variables. Our only example of this was the study comparing CBT alone with CBT given following a hypnotic induction, where the beneficial effects of CBT on pain behaviors appeared to be vitiated, or at least reduced when

hypnosis was added (Edelson and Fitzpatrick, 1989). On the other hand, there is substantial evidence that hypnosis potentiates the impact of CBT in nonpain studies (Kirsch *et al.*, 1995).

The two component analyses that were identified suggest that including a hand-warming suggestion when treating headache (Friedman and Taub, 1984), and that explicitly labeling the hypnosis intervention as hypnosis when treating tension headache (Zitman *et al.*, 1992) may not have a significant impact on outcome in the short term, although it remains possible that an explicit label of hypnosis may improve long-term outcomes (Zitman *et al.*, 1992).

The predictor analyses suggest that a number of variables are unrelated to outcome. The few predictors and covariates of hypnosis treatment outcome include perceived control over pain (Spinhoven *et al.*, 1992), imagery vividness during a pre-treatment imagery task (Gay *et al.*, 2002), and post- but not pre-first session treatment outcome expectancy (Jensen *et al.*, 2005). However, one study did not find an association between treatment outcome expectancy and treatment outcome (Gay *et al.*, 2002). The most consistent predictor of treatment outcome is global hypnotic suggestibility assessed pre-treatment (Andreychuk and Skriver, 1975; Friedman and Taub, 1984; Gay *et al.*, 2002; ter Kuile *et al.*, 1994). But even hypnotic suggestibility is not always significantly associated with outcome (see Jensen *et al.*, 2005).

Research Implications

Although the current review suggests that hypnotic interventions for chronic pain benefit some, but not all, patients with a variety of chronic pain problems, there remain a number of important unanswered questions. These include: (1) Whether the effects of hypnotic analgesia treatment can be accounted for by the effects of treatment on outcome expectancy; (2) whether the relative rates of responsiveness to hypnosis treatment differ as a function of pain type or pain diagnosis; (3) what researchers do about the problem of variability in hypnosis treatments between studies; and (4) the primary components of hypnotic analgesia interventions that contribute to their efficacy. This section discusses some ideas for addressing these key questions in future research.

What Are the Effects of Hypnotic Analgesia Treatment that Cannot Be Accounted for by the Effects of Outcome Expectancy?

As we have discussed both previously (Jensen and Patterson, 2005), and in this review, no hypnosis trial has yet been performed for chronic pain that has included an experimental condition that adequately controls for outcome expectancy. While it seems unlikely that the long-term outcomes of hypnosis as reported in a number of studies could be explained by the effects of expectancy alone, research is needed to test this impression. We view a research design that includes a minimally effective but credible (to patients) control condition useful for this purpose. A series of clinical trials that include such a condition would provide important information about the effects of hypnosis that are not due merely to the passage of time, a particularly powerful placebo, or especially the effects of treatment expectancy engendered by the treatment (Kirsch, 1985). We recognize that such trials can be difficult and expensive to perform, and that this type of a control condition still has its weaknesses (Jensen and Patterson, 2005). We would still urge any researchers interested in designing future clinical trials to carefully consider including such a treatment condition in their design, given that it is one of only effective methods for ruling out a key potential explanation for hypnotic analgesia.

What Are the Relative Rates of Responsivity to Hypnosis Treatment in Different Chronic Pain Populations?

In addition to trials that include one or more control conditions, the field could also benefit from additional case series, controlled or not, that describe the outcomes of hypnotic analgesia treatment in patients with different pain problems and diagnoses. Single-subject case studies or case series with relatively few patients in them might have some utility if they describe a new strategy that might enhance the efficacy of hypnosis treatment; however, the literature is already full of case studies that describe profound effects of hypnotic analgesia treatment in individual patients (Patterson and Jensen, 2003). More needed are larger case series that include *all* consecutive patients seen. In particular, studies examining the effects of hypnosis in large samples of persons with neuropathic pain (e.g., post-herpetic neuralgia, complex regional pain syndrome types

1 and 2, peripheral neuropathy, below-level spinal cord injury pain) and nociceptive pain (e.g., low back pain, fibromyalgia) would be useful. Our clinical experience suggests that neuropathic pain problems (in particular, phantom limb pain) may be somewhat more responsive to hypnotic analgesia than nociceptive pain problems are, but this hypothesis requires testing.

