IMAGINATIVE SUGGESTIBILITY AND HYPNOTIZABILITY: DECONSTRUCTING HYPNOTIC SUGGESTIBILITY

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ABSTRACT

The predictive utility of nonhypnotic imaginative suggestibility and hypnotizability (operationalized as hypnotic suggestibility with imaginative suggestibility statistically controlled) was investigated in two experiments. In Experiment 1, using a between-subjects design, imaginative suggestibility moderated responding to a nonhypnotic imaginative analgesia suggestion and hypnotic suggestibility moderated responding to the same suggestion provided in hypnosis. However, hypnotizability (i.e. hypnotic suggestibility with imaginative suggestibility controlled) did not moderate responding to the hypnotic analgesia suggestion. In Experiment 2, using a within-subjects design, hypnotizability (i.e. hypnotic suggestibility with imaginative suggestibility controlled) predicted intra-individual differences in responding to the hypnotic and imaginative analgesia suggestions. Higher hypnotizability was associated with relatively greater responding to the hypnotic analgesia suggestion than to the imaginative analgesia suggestion. The results are consistent with the position that individual differences in hypnotic suggestibility are largely accounted for by individual differences in imaginative suggestibility and to a lesser extent by individual differences in hypnotizability.

Key words: hypnotic suggestibility, imaginative suggestibility, hypnotizability, suggestion, analgesia

Hypnotic suggestibility is a trait-like individual difference variable reflecting the general tendency to respond to hypnosis and hypnotic suggestions (Gur, 1978–1979). It is measured with standardized scales consisting of a hypnotic induction and a series of test suggestions (e.g. Weitzenhoffer & Hilgard, 1962). The number of test suggestions to which a person responds provides an index of his or her level of hypnotic suggestibility. Research with standardized scales has demonstrated that there are large individual differences in hypnotic suggestibility (reviewed in Gwynn & Spanos, 1996). Moreover, a sizeable literature shows that hypnotic suggestibility is associated with responding to a variety of specific hypnotic suggestions (reviewed in de Groh, 1989). Perhaps the most robust of these associations is between hypnotic suggestibility and responding to suggestions for hypnotic analgesia (see Montgomery et al., 2000).

IMAGINATIVE SUGGESTIBILITY

A hypnotic suggestion consists of a hypnotic induction and a suggestion to experience an imaginary state of affairs (Hilgard, 1965). Suggestions delivered without a hypnotic induction are termed nonhypnotic, 'waking' (Hull, 1933), or imaginative suggestions (Kirsch, 1997). Just as hypnotic suggestibility is the general tendency to respond to hypnosis and hypnotic suggestions, imaginative suggestibility is the general tendency to respond to imaginative suggestions delivered without an induction (Kirsch & Braffman, 2001). The Barber Suggestibility Scale was explicitly developed to assess both imaginative and hypnotic suggestibility (Barber, 1965). Other researchers have measured imaginative suggestibility by removing the induction and all references to hypnosis from a standardized hypnotic suggestibility scale and instructing participants to experience the test suggestions with their imagination (Braffman & Kirsch, 1999). As is the case with hypnotic suggestibility, there are large individual differences in imaginative suggestibility (Braffman & Kirsch, 1999). The association between imaginative and hypnotic suggestibility is considerable, with correlations reported to be as large as 0.85 (Hull, 1933; Weitzenhoffer & Sjoberg, 1961; Barber & Glass, 1962; Hilgard & Tart, 1966; Braffman & Kirsch, 1999).

Aside from the aforementioned investigations, there has been very little research on imaginative suggestibility (Kirsch & Braffman, 2001). One purpose of the studies described herein is to evaluate the predictive utility of imaginative suggestibility by examining its capacity to predict a well-established phenomenon from the domain of hypnosis—the suggested reduction of pain (Montgomery et al., 2000). Specifically, we were interested in seeing whether imaginative suggestibility predicted responding to an imaginative analgesia suggestion. Moreover, because imaginative and hypnotic suggestibility are so highly correlated, we were also interested in seeing how the oft-cited relationship between hypnotic suggestibility and responding to a hypnotic analgesia suggestion was affected when imaginative suggestibility was controlled. This is one of the first studies to examine associations of imaginative and hypnotic suggestibility with the response to a well-established suggestion delivered both in and outside of hypnosis.

HYPNOTIZABILITY

The hypnosis literature generally treats hypnotic suggestibility, hypnotic susceptibility, and hypnotizability as synonyms. Nevertheless, hypnosis researchers do not always mean the same thing when they use these labels. Hypnotic susceptibility and hypnotizability were initially thought of as the increase in suggestibility caused by hypnosis (Hull, 1933; Weitzenhoffer & Hilgard, 1962; Hilgard & Tart, 1966). However, standardized hypnotic suggestibility scales do not assess the change in suggestibility resulting from a hypnotic induction (Weitzenhoffer, 1980; Kirsch, 1997). Instead, a score on a hypnotic suggestibility scale shows the number of test suggestions that were passed. This score reflects a combination of the tendency to respond to hypnosis and the tendency to respond to imaginative suggestions independent of hypnosis—and it is impossible to separate one from the other in the score. To pinpoint the effects of inducing hypnosis, it would be necessary to measure both imaginative suggestibility and hypnotic suggestibility and to calculate their difference. However, Hilgard (1981) pointed out that there are statistical problems associated with arithmetic difference scores (i.e. regression to the mean).

Nevertheless, Braffman and Kirsch (1999) operationalized hypnotizability as originally conceptualized by measuring imaginative and hypnotic suggestibility and used regression analysis to avoid the problems associated with arithmetic difference scores. These researchers regressed hypnotic suggestibility on imaginative suggestibility, yielding residual variance reflecting the change in suggestibility produced by inducing hypnosis. This residual variance could then be analysed in relation to other variables. Braffman and Kirsch found that hypnotizability was associated with expectancy and motivation for hypnosis, but not with absorption or fantasy proneness. Soon after, Braffman and Kirsch (2001) showed that hypnotizability was also associated with simple and go/no-go reaction times.

As far as we know, there is only one other report of the ability of hypnotizability, as operationalized by Braffman and Kirsch (1999), to predict a behaviour from the domain of hypnosis. Recently, we showed that hypnotizability was associated with intra-individual differences in responding to an analgesia suggestion delivered both in and outside of hypnosis (Milling et al., 2010). A second purpose of the studies reported herein is to replicate the findings of Milling et al. in order to help establish the predictive utility of hypnotizability, operationalized as hypnotic suggestibility with imaginative suggestibility statistically controlled.

THE CURRENT STUDIES

We assessed imaginative and hypnotic suggestibility by administering a standardized hypnotic suggestibility scale with and without an induction, using the method developed by Braffman and Kirsch (1999). When examining the change in suggestibility due to hypnosis, we performed regression analysis to avoid the problems associated with arithmetic difference scores (Hilgard, 1981). We used these scores to predict the response to a classic glove analgesia suggestion provided both in and outside of hypnosis.

When two or more highly correlated variables (e.g. imaginative and hypnotic suggestibility) are entered together as predictors in a regression, there is potential for high levels of multicollinearity. As multicollinearity increases, it becomes difficult to identify which of the predictor variables account for variance in the dependent variable and the regression coefficients of individual predictors become unreliable. An accepted solution for controlling multicollinearity involves mean-centring the variables included in the regressions by subtracting the mean of each variable from the individual values (see Kutner et al., 2004). To control multicollinearity, we mean-centred the variables in all of the regressions performed in our experiments.

