Hypnotic Enhancement of Cognitive–Behavioral Interventions for Pain: An Analogue Treatment Study

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Recent meta-analyses have shown that adding hypnosis enhances the effectiveness of cognitive–behavioral psychotherapy. This hypnotic enhancement effect was evaluated in the analogue treatment of pain. Individuals scoring in the high (n = 135) and low (n = 150) ranges of hypnotic suggestibility were randomly assigned to 1 of 6 conditions: Stress Inoculation Training, the same treatment provided hypnotically, nonhypnotic analgesia suggestions, hypnotic analgesia suggestions, a hypnotic induction treatment, or a control condition. The 5 analogue treatments reduced experimental pain more than the control condition, but were not different from one another. Under circumstances optimized to detect an enhancement effect, neither Stress Inoculation Training nor analgesia suggestions produced more relief when delivered in a hypnotic context than identical treatments provided nonhypnotically.

Key words: pain, analogue treatment, hypnosis, cognitive–behavioral interventions, Stress Inoculation Training

Traditionally, clinical hypnosis involves a hypnotic induction followed by direct suggestions for reducing symptoms. From this perspective, hypnosis is thought of as a stand-alone treatment approach that can be compared with other methods of psychotherapy. In contrast, contemporary clinical hypnotists de-emphasize the importance of direct suggestions for symptom reduction and are more likely to view hypnosis as an adjunct to an established treatment, such as cognitive–behavioral psychotherapy (Rhue, Lynn, & Kirsch, 1993). To employ hypnosis as an adjunct to a recognized form of psychotherapy, various treatment procedures can be provided in a hypnotic context by delivering a hypnotic induction beforehand. Alternatively, an established treatment can be used in combination with hypnosis by adding direct suggestions for symptom reduction to the treatment procedures, all preceded by a hypnotic induction. “As a result, the question to be asked is not whether hypnosis works better than another treatment, but rather whether it enhances the effectiveness of a treatment” (Kirsch, Montgomery, & Sapirstein, 1995, p. 214).

Recently, several meta-analytic studies evaluated whether adding hypnosis enhances cognitive–behavioral psychotherapy (Allison & Faith, 1996; Kirsch, 1996; Kirsch et al., 1995). Generally, these reviews showed that using hypnosis as an adjunct significantly increased the effectiveness of cognitive–behavioral treatments for a variety of symptoms and problems. For example, in a meta-analysis of 18 studies, Kirsch et al. (1995) reported a moderate effect for the hypnotic enhancement of cognitive–behavioral psychotherapy (d = .50). Pain reduction is one of the most common clinical applications of hypnosis (reviewed in Chaves, 1993), but only 2 of the studies included in the Kirsch et al. meta-analysis examined the treatment of pain. Neither of these studies found that adding hypnosis produced more pain reduction than cognitive–behavioral intervention alone (Edelson & Fitzpatrick, 1989; McAmmond, Davidson, & Kovitz, 1971).

To our knowledge, only one other investigation has evaluated whether adding hypnosis can significantly augment a cognitive–behavioral pain intervention. In a study specifically designed to test the hypnotic enhancement effect, Milling, Kirsch, Meunier, and Levine (2002) compared analogue versions of three pain treatments: a multicomponent cognitive–behavioral intervention package (i.e., relaxation, imagery, coping self-statements) based on Stress Inoculation Training (SIT; Turk, Meichenbaum, & Genest, 1983), hypnotic analgesia (i.e., direct hypnotic suggestions for reduction of pain), and a combination of the SIT and hypnotic analgesia procedures, all preceded by a hypnotic induction. Contrary to expectation, the combined intervention produced no more...
relief from experimentally induced pain than the individual interventions alone.

Adjunctive Methods and the Hypnotic Enhancement Effect

There may be several reasons why Milling et al. (2002) failed to obtain a hypnotic enhancement effect. One possibility involves the method that Milling et al. used to add hypnosis to their cognitive–behavioral intervention. In a methodological review of research on hypnosis as an adjunctive procedure, Schoenberger (2000) described three ways that hypnosis can be added to a cognitive–behavioral treatment to assess whether there is an enhancement effect. First, identical treatments can be provided, with one labeled as hypnotic and the other as nonhypnotic. However, treatments lacking a hypnotic induction possessing the appropriate hypnotic cadence and voice tone may not be sufficiently credible to produce an effect. Second, a cognitive–behavioral treatment may be compared with the identical treatment provided in a hypnotic context, which is accomplished by preceding it with an induction and relabeling some of the techniques as hypnotic in nature. Third, a cognitive–behavioral treatment may be compared with a combination of the identical cognitive–behavioral techniques (now relabeled as hypnotic in nature), plus direct suggestions for symptom reduction, all preceded by an induction.

