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Absorption and Hypnotizability: Context Effects Reexamined

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Two independent studies failed to find evidence consistent with Council, Kirsch, and Hafner (1986), who argued that the repeatedly observed correlations between Tellegen's (1981) Absorption Scale (TAS) and hypnosis measures were artifacts of testing context, and de Groot, Gwynn, and Spanos (1988), who claimed evidence for a Gender × Context moderator effect. In the present studies, Ss completed the TAS and other personality questionnaires on 2 occasions: during an independent survey and later immediately prior to an assessment of hypnotizability. In Experiment 1 ($N = 475$), the effect of context on the relation between questionnaire scores and hypnotizability was weak and variable; in Experiment 2 ($N = 434$), these weak effects were reversed. The results reaffirm the construct validity of absorption as both a major dimension of personality and as a predictor of hypnotic responsiveness.

Beginning in the 1960s, several independent lines of psychometric work began to converge on a dimension of personality variously construed as "absorption" (Tellegen, 1981; Tellegen & Atkinson, 1974) and "openness to experience" (Coan, 1972; McCrae & Costa, 1985). A major impetus for this work was the attempt to discover personality correlates of individual differences in response to hypnosis (for reviews, see E. R. Hilgard, 1965; J. R. Hilgard, 1979; Kihlstrom, 1985). Although hypnotizability did not appear to correlate with the dimensions measured on the common personality inventories such as the Minnesota Multiphasic Personality Inventory and California Personality Inventory (e.g., Shor, Orne, & O'Connell, 1962), a number of separate investigations indicated that it did correlate with scales intended to measure imaginative involvement and other hypnotic-like experiences (e.g., As, 1962; J. R. Hilgard, 1965; Lee-Teng, 1965; Shor, 1960; for a summary of early work, see J. R. Hilgard, 1979).

On the basis of this early work, E. R. Hilgard (1965) suggested that the item pools of the most commonly used personality inventories did not in fact sample all aspects of personality and that significant additions would have to be made before they could be used to predict hypnotic response and similar aspects of psychological functioning. This suggestion gained credence with a factor analytic study by Tellegen and Atkinson (1974; see also Tellegen, 1987), who drew on the work of As, J. R. Hilgard, Lee-Teng, and Shor to develop a scale of *absorption*, defined as the subject's "full commitment of available perceptual, motoric, imaginative, and ideational resources to a unified representation of the attentional object" (p. 274).[1] Their study also included items representative of Block's (1965) factors of ego-control (extraversion) and ego-resiliency (neuroticism), the two major factors that run through all personality inventories. Absorption correlated significantly with hypnotizability, but neither dimension correlated with either ego-control or ego-resiliency.

More recent support for the discriminant validity of the absorption construct comes from work on personality structure by McCrae and Costa (e.g., McCrae, 1982, 1987; McCrae & Costa, 1983a, 1983b, 1987). Beginning with a fresh analysis of the scales of Cattell's Sixteen Personality Factor Questionnaire and the work of Coan (1972, 1974), McCrae and Costa (1985) developed a questionnaire measure of "Openness to Experience" (p. 145; and a set of related adjective rating scales viz., the

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[1] More recently, Tellegen (1987) defined absorption as "a disposition, penchant, or readiness to enter states characterized by marked cognitive restructuring," which may be experienced retrospectively as either a dissociative narrowing of attention or as a peak experience involving expanded attention; a "readiness to depart from more everyday life cognitive maps and to restructure also in the process one's representation of one's self and its boundaries." This redefinition is based on content analyses of the Tellegen Absorption Scale (TAS) items and has no bearing on the external validity of the TAS as a predictor of hypnotizability.

Neuroticism-Extraversion Openness—NEO—Personality Inventory) that taps much the same domain as the Tellegen Absorption Scale (TAS). In McCrae and Costa's (1985) construction, openness has several different facets including "a rich fantasy life, aesthetic sensitivity, awareness of inner feelings, need for variety in actions, intellectual curiosity, and liberal value systems" (p. 145). McCrae and Costa (1985) reported a correlation of .56 between the TAS and their summary measure of openness; most of the correlation was carried by the Fantasy, Esthetics, and Feelings subscales of the openness measure. In addition, openness shows significant positive correlations with artistic and imaginative vocational interests (Costa, McCrae, & Holland, 1984), divergent thinking and sensation seeking (McCrae, 1987), and level of ego development (McCrae & Costa, 1980) and significant negative correlations with traditional family ideology (Costa & McCrae, 1978).

