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A Randomized Controlled Trial of Hypnosis for Burn Wound Care

Shelley Wiechman Askay, David R. Patterson, Mark P. Jensen, and Samuel R. Sharar
University of Washington Medical School

Purpose/Objective: There have been few randomized controlled studies on the effectiveness of clinical hypnotic analgesia. The authors' goal was to improve on previous methodologies and gain a better understanding of the effects of hypnosis on different components of pain in a clinical setting. ***Research Method/Design:*** This study used a randomized controlled design in which the nurses and data collectors were unaware of treatment condition to compare hypnotic analgesia with an attention-only placebo for burn pain during wound debridements. Data were analyzed on a total of 46 adult participants. ***Results:*** The authors found that the group receiving hypnosis had a significant drop in pain compared with the control group when measured by the McGill Pain Questionnaire but not when measured by other pain rating scales. ***Conclusion:*** The McGill Pain Questionnaire total score reflects multiple pain components, such as its affective component and various qualitative components, and is not merely a measure of pain intensity. Thus, the findings suggest that hypnosis affects multiple pain domains and that measures that assess these multiple domains may be more sensitive to the effects of hypnotic analgesia treatments.

Keywords: hypnosis, burn pain, hypnotic analgesia, randomized controlled trial

A burn injury is one of the most painful injuries a person can endure, and the subsequent wound debridement required to heal a burn injury is often more painful than the initial injury (Patterson & Ptacek, 1997). There are several limitations of opioid analgesics in the treatment of burn pain (Koyyalagunta, 2007; Patt, 2007; Perry & Heidrich, 1982). First, they are inadequate as the sole mechanism for controlling pain. Second, they often lead to unwanted side effects, such as sedation, respiratory depression, and constipation. The frequency of the wound debridements precludes stronger, anesthesia-assisted procedures. Accreditation organizations, such as the Joint Commission on Accreditation of Healthcare Organizations, have mandated that the assessment and treatment of pain be a top priority for hospitals and that persons not be discharged from the hospital with poor pain control. Because of this focus on pain control, there has been an increased focus on hypnosis and other nonpharmacological techniques as adjuncts to pain management. Furthermore, recent evidence suggests that hypnosis can have a cost-saving role in medicine as well. Lang and colleagues (2000) demonstrated substantial cost savings in the operating room with hypnosis. Specifically, they found that procedures performed with standard sedation cost an average of $638, whereas those done using hypnosis as an adjunct are only $300 on average. A 50% reduction in cost is important in today's health care environment.

Numerous studies have demonstrated the efficacy of hypnotic analgesia for reducing pain in laboratory settings (Evans & Paul, 1970; Freeman, Barabasz, Barabasz, & Warner, 2000; Hilgard & Hilgard, 1975; McGlashan, Evans, & Orne, 1969; Miller, Barabasz, & Barabasz, 1991). Unfortunately, most of the evidence for the effect of hypnotic analgesia on clinical pain has been from case reports (Barber & Mayer, 1977; Esdaile, 1957; Gainer, 1992; Gilboa, Borenstein, Seidman, & Tsur, 1990; Hilgard & Hilgard, 1975; Patterson, Questad, & Boltwood, 1987). Few randomized clinical studies on hypnotic analgesia have been published, limiting researchers' understanding of its effectiveness. Montgomery, DuHamel and Redd (2000) conducted a meta-analysis on 18 studies that used hypnotic analgesia in both laboratory and clinical settings. Their findings indicated that hypnosis provided substantial pain relief for 75% of the populations studied, and that hypnotic suggestibility served as a moderator for pain relief. Those who scored in the moderate or high suggestibility range could benefit from hypnosis for pain control, and the majority of the population falls into this range. The emphasis of this meta-analysis was on experimental pain, as 8 of the 18 studies reviewed were on clinical pain and methodological issues; limitations of the studies were not discussed.