This third method was the approach employed by Milling et al. (2002). These investigators combined the SIT procedures with direct suggestions for analgesia into a single hypnotic treatment. However, this methodology introduces the possibility of an unanticipated interaction between the direct suggestions and the cognitive–behavioral procedures. That is, in their combined condition, Milling et al. utilized direct suggestions for glove analgesia, thereby instructing participants to attend to their hand. This technique was followed by suggestions for hypnotic imagery, thus directing participants’ attention away from their hand and toward pleasant mental imagery. Conceivably, the different sets of instructions and conflicting attentional focal points may have interfered with one another. This line of reasoning would argue that comparing SIT with the same intervention provided in a hypnotic context might provide a purer test of the hypnotic enhancement effect than a combination of SIT and direct suggestions for hypnotic analgesia. Consequently, the first purpose of this study was to evaluate the hypnotic enhancement effect in pain treatment by comparing analogue versions of several different cognitive–behavioral interventions with the same procedures provided in a hypnotic context.

To accomplish this purpose, we compared the SIT analogue developed by Milling et al. (2002) with a hypnotic version created by preceding the treatment with a hypnotic induction as well as by describing the relaxation as “hypnotic relaxation,” the guided imagery as “hypnotic imagery,” and the coping self-statements as “coping self-suggestions.” We also compared the hypnotic analgesia analogue (i.e., direct hypnotic suggestions for glove analgesia) employed by Milling et al. with the same suggestions delivered nonhypnotically. A fifth treatment consisted of a hypnotic induction (framed as an intervention), which would seem to be of interest because an induction is the main ingredient needed to transform a nonhypnotic intervention into a hypnotic one. Finally, a no-treatment control condition was included for comparison purposes.

Hypnotic Suggestibility and the Hypnotic Enhancement Effect

A second reason that Milling et al. (2002) may have failed to obtain a hypnotic enhancement effect involves the nature of the sample utilized in that study. The ability to experience hypnotic analgesia has been shown to be associated with hypnotic suggestibility (see Montgomery, DuHamel, & Redd, 2000). It therefore seems reasonable to assume that if there is a hypnotic enhancement effect in the treatment of pain, it probably would be most evident among highly suggestible individuals.

However, participants in the Milling et al. (2002) study were representative of the full range of hypnotic suggestibility in the general population. Most people fall in the medium and low ranges of suggestibility (Spanos, Radtke, Hodgins, Stam, & Bertrand, 1983). Thus, the sample employed by Milling et al. was not optimized to detect a hypnotic enhancement effect. Consequently, a second purpose of the present study was to determine whether the hypnotic enhancement effect exists in the analogue treatment of pain by assessing it under circumstances designed to promote the likelihood of its production and detection—that is, by evaluating the effect with maximum statistical power among highly suggestible participants. To achieve this goal, we recruited as participants a large number of individuals scoring in the high range of hypnotic suggestibility. For comparison purposes, a large group of individuals in the low range of suggestibility were also included.

Hypnotic Pain Reduction and Response Expectancies

Response expectancies are the expectation of one’s own automatic, nonvolitional reactions to situational cues (Kirsch, 1990). Response expectancies have been found to play a role in a variety of behavioral phenomena, including response to psychotherapy (reviewed in Weinberger & Eig, 1999). Indeed, Kirsch (1997) proposed that hypnosis operates via response expectancies by altering expectancies for nonvolitional responding. However, of the many studies of hypnotic analgesia, only a few have actually tested the role of response expectancies in pain reduction. Specifically, Baker and Kirsch (1993) reported that expected pain reduction completely mediated the effects of hypnotic and placebo treatments on cold pressor pain. More recently, Milling et al. (2002) found that response expectancies partially mediated the effect of SIT, hypnotic analgesia, and a combined treatment in the reduction of finger pressure pain. Also, Montgomery, Weltz, Seltz, and Bovbjerg (2002) reported that response expectancies partially mediated the effects of hypnosis on breast-biopsy pain. Thus, the mediational role of response expectancies in hypnotic analgesia has not been well studied. Therefore, a final purpose of the present study was to examine whether response expectancies mediate the effects of hypnotic and cognitive–behavioral treatments for pain.

