ABSTRACT

Examining the Role of Expectancies during a Mind-Body Intervention for Hot Flash Reduction in Postmenopausal Women: Is the Relationship between Treatment Condition and Symptom Improvement Mediated by Response Expectancy?

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Hypnotherapy has been shown to be an effective intervention for the treatment of a variety of physical and psychological symptoms. However, the mechanisms of action responsible for hypnotherapy's beneficial effects are not yet fully understood. One social cognitive perspective suggests that improvement can be attributed to changes in response expectancy. However, this theory has been widely debated, as studies investigating response expectancy as a mediator of the beneficial effects of hypnotherapy have produced mixed results.

During this study, data collected from a sample of 172 postmenopausal women who had been randomized to a five-week hypnosis intervention or a structured attention control group were analyzed to determine if the relationship between group assignment and the number of hot flash reported by participants was mediated by expectancies for treatment efficacy. A series of simple mediation and conditional process analyses were used to test the significance of the indirect and direct effect of group assignment on hot flash frequency.

Results did not support mediation of the relationship between treatment condition and hot flash frequency through response expectancy. This was true for all models tested in the analyses, including those that both did and did not account for the potential moderating role of hypnotizability. Secondary analysis suggested that hypnotizability was a moderator of the direct effect of group assignment on hot flash frequency. Furthermore, results suggested that participants were more likely to practice self-hypnosis when they were experiencing a greater number of hot flashes.

Together, these results suggest that changes in response expectancy did not account for symptom improvement during a hypnosis intervention for hot flashes. Future studies should seek to determine whether alternative theories offer a more probable explanation. Efforts should also be made to uncover additional mediating variables.

Examining the Role of Expectancies during a Mind-Body Intervention for Hot Flash Reduction in Postmenopausal Women: Is the Relationship between Treatment Condition and Symptom Improvement Mediated by Response Expectancy?

by

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A Dissertation

Approved by the Department of Psychology and Neuroscience

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Submitted to the Graduate Faculty of
Baylor University in Partial Fulfillment of the
Requirements for the Degree
of

Doctor of Philosophy

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ACKNOWLEDGMENTS

I would like to thank my mentor, Dr. Gary Elkins, for allowing me to undertake this ambitious project. I appreciate your support and guidance throughout the process, as well as the faith you've shown in me over the last four and a half years. I would also like to thank Dr. Wade Rowatt for encouraging me to conduct my statistical analyses using the criteria put forth by Dr. Andrew Hayes for examining mediation. I thoroughly enjoyed learning about conditional process analysis over the past year. I also need to think my remaining committee members, Drs. Grant Morgan, Keith Sanford, and Jo-Ann Tsang for your helpful advice and encouragement during the process, as well as the knowledge you've shared with me during my time here at Baylor.

I would also like to express my appreciation to my fellow graduate students in the Psychology and Neuroscience department. You are all amazingly bright and caring individuals and I have enjoyed getting to know you over the last four years. Your kind words of encouragement have been a blessing and a source of inspiration for me on numerous occasions.

Finally, I would like to thank my wife, Jessica, my father, Jim Sr., and my mother Cynthia, for all the sacrifices you have made that have allowed me to fulfill my dream of pursuing an academic calling. I would not have been able to do so without such wonderful and caring people in my life. Thanks to all of you.

DEDICATION

To my grandfather, Joseph Sliwinski
I miss you

CHAPTER ONE

Introduction

Examining the Role of Expectancies during a Mind-Body Intervention for Hot Flash Reduction in Postmenopausal Women: Is the Relationship between Treatment Condition and Symptom Improvement Mediated by Response Expectancy?

For over 150 years, hypnosis has been used to treat a variety of medical and psychological conditions (Braid 1853). Hypnotherapy, or "the use of hypnosis in the treatment of a medical or psychological disorder or concern" (Elkins, Barabasz, Council, & Spiegel, 2015, p. 7) has proven effective for the treatment of pain (Stoelb, Molton, Jensen, & Patterson; 2009) irritable bowel syndrome (Gholamrezaei, Ardestani, & Emami, 2006), depression (Shih, Yang, & Koo, 2009), resting tremor (Elkins, Sliwinski, Bowers, & Encarnacion, 2013), test and social anxiety (Coelho, Canter, & Ernst, 2008), and hot flashes (Elkins, Fisher, Johnson, Carpenter, & Keith, 2013), among other disorders. However, despite the numerous studies providing empirical support for the utility of hypnosis, very little is known about the possible mechanisms of action behind hypnotherapy's beneficial effects. This is reflected by the fact that leading members of APA's Division 30, the Society of Psychological Hypnosis, recently felt compelled to update their official definition of hypnosis, in part, to appease criticism stemming from allegations that the previous definition did not account for theoretical biases regarding hypnosis' mechanisms of action, which they suggested may be accounted for by "social, cognitive, neurobiological, interpersonal, a combination of these, or some yet undiscovered factors" (Elkins et al., 2015, p. 7).

Montgomery et al. (2010) have suggested that the lack of research investigating the underlying mechanisms of hypnosis in medical and clinical settings is surprising for two reasons. First of all, the identification of possible mechanisms of action has been a hotly debated topic within the hypnosis community. Secondly, this debate has resulted in numerous studies that have sought to identify potential moderators of hypnotic effects, such as hypnotizability, while simultaneously ignoring the importance of potential mediators. As Montgomery et al. (2010, p. 81) have so eloquently stated, such focus has been placed on the question of "For whom does hypnosis work best?" that researchers have largely forgotten that the question that remains to be answered is "How does hypnosis work?"

Expectancy Theory

One of the most intensely debated theories to attempt to identify the mechanism of action behind hypnosis' beneficial effects has been put forth by Dr. Irving Kirsch, and is known as expectancy theory (Kirsch, 1985, 1994). According to expectancy theory, the benefits of hypnosis are attributable to placebo effects that are brought about through positive hypnotic suggestions (Kirsch, 1999). Hypnotic suggestions are believed to lead to improvement by either creating or altering the patient's response expectancies, or his or her expectations for the occurrence of nonvolitional outcomes or behaviors. For example, response expectancies are believed to have a direct effect on physiological functioning, overt behavior, and subjective experience (Kirsch, 1985). Such happenings are thought to occur automatically, or without effort on the part of the patient. These nonvolitional responses are believed to occur as a result of a basic psychological mechanism that is reliant on the mind-body connection.

Expectancy theory does not place limits on the type or number of nonvolitional responses that can be brought about through hypnosis. Instead, patient response is limited only to the extent to which the hypnotherapist is able to alter response expectancies. Therefore, if a patient believes that a symptom will improve as a result of hypnosis, the treatment will be effective. Kirsch (1985) points out that many of the beneficial effects brought about by hypnosis are not unique to the treatment, but can also be elicited by other placebos, such as sugar pills or sham procedures, and that the only thing unique about hypnosis relative to other placebos is that it does not rely on deception. However, he does suggest that there are three key expectancies that limit the extent to which a patient may benefit from hypnosis. The first key expectancy is that the patient must believe that his or her surroundings are appropriate for complying with hypnotic suggestions. Secondly, the patient must believe that his or her responses to suggestions are appropriate while he or she is serving in his or her role as a patient. Finally, the patient must believe that he or she is hypnotizable (Kirsch 1985). There is currently no consensus on how to most effectively maximize these expectancies. However, possible means such as priming, establishing rapport, and altering normative beliefs have been suggested (Sliwinski & Elkins, 2013).

Support for expectancy theory has come from a variety of sources. For example, Kirsch (1999) has noted that the phenomena experienced by hypnotic participants is dependent on the suggestions given, and not the particular induction technique (eye fixation, applying pressure, banging gongs, etc.) employed by the hypnotherapist. This is similar to the way in which placebo effects brought about by sham medications correspond to the knowledge and expectations individuals have about the drugs they

believe themselves to be ingesting, and not on the particular components of the placebo (Kirsch, 1985).

One study that demonstrates this power of suggestion was conducted by Young and Cooper (1972). During this study, participants were assigned to two groups with one group of participants being told that they could expect to experience amnesia as a result of being hypnotized and the other group being told they would not experience amnesia. Prior to being hypnotized, participants were asked if they expected to experience spontaneous amnesia after hypnosis. Results indicated that 48% of participants in the first group expected to experience amnesia, whereas only 15% of participants in the second group anticipated memory loss. Later testing indicated that after both groups of participants had been hypnotized, 37% of participants in the first group experienced amnesia compared to only 10% of participants in the second group (Young & Cooper, 1972). Furthermore, it was found that 75% of the participants who anticipated spontaneous amnesia following hypnosis experienced memory loss. Meanwhile, of the participants who did not anticipate amnesia, none reported experiencing any memory loss.

Additional evidence for expectancy theory comes from research indicating that expectancy is one of only a few select variables that has been shown to consistently correlate with hypnotizability (Kirsch & Council, 1992), which has traditionally been thought of as a stable trait (Barry, Mackinnon, & Murray, 1931). However, more convincing evidence comes from studies indicating that changing participants' expectancies significantly impacts the way they respond to hypnotic suggestion (Wilson, 1967; Vickery & Kirsch, 1985, cited from Kirsch, 1985; Kirsch, Council, & Mobayed,

1987; Wickless & Kirsch, 1989). For example, during one study (Wickless & Kirsch, 1989), 60 undergraduate students who had no prior experience with hypnosis were assigned to either a control group, a verbal expectancy manipulation group, and experiential expectancy manipulation group, or a combined manipulation group. Participants assigned to the control condition received no information about their own ability to be hypnotized prior to being administered Form C of the Stanford Hypnotic Susceptibility Scale (SHSS:C; Weitzenhoffer & Hilgard, 1962). Participants assigned to the verbal manipulation condition were asked to complete three bogus personality tests before they were informed that the tests identified them as possessing hypnotic talent. Participants in the experiential manipulation condition were administered six deception items before taking the actual SHSS:C. During the administration of these items, participants were tricked into believing they were experiencing visual and auditory hallucinations as a result of undergoing a hypnotic induction. For example, during one of the items, a hidden red light was turned on in the room after participants received a suggestion for seeing red. Finally, participants in the combined manipulation condition were administered both the verbal and experiential manipulations.

Results indicated that 73% of participants assigned to the combined manipulation condition received scores of 9 or higher on the SHSS:C, which is thought to be indicative of high hypnotizability (Wickless & Kirsch, 1989). Additionally, 53% of participants assigned to the experiential manipulation condition received scores of 9 or higher. Only one control participant and two participants in the verbal manipulation condition received high scores on the SHSS:C. Furthermore, none of the participants in the combined manipulation condition received a score below 5 on the SHSS:C, which would be

indicative of low hypnotizability. The percentage of participants receiving low scores from the control, verbal manipulation, and experiential manipulation conditions was 27%, 20% and 13% respectively (Wickless & Kirsch, 1989). This study provides strong support for the argument that hypnotic response is not stable within the individual, but is highly dependent upon expectancies.

Finally, one early study found that when expectancies were compared to previous hypnotizability scores during a regression analysis, expectancies accounted for 46% of the variance in hypnotic response. Meanwhile, only 10% of the variance was accounted for by test-retest correlations (Council & Kirsch, 1984; cited from Kirsch, 1985). Kirsch (1999) has theorized that the fact that expectancies did not account for 100% of the variance may be due to measurement error or to some unknown talent or personality characteristic.