Subsequently, Patterson and Jensen (2003) conducted a rigorous review of the hypnotic analgesia literature with an emphasis on identification of the type of pain being treated (experimental vs. clinical), study design, the nature of the hypnotic suggestions, and the type of control groups. As mentioned earlier, the authors found numerous case studies reporting the success of hypnotic analgesia for many different pain problems, but case reports do not allow researchers to determine whether benefit from hypnosis is the exception or the norm. In their review of controlled clinical studies, the authors found 19 controlled studies on acute clinical pain (Davidson, 1962; Everett, Patterson, Burns, Montgomery, & Heimbach, 1994; Faymonville et al., 1997; Freeman, Macaulay, Eve, Chamberlain, & Bhat, 1986; Harmon, Hynan, & Tyre, 1990; Katz, Kellerman, & Ellenberg, 1987; Kuttner, 1988; Lambert,

Shelley Wiechman Askay, David R. Patterson, and Mark P. Jensen, Department of Rehabilitation Medicine, University of Washington Medical School; Samuel R. Sharar, Department of Anesthesiology, University of Washington Medical School.

Correspondence concerning this article should be addressed to Shelley Wiechman Askay, PhD, Department of Rehabilitation Medicine, University of Washington School of Medicine/Harborview Medical Center, 325 Ninth Avenue, Box 359740, Seattle, WA 98104. E-mail: wiechman@u.washington.edu

1996; Lang et al., 2000; Lang, Joyce, Spiegel, Hamilton, & Lee, 1996; Liossi & Hatira, 1999; Patterson, Everett, Burns, & Marvin, 1992; Patterson & Ptacek, 1997; Patterson, Questad, & DeLateur, 1989; Syrjala, Cummings, & Donaldson, 1992; Wakeman & Kaplan, 1978; Weinstein & Au, 1991; Wright & Drummond, 2000; Zeltzer & LeBaron, 1982). Most studies in these areas focused on pain produced by invasive medical procedures or childbirth. Out of the 17 studies that included self-report measures of pain, 8 showed hypnosis to be more effective than no treatment, standard care, or an attention control condition (Davidson, 1962; Harmon et al., 1990; Kuttner, 1988; Patterson et al., 1989; Syrjala et al., 1992; Wakeman & Kaplan, 1978; Wright & Drummond, 2000; Zeltzer & LeBaron, 1982). Three studies showed hypnosis to be no better than control conditions, and one study showed mixed results (Everett et al., 1994; Katz et al., 1987; Liossi & Hatira, 1999; Patterson & Ptacek, 1997). No studies found other treatments to be superior to hypnosis for reducing pain. Patterson and Jensen concluded that hypnosis appears to be at least as effective as other treatments all of the time, and more effective than other treatments half of the time. The authors also made suggestions for future studies on hypnosis, including using larger sample sizes, standardizing hypnotic procedures, measuring suggestibility, measuring nonspecific effects, and determining the cost effectiveness of hypnosis seen in the Lang study (Lang et al., 2000).

The literature includes six controlled studies examining the effectiveness of hypnotic analgesia on burn pain. Wakeman and Kaplan (1978) reported that persons with burns who received hypnosis used significantly less analgesic medication over a 24-hr period than a control group of persons who received attention from a psychologist. The therapist was present during wound care procedures, and treatment included suggestions for pain relief as well as reduction of fear and anxiety. Our own lab has reported a series of studies using Barber's (1977) rapid induction analgesia technique. In the first study, we found that individuals with high initial levels of burn pain at baseline benefited from hypnotic analgesia prior to their wound care as compared to a control group (Patterson et al., 1989). In the next study, individuals were randomly assigned to either a hypnosis group or a control group of persons who received attention only from a psychologist. Individuals in the hypnosis group reported a greater drop in pain scores than did those in the control group, despite labeling and presenting the control condition as a "hypnosis intervention" (Patterson et al., 1992). However, in a subsequent study, we did not find that posthypnotic suggestions for comfort, relaxation, and analgesia resulted in reduced pain ratings when compared to an attention control group or to the anxiolytic lorazepam (Everett et al., 1994). One possible explanation for this negative finding may be that the baseline pain ratings may not have been high enough in these persons to see a statistically significant effect. This explanation was supported in a subsequent replication (Patterson & Ptacek, 1997), in which we found that posthypnotic suggestions had a large effect but only for individuals with high levels of baseline pain. It should be noted that Wright and Drummond (2000) found positive effects of the rapid induction analgesia technique and posthypnotic suggestions for analgesia during burn wound care even when initial levels of pain were not considered. Unfortunately, none of these six studies on burn wound care included measures of suggestibility; they were therefore unable to examine the association between suggestibility and outcome.