To accomplish this objective, we assessed changes in participants’ expectancies for pain as a result of undergoing training in the various treatments and then tested the mediating role of expectancy on treatment outcome using regression analysis.
Method

Participants

Participants were 166 female and 119 male introductory psychology students who had attained either low (0–1) or high (5–7) objective suggestibility scores on a modified version of the Carleton University Responsiveness to Suggestion Scale (CURSS; Spanos, Radtke, Hodgins, Stam, & Bertrand, 1983). The CURSS had been administered previously to 1,500 introductory psychology students as part of a separate experiment. Potential participants were then contacted by telephone and invited to take part in a study comparing different psychological methods of pain control. For their assistance, participants received credits satisfying a course requirement.

The CURSS consists of a hypnotic induction and seven test suggestions. Participants complete a booklet in which they indicate whether they responded to each suggestion (0 = no, 1 = yes). Objective suggestibility is measured as the sum of scores on the seven suggestions. Spanos, Radtke, Hodgins, Bertrand, Stam, and Dubreuil (1983) reported a test–retest reliability of .67 for objective scores. Correlations between the CURSS and other measures of suggestibility provide evidence of scale validity (Spanos, Radtke, Hodgins, Bertrand, Stam, & Moretti, 1983). In the present study, the CURSS was modified by replacing goal-directed fantasies with repetition of suggestions (Comey & Kirsch, 1999). This modification produces a more normal distribution of scores.

Individuals who had received objective suggestibility scores on the CURSS in the high (5–7) or the low (0–1) range were invited to participate in the main experiment. Traditionally, objective scores of 2 are classified in the low range (Spanos, Radtke, Hodgins, Stam, & Bertrand, 1983). However, the positively skewed distribution of CURSS scores can produce an underrepresentation of true lows when those receiving a score of 2 are included in the low category. To ensure that our suggestibility groups were composed only of individuals falling at the extremes of the normative distribution, we restricted the low-suggestibility group in our study to those receiving scores of 0 or 1. Consequently, 150 individuals receiving objective scores of 0 or 1 constituted the low-suggestibility group and 135 individuals receiving objective scores of 5 or higher constituted the high-suggestibility group.

Apparatus

A Forgione–Barber strain gauge pain stimulator (Forgione & Barber, 1971) was used to administer finger pressure pain. The stimulator consists of a doughnut-shaped weight (900 g) attached to a bar (231 g) that pivots from a stand at the far end. The index finger is placed atop a 5-cm platform in the middle of the device, and the bar is lowered on it, producing 2.041 g of force at the contact point.

Instruments

Pain intensity rating. Pain intensity was measured on an 11-point visual analog scale (VAS) ranging from 0 (no pain at all) to 10 (pain as intense as one can imagine). An 18-cm line depicting the verbal anchors and 11 numbers was mounted on the wall in front of participants. These individuals placed their finger in the stimulator, and an audiotape prompted them to report a number reflecting pain intensity every 20 seconds for 1 minute (Milling et al., 2002). The total of these reports yielded an index of overall intensity ranging from 0 to 30. Baseline intensity ratings were obtained before treatment, and post intensity ratings were made while participants utilized the pain control techniques they had learned during the training phase of treatment. Cronbach’s alpha was .93 for the baseline intensity ratings and .94 for the post intensity ratings.

Pain expectancy rating. Expected pain intensity was measured using the same 11-point VAS used in the pain intensity ratings. A single numerical rating ranging from 0 to 10 was provided. The baseline expectancy rating was made immediately after the baseline intensity rating and reflected what participants believed the pain would be like if they were again to place their finger in the stimulator for 1 minute (i.e., expected pain without pain control techniques). The post expectancy rating was made immediately after training in a pain control technique (but without placing a finger in the stimulator) and indicated what participants believed the pain would be like while using the techniques they had just learned and practiced. Participants in the no-treatment control condition made baseline and post expectancy ratings reflecting expected pain without pain reduction techniques.

Analogue Treatments

Each of the five analogue treatments was delivered in two phases. During the training phase, participants listened to an audiotape that presented information about pain management and provided an opportunity to practice a pain control technique (without placing their finger in the stimulator). Then, participants made an expectancy rating. Thereafter, during the intervention phase, the experimenters worked live from a treatment manual to administer the pain control technique to participants while they placed their finger in the stimulator and made intensity ratings.