Mediation Research within the Field of Hypnosis

Kirsch is not the only researcher to examine the possibility that the beneficial effects of hypnosis might be accounted for solely by a placebo effect. In fact, the first and still considered to be seminal study in the area was conducted more than 40 years ago by McGlashen, Evans and Orne (1969). During their study, participants were asked to complete three ischemic pain trials. The first trial served as a baseline assessment, while the following two trials were used to compare participants' pain tolerance after having either undergone a hypnotic induction or having received a placebo pill.

The authors theorized that if the beneficial effects of hypnosis were attributable solely to the placebo effect, then participants should respond similarly to a hypnotic induction and a placebo pill, as long as expectancies associated with these two forms of

treatment were positive (McGlashen et al., 1969). On the other hand, if expectancies were held equivalent across groups, and highly hypnotizable participants responded more favorably to the hypnosis intervention than did less hypnotizable individuals, and also responded more favorably to the hypnotic induction than the placebo pill, then results would be consistent with a theory suggesting that a unique mechanism of action causes hypnosis to produce greater improvements than can be explained by placebo effects alone.

In order to test this theory, 24 male college students, who had previously served as participants in studies involving hypnosis, were asked to participate in an additional study based on their previously collected hypnotizability scores (McGlashen et al., 1969). Twelve participants received scores on the Harvard Group Scale of Hypnotic Susceptibility: Form A (HGSHS:A; Shor, & Orne, 1962) and the Stanford Hypnotic Susceptibility Scale: Form C (Weitzenhoffer & Hilgard, 1962) that identified them as being in the top five percentile on the trait of hypnotizability. These participants were referred to as the highly hypnotizable group. The additional 12 participants received scores which fell in the bottom five percentile, and were referred to as the insusceptible group (McGlashen et al., 1969).

Due to the fact that half of the participants had successfully been hypnotized in the past while the other half had not, efforts were taken to match group expectancies related to the utility of a hypnosis intervention for pain management. For example, all participants underwent a physical evaluation, after which they were told that they had been identified as highly desirable participants for the study (McGlashen et al., 1969). Participants falling in the insusceptible group were also subjected to an expectancy

manipulation procedure originally developed by London and Fuhrer (1961). During the procedure, participants received a mild shock to their right arm that was just above their waking threshold for pain. An uncomfortable second shock was then delivered, and participants were told that this was to be the standard level of shock used during the procedure. The second shock was followed by a brief hypnotic induction, during which participants received suggestions for deep relaxation.

Following induction, it was suggested to participants that they would receive a moderate shock that would be equivalent to the one they had experienced immediately prior to receiving hypnosis (McGlashen et al., 1969). In truth, the 12 participants received a mild shock with an intensity midway between waking threshold and the level that they had experienced shortly before induction. Questioning following this manipulation procedure indicated that all but one of the insusceptible participants believed that they had successfully experienced hypnotic analgesia (McGlashen et al., 1969). McGlashen et al. (1969) viewed this as confirmation that their manipulation had successfully improved participants' response expectancies.

Highly hypnotizable participants did not undergo the manipulation (McGlashen et al., 1969). Instead, these participants were screened to ensure that hypnosis would effectively diminish pain intensity during electric shock. Following a hypnotic induction with suggestion for glove analgesia, all highly hypnotizable participants reported feeling no pain after they had been administered a shock with an intensity considerably above the participants' normal waking threshold. McGlashen et al. (1969) assumed that this positive experience with a hypnotic intervention for pain would ensure that expectancies related to the hypnosis condition of the experiment would also be high.

After taking steps to standardize expectancies, participants completed the ischemic pain task. During the task, an inflatable tourniquet was placed over the upper portion of each participant's dominant arm and inflated to 200 mm Hg (McGlashen et al., 1969). A rubber bulb, which was connected to a six liter flask of water, was placed in the participant's dominant hand, and the participant was asked to squeeze the bulb in time with an electric metronome that sounded at 40 beats per minute. Participants were asked to inform the experimenter when they first started to feel pain, and to continue squeezing the bulb as long as possible. After completing the task, each participant was asked to rate their pain on a 10-point scale.

The hypnotic analgesia session was conducted approximately 48 hours after the participant's baseline assessment (McGlashen et al., 1969). Hypnosis sessions involved a 15 minute induction, followed by seven minutes of suggestions for dominant arm analgesia. During hypnosis, all participants were told that they would be able to continue to squeeze the rubber bulb to the point of exhaustion without pain. The ischemic pain task used during baseline assessment was then repeated.

Participants were scheduled for their final ischemic pain trial approximately 48 hours after completing the hypnosis trial. During this placebo trial, all participants were asked to take an experimental pain relieving pill that was enclosed within a Darvon capsule. Participants were told that the pill would be more effective than the hypnosis intervention, and that the trial was being conducted to evaluate the relative effectiveness of the hypnotic intervention compared to an experimental drug (McGlashen et al., 1969). The final ischemic trial commenced 35 minutes after participants agreed to take the experimental pill.

Results indicated that highly hypnotizable participants had a significantly higher baseline pain threshold than did insusceptible participants (McGlashen et al., 1969). Although the authors suggested that this finding might be attributable to true between group differences in pain threshold, it is also possible that highly hypnotizable participants displayed greater initial pain tolerance as a result of positive associations they had made with the lab during previous experiments. Results also indicated that participants belonging to both groups were able to squeeze the bulb longer during the hypnosis and placebo pill trials than they were during baseline. They were also able to displace more water from the 6-liter flask during the hypnosis and placebo pill conditions (McGlashen et al., 1969). More importantly, however, were results indicating that pain threshold and endurance scores did not differ from the hypnosis to the placebo pill conditions for participants scoring low in hypnotizability. On the other hand, highly hypnotizable participants were able to pump water longer before reaching their initial pain threshold and before ending the trial during the hypnosis condition than during the placebo condition. It also took them significantly longer to reach threshold and exhaustion during the hypnosis condition when compared to insusceptible participants. Interestingly, final pain ratings did not significantly differ from trial to trial, or between groups. However, this is not unexpected considering the increase in the total duration during which participants were able to pump water during the hypnosis and placebo pill conditions.

McGlashen et al. (1969) suggested that their findings indicate that favorable responses to hypnotic analgesia involve both a placebo component and a unique hypnotic component. The amount of improvement in pain tolerance attributable to placebo can be

accounted for by the level of improvement insusceptible participants experienced during the hypnosis trial. This assertion is supported by the fact that participants scoring low in hypnotizability reported similar levels of pain tolerance during the hypnosis and placebo pill conditions. Meanwhile, the amount of improvement uniquely attributable to hypnosis could be accounted for by the level of pain tolerance displayed by highly hypnotizable participants during the hypnosis trial relative to the level of pain tolerance displayed during the placebo pill trial. Furthermore, while the authors acknowledged that their study was unable to specify the mechanism of action leading to the unique benefits of hypnosis (McGlashen et al., 1969), they suggested that the most likely explanation involved changes in cognitive perceptions related to pain.

Stam and Spanos (1980, 1987) have criticized McGlashen et al.'s (1969) study and their interpretation of the results of that study on three major grounds. First, Stam and Spanos (1980) argue that even though McGlashen et al. (1969) attempted to standardize expectancies related to the utility of hypnotic analgesia, the fact that all participants involved in the study had prior experience with hypnosis suggests that participants may have already decided whether they were "good hypnotic subjects" (p. 753) before undergoing the ischemic pain trials. In other words, expectancies may not have been equivalent. Secondly, Stam and Spanos (1980, 1987) suggest that if expectancies were not congruent, then the fact that highly hypnotizable participants reported greater pain tolerance following hypnotic analgesia than after ingesting a placebo pill does not imply that highly hypnotizable individuals benefit from an automatic and nonvolitional alteration in the way they perceive pain following a hypnotic induction. Instead, Stam and Spanos (1980, 1987) suggest that these participants may have engaged in active

coping skills such as redefining painful sensations and deliberately focusing their attention elsewhere. Meanwhile, individuals scoring low in hypnotizability may have engaged in catastrophizing behaviors, such as worrying about, or exaggerating their pain levels. Participants are believed to engage in such behaviors as a means of preserving their investment in their respective identities as either good or bad hypnotic subjects. Finally, Stam and Spanos (1987) have criticized the ischemic pain procedure used by McGlashen et al. (1969). They argue that using the amount of water displaced during a trial and the total time spent pumping water as measures of pain tolerance may be misleading, because even though participants were instructed to pump in time with a metronome, highly hypnotizable participants may have deliberately pumped water slower and with less effort during the hypnosis trial in order to increase the total duration that they were able to pump, and thus act in congruence with their role as good hypnotic subjects.

In order to test these criticisms, Stam and Spanos (1987) and Spanos, Perlini, and Robertson (1989) conducted a series of studies. During the first study (Stam & Spanos, 1987), 32 undergraduate students whose scores on the Carleton University Responsiveness to Suggestion Scale (CURSS:*O*; Spanos, Radtke, Hodgins, Stam, & Bertrand, 1983) indicated that they were either ranked high (n= 16) or low (n =16) in hypnotizability were asked to undergo two ischemic pain trials. Unlike participants in McGlashen et al.'s (1969) study, these participants had no prior experience with hypnosis before enrolling in the study, but were instead screened prior to their first ischemic pain trial to ensure that they either ranked high or low in hypnotizability.

Participants were informed that the first trial would serve as a baseline assessment and that they would receive hypnosis prior to the second trial. The apparatus and procedures used during the baseline trial were identical to those used during the McGlashen et al. (1969) study. Unlike the McGlashen et al. (1969) study, deception was not used to enhance the expectancies of participants scoring low in hypnotizability. Instead, all participants were told that they were excellent subjects following the baseline trial. Ten minutes after the baseline trial, participants underwent a hypnotic induction. Suggestions were offered for numbness, and participants were told that the second ischemic trial would be easy and painless and that they would not become tired or fatigued. The second trial commenced immediately following induction.

Results indicated that participants were able to pump water longer and in greater amounts after receiving hypnosis. Despite this increased production, results were also consistent with Stam and Spanos' (1980, 1987) hypothesis that participants decreased their work rate following hypnotic induction, as the amount of water pumped per second was lower during the second trial than during the first. However, Stam and Spanos' (1980, 1987) theory that highly hypnotizable participants were deliberately expending less effort during hypnosis in order to increase their overall productivity (and thus preserve their identity as good hypnosis participants) was not supported, as a significant difference in work rate was not found between high and low hypnotizable participants. Stam and Spanos (1987) suggested that they may have failed to replicate the between group differences found by McGlashen et al. (1969) because participants' identities as either good or bad hypnotic subjects may not have been solidified prior to the hypnotic

trial. Therefore, it is possible that all participants may have conserved energy during the hypnosis trial in order to comply with perceived experimenter demands.