Several researchers have begun to differentiate between the intensity and qualitative (sensory and affective) components of pain. The intensity component merely reflects the overall magnitude of the felt pain, whereas the qualitative component reflects what the pain feels like (e.g., "aching" and "electrical") and its general unpleasantness. Some have argued that these two dimensions of pain should be measured separately. For example, Price, Harkins and Baker (1987) looked at the differences in Visual Analog Scales intensity pain ratings and Visual Analog Scales affective pain ratings in persons with cancer pain and chronic pain versus in those with labor pain or experimental pain. The authors found that those whose pain was perceived as more of a threat to life (cancer pain and chronic pain) had higher affective pain ratings than intensity pain ratings, and those whose pain was due to a positive or neutral event (labor or experimental pain) had lower affective pain ratings than intensity pain ratings. Those in labor were able to lower their intensity pain ratings when encouraged to focus on the birth of their child instead of the experience of pain. The authors argued that not only should these two dimensions be measured separately, but interventions should be tailored to the different pain components. This has led some to hypothesize that hypnosis may be more effective at reducing the affective and qualitative components of pain than its intensity component. Rainville, Carrier, Hofbauer, Bushnell, and Duncan (1999) tested this hypothesis and found that different areas of the brain are impacted by hypnosis as a function of the specific posthypnotic suggestions used rather than hypnosis in general. For example, posthypnotic suggestions of reductions in pain affect tend to alter areas associated with affect regulation (anterior cingulated cortex), whereas suggestions for reductions in pain intensity alter activity in areas associated with both affect (e.g., anterior cingulated cortex) and sensory perception (e.g., sensory cortex).

In addition to this current study being one of the few randomized controlled trials of hypnosis, it has been designed to add to the literature on hypnotic analgesia in the following ways. First, we attempted to control for nonspecific effects of the treatment. Nonspecific effects are frequently termed *placebo effects*, which was defined by Kazdin (1979) as effects common to all treatments but not specific to the treatment being examined. In order to better explain these nonspecific effects, the control intervention that we designed will hopefully provide more clarity on the components of hypnosis that might make it more effective than relaxation or other interventions that offer therapist attention. Second, we measured suggestibility. There have only been four studies of hypnotic analgesia for acute pain that have measured hypnotic suggestibility, and all but one of these studies demonstrated a positive association between suggestibility and outcome that may be associated with long-term treatment effects (Freeman et al., 1986; Harmon et al., 1990; Lang et al., 1996; Liossi & Hatira, 1999). Given the suggested importance of hypnotic suggestibility, we included a measure of this domain in the current study, and we included individuals who fell into all ranges of hypnotic suggestibility. Finally, we were intrigued by the finding of Rainville et al. (1999) that demonstrated differential neurophysiological responses to different hypnotic suggestions, and we designed a hypnotic script that was used by all clinicians that included hypnotic suggestions specific to this population. We chose burn wound debride-

ment as the component of burn treatment that would most benefit from hypnotic analgesia and tailored our hypnotic suggestions to this situation to test for the efficacy of specific posthypnotic suggestions. We then used several different instruments to measure pain, one aimed at the intensity component (Visual Analog Scales rating scales) and the other more sensitive to pain qualities, including affect (McGill Pain Questionnaire [MPQ]).