The analogue treatments were designed to be as ecologically valid as practicable based on the senior author’s experience providing pain management in a variety of settings (e.g., hematology/oncology clinic, burn unit). The experimenters consisted of 11 advanced undergraduate students who were trained and monitored by the senior author.

Hypnotic analgesia suggestion condition. During the training phase, the 20 male and 28 female participants in this condition listened to an audiotape providing instruction and practice in hypnotic analgesia. First, the audiotape presented information from Kirsch, Lynn, and Rhue (1993) designed to correct misconceptions about hypnosis and to facilitate a positive attitude toward it. Next, participants heard the hypnotic induction from the CURSS (Spanos, Radtke, Hodgins, Stam, & Bertrand, 1983) followed by educational information about hypnotic analgesia. Then, participants experienced a 45-second glove analgesia suggestion adapted from Spanos, Perlini, and Robertson (1989). The audiotape ended with cancellation of the glove analgesia suggestion, but participants were told to remain in hypnosis and to sit with their eyes closed. At this point, a pain expectancy rating was obtained.

Thereafter, during the intervention phase, an experimenter working live from the treatment manual suggested that the participant go deeper into hypnosis and then administered the glove analgesia suggestion. After that, the experimenter guided the participant’s finger into the stimulator, and intensity ratings were obtained. The glove analgesia suggestion was continued throughout the time the participant’s finger was in the pain stimulator. Following the third intensity rating, the participant’s finger was withdrawn from the stimulator, the analgesia suggestion was cancelled, and the participant was brought out of hypnosis.

Nonhypnotic analgesia suggestion condition. This treatment mirrored the hypnotic analgesia suggestion condition, but lacked the hypnotic induction from the CURSS and the information adapted from Kirsch et al. (1993) intended to promote a positive attitude toward hypnosis. During the training phase, the 20 male and 28 female participants assigned to this condition experienced the 45-second glove analgesia suggestion adapted from Spanos et al. (1989), described in this condition as guided imagery. The training audiotape concluded with cancellation of the glove analgesia suggestion, but participants were instructed to remain relaxed and to sit with their eyes closed. Then, a pain expectancy rating was obtained.

Subsequently, during the intervention phase, the experimenter told the participant to become even more relaxed and administered the glove analgesia suggestion. The participant placed a finger in the stimulator and provided intensity ratings. The suggestion was continued throughout the time the participant’s finger was in the pain stimulator. After the intensity ratings were obtained and the finger was withdrawn from the stimulator,
the analgesia suggestion was cancelled and the participant was told to open his or her eyes.

**Cognitive–behavioral condition.** This treatment was directly adapted from SIT, a multicomponent cognitive–behavioral intervention package for pain (Turk et al., 1983). The organization and wording of this analogue treatment was taken verbatim almost in its entirety from Turk et al. (1983). During the training phase, the 20 male and 28 female participants assigned to this condition listened to an audiotape providing instruction in SIT. First, the audiotape described the Melzack and Wall gate-control theory of pain perception (Melzack & Wall, 1965). Next, information about progressive muscle relaxation was presented, followed by an opportunity to practice Jacobsonian muscle relaxation using instructions drawn from Goldfried and Davison (1976) in which participants were coached to tense and relax all of the muscle groups in their body, one group at a time. Then, information about guided imagery was presented, followed by an opportunity to practice imagery in which participants imagined themselves at a lake on a warm summer day. Finally, participants were trained in the use of coping self-statements (e.g., “I’ll make the pain less severe when it comes”). At the conclusion of the training audiotape, participants were instructed to sit with their eyes closed and to remain relaxed. At this point, post expectancy ratings were obtained.

Thereafter, during the intervention phase, the experimenter told the participant to become even more relaxed and to generate a coping self-statement that could be used during the post pain assessment. Next, working live from the treatment manual, the experimenter administered the same progressive muscle relaxation and guided-imagery instructions the participant had practiced during training. After experiencing the muscle relaxation and while engaged in the imagery, the participant’s left index finger was guided into the stimulator, and post intensity ratings were obtained. The imagery instructions were continued throughout the time the participant’s finger was in the stimulator. After the intensity ratings were provided, the participant’s finger was removed from the stimulator and the imagery was ended.