In order to overcome the work rate limitation associated with the traditional water displacement ischemic pain trial, Stam and Spanos (1987) conducted a second experiment during which the Submaximum Effort Tourniquet Technique (SETT; Smith, Egbert, Markowitz, Mosteller, & Beecher, 1966) was used to induce ischemic pain. During SETT, a tourniquet is placed around the participant's arm, and he or she is asked to squeeze a hand exerciser 20 times with 50% effort, and to hold each squeeze for two seconds. Maximum effort is measured before the procedure using a hand dynamometer. Each squeeze is followed by a 2-second rest period. If participants fail to reach their pain tolerance threshold while squeezing the hand exerciser, they are asked to hold their arm at rest with the tourniquet in place until the time taken to reach threshold can be recorded. Stam and Spanos (1987) theorized that because the amount of displaced water was no longer being used as a measure of pain tolerance, and because the procedure was designed to help standardized work rate, participants would be less likely to alter their activity during the hypnosis trial in order to be seen as good hypnotic subjects.

The second experiment also included a placebo trial. During the placebo trial, participants were asked to insert their arm into a small opening in an instrument panel for 10-minutes prior to undergoing the SETT task. Participants were told that a cold laser that had proven effective at reducing arthritic pain was being delivered to their arm during the 10 minutes. The experimenters believed that the complexity of this placebo condition would help maximize expectancies for analgesia (Stam & Spanos, 1987).

Sixty college students served as participants during this second study (Stam & Spanos, 1987). Participants were screened prior to baseline to ensure that an equal number of highly hypnotizable and low hypnotizable participants were included in the study. Equal numbers of male and female participants were also assigned to each group.

Following the baseline pain trial, the order in which participants received either hypnosis or the placebo cold laser was counterbalanced. Twenty participants received hypnosis prior to their second pain trial and the placebo cold laser prior to their third trial. This order was reversed for 20 additional participants. Finally, the remaining 20 participants served as a control group and did not receive any form of treatment prior to their second and third trials. Although all participants knew they would be asked to undergo three SETT trials, they were not informed as to whether they would receive treatment prior to each trial, or what the nature of that treatment would be. This was done in order to decrease the likelihood of carryover effects (Stam & Spanos, 1987).

Results indicated that highly hypnotizable participants who underwent the placebo trial prior to the hypnosis trial reported greater pain tolerance during the hypnosis trial (Stam & Spanos, 1987). This increase in pain tolerance during hypnosis was not reported by participants scoring low in hypnotizability. Additionally, highly hypnotizable participants who underwent the hypnosis trial prior to the placebo trial did not report a significant difference in pain tolerance from one trial to the next. Finally, results indicated that participants scoring both high and low in hypnotizability reported experiencing less pain across the duration of the hypnosis trial than they experienced during the placebo or control trials, but only when they underwent the placebo trial prior to the hypnosis trial.

Stam and Spanos (1987) suggest that these results may indicate that the hypnotic induction encourages highly hypnotizable participants to engage in active coping skills to help manage their pain, and that once participants begin using these strategies, they will continue to use them regardless of whether they receive a hypnotic induction. This would explain why highly hypnotizable participants reported greater pain tolerance during the hypnosis trial than during the placebo trial only when placebo was administered first. Participants who received hypnosis prior to placebo would have begun implementing active coping strategies during the hypnosis condition and would have continued to use these strategies during the placebo condition. However, Stam and Spanos (1987) admit that this interpretation cannot explain why highly hypnotizable participants who received hypnosis prior to placebo failed to report a significant increase in pain tolerance from baseline. It also does not explain why participants scoring low in hypnotizability would report experiencing less pain over the duration of the hypnosis procedure than they did during either the placebo or baseline pain trials. Therefore, Stam and Spanos (1987) suggest that although the results of their second study do not definitively identify the mechanism of action behind the beneficial effects of hypnosis, they do at least suggest that the degree of a participant's response likely depends on a variety of circumstances, and that a casual acceptance of the conclusions drawn by McGlashen et al. (1969) is not warranted.

A third study (Spanos et al., 1989) was conducted in order to determine if participants scoring high and low in hypnotizability would report different expectancies for pain following a hypnotic induction or placebo intervention, as well as if these expectancies would be significantly related to actual pain tolerance. Forty-eight male and

48 female undergraduate students whose scores on the CURSS: *O* identified them as either high or low in hypnotizability served as participants for this study. Similar to Stam and Spanos' (1987) second study, participants were assigned to one of three groups.

The first group, Group B/H/P, underwent a baseline finger pressure pain trial, followed by a hypnosis trial, and then a placebo trial. During the hypnosis trial, participants received a five minute hypnotic induction, followed by suggestions for numbness and analgesia. A strain gauge, which delivered constant pressure, was then placed around the participant's index or middle finger. Participants were asked to rate their pain on a scale ranging from 0-20 after the first 30 and 60 seconds of the trial. The total amount of time participants were able to withstand pain served as a measure of pain tolerance. During the placebo trial, a sham topical anesthetic was placed on the participant's hand, and participants were asked to wait 45 seconds for the anesthetic to take effect before undergoing the pain trial. Participants in the second group, Group B/P/H, underwent the placebo trial before the hypnosis trial. Finally, the remaining participants did not receive any form of treatment and served as a control group. Expectancies related to the effectiveness of the placebo anesthetic and the hypnotic intervention were assessed immediately after participants had received either hypnosis or the placebo, but before they underwent the pain trial.

Results indicated that no main effects or interactions involving the order in which participants received either hypnosis or placebo reached significance (Spanos et al., 1989). Therefore, data from groups B/P/H and B/H/P was combined and compared to the results of the 32 control participants. The data indicated that pain levels did not significantly differ across the three trials for participants assigned to the control

condition. Additionally, pain ratings were consistent across the baseline, placebo, and hypnosis trails for participants scoring low in hypnotizability. However, highly hypnotizable participants reported experiencing less pain during the hypnosis trial than during both the baseline and placebo trials. Results also indicated that participants scoring both high and low in hypnotizability expected the hypnosis intervention and the placebo anesthetic to be equally effective. However, participants scoring high in hypnotizability expected both interventions to be significantly more effective than did participants scoring low in hypnotizability. Finally, expectancies were significantly correlated with a reduction in pain levels from baseline during the hypnosis trials, but not during the placebo trials.

Spanos et al. (1989) suggest that these results indicate that although highly hypnotizable participants did expect the hypnosis intervention to be more effective than did participants scoring low in hypnotizability, results are still inconsistent with Kirsch's (1985) theory that the beneficial effects of hypnosis are completely accounted for by expectancies. If this were true, they argue, highly hypnotizable participants should have also experienced significant pain reduction after having used the placebo anesthetic, as expectancies were equivalently high.

In order to determine whether or not highly hypnotizable participants actually do engage in a larger number of active coping skills than do participants scoring low in hypnotizability, a final experiment was conducted (Spanos et al., 1989). Forty-four male and 46 female undergraduate students with scores on the CURSS:*O* indicating that they either ranked high or low in hypnotizability served as participants for the study. All participants were asked to undergo three pain pressure trials. Unlike previous

experiments, pain tolerance was not assessed. Instead participants were asked to rate their pain on a 21-point scale after 30 and 60 seconds of pressure, with each trial ending after 60 seconds.

Participants were once again assigned to one of three groups. Similar to Study 3, the first group of participants underwent a baseline pain trial, followed by a placebo trial and finally a hypnosis trial. This group was referred to as Group B/P/H (Spanos et al., 1989). Similar to Study 3, a sham topical anesthetic was administered to participants prior to the placebo trial. The hypnosis trial differed slightly from previous studies however, as following a 10 minute hypnotic induction, participants were asked to do everything they could to reduce their pain and make their hand feel numb and insensitive during the third pain trial.

Participants assigned to a second group also underwent baseline and placebo pain trials. Prior to their third trial, participants received the same instructions to engage in active coping skills as did participants in the first group. However, these participants received instructions without having undergone a hypnotic induction. This group was referred to as Group B/P/C, with the C standing for cognitive suggestion.

The final group of participants underwent three pain trials without receiving any form of treatment. This group was referred to as Group B/B/B, with the B standing for baseline.

Immediately after receiving treatment, participants assigned to groups B/P/H and B/P/C were asked to rate their expectancies for pain during the second and third trials. Following the second and third trials, they were asked to rate the extent to which they

engaged in either coping or catastrophizing using two 5-point scales ranging from 1 (not at all) to 5 (all the time).

Results indicated that participants assigned to Group B/B/B reported consistent pain levels across the three trials regardless of hypnotizability (Spanos et al., 1989). These participants also expected the three trials to be equally painful. Conversely, the Hypnotizability X Trials interaction did reach significance for participants in group B/P/H. Although participants scoring low in hypnotizability reported that the three trials were equally painful, highly hypnotizable participants reported experiencing significantly less pain during the placebo trial than they had during baseline. They also rated their pain significantly lower during the hypnosis trial than they had during the placebo trial. Pretrial expectancy ratings indicated that these participants anticipated that they would experience less pain during the placebo and hypnosis trials than they would during the baseline trial. However, pain expectancies were equivalent for the placebo and hypnosis trials. Finally, the Hypnotizability X Trials interaction was not significant for participants assigned to group B/P/C. However, the main effect of trials was significant, as both high and low hypnotizable participants reported experiencing less pain during the coping trial than during either the baseline or placebo trials. Expectancy ratings indicated that these participants anticipated less pain during the third trial than during either of the previous two trials. However, they also expected the placebo trial to be less painful than the baseline trial.

In order to assess the extent to which cognitive coping strategies influenced pain ratings, two stepwise hierarchical regression analyses were conducted (Spanos et al., 1989). During the first analysis, expectancy, coping, and catastrophizing ratings were

used to predict differences in 60 second pain ratings between the baseline and placebo pain trials for participants in groups B/P/H and B/P/C. During the second analysis, these same three variables were used to predict differences between 60 second-pain ratings during the baseline trial and during trial 3, which involved instructions to engage in active coping skills either within or outside of the context of hypnosis. Results indicated that catastrophizing ratings were the only significant predictor of pain differences during the baseline and placebo trials. Additionally, expectancies, coping, and catastrophizing ratings all proved to be significant predictors of pain reduction from baseline to the third pain trial. Further results indicated that among participants benefitting from treatment, both individuals rating high and low in hypnotizability reported engaging in more active coping skills than did participants who reported equivalent pain levels across trials.

Spanos et al. (1989) suggest that these results are again inconsistent with Kirsch's (1985) theory that expectancies fully account for the beneficial effects of hypnosis. Instead, they argue that these results support their own socio-cognitive perspective, which suggests that individuals ranking high in hypnotizability interpret hypnotic suggestions differently than do people ranking low in hypnotizability. They suggest that participants who rank high in hypnotizability interpret hypnotic suggestions as requests from the therapist that they engage in active coping skills. Meanwhile, participants scoring low in hypnotizability are believed to be more likely to assume that the beneficial effects of hypnosis will occur automatically, as do placebo effects, and are therefore prone to inhibit any activity geared towards symptom management.