A related line of research has been pursued by Lynn and his colleagues on the construct of "fantasy proneness" (e.g., Lynn & Rhue, 1988). Taking as their point of departure the clinical interview studies of Wilson and Barber (1981, 1983), which in turn were inspired by the studies of J. R. Hilgard (1965, 1979), Lynn and his colleagues developed a questionnaire measure of fantasy proneness that correlates positively with both hypnotizability and absorption (e.g., the Inventory of Childhood Memories and Imaginings—ICMI; Lynn & Rhue, 1986). Like openness to experience, fantasy proneness appears to be an alternative construal of absorption; together, the three constructs appear to reflect varying perspectives on a single, broad dimension of individual differences that has gone largely unrecognized in traditional analyses of the structure of personality.

Although some support for the external validity of the absorption construct is available from studies on its relation to performance on a muscle-tension biofeedback task (Qualls & Sheehan, 1981a, 1981b), the most pervasive evidence for its validity has come from the repeated finding of its relation to standardized scales of hypnotic responsiveness (for reviews, see J. R. Hilgard, 1979; Kihlstrom et al., 1989; Nadon, Laurence, & Perry, 1987; Roche & McConkey, 1990). For example, Table 1 summarizes the results of four large-scale studies in which the TAS was correlated with hypnotizability. The correlations, which hover around .22, are representative of the values obtained with the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A; Shor & Orne, 1962) in other laboratories, although there is some evidence for a stronger relation with Weitzenhoffer and Hilgard's (1962) more difficult Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C; e.g., Nadon et al., 1987). Regardless of the magnitude of the effect, the pattern of significant correlations is of theoretical interest, as it simultaneously provides evidence for the construct validity of absorption and links hypnosis to the experiences of everyday life.

A study by Council, Kirsch, and Hafner (1986), however, raised important questions concerning the generalizability of these findings. Using a between-groups multiple regression strategy, Council et al. reported that the relation between absorption and hypnotizability, as measured by Finke and Macdonald's (1978) unstandardized 10-item group version of SHSS:C was statistically significant only when the TAS was administered just prior to hypnosis testing; absorption did not correlate significantly with hypnotic response when the questionnaire was administered to other subjects in an earlier, nonhypnotic session. Interpreting their results from within a response expectancy framework outlined by Kirsch (1985), Council et al. (1986) argued that

> the relation of the Absorption Scale . . . and similar measures to hypnotic responsivity is *highly reactive* [italics added] to contextual factors and is probably mediated by subjects' expectancies. Administering the Absorption Scale to hypnotic subjects may implicitly suggest that imaginative processes are important in hypnosis, which in turn could influence levels of expectancy for successful hypnotic responding. The likelihood that past research has been confounded in this way must be considered when one evaluates theories and research that have stressed imaginative involvement and related constructs in explanations of hypnotic behavior. (p. 188)

Table 1
Representative Correlations Between Absorption and Hypnotizability

Study	*n*	*r*
Kihlstrom et al. (1980)[a]	1,300	.27
Hoyt et al. (1989)[b]		
Sample 1	479	.22
Sample 2	476	.26
Kihlstrom et al. (1989)[b]		
Sample 1	486	.17
Sample 2	465	.19
Sample 3	393	.22
Sample 4	521	.21
Sample 5		
Glisky et al. (in press)[c]		
Sample 1	430	.23
Sample 2	370	.23
Sample 3	159	.17

[a] Data collected at Harvard University and University of New Hampshire. [b] Data collected at University of Wisconsin. [c] Data collected at University of Arizona.

Although Council et al. (1986) concluded that the relation between absorption and hypnotizability was "highly reactive" (p. 188) to contextual factors, this strong conclusion was not firmly grounded in their empirical results. Although significant context effects were consistently found between absorption and subjective responses to hypnosis, the effect of context on the corresponding relation involving behavioral response to hypnosis reached a marginal level of statistical significance ($p < .10$) in only one of their three analyses. This is significant because behavioral rather than subjective response to hypnosis has served as the criterion in studies of the absorption–hypnosis relationship. Also, the path analysis did not actually show that the relation between absorption and hypnotic response was mediated by expectancies: In fact, the absorption variable was omitted from the analysis on technical grounds. Moreover, Council et al.'s path analysis showed that response to hypnotic suggestion was most strongly determined by expectancies that were themselves influenced by the subjects' response to the hypnotic induction procedure.