Method

Participants

This research protocol was approved by the institutional review board for the host institution. Entry criteria included a length of hospitalization on the burn unit for more than 3 days, a burn injury that required daily wound care, ability to speak English, and no cognitive impairment. Research assistants assessed eligibility for the study and invited those eligible to participate in the study. After explaining the study in detail, we obtained informed consent. If participants had further questions about the study, the principal investigator of the study was notified and addressed their questions. After providing consent, participants were randomly assigned to one of two treatment groups using a randomization table. A total of 57 participants with burn injuries were enrolled in the study between 1999 and 2001, and 46 participants completed the study. The mean age of our sample was 37, the mean length of hospitalization was 18 days, and the mean Total Burn Surface Area (TBSA) was 15%. The majority of our sample (76%) was Caucasian. There were no differences between the experimental and control groups in age, TBSA, or length of hospitalization. Because we did not have actual data on those who were eligible but did not consent to participate in the study, we compared these demographics to those in our database of burn admissions. In that database, the mean age is 40 ($SD = 14$) and the mean TBSA is 15% ($SD = 14$). Based on this analysis, we assumed that the sample for this study largely reflected the sample of admissions to our burn unit and that those who did not consent to participate did not differ in either age or TBSA. Reasons for dropping out of this study were identical in both groups and included being discharged from the hospital sooner than the anticipated 3 days and going to surgery for skin grafting, thus negating the need for wound care. See Figure 1 for a consort diagram of participants.

Design

Participants were randomly assigned to either an experimental group (hypnosis) or a control group (therapist attention plus relaxation). Two days of baseline data were collected on each group. Participants in the experimental group then received hypnosis delivered by a trained psychologist prior to their wound care on Day 3. A standardized script specific to wound care for burn injuries was developed for this study and was based on the script for rapid induction analgesia that has been used in previous studies (Barber, 1977). Posthypnotic suggestions specific to burn wound care were added to this standard script. During the wound care, participants listened to a tape of the hypnotic induction followed by music of their choice. The control group received a visit by a trained psychologist for similar time duration as that for the experimental group. They spent the time talking about how they got burned and what their pain level was, and they were instructed on the details of how wound care would go the following day. For example, they were given a tape of relaxing music and instructed as follows:

> This is the tape that we are going to use to make your dressing change more comfortable. The tape has some music that you can listen to while the nurses clean your wounds. Before the music starts, you will get three minutes of silence to relax yourself. You may want to picture yourself going down some stairs into a more relaxing place. I will let you practice this now, and I will check with you tomorrow after your wound care. [Therapist leaves the room.]

The nurses and research assistants were unaware of the group assignment. Participants were not told whether they were receiving attention/relaxation or hypnosis, and unless they had prior experience with hypnosis, they may not have known which group they were in. In fact, many of the participants asked us at the end of the study which intervention they had received. It is important to note that no therapist was present during the wound care. The intervention was conducted the day before wound care via appropriate posthypnotic suggestions and with a tape of the induction for their wound care. Although all of the psychologists had appropriate training in hypnotic analgesia, two of the psychologists had more than 20 years of experience in this technique and were considered experts, and the other psychologists had less experience and were considered novices. Fifteen participants received treatment from an expert psychologist, and 31 participants received treatment from a novice psychologist.