The studies we reviewed report an average pre- to post-treatment improvement in overall pain intensity with hypnosis treatment that varied from as low as 2% (Spinhoven and Linssen, 1989) to as high as 57% (Winocur *et al.*, 2002). Most (15 of 24) of the pre- to post-treatment percent improvements in pain intensity in these studies hover somewhere between 17 and 35% (see Table 1). Five of the studies reported an average improvement that was greater than 35% (range, 39–57%), and four reported an average improvement that was less than 17% (range, –19 to 9%). In the only single study that reported a pre- to post-treatment increase in average pain, Dinges *et al.* (1997) also reported a simultaneous decrease in number of pain days, so the “increase” in pain observed does not reflect overall pain. The average pre- to post-treatment improvement rates in pain intensity found in these hypnosis studies compare favorably to other chronic pain treatments, including operant therapy for low back pain (e.g., 24 and 20% improvement; van den Hout *et al.*, 2003; Turner and Clancy, 1988), treatment with intrathecal opioids for chronic pain (e.g., 27% improvement; Thimineur *et al.*, 2004), and a combination of tramadol and acetaminophen for chronic low back pain (e.g., 39% improvement on the MPQ Present Pain Index score; Ruoff *et al.*, 2003).

Overall, these studies provide an initial estimate of the average changes in pain that might be expected across different chronic pain problems with hypnotic treatment. But more data are needed to replicate these findings in both similar and new pain patient populations. We would argue that such data could be obtained by clinicians currently treating patients with chronic pain (as opposed to only researchers studying hypnotic pain control) as long as they: (1) assess pain intensity before and after treatment and (2) are careful to obtain data from all patients treated. Such data would help us understand if the usual rates of response observed in these first studies of hypnotic analgesia treatment (in the 17–35% range) are similar or differ across different pain populations. Research in this area will be particularly enhanced if future reports use a standardized and similar outcome

measure. We would recommend, for example, that all future hypnotic analgesia studies include as the primary or as a secondary outcome measure the 0–10 numerical scale of average pain (Dworkin *et al.*, 2005); this would allow for an even greater ability to compare outcomes between studies.

What Should Researchers Do About the Significant Problem of Lack of Standardization of Treatment Between Studies?

The hypnosis treatments studied in the research reviewed for this paper all met the standard definition of hypnosis presented in the introduction as an interaction in which "...one person (the subject) is guided by another (the hypnotist) to respond to suggestions for changes in subjective experience, alterations in perception, sensation, emotion, thought, or behavior" (Green *et al.*, 2005, p. 262). However, this, and most other common definitions of hypnosis, are very broad, and can include a large number of interventions that vary in important ways, such as the length of session(s), number of treatment sessions, inclusion/exclusion of home practice recommendations with or without practice tapes, use of different hypnotic induction strategies, and type(s) of suggestions given. Any one of these variables might have a significant impact on outcome. Given the very large variety of hypnotic interventions possible when such a broad definition of hypnosis is used, asking the question, "Does hypnotic analgesia reduce chronic pain?" at this point is a little like asking "Do medications reduce chronic pain?" The answer, of course, to both of these questions is that it depends. Sometimes these interventions can have a powerful effect on pain in some people, and sometimes they might have no effect, or even make things worse.

The lack of standardization in hypnotic analgesia, and the large differences in the specific procedures used between studies, makes it difficult to make comparisons between studies and to tease apart the effective from the incidental components of these interventions. While it is possible that too much standardization in research protocols too soon might reduce the possibilities of innovations in the development of particularly effective hypnotic interventions, we believe that the field would make significant advances if some preliminary standardization occurred in the components and length of hypnosis treatments that are used in research.