The study by de Groot, Gwynn, and Spanos (1988) claimed partial replication of Council et al. (1986). In this study, de Groot et al. failed to obtain contextual effects on the relation

between absorption and the various subscales of the Carleton University Responsiveness to Suggestion Scale (CURSS; Spanos et al., 1983); however, when they analyzed men and women separately, women but not men showed the effect in some analyses. This procedure, in our view, sidestepped the crucial issue of whether men and women differed in demonstrating the effect. In the absence of this difference, there is no effect of gender. Nonetheless, because the de Groot et al. findings suggested the possibility of a moderator effect of gender on the context effect as initially reported by Council et al. (1986), we examined our data for this effect.

Taken together, the findings of Council et al. (1986) and of de Groot et al. (1988) are of substantial theoretical importance. Despite methodological concerns in the Council et al. study (using an unstandardized hypnotizability scale) and statistical concerns in de Groot et al. (examining men and women separately without evidence that men and women differed on contextually mediated responses), jointly the findings undermine a reliable personality correlate of hypnotizability and impeach the external validity of the absorption/openness construct. Because the empirical evidence supporting the context effect seemed both weak and variable, we carried out a pair of studies intended as conceptual replications of the Council et al. study, using larger subject samples and powerful statistical methods. In addition to analyzing the relation between absorption and hypnotizability, several other experiential correlates of hypnotizability were also examined, to estimate the generalizability of any context effects obtained.

Experiment 1

Method

Subjects. Four hundred seventy-five subjects were administered the TAS (Tellegen, 1981, 1982; Tellegen & Atkinson, 1974), the Perceptual Alteration Scale (PAS; Sanders, 1986), and the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986). For convenience, the scales were packaged into a single questionnaire. The questionnaire package was initially completed in a nonhypnotic context, as part of an introductory psychology student survey routinely conducted at the University of Wisconsin, and then again, approximately 2 weeks later, by a subset of volunteers immediately prior to hypnosis testing. For this latter part of the experiment, subjects were administered Shor and Orne's (1962) HGSHS:A in groups of approximately 100 subjects.

Measures. The relation between two sets of measures was of interest for the present study; they are labeled *experiential* and *hypnosis* measures for expositional clarity. The three experiential measures were the TAS, PAS, and DES. The format of these inventories differed from the original versions in that all items were scored on a 4-point scale in which 0 represented a negative response and 1, 2, and 3 represented increasing degrees of endorsement. The three hypnosis measures were derived from administration of the HGSHS:A. They were (a) the standard behavioral scoring of the HGSHS:A, corrected by taking into account the reversibility of posthypnotic amnesia (Kihlstrom & Register, 1984), (b) the subjective success on the hypnotic suggestions, which subjects scored on a 1–4 scale, and (c) an eight-item version of Field's (1965) Inventory of Hypnotic Depth.

Results

Comparison of correlations. Table 2 contains the correlation matrix for all measures for the total sample and also by gender. The results displayed here offer limited support for the contextual hypothesis. For the total sample, all nine correlations between the hypnosis and the experiential measures administered in the explicitly hypnotic context were statistically significant, whereas six of the correlations involving the experiential measures administered in the nonhypnotic survey context were significant. None of the nonsignificant correlations in the nonhypnotic context, however, involved the TAS. Furthermore, although the correlations obtained in the hypnotic context were consistently higher than their counterparts from the survey context, only one pair of correlations provided evidence for a context effect by the more appropriate test of differences between the coefficients; only the correlations between DES and subjective response to hypnosis differed across contexts, $r = .18$ vs. .10, $t(473) = 2.36$, $p < 0.05$.

Table 2 also lists the various correlations separately for men and women. No support was found for the higher order Gender × Context moderator effect described by de Groot et al. (1988). Three correlation coefficients in these analyses showed statistically significant levels in the hypnotic context but not in the survey context. Contrary to what was found by de Groot et al., however, these significant correlations were found for men only; moreover, none of the correlation coefficients differed across context for either men or women.

The important result from this initial analysis pertained to the TAS, whose validity as a predictor of hypnotizability was specifically challenged by Council et al. (1986). No evidence was found for a significant context effect on the correlation between absorption and hypnotizability in either the total sample or the by-gender analyses. Nonetheless, because all correlations were in the direction predicted by a contextual hypothesis, we pursued the question further with two more-powerful mixed-model multiple regression strategies described by Cohen and Cohen (1983).