Although these early studies seem to provide strong evidence against Kirsch's (1985) theory that the beneficial effects of hypnosis are fully accounted for by

expectancies, Baker and Kirsch (1993) have cited two major limitations in each of these early studies. In all of these early studies, participation was limited to individuals scoring in the extremes of hypnotizability. This can be problematic if hypnotizability alters expectancy, a consideration that was put forth above when discussing the results of the McGlashen et al. (1969) study. Additionally, Baker and Kirsch (1993) note that the placebo conditions used in previous studies did not match the active treatment. Citing previous research indicating that different placebo conditions (placebo morphine vs. placebo aspirin; Evans, 1974) elicit different responses, they argue that hypnosis, which alters perceptions of pain by increasing participants' openness to suggestion, should not be compared to the placebo conditions used in earlier studies, which sought to directly decrease participant expectancies for pain.

In order to provide support for their arguments, Baker and Kirsch (1993) conducted an experiment in which 69 undergraduate students with varying degrees of hypnotizability were asked to complete three cold-pressor trials. Prior to undergoing these trials, participants first had their hypnotizability assessed with the Harvard Group Scale of Hypnotic Susceptibility: Form A (HGSHS:A; Shor & Orne, 1962). Participants were then randomized to one of five groups and an effort was made to equate each group on the basis of hypnotizability.

All participants completed an initial 60-second cold-pressor trial that served as a baseline assessment. Prior to the trial, participants were asked to rate their expected maximum level of pain on a scale ranging from 0-10. Participants used this same scale to rate their pain during each 15-sec interval of the cold-pressor trial (Baker & Kirsch, 1993).

Following baseline assessment, participants received either hypnosis or a placebo inhalant. The order in which participants received either hypnosis or placebo was counterbalanced so that order effects could be investigated (Baker & Kirsch, 1993). Those who received hypnosis prior to placebo underwent a hypnotic induction with suggestion given for numbness and pain tolerance prior to their second cold-pressor trial. As a result of the brief time lapse between the first two trials, the second trial was administered to whichever arm the participant had not used during baseline assessment.

Participants completed the final cold-pressor trial four to seven days after their initial experimental session. For those who had received hypnosis prior to the second trial, the third trial involved the administration of a placebo inhalant. Participants were either told that the inhalant had a powerful effect on suggestibility, or that it altered pain centers in the brain without affecting participants' ability to experience sensations of hot or cold. Participant receiving the suggestibility placebo also received suggestions for pain reduction that were identical to the suggestions given during hypnosis. Meanwhile, participants who received the analgesic placebo also underwent an expectancy manipulation procedure. The third trial commenced immediately following placebo delivery.

Finally, a fifth group of participants did not receive hypnosis or a placebo prior to their second and third cold-pressor trial (Baker & Kirsch, 1993). These participants served as controls.

Results indicated that participants assigned to the treatment conditions both expected and experienced less pain following hypnosis and placebo than did participants who were assigned to the control condition. They also expected and experienced less pain

during both the hypnosis and placebo trials than they did during baseline (Baker & Kirsch, 1993). Furthermore, results indicated that the suggestibility placebo and the hypnotic induction were equally effective at reducing pain. Meanwhile, hypnosis was more effective at reducing pain than was the analgesic placebo, but only when participants received the placebo prior to hypnosis.

Baker and Kirsch (1993) suggests that these results are consistent with their theory that differences in pain tolerance seen between patients receiving either an analgesic placebo or hypnosis are likely more attributable to changes in expectancies caused by order effects than they are to hypnotizability. Their position is supported by the fact that the partial correlation between expectancies and pain reduction remained significant when controlling for hypnotizability. Inversely, the correlation between hypnotizability and pain reduction was no longer significant after controlling for expectancies.

Although this study provides support for the role that expectancies play as a mediator in hypnotic interventions, it does not necessarily rule out the possibility that hypnotizability also influences participants' responses to hypnotic interventions. For example, because an effort was made to equate the groups in regards to hypnotizability, it is possible that the effects of hypnotizability in highly hypnotizable participants were masked by its lack of an effect in participants scoring low in hypnotizability. Evidence from more recent studies continues to support McGlashen et al.'s (1969) claim that response to hypnotic treatment differs based on hypnotizability. For example, in a study involving 20 individuals ranking either high or low in hypnotizability (Freeman, Barabasz, Barabasz, & Warner, 2000) result indicated that highly hypnotizable

participants reported a significantly larger reduction in pain during a cold pressor trial than did participants scoring low in hypnotizability. Furthermore, results from an additional study involving hypnosis for the treatment of hot flashes indicated that participants scoring higher in hypnotizability benefitted more so from the intervention than did others (Elkins et al., 2011). Therefore, the potential role that hypnotizability plays as a moderator should not be over looked just yet.

More recent attempts to uncover the extent to which cognitive expectancies account for the analgesic effects of hypnosis have been undertaken by Guy Montgomery and colleagues (Montgomery, Weltz, Seltz, & Bovbjerg, 2002; Montgomery & Bovbjerg, 2004; Montgomery et al., 2010). Unlike the previously mentioned studies, which did not rely upon any predetermined empirical criteria for establishing mediation, Montgomery and colleagues utilized the causal steps approach which was popularized by Baron and Kenny (1986). A statistical model used to help illustrate the causal steps approach is shown in Figure 1.

According to Baron and Kenny (1986), three criteria must be met before a variable can be considered a mediator. First of all, variation in an independent variable (IV) must account for variation in the presumed mediator. This is shown as path *a* in the model. Secondly, variation in the mediator must account for variation in a specified dependent variable (DV) (path *b*). Finally, variation in the potential mediator must account for variance in the DV that was originally believed to be accounted for by the IV.

This final criterion is assumed if the independent variable is shown to significantly impact the dependent variable when the mediator is free to vary (path *c*), but not when the mediator is controlled (path *c′*). Furthermore, when variation in the

mediator accounts for all of the variance in the DV that had originally been accounted for by the IV ($c' = 0$), then full mediation is said to have occurred. When the mediator accounts for only a portion of the original variance accounted for by the independent variable (c is larger than c', but c' does not equal 0), the relationship between the IV and DV is said to be partially mediated (Baron & Kenny, 1986).

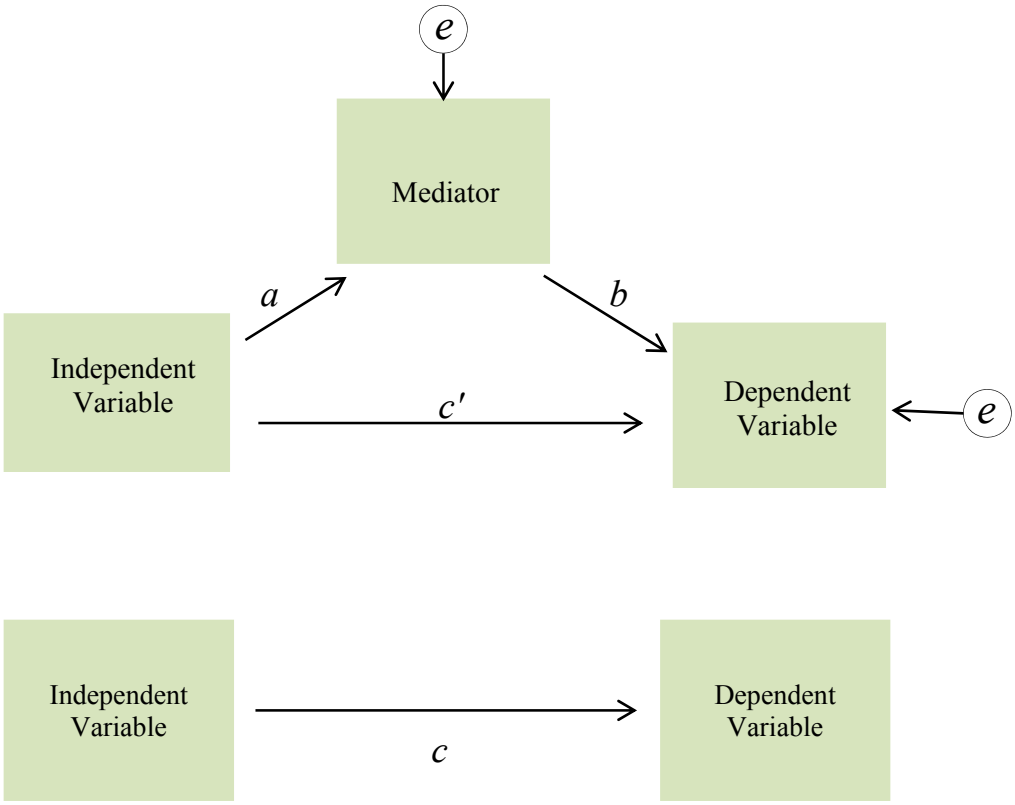


Figure 1. *Causal steps approach model*

In Montgomery and colleagues' first study on mediation during a hypnotic intervention for pain (Montgomery et al., 2002), 20 women who were to undergo an excisional breast biopsy were randomized to a hypnosis intervention or a standard care control group. Women randomized to the hypnosis intervention received a 10 minute

hypnotic induction prior to surgery. Suggestions were given for control, relaxation, and decreased pain and distress. Expectancies for post-surgery pain and distress were assessed before and after the hypnosis intervention using 10-cm visual analog scales (VASs). Women assigned to the control group also had their expectations for post-surgical pain and distress assessed before and after receiving standard care.

Results indicated that although between group differences in expectancies for pain and distress were not seen prior to the intervention, women who received hypnosis anticipated significantly less post-surgical pain than did women assigned to the control group after receiving care (Montgomery et al., 2002). Additionally, women who had received hypnosis reported significantly less post-surgical pain than did women who received standard care. Finally, regression analysis indicated that the total portion of variance in postsurgical pain originally accounted for by group assignment decreased significantly when post-intervention expectancies for pain were included as a predictor variable in the regression model (Montgomery et al., 2002). Therefore, results were congruent with all three of Baron and Kenny's (1986) criteria for establishing mediation. A Sobel's test also suggested that post-intervention pain expectancies were a significant mediator of the relationship between group assignment and pain. Results supported partial mediation, as group assignment continued to be a significant predictor of post-surgical pain even after expectancies were added to the regression model (Montgomery et al., 2002).

Assessment of the potential of postsurgical distress expectancies to act as a mediator of the relationship between post-surgical distress and group assignment produced similar results. However, in this case, it was found that post-intervention

expectancies for distress completely mediated the relationship between group assignment and postsurgical distress (Montgomery et al., 2002). These results are interesting because they suggest that while expectancies (and therefore placebo effects) may explain why hypnosis is effective at decreasing distress, expectancies do not fully account for the beneficial effects of hypnosis for the treatment of pain. This raises questions regarding whether the mechanism of action behind the beneficial effects of hypnosis is universal across conditions and symptoms.