**Hypnotic cognitive–behavioral condition.** This treatment paralleled the cognitive–behavioral treatment, but each of the techniques was presented in a hypnotic context. During the training phase, the 19 male and 28 female participants in this condition first listened to an audiotape presenting the information from Kirsch et al. (1993) intended to produce a positive attitude toward hypnosis, followed by the hypnotic induction from the CURSS. Then, participants heard information about the Melzack and Wall gate-control theory, progressive muscle relaxation, guided imagery, and coping self-statements. These techniques were described as hypnotic relaxation, hypnotic imagery, and hypnotic self-suggestions (e.g., “Worrying about the pain can just fade from my awareness”). After information about each technique was presented, the audiotape provided an opportunity to practice the technique. When the training audiotape ended, participants were instructed to remain in hypnosis with their eyes closed and made post expectancy ratings.

Subsequently, during the intervention phase, the experimenter told the participant to go deeper into hypnosis and to generate a coping self-suggestion. Next, the experimenter, working live from the treatment manual, gave instructions for hypnotic relaxation and imagery. While engaged in the imagery, the participant placed his or her left index finger in the stimulator and post intensity ratings were provided. The imagery was continued throughout the time the participant’s finger was in the stimulator. Thereafter, the finger was removed from the stimulator, the imagery was continued, and the participant was brought out of hypnosis.

**Hypnotic induction condition.** During the training phase of this treatment, the 20 male and 27 female participants in this condition listened to an audiotape presenting the information from Kirsch et al. (1993) designed to create a positive attitude toward hypnosis, followed by the hypnotic induction from the CURSS, framed as a hypnotic treatment for pain. When the audiotape ended, participants were instructed to remain in hypnosis with their eyes closed and then made post expectancy ratings.

Thereafter, during the intervention phase, the experimenter instructed the participant to go deeper into hypnosis and then, working live from the treatment manual, repeated a portion of the CURSS induction, again framed as a hypnotic pain treatment. While continuing this portion of the induction, the experimenter guided the participant’s left index finger into the stimulator, and post intensity ratings were made. Then, the index finger was removed, and the participant was brought out of hypnosis.

**Procedure**

Participants were randomly assigned to one of the six conditions in blocks such that each treatment condition had equal proportions of individuals scoring in the high and the low ranges of hypnotic suggestibility, as well as equal proportions of men and women. Experimenters were blind to participants’ suggestibility scores. Participants in the hypnotic analgesia suggestion, hypnotic cognitive–behavioral, and hypnotic induction conditions were not aware the experiment involved hypnosis until after the baseline assessment, so as to prevent a hold-back effect (Zamansky, Scharf, & Brightbill, 1964) in which they might hold back their responses (i.e., exaggerate the pain) during the baseline assessment to leave room for improvement on the post assessment due to the effects of hypnosis. Individuals in the cognitive–behavioral, nonhypnotic analgesia suggestion, and control conditions were not told that other treatments involved hypnosis until the debriefing to prevent them from erroneously concluding that they were somehow being hypnotized.

To further minimize the possibility that participants might infer that the experiment involved hypnosis unless and until they actually received a hypnotic treatment, the CURSS was administered as part of an apparently unrelated investigation by a separate group of experimenters using a different location on campus. Also, all cues associated with hypnosis (e.g., journals, books) were removed from the rooms in which the treatments were provided. Finally, in the cognitive–behavioral and nonhypnotic analgesia suggestion conditions, the relaxation and imagery instructions were delivered in a soothing voice, but without the unique tone and cadence of hypnosis. Thus, these participants had no more reason to believe they were being hypnotized than would any person taking part in a study involving relaxation and imagery.

The analogue treatments were designed to be fairly comparable in length, although there were some unavoidable differences due to the nature of the specific techniques associated with each condition. To equalize the amount of time involved in participation, those assigned to the hypnotic cognitive–behavioral condition began the training phase immediately after making the baseline expectancy rating, whereas individuals assigned to other conditions completed filler questionnaires and read magazines during an appropriate waiting period. Consequently, participants in all conditions spent approximately 90 minutes taking part in the experiment.

The 20 male and 27 female participants assigned to the no-treatment control condition waited 60 minutes after providing baseline intensity and expectancy ratings. Then, these individuals were asked to provide a second (i.e., post) expectancy rating reflecting what they expected the pain would be like if they placed their finger in the stimulator without pain reduction techniques. Thereafter, control participants placed their finger in the stimulator for 1 minute and made post intensity ratings.