EXPERIMENT 1

In Experiment 1, we wanted to verify the pain-reducing effects of our imaginative and hypnotic analgesia suggestions. Also, we wanted to examine whether imaginative suggestibility predicted the response to the imaginative analgesia suggestion. Finally, we wanted to see whether hypnotic suggestibility predicted the response to the hypnotic analgesia suggestion and how this relationship might be influenced by imaginative suggestibility.

To confirm the effects of our imaginative and hypnotic analgesia suggestions, we compared them with a no-suggestion condition and a placebo condition in relieving finger pressure pain. To examine whether imaginative suggestibility predicted responding to an

imaginative analgesia suggestion, we measured imaginative suggestibility using the approach of Braffman and Kirsch (1999), as well as the effect of our imaginative analgesia suggestion and tested their interaction in regression analysis according to Baron and Kenny's (1986) method of evaluating moderation.

To evaluate whether hypnotic suggestibility predicted responding to a hypnotic analgesia suggestion, we measured hypnotic suggestibility and the effect of our hypnotic analgesia suggestion and tested their interaction in regression analysis. Because imaginative suggestibility has been shown to be the best predictor of hypnotic suggestibility (Braffman & Kirsch, 1999), we were also interested in seeing whether imaginative suggestibility affected the relationship between hypnotic suggestibility and responding to the hypnotic analgesia suggestion. Therefore, we calculated an additional set of regressions that incorporated both imaginative and hypnotic suggestibility as predictors.

Method

Participants. Participants were 71 male and 140 female introductory psychology students who took part to fulfil a course requirement. The mean age of participants was 19.01 years (SD = 2.02, range = 17–35). Of the sample, 78% described themselves as Caucasian, 12% as African-American, 4% as Hispanic, 2% as Asian or Pacific Islander, 1% as American Indian or Alaskan native, and 2% as other.

Apparatus. A Forgione-Barber Strain Gauge Pain Stimulator was used to administer finger pressure pain (Forgione & Barber, 1971). This device consists of a doughnut-shaped weight (900 g) attached to a bar (231 g) that pivots from a hinged support stand at the far end. The weight rests on a support stand at the near end of the device. The index finger is placed on a 5 cm stand in the centre of the device. The bar is about 2 mm wide where it contacts the index finger. It produces 2,041 g of force when it is lowered onto the index finger.

Instruments. Pain intensity was measured on an 11-point visual analog scale ranging from 0 (no pain at all) to 10 (pain as intense as one can imagine). A rating guide with an 18 cm line displayed the 11 numbers and verbal anchors. Participants placed their index finger in the pain stimulator and an audiotape cued them to report a whole number reflecting intensity every 20 sec for one min. The sum of these reports produced an index of overall intensity ranging from 0 to 30. Cronbach's alpha was 0.95 for the baseline pain trial and 0.95 for the post pain trial.

Hypnotic and imaginative suggestibility were assessed using the Carleton University Responsiveness to Suggestion Scale (CURSS; Spanos, Radtke, Hodgins, Stam, & Bertrand, 1983). The CURSS is comprised of a hypnotic induction and seven test suggestions. After experiencing the induction and responding to the test suggestions, participants complete a booklet in which they rate their response to each suggestion.

The CURSS measures three dimensions of suggestibility. *Objective suggestibility* indicates what the participant believes an onlooker would have seen the participant do in response to each suggestion. *Subjective suggestibility* reflects the participant's inner experience of each suggestion. *Involuntariness* measures the extent to which each suggestion was experienced as occurring automatically and without a feeling of effort. We calculated involuntariness as the sum of the seven involuntariness items appearing in the last section

of the CURSS response booklet, with each item scored on a 0–3 scale, rather than as the sum of the items that had been passed objectively and also reported to occur involuntarily, with each item converted to a 0–1 scale, as described in Spanos, Radtke, Hodgins, Stam, & Bertrand (1983).

Spanos, Radtke, Hodgins, Bertrand, Stam, & Dubreuil (1983) report test–retest reliability coefficients of 0.67 to 0.76 for the three CURSS dimensions over a two-week to three-month span. The validity of the CURSS has been demonstrated by high correlations with other measures of suggestibility (Spanos, Radtke, Hodgins, Bertrand, Stam, & Moretti, 1983). The Comey and Kirsch (1999) version of the CURSS used herein replaces goal-directed fantasies with repetition of suggestions, which yields a more normal distribution of scores.

Imaginative and hypnotic suggestibility were assessed using the method developed by Braffman and Kirsch (1999). To assess imaginative suggestibility, the seven CURSS test suggestions were administered without a hypnotic induction. Rather, participants were told to use their imagination to experience the suggestions. To assess hypnotic suggestibility, the CURSS was administered in the standard way. Imaginative suggestibility was always assessed before hypnotic suggestibility because Braffman and Kirsch (1999) reported that when the order of administration was counterbalanced, imaginative suggestibility was inhibited when measured after hypnotic suggestibility, but hypnotic suggestibility was not affected by the order of assessment (see Braffman & Kirsch, 1999, Experiment 1).

Procedure. Participants were recruited to take part in a study comparing an experimental topical analgesic with several different psychological pain control techniques. Eligible participants could not have a medical condition that affected the sensitivity of their left index finger or have previously participated in a hypnosis study in which they had experienced the CURSS test suggestions. The study, including the sample of 211 participants, was completely separate from that of an earlier investigation (Milling, 2009). Participants were randomly assigned in blocks to one of four experimental conditions such that each condition had equal proportions of males and females.

Each participant was run through the study individually by two experimenters. Two experimenters were used in order to reduce the pressure on participants to respond consistently to the pain assessment and the suggestibility assessments. Each experimenter was blind to the information collected during the portion of the experiment he or she did not conduct.

During the initial segment of the study, the first experimenter assessed imaginative suggestibility using the nonhypnotic CURSS. Then, during the middle segment, the first experimenter left the room and a second experimenter entered to perform the pain assessment. On the baseline trial, participants placed their index finger in the stimulator for 1 min and made baseline intensity ratings.

Participants were randomly assigned in blocks to one of four conditions. In the *hypnotic analgesia suggestion* condition, participants heard a hypnotic induction followed by a glove analgesia suggestion adapted from Spanos et al. (1989). In the *imaginative analgesia suggestion* condition, participants did not hear an induction but instead were invited to use their imagination to experience the same glove analgesia suggestion. In the *placebo* condition, an inert solution described as an experimental local topical analgesic was applied to the portion of the index finger contacting the bar of the pain stimulator. The solution was

composed of povo-iodine and oil of thyme. This produces a brown liquid with a medicinal smell that was placed in a bottle labelled 'Trivaricaine: Approved for Research Purposes Only'.

During the post trial, participants were helped to place their left index finger in the stimulator while experiencing a suggestion or the placebo and made postintensity ratings. Individuals in the *no-suggestion* condition waited for the same amount of time that other participants spent receiving the suggestion or placebo. These individuals then placed their left index finger in the stimulator and made postintensity ratings without intervention, just as they had done on the baseline trial.

During the final segment of the study, the second experimenter left the room and the first experimenter returned to assess the participant's hypnotic suggestibility using the standard (i.e. hypnotic) version of the CURSS.

The imaginative suggestibility assessment was sequenced before the pain assessment and the hypnotic suggestibility assessment was sequenced after the pain assessment. The imaginative suggestibility assessment was sequenced before the hypnotic suggestibility assessment because, as previously noted, Braffman and Kirsch (1999) found that imaginative suggestibility was inhibited when assessed after hypnotic suggestibility. Also, the imaginative suggestibility assessment was sequenced before the pain assessment so that participants assigned to the hypnotic analgesia suggestion condition would not erroneously conclude they were somehow being hypnotized during the imaginative suggestibility assessment. Finally, the pain assessment was sequenced before the hypnotic suggestibility assessment to prevent participants assigned to the imaginative analgesia suggestion, placebo, and no-suggestion conditions from mistakenly believing they were somehow being hypnotized while experiencing the pain.