A follow-up study consisting of a larger sample of 200 women scheduled to undergo a breast-conserving surgery (either lumpectomy or excisional breast biopsy) was conducted by Montgomery et al. (2010). All participants were randomized to a hypnosis intervention or a structured attention control group. In addition to assessing pain expectancies as a potential mediator of the relationship between group assignment and postsurgical pain, post-intervention expectancies for postsurgical fatigue and nausea were also assessed, in order to determine whether hypnosis appeared to have the same mechanism of action across symptoms. Furthermore, unlike their earlier study (Montgomery et al., 2002), expectancies related to postsurgical distress were not assessed. Instead, actual patient distress was assessed as a potential mediator using an aggregated score taken from the Tension/Anxiety subscale of the Short Version of the Profile of Mood States (SV-POMS; DiLorenzo, Bovbjerg, Montgomery, Jacobson, & Valdimarsdottir, 1999) and a 100-mm VAS item. Distress was assessed as a potential mediator, due to the fact that previous studies have indicated that hypnosis reliably reduces distress related to medical procedures (Lang et al., 2006; Schnur, Kafer, Marcus, & Montgomery, 2008), as well as additional research indicating that distress levels are

significantly related to postsurgical levels of pain, nausea and fatigue (Croog, Baume, & Nalbandian, 1995; Kain, Servarino, Aleander, Pincus, & Mayes, 2000; Thomas, Robinson, Champion, McKell, & Pell, 1998).

Data analysis was conducted using structural equation modeling (SEM). Results from the first model indicated that the relationship between group assignment and postsurgical pain was partially mediated by pain expectancies (Montgomery et al., 2010). Distress was not shown to be a significant mediator in this model. Inversely, the second SEM model indicated that the relationship between group assignment and postsurgical nausea was partially mediated by distress, but not by post-intervention expectancies for nausea. Finally, a third SEM model suggested that the relationship between group assignment and postsurgical fatigue was partially mediated by both post-intervention expectancies for fatigue and by post-intervention distress. In all three models, only around 33% of the variance in patient outcomes was accounted for by group assignment, distress, and expectancies. The remaining variance is likely accounted for by a variety of biological, social, and psychological factors including hypnotizability (Milling, Coursen, Shores, & Waszkiewicz, 2010), patient/physician rapport (Young, 1927), and motivation (Wain, Amen, & Jabbari) among others.

Collectively, these results do not strongly support Kirsch's (1994) theory that the beneficial effects of hypnosis can be accounted for solely by placebo effects resulting from positive response expectancies. Instead, results are more consistent with McGlashen et al.'s (1969) suggestion that placebo effects are only one of the underlying mechanisms responsible for improvement following a hypnotic intervention. Furthermore, the results

obtained by Montgomery and colleagues (Montgomery et al., 2002, 2010) suggest that these mechanisms may differ depending on the disorder or the symptoms being treated.

One additional study has also sought to determine whether the beneficial effects of hypnosis can be accounted for by a placebo effect (Milling, Reardon, & Carosella, 2006). During this study, 188 undergraduate psychology students first had their hypnotizability assessed using the Comey and Kirsch (1999) version of the Carleton University Responsiveness to Suggestion Scale (CURSS; Spanos, Radtke, Hodgins, Stam, & Bertrand, 1983). Later on, participants were asked to take part in a seemingly unrelated study that would compare multiple treatments for reducing pain.

During the second phase of the study, participants were randomly assigned to one of six experimental groups (Milling et al., 2006). Two of these groups involved minimizing cognitions related to pain without the use of a hypnotic induction. Participants assigned to a distraction condition were asked to repeat monosyllable words that were presented with an audio recording. Another group of participants assigned to a cognitive behavioral condition received an audio tape with instructions that had been adapted from a Stress Inoculation Training (SIT) program originally developed by Turk, Meichenbaum, and Genest (1983). The audio recording contained an explanation of the gate-control theory of pain, led participants through a progressive muscle relaxation session along with guided imagery, and encouraged participants to use positive self-coping statements during the pain trial.

Two additional conditions were focused on changing expectancies within the context of a hypnotic intervention (Milling et al., 2006). Participants assigned to the hypnotic cognitive behavioral group received the same instructions as those given to

participants in the original cognitive behavior group. However, the audiotape given to these participants involved a hypnotic induction and the cadence of the instruction was altered to be in better alignment with traditional cadence for hypnotic suggestions. Meanwhile, participants assigned to a hypnotic analgesia intervention listened to a prerecorded message designed to dispel any misconceptions participants might have had about hypnosis. Afterwards, participants listened to a recorded hypnotic induction followed by suggestions for glove analgesia. Finally, participants in the remaining two groups were either assigned to a topical anesthetic placebo condition or to a no treatment control condition.

Expectancies were assessed both before and after participants were introduced to their respective intervention (Milling et al., 2006). Baseline pain measurements were collected immediately before participants were asked to record their cognitive expectancies for pain following treatment. Both expectancies for pain and actual pain ratings were recorded using 11-point scales ranging from 0 (no pain at all) to 10 (pain as intense as one can imagine). During the study, pain trials consisted of a 60-second delivery of finger pressure pain to the participants left index finger using a Forgione-Barber strain gauge pain stimulator (Forgione & Barber, 1971).

During analysis the researchers chose to cluster the four treatment groups involving distraction, cognitive behavioral therapy (CBT), CBT delivered within the context of hypnosis, and hypnotic analgesia into a single treatment group (Milling et al., 2006). Results from participants who either received the placebo topical analgesic or were assigned to the no treatment control condition were also combined to form a single control group cluster. Treatment cluster was then entered into two regression models to

assess the role of cognitive expectancies as a mediator of the relationship between treatment group and post-intervention pain ratings.

Results indicated that treatment cluster significantly predicted post intervention expectancies for pain, with participants who received treatment tending to expect less pain than participants who had been assigned to the control conditions (Milling et al., 2006). Results also indicated that while post-intervention expectancies were a significant predictor of post-treatment pain, treatment cluster remained a significant predictor in the regression model. Therefore, results only support partial mediation of treatment effects by response expectancies. Obviously, our ability to assess the extent to which the interventions involving hypnosis were mediated by response expectancies is severely limited by the researchers' decision to combine the data from the four treatment groups into a single cluster variable. However, these results do at least indicate that expectancies were likely to have played a role in reducing pain. Finally, it is also worth noting that results indicated that hypnotizability proved to be a significant moderator, with participants scoring higher in hypnotizability reporting greater pain relief than participants ranking low in hypnotizability, only when they received an intervention that involved hypnosis.

As was mentioned previously (Montgomery et al., 2010), the fact that these studies have produced such mixed results has led to considerable debate within the hypnosis community. Currently, we appear to be no closer to resolving the dispute over the extent to which symptom improvement can be attributed to changes in response expectancy than we were over 40 years ago when McGlashen, Evans, and Orne (1969) first began to empirically exam the issue.

One way to move the debate forward is to examine the role that expectancies play during hypnosis interventions aimed at improving symptoms other than pain. Hypnosis for the reduction of hot flashes may be one fruitful area of investigation. Unlike pain, which in the previous studies was voluntarily induced and could be alleviated either by ending the experiment or administering a proven analgesic, hot flashes occur involuntarily as part of the natural aging process. In fact, around 80% of women report experiencing hot flashes during midlife and approximately 20% report finding them nearly intolerable (Kronenberg, 1990). Although hot flashes cause significant distress in their own right, they also contribute to a myriad of related symptoms including sleep disturbance (Savard, Savard, Caplette-Gingras, Ivers, & Bastien, 2013), fatigue (Carpenter et al., 2004), decreased sex drive (Vigesaa et al., 2004), and impaired cognition (Sliwinski, Johnson, & Elkins, 2014). Furthermore, hot flashes can be very difficult to treat, as traditional treatment with hormone replacement therapy (HRT) is contraindicated for many women due to an increased risk for cardiovascular disease and cancer (Hein et al., 2013; Plonczynski & Plonczynski, 2007).

Numerous studies have shown hypnosis to be an effective treatment for the reduction of hot flashes. For example, in an early pilot study (Elkins, Marcus, Stearns, & Rajab, 2007), 16 female breast cancer survivors received four weekly 45-minute hypnosis sessions delivered by a trained hypnotherapist. During therapy, suggestions were given for coolness, comfort, and refreshment. Participants also received instruction in self-hypnosis and were encouraged to practice daily. Results indicated that hot flash frequency decreased by 59% over the course of the study.

In an additional pilot study (Elkins, Johnson, Fisher, Sliwinski, & Keith, 2013), 13 postmenopausal women who were experiencing a minimum of 50 hot flashes per week received five weekly sessions of self-hypnosis. During each session, participants listened to an audio recording of a hypnotic induction followed by 30 minutes of suggestions for relaxation, coolness, and guided imagery. During week three of treatment, participants also received instruction on how to practice self-hypnosis without the use of an audio recording and were asked to practice this technique daily. Results indicated that participants reported 72% fewer hot flashes on average after receiving treatment than they did during baseline assessment. Hot flash severity was also reduced significantly.

Results from large randomized trials have also provided evidence supporting the use of hypnotherapy for reducing hot flashes. During one such study (Elkins et al., 2008) 60 female breast cancer survivors who were experiencing a minimum of 14 hot flashes per week were randomly assigned to a five-week hypnosis intervention or a no treatment control group. Each hypnotic session lasted approximately 50 minutes and consisted of a hypnotic induction followed by suggestions for dissociation from hot flashes, coolness, relaxation, and positive future outcomes. Participants also received instruction in self-hypnosis and were encouraged to practice daily. Results indicated that participants receiving hypnosis reported an average of four fewer hot flashes per day at the end of treatment than they had reported at baseline assessment. They also experienced a 68% reduction in hot flash score (frequency X severity), compared to only a 9% reduction reported by participants who had been assigned to the control group.

Finally, during a recently conducted large clinical trial (Elkins et al., 2013), 187 postmenopausal women reporting a minimum of seven hot flashes per day were randomly assigned to a five-week hypnosis intervention or a five-week structured attention control group. Each hypnosis session lasted approximately 45 minutes and involved a hypnotic induction followed by suggestion for safe place imagery, relaxation, and coolness. Suggestions were individualized based on the preferences of the participant. Hypnosis participants also received instruction in self-hypnosis, and were encouraged to practice daily with or without the aid of an audio recording. Participants assigned to the control condition also met with a therapist for approximately 45 minutes each week. Control participants were able to discuss symptom severity and receive encouragement from the therapist. However, no suggestions for symptom improvement were offered. Control participants also received an audio recording that contained general information on hot flashes, and they were encouraged to listen to the recording at least once each day.

Results indicated that participants assigned to the hypnosis intervention reported a 64% reduction in hot flashes after five weeks of treatment and that hot flash frequency continued to decline by as much as 74% at a 12-week follow-up appointment (Elkins et al., 2013). Meanwhile, participants who had received structured attention reported only a 9% reduction in hot flash frequency after five weeks of treatment and that reduction only reached 17% at 12-week follow-up. These between group differences were highly significant.

Considering the large effect that hypnotherapy has on hot flash reduction, as well as the myriad of detriments that frequent hot flashes can have on the quality of life of

women, it seems well worth conducting further investigation into why hypnotherapy has proven to be such an effective treatment. The current study not only aims to uncover the role that response expectancy plays during a hypnosis intervention for hot flashes, but also seeks to add clarity to the debate over whether changes in expectancy should be viewed as the unique mechanism of action responsible for the beneficial effects of hypnotherapy in general, or if other factors such as hypnotizability and compliance with self-hypnosis practice also influence treatment outcome..