**Results**

**Preliminary Analyses**

Means and standard deviations for baseline and post pain intensity and expectancy ratings are shown in Table 1 and Table 2, respectively. As expected, a $2 \times 6$ (Suggestibility $\times$ Condition) analysis of variance (ANOVA) on baseline ratings failed to show a significant effect for suggestibility, treatment condition, or their interaction on either intensity or expectancy ratings. Differences
among the 11 experimenters were assessed using a 6 x 11 (Condition x Experimenter) analysis of covariance (ANCOVA) on post ratings of intensity and expectancy, with the corresponding baseline scores as the covariate. These analyses failed to yield a main effect for experimenter or an interaction between experimenter and treatment condition.

### Pain Reduction and the Hypnotic Enhancement Effect

A 2 x 6 (Suggestibility x Condition) ANCOVA on post intensity ratings, with baseline intensity scores as the covariate, yielded a significant main effect for suggestibility, \( F(1, 285) = 14.49, p < .001, \eta^2 = .05 \), and treatment condition, \( F(5, 285) = 13.49, p < .001, \eta^2 = .20 \). The Suggestibility x Condition interaction was not significant. Participants in the low-suggestibility group reported more intense pain (adjusted mean = 9.88, \( SD = 3.46 \)) than those in the high-suggestibility group (adjusted mean = 8.31, \( SD = 3.47 \)).

A least significant difference test (LSD) on estimated marginal means with a Bonferroni adjustment (\( p < .05 \)) for the number of statistical comparisons showed that participants in the control condition reported more intense pain (adjusted mean = 12.61, \( SD = 3.47 \)) than those in the hypnotic cognitive–behavioral (adjusted mean = 8.15, \( SD = 3.48 \)), cognitive–behavioral (adjusted mean = 8.04, \( SD = 3.47 \)), hypnotic analgesia suggestion (adjusted mean = 7.44, \( SD = 3.47 \)), nonhypnotic analgesia suggestion (adjusted mean = 8.96, \( SD = 3.48 \)), and hypnotic induction (adjusted mean = 9.40, \( SD = 3.46 \)) treatment conditions. However, there was no difference in intensity among the five analogue treatments.

Our main objective was to evaluate whether presenting the analogue treatments in a hypnotic context would significantly enhance their effectiveness among highly suggestible individuals. This effect would have been substantiated by a significant Suggestibility x Condition interaction with post hoc differences in pain reduction for the high-suggestibility group between the cognitive–behavioral and hypnotic cognitive–behavioral conditions as well as between the nonhypnotic and hypnotic analgesia suggestion conditions. The absence of a significant interaction thereby fails to substantiate a hypnotic enhancement effect.

### Expectancy as a Mediator of Pain Reduction

Pain expectancy was assessed as a mediator of the effects of treatment condition and hypnotic suggestibility on pain reduction using a series of simultaneous regressions. Table 3 shows the results of these regressions. In the first regression, post expectancy was regressed on baseline expectancy, suggestibility, treatment condition, and the interaction of condition and suggestibility. With baseline expectancy controlled, suggestibility and condition pre-
Table 3

Simultaneous Regressions Testing Mediation of Effects of Treatment Condition and Hypnotic Suggestibility on Pain Intensity by Pain Expectancy

<table>
<thead>
<tr>
<th>Criterion and predictor</th>
<th>F</th>
<th>p</th>
<th>η²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post expectancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline expectancy</td>
<td>297.28</td>
<td>.001</td>
<td>.52</td>
</tr>
<tr>
<td>HS</td>
<td>9.32</td>
<td>.002</td>
<td>.03</td>
</tr>
<tr>
<td>TC</td>
<td>8.10</td>
<td>.001</td>
<td>.13</td>
</tr>
<tr>
<td>TC × HS</td>
<td>1.11</td>
<td>.354</td>
<td>.02</td>
</tr>
<tr>
<td>Post intensity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline intensity</td>
<td>408.21</td>
<td>.001</td>
<td>.60</td>
</tr>
<tr>
<td>HS</td>
<td>14.49</td>
<td>.001</td>
<td>.05</td>
</tr>
<tr>
<td>TC</td>
<td>13.49</td>
<td>.001</td>
<td>.20</td>
</tr>
<tr>
<td>TC × HS</td>
<td>0.88</td>
<td>.493</td>
<td>.02</td>
</tr>
<tr>
<td>Post intensity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline intensity</td>
<td>80.09</td>
<td>.001</td>
<td>.23</td>
</tr>
<tr>
<td>Baseline expectancy</td>
<td>0.64</td>
<td>.426</td>
<td>.00</td>
</tr>
<tr>
<td>Post expectancy</td>
<td>39.51</td>
<td>.001</td>
<td>.13</td>
</tr>
<tr>
<td>HS</td>
<td>6.33</td>
<td>.012</td>
<td>.02</td>
</tr>
<tr>
<td>TC</td>
<td>8.37</td>
<td>.001</td>
<td>.13</td>
</tr>
<tr>
<td>TC × HS</td>
<td>0.76</td>
<td>.578</td>
<td>.01</td>
</tr>
</tbody>
</table>