Towards this end, and based on the studies reviewed in this paper, we make the following suggestions for such standardization. We propose that a basic chronic pain hypnotic analgesia intervention (that would be developed for use in a clinical trial; we are *not* suggesting that clinicians standardize their hypnosis interventions when they see patients clinically, see later) consist of the following: (1) A standard induction that begins by asking patient participants to focus their attention (e.g., on a visual object or the therapist's voice) and that includes preliminary suggestions for initial alterations in perceived sensations (e.g., relaxation) or nonvolitional ideomotor movement (e.g., eye closure, arm levitation, limb catalepsy), and with the specific induction used clearly described or presented verbatim in the published report; (2) suggestions for alterations in subjective experience of pain that include: (a) increased awareness of nonpain (competing) sensations, such as relaxation or a pleasant numbness or warmth, or (b) analgesia (elimination or reduction of pain), or some combination of these, with the specific suggestions used clearly described or presented verbatim in the published report; (3) treatment sessions that last a minimum of 20 min; (4) a specified number of treatment sessions, with three or less indicating "very brief hypnosis treatment," four to seven sessions indicating "brief hypnosis treatment," and eight or more sessions indicating "hypnosis treatment;" and (5) recommendations of at least daily home practice, specifying whether or not a practice tape was given to the patient. Anything that meets the above criteria could be labeled as "hypnotic analgesia treatment" for purposes of building a research base on hypnotic analgesia outcomes. Any modifications of the above would be clearly specified and labeled appropriately (e.g., "Hypnotic analgesia treatment without an explicit hypnotic induction" or "Five-minute hypnotic analgesia treatment") to help make distinctions between the hypnosis treatments studied clear. Our expectation is that the acceptance of a common operational definition of "hypnotic analgesia" would increase the chances that a literature base could be developed that allows for comparisons between different studies. Importantly, as a research database is developed on the efficacy of hypnosis treatment that meets the above criteria, then variations on this (very short versus standard treatment session length, home practice versus no home practice, etc.) could be examined and their efficacy compared to the outcome norms established in a research literature on "basic" hypnotic analgesia.

What Are the Components of Hypnotic Analgesia Interventions that Contribute to Their Efficacy?

In the previous section, we made recommendations for what we view as a reasonable working operational definition of chronic pain hypnotic analgesia treatment based on the practical consideration of what it is that most researchers do when they study “hypnotic analgesia” treatments for chronic pain. To the extent that researchers can begin to report that their interventions meet this standard, then increased comparability between research studies is possible. For the most part, we expect that meeting the standards suggested above will be more a matter of reporting interventions in greater detail rather than altering practice.

Yet it is possible that any one or more of the basic components of hypnotic analgesia treatment may not be necessary to obtain significant effects. For example, in all of the studies where hypnosis and autogenic training were compared, autogenic training, which usually involves suggestions for relaxation and nonpain competing sensations, was as effective as hypnosis for the treatment of headache pain (Spinhoven *et al.*, 1992; ter Kuile *et al.*, 1994; Zitman *et al.*, 1992). Although autogenic training does not include an explicit hypnotic induction, many hypnosis experts might express the view that the preliminary suggestions of relaxation and focused attention on sensations provided by autogenic training would constitute a type of hypnotic induction (cf., Yapko, 2003). Similarly, not all of the interventions studied that were effective included suggestions for either nonpain sensations or analgesia/anesthesia. For example, the hypnotic intervention used by Gay *et al.* (2002) to treat osteoarthritis pain did not include any direct suggestions for analgesia, only that the participants remember a time when they had no pain (age regression). Despite this, these investigators found a very large 56% pre- to post-treatment decrease in pain intensity in the patients who received the hypnosis treatment, while patients in the no-treatment control condition reported very little (4% improvement) change in pain during the 6 months of this trial. Overall then, the hypnosis analgesia research literature cannot yet tell us which specific components of treatment are necessary or sufficient to obtain significant reductions of pain and its negative effects on people’s lives. Identifying these, perhaps through the use of component analyses, will likely remain an important research goal for many years to come.

Clinical Implications

We view the most important clinical implication of the findings from this review as follows: Hypnosis has been greatly underused as a treatment and should be at least offered as an option to far greater numbers of patients with chronic pain. Further, hypnosis is almost always a benign approach with a very little likelihood of causing negative side effects. We urge clinicians who work with patients with pain to consider obtaining training in hypnotic analgesia treatment, and to then consider how to incorporate this into their practice.

The results of this review also provide some admittedly preliminary clues about how one might design and use hypnotic interventions for chronic pain. One study that compared CBT with CBT following an induction suggests the possibility that hypnosis and CBT might best be provided in different treatment sessions, or, if within the same session, that perhaps the CBT portion of treatment be given prior to training in self-hypnosis (Edelson and Fitzpatrick, 1989). Gruzelier and others have argued convincingly that the process of hypnosis, at least among those who show relatively higher levels of suggestibility, involves a reduction in executive functions and critical thinking (Gruzelier, 1998, 1999). If this is true, then any hypnosis-related reduction in critical thinking might be contra-indicated in patients who are trying to learn to alter maladaptive cognitions through a process of evaluation and modification; a process that potentially requires critical thinking in order to be successful.