CHAPTER TWO

Materials and Methods

Objectives

Our study is the first to examine expectancy as a potential mediator of improvement during an intervention aimed at diminishing the frequency of hot flashes in postmenopausal women. This is important for several reasons. Firstly, the study is highly innovative. Although previous studies have produced results suggesting that expectancies may only partially mediate the effects of hypnosis interventions aimed at reducing pain, these results have been inconsistent and have also hinted that the underlying mechanisms of hypnosis may differ depending on the symptoms being treated (Lynn, Shindler, & Meyer, 2003). Additionally our study will be the first to incorporate response expectancy and hypnotizability ratings within the same statistical model, which will allow us to examine whether these two factors interact in some way to influence treatment outcome, as was originally suggested by McGlashen et al. (1969).

Furthermore, unlike previous studies, during which pain has been deliberately induced or has resulted from a medical procedure, women suffering from hot flashes cannot predict when symptoms will occur. Nor do they have much control over when they will experience symptom relief. Therefore, expectations for relief may play a different role for patients suffering from hot flashes than they do for a more manageable symptom, such as temporary or acute pain.

Finally, this study is the first to examine whether initial expectancies continue to impact patient response to hypnosis treatment, not just after one session, but over a five-week hypnosis intervention and at a 12-week follow-up appointment.

Primary Aims

Aim 1: Determine whether response expectancies related to hot flash reduction as a result of treatment change significantly when measured immediately before and immediately after the first treatment session.

Aim 2: Determine whether response expectancy mediates the relationship between group assignment and decline in the number of subjectively reported hot flashes after one treatment session.

Aim 3: Determine whether initial response expectancy mediates the relationship between group assignment and decline in the number of subjectively reported hot flashes after five weeks of treatment.

Aim 4: Determine whether initial response expectancy mediates the relationship between group assignment and decline in the number of subjectively reported hot flashes at a 12-week follow-up appointment.

Secondary Aims

Aim 5: Determine whether initial response expectancy mediates the relationship between group assignment and decline in the number of subjectively reported hot flashes after one treatment session regardless of participant hypnotizability.

Aim 6: Determine whether initial response expectancy mediates the relationship between group assignment and decline in the number of subjectively reported hot flashes after five weeks of treatment regardless of participant hypnotizability.

Aim 7: Determine whether initial response expectancy mediates the relationship between group assignment and decline in the number of subjectively reported hot flashes at a 12-week follow-up appointment regardless of participant hypnotizability.

Aim 8: Determine whether compliance with instructions for self-hypnosis is significantly related to treatment outcome.

Participants

The data analyzed during the current study was originally collected from individuals who had served as participants in a large clinical trial that was funded by an RO1 grant from the National Institute of Health (NIH). A description of this study, as well as results related to its primary outcomes is published elsewhere (Elkins et al., 2013). Eligibility criteria included being an English speaking woman of at least 18 years of age who had either not experienced a menstrual period over the past 12 months or had not experienced a menstrual period over the past six months in addition to (a) either having undergone a bilateral oophorectomy, or (b) having had a medically confirmed history of follicle stimulating hormone (FSH) levels in excess of 40 mIU/ml. Participants also needed to self-report experiencing at least seven hot flashes per day or 50 hot flashes in total during a weeklong baseline assessment. Exclusion criteria included failing to discontinue hormone replacement therapy as well as undergoing a Federal Food and Drug Administration (FDA) approved washout period prior to baseline assessment, utilizing any other form of treatment for hot flashes, including complementary and alternative

therapies, or having a history of psychosis, borderline personality disorder, or another serious psychopathological disorder, as such conditions are considered to be contraindicated for treatment with clinical hypnotherapy (Elkins et al., 2013).

A total of 538 women were screened for participation in the original study from December 2008 through April 2012 (Elkins et al., 2013). Of these women, 146 declined participation and an additional 205 did not meet eligibility criteria. Of the remaining 187 women, 94 were randomized to a five-week structured attention control group and 93 were randomized to a five-week hypnosis intervention. Six control participants and 9 hypnosis participants failed to report response expectancies related to hot flash frequency flowing their first treatment session. This left us with a total of 88 control participants and 84 hypnosis participants with data suitable for mediation and component process analysis. Demographic information for these two groups is shown in Table 1.

Measures

Hot flash symptoms diary. Participants were asked to complete the Hot Flash Symptoms Diary (Sloan et al., 2001) during baseline assessment, weeks 1 through 5 of treatment, and during the week-12 follow-up assessment. The diary allows patients to subjectively report both the frequency and severity of their hot flashes on a daily basis. A total hot flash score can be created by multiplying frequency by severity. Hot flash diaries are considered to be the gold standard for assessing both the frequency and severity of hot flashes (Carpenter et al., 2002).

Self-hypnosis practice diary. Participants assigned to the hypnosis condition were asked to record the total number of times they practiced self-hypnosis either with or without the aid of the audio recording during each day of the study and at 12-week follow-up.

Response expectancy visual analog scale. Participants completed a 100-mm response expectancy visual analog scale (VAS) both immediately preceding and immediately after having completed their first structured attention or hypnosis session. The scale asked participants, "How effective do you expect the intervention you will receive to be in reducing the frequency of your hot flashes?" The lower end of the scale was anchored by the phrase "Not at all effective", while the upper end of the scale was anchored by the phrase "Completely effective".

Elkins hypnotizability scale. Participants were asked to complete the Elkins Hypnotizability Scale (EHS; Elkins, Fisher, & Johnson, 2012) after completing their final therapy session. The EHS is a 12-item, therapist administered, scale for rating hypnotizability in the general population. Each item is rated pass\fail, with higher scores indicative of greater hypnotizability. Previous research indicates that the EHS is highly correlated with longer measures of hypnotizability and has excellent reliability with a Cronbach's alpha of .94.

Table 1. *Demographic information for study participants*

Demographic	Structured Attention (n = 88)	Hypnosis (n = 84)
Age group, n (%)		
35-44 y	3 (3.4)	7 (8.3)
45-54 y	39 (44.3)	39 (46.4)
55-65 y	39 (44.3)	29 (34.5)
> 65 y	7 (8.0)	9 (10.7)
Age, mean (SD)	55.0 (6.4)	54.4 (7.4)
Race, n (%)		
American Indian	3 (3.4)	2 (2.4)
Asian	0	1 (1.2)
African American	11 (12.5)	18 (21.4)
Hispanic	11 (12.5)	5 (6.0)
White	63 (71.6)	58 (69.0)
Relationship status, n (%)		
Divorced	10 (11.4)	8 (9.5)
Married	59 (67.0)	65 (55.5)
Separated	5 (5.7)	3 (3.6)
Single	4 (4.5)	8 (9.5)
Steady Partner	8 (9.1)	6 (7.2)
Widowed	2 (2.3)	4 (4.8)
Education Level		
Less than high school	6 (6.8)	8 (9.5)
High school diploma	24 (27.3)	21 (25.0)
Some college	18 (20.5)	30 (35.7)
Bachelor's Degree	21 (23.9)	14 (16.7)
Graduate Degree	8 (9.1)	11 (13.1)
BMI, mean (SD)	28.1 (5.1)	29.6 (6.5)
Baseline hot flash frequency, mean (SD)	67.1 (21.6)	70.5 (24.7)

Procedure

Participants were recruited by means of advertisements (television, billboard, and newspaper), word of mouth, and professional referral. Individuals expressing interest in the study were first screened for eligibility via a telephone interview. Those who met inclusion criteria were then asked to complete baseline measures, which included the Hot Flash Symptoms Diary. Randomization was handled by way of sealed envelopes, which

were only unsealed after participants had completed all baseline assessments. A confidential computer generated list of permuted blocks of differing sizes was used to determine which group assignment would be contained within each envelope.

Following randomization, participants either received five weekly sessions of structured attention or the clinical hypnosis intervention. Participants assigned to the structured attention condition met with a trained therapist for approximately 45 minutes each week. Sessions were conducted according to a standardized manual and were designed to match the hypnosis intervention in terms of time spent with a therapist, opportunity for interpersonal exchange, and encouragement. Approved practices included symptom severity measurement and monitoring, interpersonal exchange, encouragement, and attentive listening. Such practices are based on recommendations for minimal-effect control interventions in clinical trials involving hypnosis (Jensen & Patterson, 2005). Control participants were also provided with an audio recording that included information on hot flashes, and were asked to listen to the recording daily.

Participants assigned to the hypnosis intervention also meet with a trained therapist for 45 minutes each week. Each session consisted of a standard hypnotic induction followed by suggestions for coolness, safe place imagery, and relaxation. Relaxation suggestions were individualized based on the preferences of each participant. Intervention participants were also provided with an audio recording of a hypnosis session, and were asked to use the audio recording daily for practicing self-hypnosis.

All participants were asked to continue to record the total number of hot flashes they experienced each day in their Hot Flash Symptoms Diary throughout the study. Participants were also asked to complete the Hot Flash Symptoms Diary for an additional

week during a week-12 follow-up assessment. Response expectancies related to hot flash severity were reported both immediately preceding and immediately after the first structured attention or hypnosis session, which allowed change in expectancies to be evaluated. Participants had an opportunity to earn $300 in total for participating in the study through the 12-week follow-up assessment.

Hypotheses

Aim 1: Determine whether response expectancies related to hot flash reduction as a result of treatment change significantly when measured immediately before and immediately after the first treatment session.

> *H 1.1* Response expectancies related to hot flash reduction as a result of treatment will change significantly for participants assigned to the hypnosis intervention.
>
> *H 1.2* Response expectancies related to hot flash reduction as a result of treatment will not change significantly for participants assigned to the structured attention control group.

Aim 2: Determine whether response expectancy mediates the relationship between group assignment and decline in the number of subjectively reported hot flashes after one treatment session.

> *H 2* Response expectancy will be a significant mediator of the relationship between group assignment and the number of subjectively reported hot flashes after one treatment session.

Aim 3: Determine whether initial response expectancy mediates the relationship between group assignment and decline in the number of subjectively reported hot flashes after five weeks of treatment.

H 3 Initial response expectancy will be a significant mediator of the relationship between group assignment and the number of subjectively reported hot flashes after five weeks of treatment.

Aim 4: Determine whether initial response expectancy mediates the relationship between group assignment and decline in the number of subjectively reported hot flashes at a 12-week follow-up appointment.

H 4 Initial response expectancy will be a significant mediator of the relationship between group assignment and the number of subjectively reported hot flashes at a 12-week follow-up appointment.

Aim 5: Determine whether initial response expectancy mediates the relationship between group assignment and decline in the number of subjectively reported hot flashes after one treatment session regardless of participant hypnotizability.

H 5 Initial response expectancy will be a significant mediator of the relationship between group assignment and the number of subjectively reported hot flashes reported after one treatment session only for participants scoring low or very low in hypnotizability.

Aim 6: Determine whether initial response expectancy mediates the relationship between group assignment and decline in the number of subjectively reported hot flashes after five weeks of treatment regardless of participant hypnotizability.

H 6 Initial response expectancy will be a significant mediator of the relationship between group assignment and the number of subjectively reported hot flashes reported after five weeks of treatment only for participants scoring low or very low in hypnotizability.

Aim 7: Determine whether initial response expectancy mediates the relationship between group assignment and decline in the number of subjectively reported hot flashes at a 12-week follow-up appointment regardless of participant hypnotizability.