As such, individuals in the imaginative analgesia suggestion, placebo, and no-suggestion conditions were not told that the experiment involved hypnosis until the hypnotic suggestibility assessment. Participants assigned to the hypnotic analgesia suggestion condition were not told the experiment involved hypnosis until after the baseline trial to prevent a *hold-back effect* (Zamansky et al., 1964). In a hold-back effect, participants hold back their responses (e.g. exaggerate the pain) during the baseline trial to leave room for improvement on the post trial due to the effects of hypnosis.

Results

On the objective suggestibility dimension, the nonhypnotic and hypnotic versions of the CURSS yielded mean scores of 3.35 (SD = 1.95; range = 0–7) and 3.06 (SD = 2.17; range = 0–7). The mean difference was significant, $t_{210} = 2.70$, $p < 0.008$. The correlation between nonhypnotic and hypnotic objective scores was 0.72, $p < 0.001$.

On the subjective dimension, the nonhypnotic and hypnotic CURSS produced mean scores of 7.60 (SD = 3.88; range = 0–20) and 7.31 (SD = 5.12; range = 0–21). The mean difference was not significant. The correlation between nonhypnotic and hypnotic subjective scores was 0.75, $p < 0.001$.

Finally, on the involuntariness dimension, the nonhypnotic and hypnotic CURSS yielded mean scores of 6.30 (SD = 4.02; range = 0–18) and 6.61 (SD = 5.29, range = 0–21). The

mean difference was not significant. The correlation between nonhypnotic and hypnotic involuntariness scores was 0.75, $p < 0.001$.

The majority of participants did not show higher suggestibility scores on the hypnotic CURSS than on the nonhypnotic CURSS. The frequency of differences in hypnotic and nonhypnotic objective scores was -5 (1%), -4 (3%), -3 (5%), -2 (9%), -1 (27%), 0 (28%), 1 (15%), 2 (9%), 3 (3%), and 4 (1%). Therefore, 44% of participants passed fewer suggestions in hypnosis, 28% showed no difference, and 28% passed more suggestions in hypnosis. The frequency of differences in subjective scores indicated that 51% of participants scored lower in hypnosis, 12% showed no difference, and 37% scored higher in hypnosis. Finally, the frequency of differences in involuntariness scores showed that 42% of participants scored lower in hypnosis, 15% showed no difference, and 43% scored higher in hypnosis.

Pain intensity ratings produced mean scores of 13.90 (*SD* = 6.59; range = 1–29) on the baseline trial and 10.64 (*SD* = 6.78; range = 0–30) on the post trial. Means and standard deviations for intensity ratings by condition are shown in Table 1. A one-way analysis of variance on baseline intensity ratings did not yield a significant effect for condition, thereby suggesting the comparability of the groups on this variable.

Table 1. Means and standard deviations for pain intensity ratings by condition

	Measure			
	Baseline intensity		Post intensity	
Condition	M	SD	M	SD
Hypnotic analgesia suggestion[a]	14.58	6.60	7.94	5.74
Imaginative analgesia suggestion[b]	13.47	6.69	8.92	5.53
Placebo[c]	12.98	6.74	11.42	7.08
No-suggestion[d]	14.57	6.37	14.21	7.00

[a]n = 52, [b]n = 53, [c]n = 53, [d]n = 53

Within condition, paired-comparisons of baseline and postintensity ratings indicated that baseline to post decreases in intensity were significantly different from 0 in the hypnotic analgesia suggestion ($t_{51} = 10.21$, $p < 0.001$), imaginative analgesia suggestion ($t_{52} = 7.83$, $p < 0.001$), and placebo ($t_{52} = 2.65$, $p < 0.01$) conditions. However, in the no-suggestion condition, baseline to post changes in intensity were not significantly different from 0 ($t_{52} = 0.72$, *ns*).

A one-way analysis of covariance on postintensity ratings, with baseline intensity ratings as the covariate, produced a significant main effect for condition, F (3,206) = 26.90, $p < 0.001$, eta^2 = 0.28. A least significant difference test on estimated marginal means with a Bonferroni adjustment for the number of statistical comparisons revealed that participants in the no-suggestion condition reported more intense pain (adjusted mean = 13.70, *SD* = 7.86) than those in the hypnotic analgesia suggestion condition (adjusted mean = 7.42, *SD* = 7.95) and imaginative analgesia suggestion condition (adjusted mean = 9.25, *SD* = 7.86). Additionally, participants in the placebo condition (adjusted mean = 12.11, *SD* = 7.87) reported more intense pain than those in hypnotic analgesia suggestion and imaginative analgesia suggestion conditions. All of the other pairwise comparisons were nonsignificant.

We predicted that imaginative suggestibility would moderate the response to our imaginative analgesia suggestion. Baron and Kenny's (1986) analytic strategy for testing moderation involves evaluating whether there is an interaction between the hypothesized moderator and the independent variable. Accordingly, we performed a series of hierarchical regressions in which we compared the pain-reducing effects of our imaginative analgesia suggestion condition with that of our no-suggestion condition and tested the interaction of imaginative suggestibility and condition in reducing pain. Three separate hierarchical regressions were generated, one for each dimension of suggestibility.

Table 2 presents the results of these regressions. In each analysis, we regressed postintensity on baseline intensity, imaginative suggestibility, condition, and the interaction of imaginative suggestibility and condition. The regression on the objective dimension shows that after controlling for baseline intensity, postintensity was predicted only by suggestibility and condition.

Table 2. Hierarchical regressions testing moderation of imaginative analgesia suggestion by imaginative suggestibility

Suggestibility Dimension	F	p <	Beta	Eta^2	Tolerance	VIF[a]
Objective						
Baseline intensity	243.17	0.001	0.78	0.71	1.00	1.00
Imaginative suggestibility (IS)	9.99	0.002	-0.16	0.09	0.98	1.03
Condition (C)	44.44	0.001	-0.33	0.31	0.99	1.01
C x IS	3.54	0.063	-0.14	0.03	0.44	2.29
Subjective						
Baseline intensity	258.07	0.001	0.78	0.72	1.00	1.00
Imaginative suggestibility (IS)	24.04	0.001	-0.24	0.19	0.98	1.02
Condition (C)	38.98	0.001	-0.31	0.28	0.98	1.02
C x IS	4.69	0.033	-0.15	0.04	0.47	2.15
Involuntariness						
Baseline intensity	242.02	0.001	0.78	0.71	1.00	1.00
Imaginative suggestibility (IS)	9.82	0.002	-0.16	0.09	0.99	1.01
Condition (C)	41.84	0.001	-0.33	0.29	0.99	1.01
C x IS	5.55	0.020	-0.17	0.05	0.48	2.07

[a]Variance Inflation Factor

The regression on the subjective dimension shows that after controlling for baseline intensity, postintensity was predicted by imaginative suggestibility, condition, and the interaction of suggestibility and condition, thereby indicating a moderator effect. Figure 1 summarizes the interaction of imaginative suggestibility and condition in the regression. Residualized change scores in pain intensity were generated by regressing postintensity on baseline intensity. A scatterplot of residualized change scores and imaginative suggestibility was created, and a regression line was generated for the imaginative analgesia suggestion condition and the no-suggestion condition.

