



Hypnotherapy to Reduce Hot Flashes: Examination of Response Expectancies as a Mediator of Outcomes

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Abstract

The mechanism of action responsible for hypnotherapy's effect in reducing hot flashes is not yet known. The purpose of this study was to examine the role of response expectancies as a potential mediator. Hypnotizability was also tested as an effect moderator. Data were collected from a sample of 172 postmenopausal women, who had been randomized to receive either a 5-week hypnosis intervention or structured attention counseling. Measures of response expectancies were analyzed to determine if the relationship between group assignment and hot flashes frequency was mediated by expectancies for treatment efficacy. A series of simple mediation and conditional process analyses did not support mediation of the relationship between treatment condition and hot flash frequency through response expectancy. The effect of hypnotherapy in reducing hot flashes does not appear to be due to placebo effects as determined by response expectancies. Implications for clinical practice and future research are discussed.

Keywords

hot flashes, response expectancies, hypnosis, mediation

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Approximately 80% of women report experiencing hot flashes during midlife.¹ Hot flashes cause significant distress and contribute to a myriad of related symptoms, including sleep disturbance,² fatigue,³ decreased sex drive,⁴ and impaired cognition.⁵ Furthermore, the effective treatment of hot flashes can be challenging, as traditional treatment with hormone replacement therapy is contraindicated for many women, due to an increased risk for cardiovascular disease and cancer.^{6,7}

Clinically significant reduction in hot flashes has been defined as 50% or greater improvement.⁸ Several studies have shown a hypnotherapy intervention to have a clinically significant effect for the reduction of hot flashes. For example, in an early pilot study,⁹ 16 female breast cancer survivors received 4 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,¹⁰ 13 postmenopausal women who were experiencing a minimum of 50 hot flashes per week received 5 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 3 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,¹¹ 60 female breast cancer survivors who were experiencing a minimum of 14 hot flashes per week were randomly assigned to a 5-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

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hypnosis reported an average of 4 fewer hot flashes per day at the end of treatment than they had reported at baseline assessment.

Finally, during a recently conducted large clinical trial,¹² 187 postmenopausal women reporting a minimum of seven hot flashes per day were randomly assigned to a 5-week hypnosis intervention or a 5-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. 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 5 weeks of treatment and that hot flash frequency continued to decline by as much as 74% at a 12-week follow-up appointment.¹² Meanwhile, participants who had received structured attention reported only a 9% reduction in hot flash frequency after 5 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. However, despite the numerous studies providing empirical support for the utility of hypnosis, not just for hot flashes, but for a variety of additional symptoms and disorders as well, very little is known about the possible mechanisms of action behind hypnotherapy's beneficial effects.¹³

Expectancy Theory

Expectancy theory provides one potential explanation as to why hypnotherapy may be effective.^{14,15} According to expectancy theory, the benefits of hypnotherapy are attributable to placebo effects that are brought about through positive response expectancies following a hypnotic induction.¹⁶ It has been hypothesized that hypnotic suggestions lead to improvement by altering the patient's expectations for the occurrence of nonvolitional outcomes or behaviors.

Some support for expectancy theory has come from a variety of sources. Kirsch¹⁶ has noted that the phenomena experienced by hypnotic participants are dependent on the suggestions given, and not the particular induction technique employed by the hypnotherapist. Therefore, the rationale offered is that participants are responding to a specific suggestion for symptom improvement (eg, reduced pain), and not to

any unique hypnotic mechanism. Gandhi and Oakley¹⁷ have also found evidence suggesting that the word hypnosis alone may be enough to create a beneficial expectancy effect, as participants in one study scored significantly higher on a standardized measure of hypnotizability when the induction technique was referred to as "hypnosis" rather than "relaxation." However, only a small number of randomized control trials have investigated whether the beneficial effects of hypnosis can be explained by changes in outcome expectancies. Additionally, these studies have only examined the role of expectancies when hypnosis was being utilized as a treatment for pain. The role of expectancies during hypnosis interventions aimed at reducing hot flashes remains completely unknown.

An early study examined the contributions of placebo effects and hypnotizability on response to hypnosis for pain reduction.¹⁸ Improvement in pain tolerance in insusceptible (low hypnotizable) participants following a hypnotic induction was attributed to placebo effects. This assertion is supported by the fact that participants scoring low in hypnotizability reported similar levels of pain tolerance during a hypnosis condition and a placebo pill condition. However, the response to hypnosis among high hypnotizable participants was not attributed to placebo (response expectancy) effects.