H 7 Initial response expectancy will be a significant mediator of the relationship between group assignment and the number of subjectively reported hot flashes reported at a 12-week follow-up appointment only for participants scoring low or very low in hypnotizability.

Aim 8: Determine whether compliance with instructions for self-hypnosis is significantly related to treatment outcome.

H 8 There will be a significant positive correlation between hot flash frequency and the number of occasions during which participants assigned to the hypnosis group reported practicing self-hypnosis during each assessment period.

Statistical Analysis

All mediation and conditional process analyses were conducted using the PROCESS macro program for SPSS (Hayes, 2013). PROCESS can provide researchers with point and confidence interval estimates for direct, indirect, and total effects for any simple mediation model involving continuous or dichotomous variables. It can also provide researchers with point and confidence interval estimates for conditional direct and indirect effects for over 70 models involving either simple moderation or conditional

process analysis. PROCESS can be acquired as a free download for either SPSS or SAS from ww.afhayes.com. Instructions on how to install and implement PROCESS can be found in Hayes' "*Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*".

In order to test our hypotheses, three simple mediation models and three conditional process models were ran using ordinary least squares (OLS) path analysis. As can be seen in Figure 2, the first three models were used to assess the indirect effect of group assignment (hypnosis vs. structured attention) on hot flash frequency, through response expectancy, without accounting for participant hypnotizability.

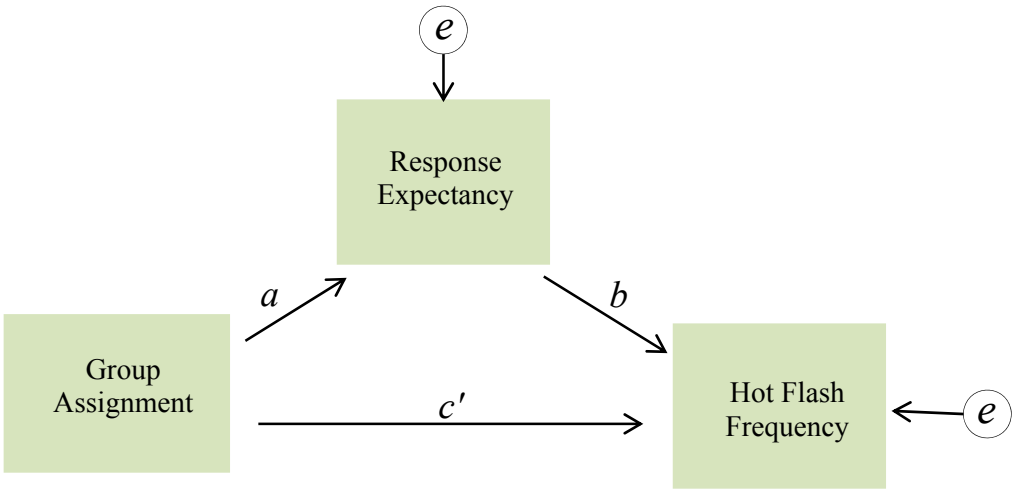


Figure 2. *Simple mediation model*

Figure 3 depicts the conditional process model that was used to test hypotheses 5-7, in which hypnotizability was included in the model in order to examine its role as a potential moderator of the relationship between group assignment and hot flash frequency and also the relationship between response expectancy and hot flash frequency.

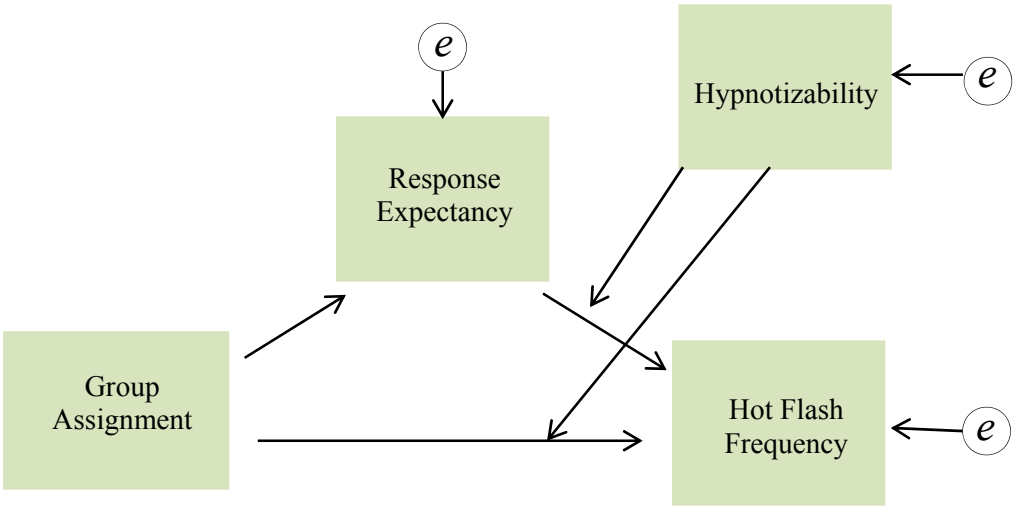


Figure 3. *Conditional process model*

Following the recommendations of Hayes (2013), in order to test the null hypothesis that the true indirect effect of group assignment on hot flash frequency through response expectancy does not equal 0 (${}_{I}a_{I}b \neq 0$), a bias-corrected bootstrap confidence interval based on 10,000 bootstrap samples was created for each model. For the simple mediation models, effect size was measured using Preacher and Kelly's (2011) kappa-squared. Although this method of mediation analysis may be less familiar than the causal steps approach recommended by Baron and Kenny (1986), it does possess several advantages. For example, in order to establish mediation under the causal steps approach, one must attempt to show that the true values of *a*, *b*, and *c* do not equal 0. On the other hand, the approach recommended by Hayes (2013) only requires a test of the null hypothesis that the indirect effect (*ab*) differs from 0. Therefore, this approach provides us with much greater power. Additionally, the above mentioned approach does not require the establishment of a significant total effect of the independent variable (*X*) on the dependent variable (*Y*), as does the causal steps approach. The importance of this difference becomes evident when we consider that it is possible for *X* to indirectly impact

Y through the mediator (*M*), even if the total effect does not differ from 0. This can occur when two or more mediating variables serve to cancel out the effects of one another, or when *X* will exert a different effect on *Y* depending on the populations or subpopulations being assessed. Finally, this approach involves fewer assumptions regarding the shape of the sampling distribution of the indirect effect.

Statistical Analysis for Study Aims

Aim 1. Two dependent samples *t* tests were conducted to determine whether response expectancies related to hot flash reduction as a result of treatment change significantly when measured both before and after the first treatment session. One test compared response expectancies for the hypnosis intervention participants, while the other was used to compare expectancies for participants assigned to the control condition. Hedges' *g* was used to compute effect size for any significant *t* test.

Aims 2-4. As stated above, three simple mediation models were used to assess mediation of the effect of group assignment on reduction in the number of subjectively reported hot flashes through response expectancy. An inferential test of the indirect effect of group assignment on the number of subjectively reported hot flashes, through response expectancy (*ab*) was conducted by creating a bias-corrected bootstrap confidence interval based on 10,000 bootstrap samples. In the dataset, participants assigned to the control condition are designated with a 0, while participants assigned to the hot flash intervention are designated with a 1. This allows for the interpretation of the indirect effect as the mean difference in the number of subjectively reported hot flashes between groups as a result of differing response expectancies. Effect size for indirect effects were calculated using Preacher and Kelley's (2011) kappa squared (κ^2).

Aims 5-7. Three conditional process models were used to assess the role of hypnotizability as a moderator of the direct and indirect effects of group assignment on hot flash frequency. During each assessment point, the conditional indirect effect of group assignment on hot flash frequency was tested for significance at five different levels of hypnotizability. Using 95% bias-corrected bootstrap confidence intervals that were each based on 10000 bootstrap samples, five inferential tests were conducted in order to examine if response expectancy mediated the relationship between group assignment and hot flash frequency for participants scoring at the 10^{th}, 25^{th}, 50^{th}, 75^{th}, and 90^{th} percentiles of hypnotizability,. Inferential tests of the conditional direct effect of group assignment on hot flash frequency at these five different levels of hypnotizability were also tested using 95% bias-corrected bootstrap confidence intervals, as well as independent t-tests.

Aim 8. Three Pearson product-moment correlations were used to determine whether the relationship between the frequency with which participants assigned to the hypnosis intervention reported practicing self-hypnosis was significantly correlated with hot flash frequency during week 1, post-treatment, and 12-week follow-up assessment.

CHAPTER THREE

Results

Means and standard deviations for hot flash frequency at baseline, week 1, post-treatment, and 12-week follow-up assessment are provided in Table 2.

Table 2. *Descriptive statistics for hot flash frequency.*

	Hypnosis			Structured Attention		
Assessment Point	*n*	*M*	*SD*	*n*	*M*	*SD*
Baseline	84	73.90	24.81	88	76.45	30.00
Week 1	83	53.05	24.13	87	74.31	34.88
Post-treatment	78	27.86	21.82	86	69.45	30.02
Follow-up	72	20.07	17.68	83	61.96	32.42

An independent samples t-test indicated that the number of hot flashes did not differ significantly as a function of group assignment at baseline, $t(170) = 0.61$, $p = 0.54$, *95% CI* [-5.76, 10.86].

Aim 1. Means and standard deviation for response expectancy are displayed in Table 3.

Table 3. *Descriptive statistics for response expectancy*.

	Hypnosis			Structured Attention		
Assessment Point	*n*	*M*	*SD*	*n*	*M*	*SD*
Pre-session 1	84	7.26	1.99	88	6.83	2.27
Post-session 1	84	8.13	1.56	88	6.90	2.27

A dependent samples t-test indicated that expectancy increased significantly for participants assigned to the hypnosis intervention, $t(83) = -3.70$, $p < .01$, *95% CI* [-1.33, -

.40], $g = 0.48$. An additional test indicated that expectancy did not increase significantly for participants assigned to the structured attention control group, $t(87) = -0.27$, $p = 0.79$, *95% CI* [-.53, .40].

Aims 2-4. The indirect, direct, and total effects of group assignment on hot flash frequency at week 1, after five weeks of treatment, and at 12-week follow-up are displayed in Table 4.

Table 4. *Indirect, direct, and total effects.*

	Indirect Effect		Direct Effect		Total Effect	
Time	*ab*	95% CI	*c′*	95% CI	*c*	95% CI
Week 1	-0.37	-3.57 to 2.72	-20.89	-30.47 to -11.31	-21.26	-30.38 to -12.14
Post-Treatment	-0.12	-3.08 to 3.00	-41.47	-50.04 to -32.90	-41.59	-49.75 to -33.43
Follow-up	0.84	-1.76 to 4.44	-42.74	-51.62 to -33.87	-41.89	-50.36 to -33.43

Results indicated that the indirect effect of group assignment on hot flash frequency through response expectancy failed to reach significance at all three time points. Kappa squared values ranging from 0.0025 to 0.0175 support this conclusion. Inversely, direct and total effects were significant at all three time points, and appear to be large.