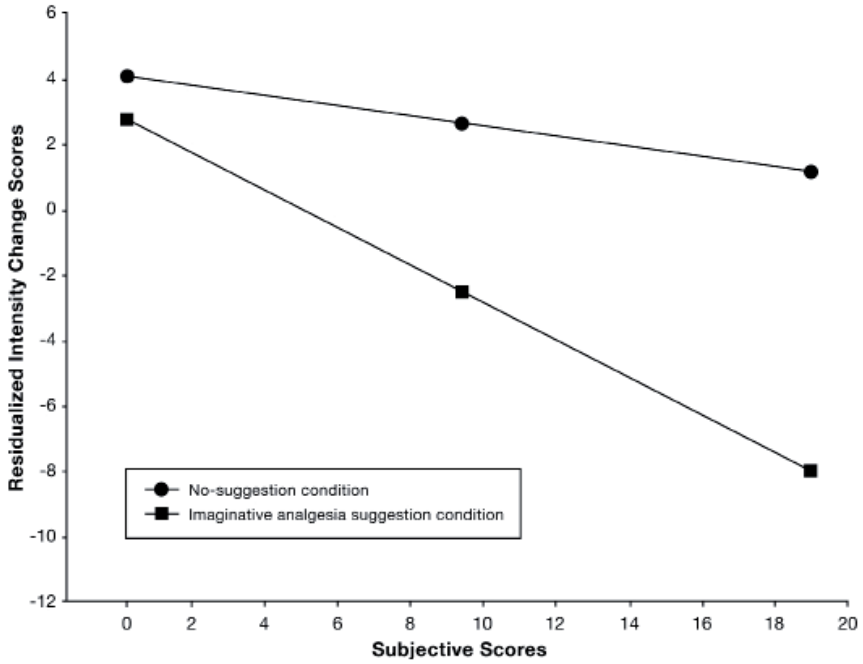

Figure 1. Interaction of subjective dimension of imaginative suggestibiity and condition on residualized pain intensity change scores.

Figure 1 shows that the imaginative analgesia suggestion produced more pain reduction among participants scoring higher on the subjective dimension of imaginative suggestibility than among those scoring lower on suggestibility. However, in the no-suggestion condition, changes in pain were not associated with subjective imaginative suggestibility scores.

A similar pattern of findings was obtained for the involuntariness dimension (see Figure 2). Thus, for both the subjective and involuntariness dimensions, there was a significant moderator effect in which pain reduction was associated with imaginative suggestibility in the imaginative analgesia suggestion condition, but not in the no-suggestion condition.

We also predicted that hypnotic suggestibility would moderate the effect of our hypnotic analgesia suggestion. Using Baron and Kenny's (1986) method of evaluating moderation, we performed a series of hierarchical regressions in which we compared the pain-reducing effects of our hypnotic analgesia suggestion condition with that of our no-suggestion condition and tested the interaction of hypnotic suggestibility and condition. A separate regression was performed for each suggestibility dimension. We were also interested in seeing whether including imaginative suggestibility in the regressions affected the relationship between hypnotic suggestibility and response to the hypnotic analgesia suggestion. Therefore, we calculated a second regression for each suggestibility dimension that added imaginative suggestibility and the interaction of imaginative suggestibility and condition to the prediction equation.

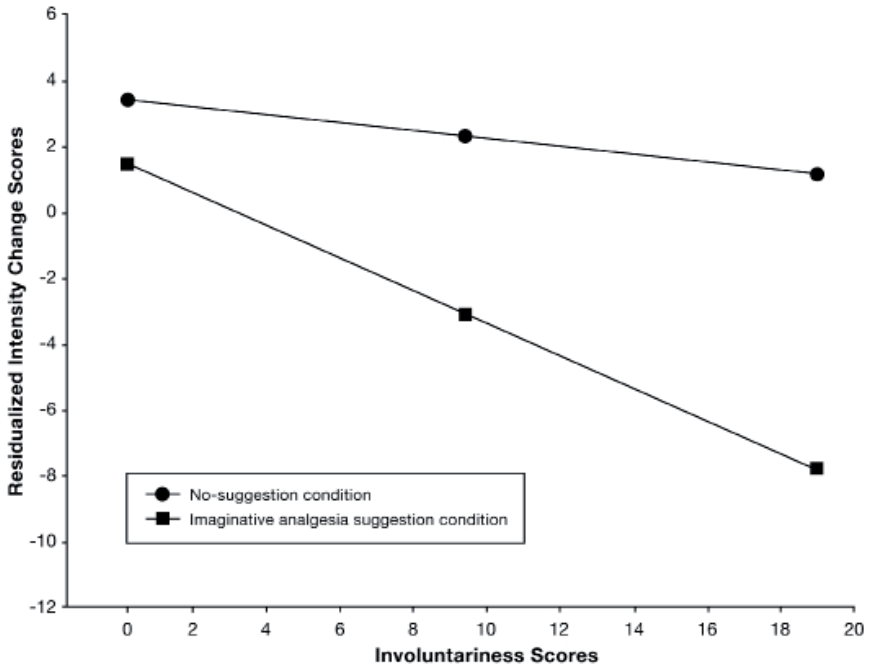

Figure 2. Interaction of involuntariness dimension of imaginative suggestibility and condition on residualized pain intensity change scores.

Table 3 shows the results of these regressions for the objective dimension. In the first analysis, we regressed postintensity on baseline intensity, hypnotic suggestibility, condition, and the interaction of hypnotic suggestibility and condition. After controlling for baseline intensity, postintensity was predicted only by hypnotic suggestibility and condition.

In the follow-up analysis, we regressed postintensity on baseline intensity, imaginative suggestibility, hypnotic suggestibility, condition, the interaction of imaginative suggestibility and condition, and the interaction of hypnotic suggestibility and condition. Braffman and Kirsch (1999) operationally define hypnotizability as hypnotic suggestibility with imaginative suggestibility statistically controlled. Therefore, by entering imaginative suggestibility into the regression immediately before hypnotic suggestibility, the results for hypnotic suggestibility reflect the main effect of hypnotizability. By entering the interaction of imaginative suggestibility and condition into the regression immediately before the interaction of hypnotic suggestibility and condition, the results for the second interaction term reflect the statistical effect of the interaction of hypnotizability and condition. The regression showed that with baseline intensity controlled, postintensity was predicted only by imaginative suggestibility and condition.

Table 3. Hierarchical regressions evaluating prediction of response to hypnotic analgesia suggestion by the objective dimension of suggestibility

Criterion and predictor	F	p <	Beta	Eta^2	Tolerance	VIF[a]
Postintensity						
Baseline intensity	178.38	0.001	0.71	0.64	1.00	1.00
Hypnotic suggestibility (HS)	8.77	0.004	-0.16	0.08	0.99	1.01
Condition (C)	67.20	0.001	-0.44	0.40	1.00	1.01
C x HS	3.00	0.087	-0.13	0.03	0.49	2.06
Postintensity						
Baseline intensity	176.85	0.001	0.71	0.64	1.00	1.00
Imaginative suggestibility (IS)	5.58	0.020	-0.13	0.05	0.99	1.01
Hypnotic suggestibility (HS)	3.40	0.068	-0.13	0.03	0.56	1.80
Condition (C)	67.93	0.001	-0.44	0.41	0.99	1.01
C x IS	1.08	0.300	-0.08	0.01	0.43	2.32
C x HS	1.43	0.235	-0.13	0.01	0.26	3.86

[a]Variance Inflation Factor

Table 4 shows the results of the regressions for the subjective dimension. In the first analysis, we regressed postintensity on baseline intensity, hypnotic suggestibility, condition, and the interaction of hypnotic suggestibility and condition. After controlling for baseline intensity, postintensity was predicted by hypnotic suggestibility, condition, and the interaction of hypnotic suggestibility and condition, thereby indicating a moderator effect. Figure 3 summarizes the interaction of hypnotic suggestibility and condition. The hypnotic analgesia suggestion produced more pain relief among participants scoring higher on the subjective dimension of hypnotic suggestibility. However, in the no-suggestion condition, changes in pain were not associated with subjective hypnotic suggestibility scores.