Several recent studies have provided some support for response expectancies as a mediator of hypnotherapy effects on pain and distress.¹⁹⁻²¹ For example, in one study,¹⁹ 20 women who were to undergo an excisional breast biopsy received either a hypnosis intervention or 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 postsurgical pain than did women assigned to the control group after receiving care.¹⁹ Regression analysis indicated that the total proportion of variance in postsurgical pain originally accounted for by group assignment decreased significantly when postintervention expectancies for pain were included as a predictor variable.¹⁹ Additionally, it was found that postintervention expectancies for distress completely mediated the relationship between group assignment and postsurgical distress.¹⁹

These findings were replicated in a larger study consisting of a sample of 200 women scheduled to undergo a breast-conserving surgery (either lumpectomy or excisional breast biopsy).²¹ In addition to assessing pain expectancies as a potential mediator of the relationship between group assignment and postsurgical pain, postintervention 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. Results indicated that the relationship between group assignment and postsurgical pain was partially mediated by pain expectancies.²¹ Also, the relationship between group assignment and postsurgical fatigue was partially mediated by postintervention expectancies for fatigue.

These studies suggest there is reason to believe that response expectancies may mediate hypnotherapy's effect on hot flash reduction. However, no previous studies have examined the

role of response expectancies as a mediator of hypnotherapy's effect on hot flashes. It is possible that the mechanism of action behind the beneficial effects of hypnosis interventions may vary by symptom or condition. Also, the role of hypnotizability in reduction of hot flashes is not fully known.

Hypnotizability

In contrast to expectancy theory, several studies have suggested that response to hypnotic treatment differs based on hypnotizability. For example, in a study involving 20 individuals ranking either high or low in hypnotizability,²² results 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.²³ Therefore, the potential moderating role of hypnotizability also merits further study.

The Present Study

The current study aimed to uncover the role that response expectancy plays during a hypnosis intervention for hot flashes. In addition, the study examined whether hypnotizability influences treatment outcome following a hypnotherapy intervention for hot flashes. This is the first study to examine expectancy as a potential mediator of improvement during an intervention aimed at diminishing the frequency of hot flashes in postmenopausal women.

With regard to participant expectancies, we hypothesized that expectancies for hot flash reduction would increase significantly for participants assigned to the hypnosis intervention. No significant changes were expected for participants assigned to the structured attention control group. We also anticipated that response expectancy would be a significant mediator of the relationship between group assignment and the number of subjectively reported hot flashes after one treatment session, after 5 weeks of treatment, and then again at a 12-week follow-up appointment. Finally, when examining the role of hypnotizability as a moderator, we hypothesized that response expectancy would mediate the relationship between group assignment and the number of subjectively reported hot flashes for participants scoring low or very low in hypnotizability. However, we did not anticipate similar results in participants with moderate or high hypnotizability scores.

Method

Participants

The data analyzed during the current study were originally collected from individuals who had served as participants in a large clinical trial that was funded by a grant from the National Institute of Health. A description of this study, as well as results related to its primary outcomes, is published elsewhere.¹²

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 6 months in addition to (a) either having undergone a bilateral oophorectomy or (b) having had a medically confirmed history of follicle-stimulating hormone levels in excess of 40 mIU/mL. Participants also needed to self-report experiencing at least 7 hot flashes per day or 50 hot flashes in total during a weeklong baseline assessment. Exclusion criteria included use of hormone replacement therapy or electing not to undergo a Federal Food and Drug Administration–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 or borderline personality disorder.

A total of 538 women were screened for participation in the original study from December 2008 through April 2012.¹² 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 5-week structured attention control group and 93 were randomized to a 5-week hypnosis intervention. Six control participants and 9 hypnosis participants failed to report response expectancies related to hot flash frequency following their first treatment session and were dropped from analysis. This left a total of 88 control participants and 84 hypnosis participants with data suitable for mediation and component process analysis. Demographic information for these participants is provided in Table 1.

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. 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.

Participants assigned to the hypnosis intervention met 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. 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.

Participants assigned to the structured attention condition met with a trained therapist for approximately 45 minutes each week. Structured attention consisted of interpersonal exchange, encouragement, attentive listening, and self-monitoring of hot flashes.

For all participants, 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. The participants were also asked to record the total number of hot flashes they experienced each day in their Hot Flash Symptoms Diary throughout the study. Participants also completed the Hot Flash Symptoms Diary for an additional week during a week-12 follow-up assessment.

Measures

Response Expectancy Visual Analog Scale. Participants completed a 100-mm response expectancy visual analog scale both immediately

Table 1. Demographic Information for Study Participants.