Aim 5-7. Conditional indirect and direct effects for participants scoring at the 10th, 25th, 50th, 75th, and 90th percentiles of hypnotizability are displayed in Table 5. Results indicate that the indirect effect of group assignment on hot flash frequency through response expectancy remains nonsignificant across all levels of hypnotizability. Additionally, results indicate that the direct effect of group assignment on hot flash frequency was significant at all assessment points, except for individuals scoring at the 10th percentile on hypnotizability during week one of treatment. These participants received a score of 1 on the EHS, which indicates that the ranked very low in hypnotizability.

Table 5. *Conditional indirect and direct effects.*

	Indirect Effect		Direct Effect		
Hypnotizability	ω	95% CI	$\theta_{X \rightarrow Y}$	p	95% CI
Week 1					
10th %ile	-1.14	-6.89 to 3.56	-12.84	0.20	-32.61 to 6.94
25th %ile	-1.02	-5.45 to 2.66	-16.44	0.03	-31.38 to -1.51
50th %ile	-0.79	-4.43 to 2.38	-23.67	< .01	-34.29 to -13.04
75th %ile	-0.67	-4.88 to 3.44	-27.27	< .01	-40.64 to -14.21
90th %ile	-0.55	-5.78 to 4.85	-30.88	< .01	-48.31 to -13.45
Post-treatment					
10th %ile	-0.12	-5.43 to 5.18	-25.13	< .01	-42.26 to -8.00
25th %ile	-0.31	-4.36 to 3.65	-30.96	< .01	-43.90 to -18.04
50th %ile	-0.68	-4.02 to 2.04	-42.62	< .01	-51.82 to -33.41
75th %ile	-0.87	-4.93 to 2.50	--48.44	< .01	-59.76 to -37.12
90th %ile	-1.06	-6.30 to 3.41	-54.27	< .01	-69.36 to -39.17
Follow-up					
10th %ile	2.22	-2.21 to 8.78	-31.78	< .01	-49.89 to -13.67
25th %ile	1.35	-1.98 to 6.14	-35.93	< .01	-49.59 to -22.28
50th %ile	-0.39	-3.86 to 2.69	-44.24	< .01	-53.70 to -34.78
75th %ile	-1.25	-6.10 to 2.50	-48.39	< .01	-59.97 to -36.81
90th %ile	-1.69	-7.27 to 2.59	-50.47	< .01	-63.87 to -37.07

Aim 8. The number of self-hypnosis practice sessions participants assigned to the hypnosis condition reported during week 1 was not significantly correlated with the number of hot flashes reported that same week, $r = 0.14$, $p = 0.21$. The correlation between week 5 self-hypnosis practice sessions and hot flash frequency at week 5 also did not reach significance, $r = 0.21$, $p = 0.07$. Finally, the correlation between the number of self-hypnosis practice sessions reported during week 12 and hot flash frequency at week 12 was small, yet significant, $r = 0.23$, $p = 0.049$.

CHAPTER FOUR

Discussion

Primary Outcomes

The results of this study suggest that response expectancy was not a mediator of the relationship between treatment condition and outcome. Although results are consistent with one of the fundamental tenets of expectancy theory, that hypnosis significantly increases participants' expectations for a favorable treatment outcome (Kirsch, 1985, 1994), results indicated that, on average, expectancies were only raised by 0.87 points on a 10-point scale, an increase of only 11%. According to our measure of effect size, this represents a small to moderate increase in outcome expectancy, and it is questionable as to whether this increase is of practical significance.

Furthermore, the results of our inferential tests for the significance of the indirect effect of group assignment on hot flash frequency through response expectancy indicated that the prospect that response expectancies have no effect on treatment outcome cannot be ruled out. In fact, a trend in the results indicated that participants with greater initial expectations for improvement may actually experience more hot flashes than those with lower initial expectations as treatment progresses. However, again, this increase did not reach statistical significance. Therefore, our results suggest that an increase in positive response expectancies was not the mechanism of action through which the hypnosis intervention was able to reduce hot flash frequency.

One possible explanation for this finding is that participants with higher initial expectancies may become frustrated if they do not experience immediate symptom improvement, and that this frustration may actually exacerbate symptoms. Alternatively it may be that, as opposed to the theory that was proposed by Stam and Spanos (1987), which argues that individuals ranking low in hypnotizability may interpret hypnotic suggestions as cues indicating that the benefits of hypnosis will occur automatically, and therefore exert less effort during treatment, individuals with high expectations for symptom improvement may exert less effort during treatment, such as failing to practice self-hypnosis, and may therefore experience less improvement than those with lower initial expectations. Such findings have been reported for individuals who were prescribed an exercise regime by their physician (Jones, Harris, Waller, & Coggins, 2005). Future research examining whether individuals with higher expectations for favorable treatment outcomes during hypnotherapy are actually less likely to adhere to therapist recommendations should help shed light on this possibility.

Secondary Outcomes

Contrary to our initial hypotheses, the conditional indirect effect of group assignment on hot flash frequency through treatment outcome proved to be nonsignificant regardless of participant hypnotizability. Based on the results of McGlashen et al.'s (1969) study, during which it was found that highly hypnotizable participants exhibited greater pain tolerance after receiving hypnosis than did participants ranking low in hypnotizability, we predicted that the indirect effect would be significant for participants scoring low and very low in hypnotizability, as it would be the primary means through which these participants experienced symptom improvement. Meanwhile,

the indirect effect was predicted to be nonsignificant for individuals scoring high in hypnotizability, because they would also benefit from changes in cognition and an ability to disassociate themselves from sensations of pain. We predicted that the relative impact of expectancies would be small by comparison. The fact that our findings did not support this position suggest that a sizable placebo effect may not exist during all hypnosis interventions and that the relative role played by expectancies during hypnotherapy may vary based on the symptoms being treated. Such a theory is consistent with the results reported by Montgomery et al. (2002) and Montgomery et al. (2010), during which it was found that the size of the indirect effect varied based on the primary outcome variable included in the mediation model.

Differing from our analysis involving the indirect effect, hypnotizability was shown to be a significant moderator of the direct effect of group assignment on hot flash frequency. In fact, at all three assessment periods, individuals ranking higher in hypnotizability reported fewer hot flashes than did individuals ranking lower in hypnotizability. These results are most congruent with a state dependent theory of hypnosis, whereby undergoing a hypnotic induction increases participants' responsiveness to suggestion. In this case, participants would have been more responsive to suggestions for hot flash reduction.

Finally, the results of our correlational analyses indicated that participants who practiced self-hypnosis more often during the week were also likely to report experiencing a greater number of hot flashes. However, the magnitude of this relationship only reached significance during the 12-week follow-up assessment. The most likely explanation for this finding is that individuals who were experiencing a greater number of

hot flashes were also more likely to practice self-hypnosis in an effort to reduce their symptoms. Future studies that wish to investigate the extent to which adherence is related to treatment outcome should incorporate a more inclusive and standardized rating system for assessing adherence throughout the duration of the study.

Limitations and Considerations

All analyses were conducted with a sample comprised of postmenopausal women living in central Texas. Therefore, generalization of our findings to other groups of individuals should be tempered until further research has been conducted. Furthermore, our results are dependent upon single measures for assessing response expectancy, hot flash occurrence, and hypnotizability. Although efforts were made to incorporate measures that had either been used in previous research involving mediation and moderation analyses of a hypnosis intervention, as well as measures known to be highly reliable and valid, it is possible that our results may have differed had we incorporated additional assessments into our study design.

An additional consideration that should be addressed is the fact that participants assigned to the hypnosis intervention reported higher response expectancies than did participants assigned to the structured attention control condition even before their initial treatment session. Although efforts were made to blind patients to treatment condition, all patients would have been made aware of the possibility that they could be randomized to a control condition before they were asked to give their informed consent. Therefore, it is possible that this knowledge, along with subtle and involuntary hints from the experimental staff, raised the expectancies of hypnosis participants even before the start of the intervention. If so, the full extent to which expectancies were enhanced prior to

randomization in our study was not completely accounted for. However, the fact that parameter estimates for expectancies were so small suggests that results would not have been markedly different had changes in expectancy been slightly larger.

Future Directions

Although our study suggests that changes in response expectancy may not account for symptom improvement during a hypnosis intervention for hot flashes, very little is known about the relative impact of response expectancies across various symptoms and treatments. It is possible that expectancies may play a larger role during brief interventions aimed at managing symptoms over a relatively short duration. A logical next step would be to examine whether response expectancies influence pain outcomes differently when treating acute versus chronic pain. Findings may produce results leading to new hypotheses about how different variables, such as the length of treatment, the severity of symptoms, and the total duration over which the patient has been suffering from symptoms before seeking treatment influences the perspective role of response expectancies during hypnosis interventions.

Another area of investigation worth exploring is whether response expectancies mediate outcomes during mind-body interventions other than hypnosis. Findings could lead to new theories regarding the relative efficacy of using various mind-body therapies for the treatment of certain disorders. Findings would also help indicate whether the mechanisms of action differ from one treatment to another.

Conclusions

Although expectancy theory has gained a considerable backing within the hypnosis community, the results of our study indicate that changes in response expectancy did not mediate the relationship between treatment condition and hot flash frequency during a five-week hypnosis intervention. Instead, results were more congruent with a state dependent theory of hypnosis. Additional research is needed to determine whether results will generalize to other populations as well as to studies involving outcomes other than hot flash frequency.

APPENDIX

APPENDIX

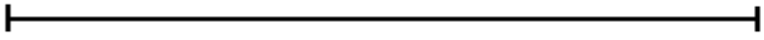
Hot Flash Symptoms Diary

Participant ID #: _____ Study ID #: _____ Site Name: _____ Date Completed (MM/DD/YEAR): _____

Date (month/day/year)	**Number of Hot flashes today**	**For each day, write the number of hot flashes that were mild, moderate, severe, or very severe**			
		Mild	**Moderate**	**Severe**	**Very Severe**
Day 1: / /					
Day 2: / /					
Day 3: / /					
Day 4: / /					
Day 5: / /					
Day 6: / /					
Day 7: / /					
Total number of Hot Flashes					

Cognitive Expectancies

1. How effective do you expect the intervention you will receive to be in reducing the frequency of your hot flashes?



Not at all effective ***Completely effective***

Self-Hypnosis Practice Diary

Instructions: Please use this form to record the number of times you practice self-hypnosis over the following week, both with and without your audio-recording.

	Date (month/day/year)	Number of times practiced self-hypnosis **with** audio-recording	Number of times practiced hypnosis **without** audio-recording
Day 1:	/ /		
Day 2:	/ /		
Day 3:	/ /		
Day 4:	/ /		
Day 5:	/ /		
Day 6:	/ /		
Day 7:	/ /		

Elkins Hypnotizability Scale

EHS Scoring Summary

Examiner: _____ **Date:** _____

Time to complete EHS:

1. Subjective Heaviness Yes _____ No
2. Arm Immobilization Yes No
3. Subjective Lightness Yes No
4. Arm Levitation Yes No
5. Elbow Lift Yes No
6. Imagery Yes No

7. Dissociation	Yes	No
8. Faint Rose Smell	Yes	No
9. Distinct Rose Smell	Yes	No
10. Recalls One or Less Items	Yes	No
11. Vague Hallucination	Yes	No
12. Clear Hallucination	Yes	No

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