In the follow-up analysis, we regressed postintensity on baseline intensity, imaginative suggestibility, hypnotic suggestibility, condition, the interaction of imaginative suggestibility and condition, and the interaction of hypnotic suggestibility and condition. With baseline intensity controlled, postintensity was predicted by imaginative suggestibility, hypnotic suggestibility, and condition. Recall that in the previous regression, there was a significant interaction between hypnotic suggestibility and condition, thereby indicating a moderator effect. However, when imaginative suggestibility and the interaction of imaginative suggestibility were included in the follow-up regression, the interaction of hypnotic suggestibility and condition was no longer significant.

Table 4. Hierarchical regressions evaluating prediction of response to hypnotic analgesia suggestion by the subjective dimension of suggestibility

Criterion and predictor	F	p <	Beta	Eta^2	Tolerance	VIF[a]
Postintensity						
Baseline intensity	190.32	0.001	0.71	0.66	1.00	1.00
Hypnotic suggestibility (HS)	22.62	0.001	-0.25	0.18	0.98	1.02
Condition (C)	62.00	0.001	-0.41	0.38	0.96	1.04
C x HS	6.32	0.014	-0.20	0.06	0.43	2.31
Postintensity						
Baseline intensity	194.42	0.001	0.71	0.67	1.00	1.00
Imaginative suggestibility (IS)	22.34	0.001	-0.25	0.19	0.95	1.06
Hypnotic suggestibility (HS)	4.01	0.048	-0.15	0.04	0.47	2.14
Condition (C)	65.57	0.001	-0.42	0.40	0.96	1.05
C x IS	3.61	0.060	-0.14	0.04	0.45	2.21
C x HS	1.51	0.222	-0.14	0.02	0.19	5.31

[a]Variance Inflation Factor

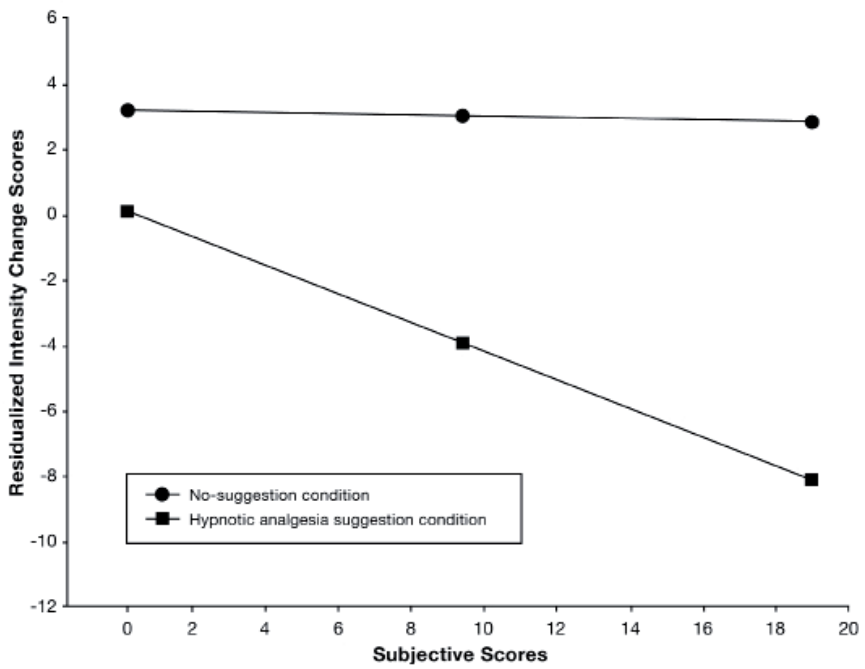

Figure 3. Interaction of subjective dimension of hypnotic suggestibility and condition on residualized pain intensity change scores

A similar pattern of findings was obtained for the involuntariness dimension (see Table 5 and Figure 4). Therefore, for both the subjective and involuntariness dimensions, there

was a significant moderator effect in which pain relief was associated with hypnotic suggestibility in the hypnotic analgesia suggestion condition, but not in the no-suggestion condition. However, when imaginative suggestibility and the interaction of imaginative suggestibility were added to the follow-up regression equations, the interaction of hypnotic suggestibility and condition was no longer significant. Thus, the results indicate that adding imaginative suggestibility to the moderator analysis suppressed the moderation of the hypnotic analgesia suggestion by hypnotic suggestibility.

Table 5. Hierarchical regressions evaluating prediction of response to hypnotic analgesia suggestion by the involuntariness dimension of suggestibility

Criterion and predictor	F	p <	Beta	Eta^2	Tolerance	VIF[a]
Postintensity						
Baseline intensity	190.85	0.001	0.71	0.66	1.00	1.00
Hypnotic suggestibility (HS)	22.94	0.001	-0.25	0.19	0.98	1.02
Condition (C)	63.19	0.001	-0.41	0.39	0.97	1.03
C x HS	5.34	0.023	-0.18	0.05	0.45	2.39
Postintensity						
Baseline intensity	187.49	0.000	0.71	0.66	1.00	1.00
Imaginative suggestibility (IS)	10.41	0.002	-0.17	0.10	0.97	1.03
Hypnotic suggestibility (HS)	12.22	0.001	-0.27	0.11	0.47	2.15
Condition (C)	62.23	0.001	-0.42	0.39	0.96	1.04
C x IS	3.39	0.069	-0.14	0.03	0.46	2.18
C x HS	1.83	0.179	-0.16	0.02	0.19	5.26

[a]Variance Inflation Factor

Recall that we mean-centred the variables included in all regression analyses to control multicollinearity. High levels of multicollinearity are generally thought to be signified by Tolerance values of less than 0.20 and/or by Variance Inflation Factor (VIF) values greater than 10. For example, Kutner et al. (2004) state that high multicollinearity is indicated by a VIF of 10 or greater. The Tolerance and VIF values shown in Tables 2 through 5 fell within acceptable limits, even when imaginative suggestibility and hypnotic suggestibility were included together in the same regressions. This suggests that the regression analyses were not unduly influenced by multicollinearity.