Although the available research suggests that including versus not including hand-warming suggestions for headache pain does not impact outcome, hypnosis research also clearly indicates that different types of analgesic suggestions can have different and specific effects, at least in pain analogue studies (Rainville *et al.*, 1997). In order to ensure that the most patients benefit, it would appear to be wise early in clinical practice to include a variety of suggestions that are non-analgesic, as well as more than one option for analgesia or comfort. Useful non-analgesic suggestions includes ones for relaxation, improved sleep, and ‘ego strengthening’ suggestions to increase confidence and well-being. Post-hypnotic suggestions that the benefits of treatment will persist and become even more effective over time and with practice, may also increase efficacy. Based on the patient’s response(s) to these initial suggestions, the clinician can then tailor future suggestions to in-

clude those that seemed most effective for the patient. There are no data from the current review that would argue against this practical approach to tailoring hypnosis treatment for maximum efficacy in clinical settings, although, as indicated above, research is needed to help determine which of these components of hypnotic treatment actually do contribute to hypnotic treatment's efficacy.

Conclusive research has yet to be performed to identify the importance of, and best ways to incorporate, home practice in treatment. Are most patients able to practice on their own without a tape? Is home practice even helpful or necessary? If practice is helpful, how often and for how long should patients practice? Unfortunately, none of the studies that have been published to date have systematically manipulated practice, so the importance of this variable on self-hypnosis skills remains unclear. There is certainly no reason to believe that hypnosis is a skill that cannot benefit from practice, and this idea is consistent with decades of research from sociocognitive theorists (e.g., Lynn and Rhue, 1991). Our clinical experience suggests that patients who practice regularly benefit more than those who do not, and we have had more than one patient report increases in pain after they have misplaced their practice tapes. Further, there are no theoretical arguments of which we are aware that practice would have any negative effects on treatment. In our own clinical application of hypnotic analgesia treatment, we recommend to patients that they practice "at least" once a day, but we also inform patients of our opinion that the more often they practice, the more benefit they will get from treatment, and the longer it will last, based on our clinical experience that patients who practice regularly have better outcomes (see Jensen and Barber, 2000).

Finally, we have emphasized a number of times in this review that research is needed to determine if hypnosis is effective primarily through its effect on patient expectancy, or for other reasons, such as a specific effect on some underlying physiological or phenomenological "stage" which increases their ability to alter the processing and therefore perception of pain. While this issue is critical for researchers and for a clearer theoretical understanding of the mechanism(s) of effective hypnotic analgesia, for clinicians, it may not matter if hypnosis works through expectancies or physiological mechanisms. What matters most to clinicians, and presumably even more so to their clients and patients, is that hypnosis can provide substantial and long-term benefits.

Conclusions

The current review indicates that, despite significant differences in the hypnotic interventions used between studies, and in the populations of patients studied, hypnotic analgesia treatment for chronic pain results in significant reductions in perceived pain that maintain for at least several months, and possibly longer. Such changes in pain are not observed in patients who do not receive hypnosis treatment. Moreover, a few studies suggest that hypnotic analgesia treatment appears to be more effective, on average, than other treatments, such as medication management, physical therapy, or education. Treatments that are hypnotic-like, such as progressive muscle relaxation and autogenic training, seem to be about as effective as hypnosis for chronic pain. This, as well as the fairly consistent finding that general hypnotic suggestibility predicts outcome in hypnotic treatment as well as relaxation and autogenic training treatments, suggests the possibility (but does not prove) that these treatments might operate through some shared mechanism(s). Research is needed to examine the efficacy of hypnotic analgesia treatment across different chronic pain conditions using more standardized hypnotic intervention protocols, which would allow for better comparisons between studies. We proposed a standard operational definition of chronic pain hypnotic analgesia that could be used for this purpose, and suggested that researchers use this as a basis for developing and describing hypnosis treatments that are used in future clinical trials. Research is also needed to identify: (1) The specific components of standard hypnotic analgesia treatment that are necessary and sufficient for reducing chronic pain, (2) which of these components are unique to hypnosis, and (3) which are shared with other psychological interventions. Based on the findings from this review, we recommend that clinicians who work with patients with chronic pain learn hypnotic treatment skills in order to assist those patients who would be interested in learning self-hypnosis skills for pain management. Our hope is that continued research in this area, as well as increased application of hypnosis in clinical practice, will contribute to the reduction in pain and suffering of the many people who suffer from chronic pain conditions.

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