Measures

Several measures of pain were used, including the Short Form of the MPQ (SF-MPQ; Melzack, 1987). This questionnaire uses 15 word descriptors to specify participants' subjective pain experience. It has been widely used to assess pain in participants with diverse types of pain. It has correlations of .62 to .90 with the

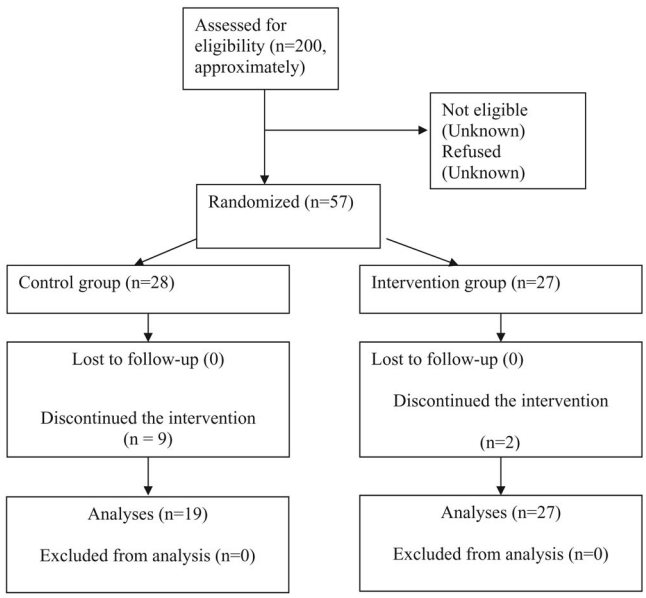

Figure 1. Consort diagram.

original 78-item MPQ (Stephenson & Herman, 2000). Participants also rated their worst pain intensity, average pain intensity, and time spent thinking about pain during wound care using Graphic Rating Scales (Scott & Huskisson, 1976), in which *no pain* is 0 and *the worst possible pain* is 100. Participants were asked to choose a number from 0 to 100 that best represented their pain intensity. The Burn Specific Anxiety Scale (Taal & Faber, 1998) was used to assess anxiety. This is a 9-item self-report scale that assesses anxiety during painful medical procedures. It was created specifically for use with individuals with burn injuries undergoing wound care or other painful procedures. It is also scored on a 0 to 100 scale (0 = *no pain*, 100 = *worst imaginable pain*). This scale has been shown to have good validity and reliability, with a coefficient alpha of .94, indicating excellent internal consistency.

Three trait measures were used to assess hypnotizability, dissociation, and absorption. The Stanford Hypnotic Clinical Scale (Hilgard & Hilgard, 1975) assesses hypnotizability with five items and is appropriate for adults aged 17 and older. It has a reliability of .72 with the previously validated longer version (Weitzenhoffer & Hilgard, 1959, 1962). The Tellegen Absorption Scale consists of 34 true/false items that have been used to assess hypnotic susceptibility in individuals aged 17 and older. The internal reliability is .88, and test–retest reliability is .91 (Lyons & Crawford, 1997). Finally, to determine a participant's ability to dissociate, we used the dissociation subscale from the Stanford Acute Stress Reaction Questionnaire. This is a 30-item measure that was developed to evaluate both dissociation and anxiety symptoms following a trauma. It uses standard criteria to assess for acute stress disorder. It has been shown to be a valid and reliable measure that accurately assesses a participant's ability to dissociate (Koopman, Classen, & Spiegel, 1994) in response to a trauma. Although the Stanford Acute Stress Reaction Questionnaire cannot strictly be considered a measure of dissociation during hypnosis because it is a state measure, this variable was of interest and the questionnaire is the best measure of the trait of dissociation that is available at this point.

Data were also collected on participants' perceptions of the interventions. For example, participants were asked the following four questions regarding their perceptions of the treatment: (a) to guess which intervention they had received, (b) how certain they were about their guess, (c) reasons why they thought they had received that particular intervention, and (d) their overall rating of the benefits versus side effects of the treatment.

Results

The means and standard deviations at baseline for all outcome measures are listed in Table 1. Baseline scores for pain and anxiety were calculated by averaging their scores from Days 1 and 2 of the study. The data were normally distributed.

The majority of participants fell into the medium range of hypnotizability as determined by the Stanford Hypnotic Clinical Scale.