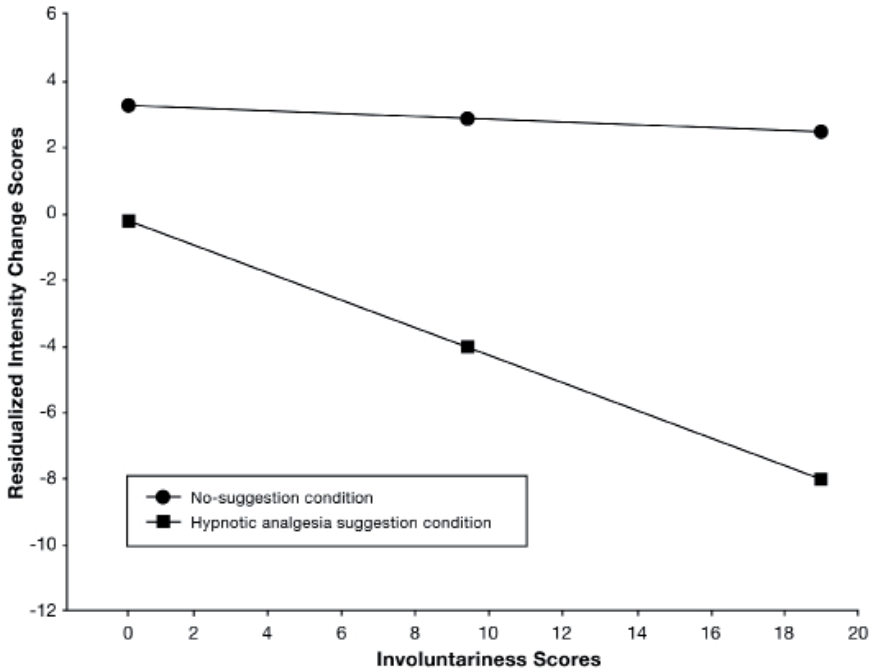

Figure 4. Interaction of involuntariness dimension of hypnotic suggestibility and condition on residualized pain intensity change scores

Discussion

The results of Experiment 1 showed that our hypnotic and imaginative analgesia suggestions reduced pain more than our placebo and no-suggestion conditions, thereby verifying the pain-reducing effects of both analgesia suggestions. Consistent with prediction, the subjective and involuntariness dimensions of imaginative suggestibility moderated the effect of our imaginative analgesia suggestion. Also consistent with prediction, the subjective and involuntariness dimensions of hypnotic suggestibility moderated the effect of our hypnotic analgesia suggestion.

However, when imaginative suggestibility and hypnotic suggestibility were included together as predictors in the follow-up regressions, hypnotic suggestibility no longer moderated the effect of the hypnotic analgesia suggestion. Because Braffman and Kirsch (1999) operationally define hypnotizability as hypnotic suggestibility with imaginative suggestibility statistically controlled, the results of these regressions indicate that the subjective and involuntariness dimensions of hypnotizability did not moderate the effect of the hypnotic analgesia suggestion. This suggests that the association of hypnotizability with the effect of the hypnotic and imaginative analgesia suggestions may be complex and requires a different kind of design to detect.

EXPERIMENT 2

Previously, we reported that hypnotizability (operationalized as hypnotic suggestibility with imaginative suggestibility controlled) predicted intra-individual differences in responding to imaginative and hypnotic analgesia suggestions (Milling et al., 2010). In Experiment 2, we were interested in seeing whether we could replicate these findings with new participants and experimenters. Consequently, we assessed imaginative suggestibility during the initial segment of the study and hypnotic suggestibility during the final segment. During the middle segment, each participant experienced both the imaginative analgesia suggestion, as well as the hypnotic analgesia suggestion.

We counterbalanced the order in which the suggestions were delivered to control for the reactive effects of using a within-subjects design. Half of the participants experienced the imaginative analgesia suggestion followed by the hypnotic analgesia suggestion and the other half experienced the suggestions in the reverse order. Consistent with Milling et al. (2010), we hypothesized that hypnotizability would predict intra-individual differences in responding to the imaginative and hypnotic analgesia suggestions, but only when the hypnotic analgesia suggestion was provided after the imaginative analgesia suggestion.

Method

Participants. Participants were 79 male and 64 female introductory psychology students who took part to fulfil a course requirement. The mean age of participants was 18.99 years (SD = 1.69, range = 17–25). Of the sample, 80% described themselves as Caucasian, 6% as African-American, 4% as Hispanic, 4% as Asian or Pacific Islander, and 5% as other.

Procedure. Participants were recruited to take part in a study evaluating different psychological pain control techniques. To be eligible, participants could not have a medical condition that affected the sensitivity of either index finger or have previously participated in a hypnosis study in which they had experienced the CURSS test suggestions. The sample of 143 participants was completely separate from those in our earlier report (Milling et al., 2010). Participants were randomly assigned to one of two experimental conditions and to one of two orders, in which they alternately placed their left and right index fingers in the stimulator for four 1 min pain trials.

The study utilized the same basic methodology employed in Experiment 1. During the initial segment of the study, the first experimenter assessed imaginative suggestibility with the nonhypnotic CURSS, using the Braffman and Kirsch (1999) procedure.

During the middle segment of the study, the first experimenter left the room and a second experimenter entered to perform the pain assessments. On trial 1, participants placed an index finger in the stimulator and made baseline intensity ratings. On trial 2, participants placed their other index finger in the stimulator and made a second set of baseline intensity ratings.

Participants were randomly assigned to one of two experimental conditions. In the IA-HA condition, participants experienced the imaginative analgesia suggestion on trial 3 followed by the hypnotic analgesia suggestion on trial 4. In the HA-IA condition, participants experienced the hypnotic analgesia suggestion on trial 3 followed by the imaginative analgesia suggestion on trial 4. The suggestions were identical to those used in Experiment 1. On trial 3, participants placed the same index finger in the stimulator that had been

stressed on trial 1 and made intensity ratings. On trial 4, participants placing the same finger in the stimulator that had been stressed on trial 2 and made intensity ratings.

During the final segment of the study, the second experimenter left the room and the first experimenter returned to assess hypnotic suggestibility using the hypnotic version of the CURSS. To prevent a hold-back effect, participants were not informed the study involved hypnosis until they experienced the hypnotic analgesia suggestion.

Results

On the objective suggestibility dimension, the nonhypnotic and hypnotic CURSS yielded mean scores of 3.36 (*SD* = 1.72; range = 0–7) and 3.08 (*SD* = 2.06; range = 0–7). The mean difference was not significant. The correlation between nonhypnotic and hypnotic objective scores was 0.55, $p < 0.001$.

On the subjective dimension, the nonhypnotic and hypnotic CURSS produced mean scores of 7.47 (*SD* = 3.45; range = 0–18) and 7.25 (*SD* = 5.04; range = 0–21). The mean difference was not significant. The correlation between nonhypnotic and hypnotic subjective scores was 0.74, $p < 0.001$.

Finally, on the involuntariness dimension, the nonhypnotic and hypnotic CURSS yielded mean scores of 5.95 (*SD* = 3.62; range = 0–17) and 6.56 (*SD* = 5.03, range = 0–21). The mean increase of 0.61 produced by an induction was significant, $t_{142} = -2.25$, $p < 0.005$. The correlation between nonhypnotic and hypnotic involuntariness scores was 0.76, $p < 0.001$.

Once again, the majority of participants did not show higher suggestibility scores on the hypnotic CURSS than on the nonhypnotic version. The frequency of differences in hypnotic and nonhypnotic objective scores was -5 (1%), -4 (5%), -3 (5%), -2 (13%), -1 (16%), 0 (29%), 1 (13%), 2 (13%), 3 (3%), 4 (1%), 5 (0%), and 6 (1%). Thus, 40% of participants passed fewer suggestions in hypnosis, 29% showed no difference, and 31% passed more suggestions in hypnosis. The frequency of differences in subjective scores indicated that 54% of participants scored lower in hypnosis, 15% showed no difference, and 31% scored higher in hypnosis. Finally, the frequency of involuntariness scores showed that 36% of participants scored lower in hypnosis, 17% showed no difference, and 47% scored higher in hypnosis.

Pain intensity ratings produced mean scores of 14.69 (*SD* = 6.80; range = 3–30) on trial 1, 14.31 (*SD* = 6.72; range = 2–30) on trial 2, 9.48 (*SD* = 6.21; range = 0–29) on trial 3, and 8.40 (*SD* = 6.01; range = 0–28) on trial 4. Means and standard deviations for intensity ratings by condition are shown in Table 6.