Note. HS = hypnotic suggestibility; TC = treatment condition.

In the second regression, post intensity was regressed on baseline intensity, suggestibility, treatment condition, and the interaction of condition and suggestibility. After baseline intensity was controlled for, suggestibility and condition predicted post intensity. This result indicates that suggestibility and condition were associated with changes in pain intensity, thereby demonstrating a linkage between the independent variables and the dependent variable.

In the third regression, baseline intensity, baseline expectancy, post expectancy, suggestibility, treatment condition, and the interaction of condition and suggestibility were regressed on post intensity. With baseline intensity and baseline expectancy controlled, post intensity was predicted by post expectancy, suggestibility, and condition. This finding indicates that changes in pain intensity were associated with changes in expected pain, suggestibility, and condition. Expected pain reduction was directly related to reduction of pain intensity ($β = .34, p < .001$). A z test of proportions showed the effect of treatment condition on intensity was less ($z = 2.25, p < .01$) when entered together with expectancy in the third regression ($η^2 = .13$) than when entered without expectancy in the second regression ($η^2 = .20$). Similarly, the effect of suggestibility on intensity was less ($z = 1.95, p < .03$) when entered along with expectancy in the third regression ($η^2 = .02$) than when entered without expectancy in the second regression ($η^2 = .05$). These results indicate that the effects of treatment condition and suggestibility on pain intensity were partially mediated by changes in expected pain. However, these findings also mean that the effects of treatment condition and suggestibility on pain reduction were partially independent of expectancy.

In the third regression, a least significant difference (LSD) test on estimated marginal means with a Bonferroni adjustment ($p < .05$) showed the same pattern of results found in the earlier ANCOVA in which expectancy was not controlled. Participants in the control condition reported more intense pain (adjusted mean = 11.79, SD = 3.37) than those in the hypnotic cognitive–behavioral (adjusted mean = 8.06, SD = 3.27), cognitive–behavioral (adjusted mean = 8.65, SD = 3.31), hypnotic analgesia suggestion (adjusted mean = 7.85, SD = 3.27), nonhypnotic analgesia suggestion (adjusted mean = 8.98, SD = 3.26), and hypnotic induction (adjusted mean = 9.33, SD = 3.24) treatment conditions. There was no difference in intensity among the five analog treatments.

Discussion

The results of this investigation showed that each of the five analogue treatments was more effective than a no-treatment control condition in reducing finger pressure pain. However, there was no difference among the five treatments in the amount of relief produced. This finding is inconsistent with the contention that cognitive–behavioral treatments for pain can be significantly enhanced by providing them in a hypnotic context. SIT delivered hypnotically produced no more relief from finger pressure pain than did standard SIT. Similarly, direct hypnotic suggestions for analgesia, perhaps the classic application of hypnosis for pain control, were no more effective in reducing discomfort than the same suggestions provided without hypnosis. Our results are in concert with those of an earlier investigation in which a combination of SIT and direct suggestions for hypnotic analgesia was no more effective than either intervention alone in reducing experimental pain (Milling et al., 2002).