Four separate analyses of covariance were performed to determine the differences between the groups in their ratings of worst pain, average pain, and anxiety, and in the total SF-MPQ score on Day 3 of the study (postintervention). We chose to use the total score on the MPQ due to evidence that the two subscales of this measure are so strongly associated with one another that they tap into the same underlying construct (Turk, Rudy, & Salovey, 1985). The covariate was the participant's baseline scores of the variable as defined by the average rating across Days 1 and 2 of the study. Only the score from the SF-MPQ was statistically significantly different between treatment conditions, $F(1, 43) = 7.7$, $p = .008$, with those in the hypnosis group showing a statistically significantly greater decrease in pain from baseline to postintervention.

Table 1
Means and Standard Deviations at Baseline for All Outcome Measures

	Experimental		Control	
Measure	*M*	*SD*	*M*	*SD*
Worst pain	67.8	22.2	69.0	21.7
Average pain	48.3	17.8	45.4	17.8
McGill-SF	32.6	7.6	30.0	5.9
Anxiety	40.3	27.1	35.0	23.0
Hypnotizability	3.0	1.4	2.1	1.7
Absorption	22.1	7.5	13.0	9.7
Dissociation	11.0	7.0	13.0	11.6

Note. McGill-SF = Short Form of the McGill Pain Questionnaire.

We also examined effect sizes on all of the pain outcome measures in order to gain a sense of clinical significance of the changes observed. Although both groups showed a drop in pain from baseline to postintervention, the experimental group consistently showed large effect sizes across all of the pain measures. The control group showed only small to medium effect sizes on all pain measures (see Tables 2 and 3).

Two *t* tests determined that there were no statistically significant differences between the groups in the amount of opioids (as measured by opioid equivalents) that they had received immediately prior to and/or during wound care or the length of time they had spent in wound care, although the mean opioid equivalents for the hypnosis group (5.5) was less than that for the relaxation group (6.8). The mean length of time spent in wound care was 53 min for the hypnosis group and 54 min for the relaxation group. Receiving the intervention from an expert versus novice clinician did not make a significant difference in any outcome measure.

Three two-way analyses of variance were conducted to determine if there were any main effects or interactions between hypnotizability and worst pain intensity score, absorption and worst pain intensity score, and dissociation and worst pain intensity score. There were no significant main effects or interactions. A total of 59% of our sample correctly determined which intervention they had received. Of note, 80% of our sample felt that they had benefited from the study regardless of the intervention that they had received, and only 13% felt that there had been no benefits from the intervention.

Discussion

One of the key findings from this study is that the scores on the SF-MPQ showed a significant difference between the hypnosis group and the relaxation/attention group, whereas no significant differences between conditions were found for any other outcome measure. One possible explanation for this finding is the greater complexity of the pain domains assessed by the multiple-item

Table 2
Means and Standard Deviations of the Graphic Rating Scales Scores for Worst Pain and Average Pain From Pretest to Posttest

	Experimental (n = 27)		Control (n = 19)	
Measure	*M*	*SD*	*M*	*SD*
Worst pain pretest	67.8	22.2	68.9	21.7
Worst pain posttest	55.6	28.9	52.5	26.6
Average pain pretest	48.2	17.8	45.4	17.8
Average pain posttest	35.4	21.9	35.4	23.1

SF-MPQ than by single ratings of pain intensity. For example, the SF-MPQ contains items that assess pain qualities (e.g., "throbbing" and "sharp" pain) in addition to its affective components (e.g., "fearful" and "punishing/cruel"). These components of pain would have a greater cognitive or evaluative element than simple judgments about pain magnitude (i.e., pain intensity). In other words, the SF-MPQ reflects how a person feels about his or her pain and interprets the meaning of the pain. Pain intensity, in contrast, is more closely associated with nociceptive input and how a person experiences the pain on a sensory level. Rainville et al. (1999) offered the following examples of suggestions that aim to decrease a person's affective experience of pain: "During the wound care a sensation of well-being will sweep through all of your body" and "You will be more comfortable and restful than you might have expected." Suggestions aimed at the intensity component of pain include "The sensations in your hand are less intense than you might have expected" and "The sensations you felt are now turning into numbness or tingling and becoming less intense."