We used the analytic approach of Milling et al. (2010) to evaluate the role of hypnotizability in predicting pain reduction. Accordingly, the data were organized on the basis of whether the analgesia suggestion was administered with or without hypnosis. *Hypnotic suggestion pain* consisted of intensity scores following the hypnotic analgesia suggestion (i.e. trial 4 for participants in the IA-HA condition and trial 3 for participants in the HA-IA condition). *Imaginative suggestion pain* consisted of intensity scores following the imaginative analgesia suggestion (i.e. trial 3 for participants in the IA-HA condition and trial 4 for participants in the HA-IA condition).

Table 6. Means and standard deviations for pain intensity ratings by condition

	Condition			
	IA-HA[a]		HA-IA[b]	
Measure	M	SD	M	SD
Trial 1 intensity	14.78	6.68	14.59	6.98
Trial 2 intensity	14.75	6.60	13.84	6.86
Trial 3 intensity	9.90	6.27	9.04	6.17
Trial 4 intensity	8.27	5.69	8.53	6.37

[a]n = 73, [b]n = 70

Counterpart baseline pain indices were generated using the baseline intensity scores for the same index finger. Thus, *hypnotic baseline pain* consisted of trial 2 intensity scores for participants in the IA-HA condition and trial 1 intensity scores for participants in the HA-IA condition. *Imaginative baseline pain* consisted of trial 1 intensity scores for participants in the IA-HA condition and trial 2 intensity scores for participants in the HA-IA condition.

The mean hypnotic suggestion pain score was 8.65 (SD = 5.92) and the mean imaginative suggestion pain score was 9.23 (SD = 6.34). The correlation between hypnotic and imaginative suggestion pain was 0.81, $p < 0.001$. The mean hypnotic baseline pain score was 14.67 (SD = 6.76) and the mean imaginative baseline pain score was 14.32 (SD = 6.76). The correlation between hypnotic and imaginative baseline pain was 0.87, $p < 0.001$.

A series of hierarchical regressions was used to examine hypnotizability as a predictor of intra-individual differences in hypnotic and imaginative pain reduction, following Milling et al. (2010). In each analysis, hypnotic suggestion pain was regressed on hypnotic baseline pain, imaginative suggestion pain, imaginative baseline pain, condition, imaginative suggestibility, hypnotic suggestibility, the interaction of imaginative suggestibility with condition, and the interaction of hypnotic suggestibility with condition. By entering hypnotic baseline pain, imaginative suggestion pain, and imaginative baseline pain into the regression first, the residual variance reflected the difference in the amount of relief generated by the imaginative and hypnotic analgesia suggestions. By entering imaginative suggestibility into the regression before hypnotic suggestibility, the effect of hypnotic suggestibility reflected the contribution of hypnotizability (i.e. hypnotic suggestibility with imaginative suggestibility controlled) to the prediction of differences in the amount of relief produced by the imaginative and hypnotic analgesia suggestions. The condition variable indicated the order in which the imaginative and hypnotic analgesia suggestions had been provided. We hypothesized that hypnotizability would predict differences in relief produced by the imaginative and hypnotic analgesia suggestions, but only when the imaginative suggestion was delivered first (i.e. in the IA-HA condition).

Table 7 shows the results of this analysis for the objective suggestibility dimension. Hypnotic suggestion pain was predicted by hypnotic baseline pain, imaginative suggestion pain, condition, and hypnotic suggestibility. Braffman and Kirsch (1999) operationally define hypnotizability as hypnotic suggestibility with imaginative suggestibility statistically controlled. Because the variance associated with imaginative suggestibility was controlled in this regression, the statistical effect of hypnotic suggestibility indicates that

hypnotizability predicted the difference in responding to the imaginative and hypnotic analgesia suggestion. Higher hypnotizability was associated with greater response to the hypnotic analgesia suggestion than to the imaginative analgesia suggestion (*Beta* = -0.13, $p < 0.02$).

Table 7. Hierarchical regression of hypnotic suggestion pain on imaginative suggestion pain, baseline pain, condition, and objective dimension of imaginative and hypnotic suggestibility

Criterion and predictor	F	p <	Beta	Eta^2	Tolerance	VIF[a]
Hypnotic suggestion pain						
Hypnotic baseline pain	247.25	0.001	0.70	0.65	1.00	1.00
Imaginative suggestion pain	108.18	0.001	0.61	0.45	0.57	1.77
Imaginative baseline pain	0.76	0.386	-0.09	0.01	0.18	5.57
Condition (C)	9.22	0.003	-0.14	0.06	0.98	1.02
Imaginative suggestibility (IS)	3.22	0.075	-0.08	0.02	0.95	1.06
Hypnotic suggestibility (HS)	5.95	0.016	-0.13	0.04	0.66	1.52
IS x C	0.20	0.656	-0.03	0.00	0.52	1.94
HS x C	0.69	0.408	-0.06	0.01	0.33	3.04

[a]Variance Inflation Factor

An identical pattern of results was obtained for the subjective (see Table 8) and involuntariness dimensions (see Table 9). Consequently, for all three dimensions of suggestibility, higher hypnotizability (operationalized as hypnotic suggestibility with imaginative suggestibility statistically controlled) was associated with more pain reduction from the hypnotic analgesia suggestion than from the imaginative analgesia suggestion, regardless of the order in which the suggestions were delivered.

Table 8. Hierarchical regression of hypnotic suggestion pain on imaginative suggestion pain, baseline pain, condition, and subjective dimension of imaginative and hypnotic suggestibility

Criterion and predictor	F	p <	Beta	Eta^2	Tolerance	VIF[a]
Hypnotic suggestion pain						
Hypnotic baseline pain	256.55	0.001	0.70	0.66	1.00	1.00
Imaginative suggestion pain	112.25	0.001	0.61	0.46	0.57	1.77
Imaginative baseline pain	0.79	0.377	-0.09	0.01	0.18	5.57
Condition (C)	9.57	0.002	-0.14	0.07	0.98	1.02
Imaginative suggestibility (IS)	3.42	0.067	-0.09	0.03	0.79	1.26
Hypnotic suggestibility (HS)	8.60	0.004	-0.20	0.06	0.42	2.38
IS x C	1.03	0.313	-0.06	0.01	0.54	1.86
HS x C	2.43	0.122	0.15	0.02	0.21	4.71

[a]Variance Inflation Factor

Table 9. Hierarchical regression of hypnotic suggestion pain on imaginative suggestion pain, baseline pain, condition, and involuntariness dimension of imaginative and hypnotic suggestibility

Criterion and predictor	F	p <	Beta	Eta^2	Tolerance	VIF[a]
Hypnotic suggestion pain						
Hypnotic baseline pain	255.47	0.001	0.70	0.66	1.00	1.00
Imaginative suggestion pain	111.77	0.001	0.61	0.46	0.57	1.77
Imaginative baseline pain	0.78	0.378	-0.09	0.01	0.18	5.57
Condition (C)	9.53	0.002	-0.14	0.07	0.98	1.02
Imaginative suggestibility (IS)	0.96	0.330	-0.05	0.01	0.77	1.30
Hypnotic suggestibility (HS)	12.56	0.001	-0.25	0.09	0.39	2.59
IS x C	0.41	0.524	-0.04	0.00	0.53	1.89
HS x C	0.91	0.341	0.10	0.01	0.19	5.25

[a]Variance Inflation Factor

Tables 7 though 9 indicate that Tolerance and VIF values fell within acceptable limits, even though imaginative suggestibility and hypnotic suggestibility were included together in each of the regressions. This suggests that these analyses were not affected by high levels of multicollinearity.