The present findings are striking because our study was optimized to produce and detect a hypnotic enhancement effect. That is, predicted differences between our hypnotic and nonhypnotic treatments consistent with a hypnotic enhancement effect were tested by using a large group of participants falling in the high range of suggestibility. It is not possible to prove the null hypothesis. However, power analysis permits an estimation of the probability that an effect of a given magnitude is not present in the population. Using the same experimental paradigm and three of the conditions employed in this study, Milling et al. (2002) obtained an effect size ($f$) of .41 for the main effect of condition. With 12 groups, a sample size of 285, and alpha set at .05, an effect size of .41 in a 5 degree of freedom $F$ test on means in an analysis of variance produces a power coefficient of 1.00. Statistical power indicates the probability of rejecting the null hypothesis when the alternative hypothesis is true. Thus, it seems somewhat unlikely that we would have failed to detect a hypnotic enhancement effect if it were to exist in this treatment paradigm.

Each of our five analogue treatments produced more relief than no treatment, but there was no difference in efficacy among them. This finding is consistent with the results of a recent meta-analysis of hypnotic analgesia showing the equivalence of hypnotic and nonhypnotic pain treatments (Montgomery et al., 2000). Our results are interesting given the brevity of several of the interventions. As much as practicable, our treatments were designed to be faithful analogues of how each might be employed in a clinical situation. Our hypnotic analgesia suggestion treatment required only about 20 minutes. When the CURSS induction and educational information about hypnosis were removed from this ana-
the resulting nonhypnotic analgesia suggestion treatment could be implemented in about 12 minutes. In contrast, our cognitive–behavioral treatment required approximately 60 minutes to provide the minimum amount of training needed to create a reasonably faithful analogue of SIT. When the induction and educational information about hypnosis were added to this analogue, the resulting hypnotic cognitive–behavioral treatment entailed almost 75 minutes of intervention. However, the amount of relief generated by the lengthy hypnotic and nonhypnotic SIT analogues was no different than that produced by the brief and simple nonhypnotic analgesia suggestion treatment.

This observation may have important practical implications. In some clinical situations, it is not feasible to work with a pain patient for an extended period of time. For example, on a burn unit, new patients are already in pain from their burn injury and may require rapid intervention to prepare for their next debridement. In some regions, patients must travel many hours from home to undergo invasive diagnostic tests (e.g., bone marrow aspirations) and do not have the time to participate in extensive psychological preparation beforehand. Some patients may be too debilitated to focus their attention for 60 minutes or more of training in pain control techniques. Occasionally, patients may be so incapacitated by pain that they become out of control. In such a circumstance, the consultation–liaison service may be expected to provide swift intervention with immediate results. Thus, everything else being equal, a brief intervention is likely to be much more desirable than a lengthy one in a hospital or clinic. An important next step in this area of inquiry might involve evaluating whether the brief treatments utilized in this study can reduce acute clinical pain as effectively as longer and more complex interventions.

The findings of this research indicate that expected pain reduction partially mediated the effects of the analogue treatments. Previously, Milling et al. (2002) found that response expectancies partially mediated the individual and combined effects of SIT and hypnotic analgesia in reducing experimental pain. Similarly, Montgomery et al. (2002) reported that expectancies partially mediated the effect of a brief hypnotic intervention on postsurgery pain from excisional breast biopsies. As a group, these studies argue that response expectancies may be a common factor in hypnotic and cognitive–behavioral treatments for pain. However, these investigations found that treatment condition predicted pain reduction even when expectancy was controlled statistically, thereby suggesting that factors specific to each of the treatments may have been partially responsible for pain reduction.

Several important limitations of this study should be noted. First, it is unclear to what extent our findings, based on the analogue treatment of experimental pain, apply to the treatment of clinical pain. Our results may generalize more readily to acute clinical pain that is mild to moderate in intensity (e.g., finger stick) and less readily to severe acute pain or to pain that is recurrent or chronic. Also, our analogue interventions may not have been fully representative of the actual interventions from which they were drawn. For example, SIT often involves multiple practice sessions with gradual exposure to the threat stimulus. Likewise, clinical hypnotists do not usually restrict themselves to a single suggestion in treating clinical pain.

Conversely, in an analogue treatment study, the pain stimulus and experimental treatments can be standardized to a greater extent than is often possible in a clinical setting. Our analogue treatment protocols were designed to possess a high level of ecological validity and to be easily transferred to clinical situations. The results of this study failed to substantiate a hypnotic-enhancement effect in the analogue treatment of acute experimental pain and instead suggest the equivalence of hypnotic and nonhypnotic versions of SIT and direct suggestions for analgesia. Future research might usefully evaluate whether there are differences in the effectiveness of these hypnotic and nonhypnotic interventions in treating acute clinical pain.

References