Demographic	Structured Attention (n = 88)	Hypnosis (n = 84)
Age group, years, n (%)		
35-44	3 (3.4)	7 (8.3)
45-54	39 (44.3)	39 (46.4)
55-65	39 (44.3)	29 (34.5)
>65	7 (8.0)	9 (10.7)
Age, years, mean (SD)	55.0 (6.4)	54.4 (7.4)
Race, n (%)		
American Indian	3 (3.4)	2 (2.4)
Asian	0 (0.0)	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, n (%)		
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)
Body mass index, kg/m ² , mean (SD)	28.1 (5.1)	29.6 (6.5)
Baseline hot flash frequency, mean (SD)	67.1 (21.6)	70.5 (24.7)

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.” This scale is a modification of visual analog scales used in previous studies to assess patient expectations for symptom improvement following a hypnosis intervention.^{19,21}

Hot Flash Symptoms Diary. Participants were asked to complete the Hot Flash Symptoms Diary²⁴ 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.³

Elkins Hypnotizability Scale. Participants were asked to complete the Elkins Hypnotizability Scale²⁵ after completing their final therapy session. The Elkins Hypnotizability Scale 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 Elkins Hypnotizability Scale is highly correlated with longer measures of hypnotizability and has excellent reliability with a Cronbach’s alpha of .94.

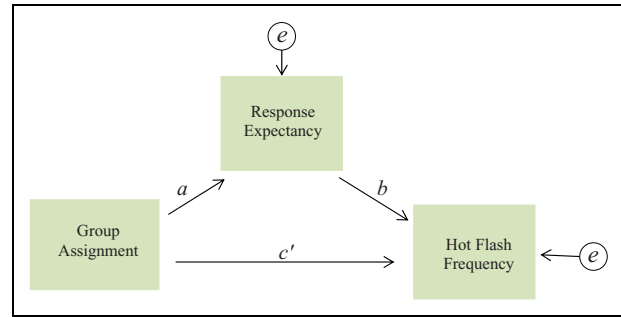


Figure 1. Simple mediation model.

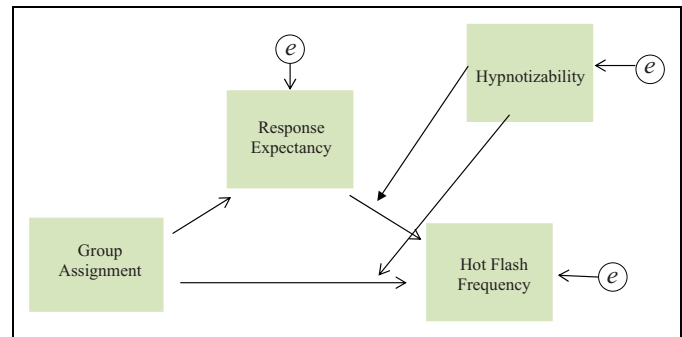


Figure 2. Conditional process model.

Statistical Analysis

All mediation and conditional process analyses were conducted using the PROCESS macro program for SPSS.²⁶ Instructions on how to install and implement PROCESS can be found in Hayes’s *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*.²⁶

Three simple mediation models and 3 conditional process models were assessed using ordinary least squares path analysis. The simple mediation path model used to assess the indirect effect of group assignment (hypnosis vs structured attention) on hot flash frequency, through response expectancy after an initial treatment session, the 5-week intervention, and 12-week follow-up is displayed in Figure 1.

Figure 2 depicts the conditional process model that was used to assess mediation with hypnotizability included in the path model 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.

Following the recommendations of Hayes,²⁶ in order to test the null hypothesis that the true indirect effect of group assignment on hot flash frequency through response expectancy equals 0 ($\gamma a \gamma b = 0$), 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’s²⁷ kappa-squared, which is the ratio of the observed indirect effect relative to the maximum possible value of the indirect effect given participant variability and intercorrelations among variables in the data.

Results

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

Table 2. Descriptive Statistics for Hot Flash Frequency.

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

Table 3. Descriptive Statistics for Response Expectancy.

Assessment Point	Hypnosis			Structured Attention		
	n	Mean	SD	n	Mean	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

An independent-samples *t* test indicated that the number of hot flashes did not differ significantly as a function of group assignment at baseline, $t(170) = 0.61$, $P = .54$, 95% CI [-5.76, 10.86].

Means and standard deviation for response expectancy are presented in Table 3.

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, -0.40], $g = 0.48$. An additional test indicated that expectancy did not increase significantly for participants assigned to the structured attention control group, $t(87) = -0.27$, $P = .79$, 95% CI [-0.53, 0.40].

The indirect, direct, and total effects of group assignment on hot flash frequency at week 1, after 5 weeks of treatment, and at 12-week follow-up are displayed in Table 4.

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. Conversely, direct and total effects were significant at all 3 time points, and appear to be large.