Discussion

In Experiment 2, using a within-subjects design, we showed that hypnotizability predicted differences within people in responding to the imaginative and hypnotic analgesia suggestions. Hypnotizability, conceptualized as the change in suggestibility produced by a hypnotic induction, predicted intra-individual differences in relief produced by the analgesia suggestion delivered in and outside of hypnosis. This was consistent across the objective, subjective, and involuntariness dimensions of responding. Contrary to expectation, this effect was present regardless of the order in which the hypnotic and imaginative suggestions were provided.

GENERAL DISCUSSION

The aim of these experiments was to evaluate the utility of imaginative suggestibility and hypnotizability (operationalized as hypnotic suggestibility with imaginative suggestibility controlled) for predicting the response to an analgesia suggestion delivered in and outside of hypnosis.

PREDICTIVE UTILITY OF IMAGINATIVE SUGGESTIBILITY

We found that responding to our imaginative analgesia suggestion was moderated by imaginative suggestibility. Pain reduction was associated with the subjective and involuntariness dimensions of imaginative suggestibility in the imaginative analgesia suggestion condition, but not in the no-suggestion condition. Such findings support the predictive utility of imaginative suggestibility.

We also found that responding to our hypnotic analgesia suggestion was moderated by hypnotic suggestibility. Pain relief was associated with the subjective and involuntariness

dimensions of hypnotic suggestibility in the hypnotic analgesia suggestion condition, but not in the no-suggestion condition. These results mirror the findings of a wealth of studies showing an association between hypnotic suggestibility and hypnotic pain reduction (see Montgomery et al., 2000). However, when imaginative suggestibility was entered along with hypnotic suggestibility in the follow-up regressions, hypnotic suggestibility no longer moderated the effect of the hypnotic analgesia suggestion.

These findings may have important theoretical implications. Absorption (Tellegen & Atkinson, 1974) and fantasy proneness (Lynn & Rhue, 1988) are frequently mentioned as correlates of hypnotic suggestibility. However, Braffman and Kirsch (1999) found that absorption and fantasy proneness were no longer associated with hypnotic suggestibility when the variance associated with imaginative suggestibility was controlled. Then, the correlations between these variables and hypnotic suggestibility were very small and non-significant.

Braffman and Kirsch (1999) also reported that when imaginative suggestibility was assessed before hypnotic suggestibility, correlations between the two ranged from 0.53 to 0.82. Similarly, we observed that correlations between imaginative and hypnotic suggestibility were high, ranging between 0.55 and 0.76. It is therefore not surprising that in our study and also in Braffman and Kirsch (1999), when the variance associated imaginative suggestibility was removed from hypnotic suggestibility, the relationship between hypnotic suggestibility and the dependent variables was reduced. Our results and those of Braffman and Kirsch suggest that individual differences in hypnotic suggestibility may largely be accounted for by individual differences in imaginative suggestibility. Together, the findings of these investigations also suggest the possibility that relationships between hypnotic suggestibility and other variables like hypnotic analgesia, fantasy proneness, and absorption may primarily be explained by their common association with imaginative suggestibility. Additional research is needed to illuminate the nature of these relationships.

PREDICTIVE UTILITY OF HYPNOTIZABILITY

In Experiment 1, we showed that imaginative suggestibility moderated the effect of our imaginative analgesia suggestion and hypnotic suggestibility moderated the effect of our hypnotic analgesia suggestion. However, hypnotic suggestibility no longer moderated the effect of our hypnotic analgesia suggestion when imaginative suggestibility and hypnotic suggestibility were included together as predictors in the regression analyses. Because Braffman and Kirsch (1999) operationally define hypnotizability as hypnotic suggestibility with imaginative suggestibility controlled, these results mean that hypnotizability did not moderate the response to the hypnotic analgesia suggestion.

On the other hand, in Experiment 2, we found that hypnotizability predicted differences within people in responding to the hypnotic and imaginative analgesia suggestions. That is, intra-individual differences in imaginative and hypnotic suggestibility were directly associated with intra-individual differences in responding to the imaginative and hypnotic analgesia suggestions. This effect was evident across the objective, subjective, and involuntariness dimensions of suggestibility.

The findings of Experiment 2 are consistent with those of Milling et al. (2010), thereby corroborating the utility of hypnotizability for predicting the effect of adding a hypnotic

induction to a specific suggestion. The results of Experiments 1 and 2, in combination with Milling et al. (2010), argue that relative to the effect of suggestibility, the effect of hypnosis is less robust and may sometimes require a within-subjects design to detect. Other researchers have similarly noted that it is difficult to obtain significant effects for inducing hypnosis unless participants serve as their own controls (Hilgard & Tart, 1966).

Like Braffman and Kirsch (1999), we found that a considerable minority of participants scored higher on imaginative suggestibility than on hypnotic suggestibility. Like Milling et al. (2010), we noted a direct relationship between hypnotizability and intra-individual differences in responding to the imaginative and hypnotic analgesia suggestions. In combination, these studies suggest the possibility that in a clinical situation, some people may experience more relief from an imaginative analgesia suggestion than from a hypnotic analgesia suggestion and that these individuals may well score higher on imaginative suggestibility than on hypnotic suggestibility.

However, because of the way that hypnotic suggestibility is typically assessed, it is impossible to anticipate who will respond more to imaginative suggestions and who will respond more to hypnotic suggestions. A clinician could administer a measure of hypnotic suggestibility to decide whether a client might benefit from the use of hypnosis in psychotherapy. However, the results obtained from a hypnotic suggestibility scale can only provide an estimate of how much that client might respond to hypnotic suggestions. It would not provide an estimate of whether the client might benefit more from hypnotic suggestions or imaginative suggestions. To anticipate whether hypnotic or imaginative suggestions would be of greater benefit, a clinician would need to administer measures of both hypnotic and imaginative suggestibility.

CONCLUSIONS

Our findings provide evidence of the predictive utility of imaginative suggestibility and hypnotizability (conceptualized as the change in suggestibility produced by a hypnotic induction). Imaginative suggestibility moderated responding to an imaginative analgesia suggestion and hypnotic suggestibility moderated responding to a hypnotic analgesia suggestion. However, hypnotizability (operationalized as hypnotic suggestibility with imaginative suggestibility controlled) did not moderate responding to the hypnotic analgesia suggestion. On the other hand, hypnotizability predicted intra-individual differences in responding to the imaginative and hypnotic analgesia suggestions. Thus, hypnotizability may be a useful predictor of the effect of adding a hypnotic induction to a specific suggestion. Our results, in combination with those of Braffman and Kirsch (1999, 2001) and Milling et al. (2010) are consistent with the position that a large portion of individual differences in hypnotic suggestibility may be explained by individual differences in imaginative suggestibility and that a small portion of individual differences in hypnotic suggestibility may be explained by hypnotizability.

Conceptualizing hypnotizability as the change in suggestibility produced by a hypnotic induction has been characterized by some contemporary hypnosis researchers as 'novel' (e.g. Hutchinson-Philips et al., 2007). However, as Kirsch et al. (2007) recently pointed out, it is actually a venerable and perhaps the original way of defining hypnotizability. Certainly, it is a long overlooked way of thinking about hypnotizability. Indeed, as Clark Hull stated

many years ago, 'The essence of hypnosis lies in the fact of *change* in suggestibility' (Hull, 1933: 391, emphasis in original). Conceptualizing and measuring hypnotizability in this way promises to inspire some very interesting lines of research in hypnosis and to advance our understanding of the nature of suggestibility.

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