Researchers have speculated on whether hypnotic analgesia has a greater effect on intensity or qualitative (including affective aspects) components of pain. Many have hypothesized that hypnosis would have a greater impact on the affective components of pain. Price et al. (1987) found support for this hypothesis when they reported that affective ratings of pain showed a greater reduction with hypnosis than did intensity ratings. However, a subsequent study by Price and Barber (1987) showed that both components could show a reduction and that the amount of change depended upon the nature of the suggestion. As mentioned earlier, Rainville et al. (1999) further supported the notion that the effects of hypnotic analgesia on pain intensity versus pain affect depend on the specific suggestions as evidenced by brain imaging. This study showed that regional pain-related brain activity also varies as a function of the nature of analgesic suggestion, implying that hypnosis can potentially impact both intensity and qualitative/affective components of pain. As discussed previously, suggestions for intensity reductions of pain correspond to changes in activity in the somatosensory cortex, whereas suggestions for affective pain reduction are reflected in the part of the brain that corresponds to processing emotional information.

In our study, the standardized script that we used was meant to be neutral regarding the components of pain that it would affect. Our specific posthypnotic suggestions included such phrases as "You may feel more comfortable and relaxed than you were before" and "You may feel more in control of your own comfort." The word *pain* was never mentioned in our interventions. In our clinical experience with burn pain, burn injuries are so excruciatingly painful that even opioids do not fully take the pain away. If we use posthypnotic suggestions implying a decrease in pain, we find that we are not as successful as when we provide posthypnotic suggestions that change the participant's experience or interpretation of pain. For example, we commonly suggest to participants that they may feel more control over their own comfort or that they are not as bothered by their situation as they were before. We further change the negative association between pain and tissue damage by suggesting that any sensations that they feel are a positive sign that the tissue is still viable and has nerve endings that are regenerating, and that these sensations are a sign of healing (vs. harm).

Another promising finding of this study is that pain decreased from pretreatment to posttreatment in both groups. It is likely that the control condition had a beneficial effect on pain, and that it therefore should have been considered as a second intervention. Other studies have shown both relaxation and positive attention to reduce acute pain (Kwekkeboom & Gretarsdottir, 2006; Price, Craggs, Verne, Perlstein, & Robinson, 2007; Vase, Robinson, Verne, & Price, 2003). This study is consistent with those findings as well. Ideally, we would have liked to have had a third true control group that had no nonpharmacological intervention, but challenges with participant accrual limited us to two groups. This is a promising finding for those medical settings that do not have access to trained hypnotherapists, as it is much easier and cheaper to train a caregiver in relaxation techniques and positive, nurturing attention that are already so inherent in a nurse's role.

One key limitation of this study, mentioned previously, was the absence of a control condition that had no impact on pain but could control for participant expectancy. The inclusion of such a group, although precluded from our setting because of ethical considerations, would have allowed conclusions regarding the relative effects of both relaxation and hypnosis. A second limitation concerns the sample size: It is possible that we might have detected greater differences between the treatment conditions had we been able to recruit more participants, given the larger effect sizes across all measures for the hypnosis condition relative to the relaxation condition. Thus, although we are confident that hypnotic analgesia has the potential to have a greater impact on pain than simple relaxation, this hypothesis needs to be tested in larger samples of persons than could be recruited for the current study.

Table 3
Effect Sizes on Pain Outcome Measures Between the Experimental and Control Groups

Outcome measure	Experimental (*d*)	Control (*d*)
GRS worst pain	.69	.42
GRS average pain	.72	.56
Total McGill	.83	.06
McGill—Affect subscale	.75	.06
McGill—Sensory subscale	.78	.16

Note. d = .20 (small), .50 (medium), .80 (large). GRS = Graphic Rating Scales; McGill = McGill Pain Questionnaire.

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