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 of hypnotizability during week one of treatment. These participants received a score of 1 on the Elkins Hypnotizability Scale, which indicates that they ranked very low in hypnotizability.

Discussion

The results of this study suggest that response expectancy is not a mediator of the relationship between treatment condition and

hot flash frequency. Although results are consistent with one of the fundamental tenets of expectancy theory, that hypnosis significantly increases participants' expectations for a favorable treatment outcome,^{14,15} 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 possibility 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, 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.

This is important for several reasons. First, 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.²¹ Second, this study is the first to examine whether initial expectancies continue to affect patient response to hypnosis treatment, not just after 1 session, but over a 5-week hypnosis intervention and at a 12-week follow-up appointment. Furthermore, unlike previous studies, during which pain has been deliberately induced or has resulted from a medical procedure, women suffering from hot flashes can neither 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.

In addition, data suggested that response expectancy did not mediate the relationship between group assignment and hot flash frequency, regardless of participant 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 not predicted to reach significance 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.

Table 4. Indirect, Direct, and Total Effects of Group Assignment on Hot Flash Frequency.

Time	Indirect Effect		Direct Effect		Total Effect	
	<i>ab</i>	95% CI	<i>c'</i>	95% CI	<i>c</i>	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
Posttreatment	-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

Table 5. Conditional Indirect and Direct Effects of Group Assignment on Hot Flash frequency.

Hypnotizability	Indirect Effect		Direct Effect		
	ω	95% CI	$\theta_{X \rightarrow Y}$	<i>P</i>	95% CI
Week 1					
10th percentile	-1.14	-6.89 to 3.56	-12.84	.20	-32.61 to 6.94
25th percentile	-1.02	-5.45 to 2.66	-16.44	.03	-31.38 to -1.51
50th percentile	-0.79	-4.43 to 2.38	-23.67	<.01	-34.29 to -13.04
75th percentile	-0.67	-4.88 to 3.44	-27.27	<.01	-40.64 to -14.21
90th percentile	-0.55	-5.78 to 4.85	-30.88	<.01	-48.31 to -13.45
Posttreatment					
10th percentile	-0.12	-5.43 to 5.18	-25.13	<.01	-42.26 to -8.00
25th percentile	-0.31	-4.36 to 3.65	-30.96	<.01	-43.90 to -18.04
50th percentile	-0.68	-4.02 to 2.04	-42.62	<.01	-51.82 to -33.41
75th percentile	-0.87	-4.93 to 2.50	-48.44	<.01	-59.76 to -37.12
90th percentile	-1.06	-6.30 to 3.41	-54.27	<.01	-69.36 to -39.17
Follow-up					
10th percentile	2.22	-2.21 to 8.78	-31.78	<.01	-49.89 to -13.67
25th percentile	1.35	-1.98 to 6.14	-35.93	<.01	-49.59 to -22.28
50th percentile	-0.39	-3.86 to 2.69	-44.24	<.01	-53.70 to -34.78
75th percentile	-1.25	-6.10 to 2.50	-48.39	<.01	-59.97 to -36.81
90th percentile	-1.69	-7.27 to 2.59	-50.47	<.01	-63.87 to -37.07

Therefore, hypnotherapy's effect on reduction of hot flashes does not appear to be due to expectancy/placebo effects.

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.

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 depend on single measures for assessing response expectancy, hot flash frequency, 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. Investigation into alternative means of measuring response expectancy, other than relying on self-reported visual analog scale ratings, may prove useful.

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 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 response 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 outcomes differently depending on symptoms being treated. 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 prospective role of response expectancies during hypnosis interventions.

The fact that response expectancies did not account for the relationship between group assignment and treatment outcome during the current study suggests that efforts to maximize placebo effects may not be beneficial to all patients. Furthermore, this finding highlights the importance of adequately training therapists to deliver hypnosis interventions, without relying solely on expectancies to produce favorable outcomes.

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.

Additional research is needed to determine the mechanisms by which hypnotherapy reduces hot flashes. Potential areas for future research are whether physiological changes brought about by hypnosis practice mediate change in frequency or severity of hot flashes. For example, reduction in stress as measured by cortisol, or stress reactivity as measured by physiological arousal, are areas for future study. Also, the role of hypnotizability warrants further study.

Conclusion

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 randomized controlled trial. 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.

Authors' Note

This study was conducted at the Baylor University Mind-Body Medicine Research Laboratory. The contents of this article are solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Author Contributions

JRS wrote the first draft of the manuscript and analyzed the data collected for this study. GRE provided the data and contributed to subsequent versions of the document.

Declaration of Conflicting Interests

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Ethical Approval

This study was approved by the Baylor University Institutional Review Board (IRBNet ID 754578-1).

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