Mixed-model regression analyses. The first set of analyses followed a general strategy for mixed-model regression, which is conceptually identical to the more familiar mixed-model analysis of variance. Nine analyses of this type were conducted (with Model II error terms throughout, as is customary with mixed-model designs), each pairing an experiential measure with a hypnosis one. In these analyses, a context effect on the correlation between the experiential and the hypnosis measures was represented by the interactions between the hypnosis variables and context, which account for some proportion of the within-subjects variance.[2]

Table 3 contains the results of these analyses. All main effects for the hypnosis measures were found to be statistically significant, indicating that each experiential measure (averaged across testings) was positively related to each hypnosis measure. Similarly, each main effect for context was found to be significant, reflecting changes in subjects' scores across the two administra-

[2] At the time of analysis, we had access only to statistical software packages that did not allow within-subjects regression analyses to be done in a canned fashion; Cohen and Cohen (1983; pp. 438–439) describe how the analyses are done under these circumstances. Happily, personal computer desktop programs are now readily available that preclude the otherwise tedious additional hand computations.

Table 2
Correlation Matrices for Total Sample and for Women and Men (Experiment 1)

Measure	1	2	3	4	5	6	7	8	9
				Total sample					
1. HGSHS:A beh.	—	.77	.42	*.14*	*.07*	*.08*	**.17**	**.11**	**.14**
2. HGSHS:A sub.		—	.51	*.19*	*.09*	*.10*	**.22**	**.16**	**.18**
3. Field Depth			—	*.10*	*.13*	*.07*	**.11**	**.14**	**.10**
4. TAS (survey)				—	.64	.70	.82	.51	.56
5. PAS (survey)					—	.83	.46	.76	.61
6. DES (survey)						—	.55	.66	.75
7. TAS (hypnosis)							—	.61	.70
8. PAS (hypnosis)								—	.82
9. DES (hypnosis)									—
				By gender					
1. HGSHS:A beh.	—	.74	.36	*.08*	*.04*	*.04*	**.10**	**.06**	**.09**
2. HGSHS:A sub.	.80	—	.44	*.15*	*.05*	*.05*	**.16**	**.10**	**.12**
3. Field Depth	.48	.58	—	*.05*	*.09*	*.01*	**.06**	**.09**	**.05**
4. TAS (survey)	*.18*	*.20*	*.15*	—	.63	.73	.88	.55	.65
5. PAS (survey)	*.08*	*.12*	*.17*	.64	—	.82	.51	.86	.70
6. DES (survey)	*.12*	*.15*	*.15*	.68	.83	—	.64	.75	.84
7. TAS (hypnosis)	**.24**	**.28**	**.17**	.74	.37	.43	—	.57	.72
8. PAS (hypnosis)	**.15**	**.21**	**.19**	.43	.62	.54	.65	—	.81
9. DES (hypnosis)	**.19**	**.23**	**.17**	.42	.47	.62	.66	.83	—

Note. HGSHS:A = Harvard Group Scale of Hypnotic Susceptibility, Form A; beh. = behavioral response; sub. = subjective success; Field Depth = Field's Inventory of Hypnotic Depth; TAS = Tellegen Absorption Scale; survey = survey context; PAS = Perceptual Alterations Scale; DES = Dissociative Experiences Scale; hypnosis = hypnosis context. For the total-sample matrix, $N = 475$, $r > .08$, $p < .05$. For the by-gender matrix, values above the diagonal are for women and below the diagonal are for men. n (women) = 272, $r > .11$, $p < .05$; n (men) = 203, $r > .13$, $p < .05$. Values in italics are from the survey context; values in bold are from the hypnotic context. All tests were two-tailed and uncorrected for multiple comparisons.

tions of the experiential measures; the negative sign indicates that scores on all experiential measures were significantly lower when administered the second time, before hypnosis.

The question of primary interest in this analysis was whether this change across contexts was systematically related to any of the hypnosis measures. All the interaction effects were in the positive direction, consistent with the hypothesized context effect. None of the interactions, however, were found to be significant for the TAS, indicating that there were no context effects on any of the relations between this variable and hypnosis. For the DES, small but statistically significant context effects were found for two of the three correlations (accounting for 0.86% and 1.32% of within-subjects variance, respectively). Similarly, a small context effect was found for one of three correlations involving the PAS (accounting for 1.02% of within-subjects variance). Finally, no three-way Context × Hypnosis Variable × Gender interactions were found, indicating no differential context effect for women and men.

Regressed-change analyses. A final set of analyses used a powerful regression design that can be used in the special case of pre-postscore repeated measures designs, which is described by Cohen and Cohen (1983; pp. 413–423). The analysis again proceeds hierarchically, but scores on the experiential measures assessed in the hypnotic context now serve as the criterion variable. The corresponding scores from the survey are entered first, leaving residual variance. The respective hypnosis measures are entered next, allowing the correlation between those measures and regressed change to be assessed. Because regressed change is like a change score (although without the undesirable possibility of being correlated with the prescore), positive relations between regressed change and the hypnosis measures would provide evidence of context effects.

Table 4 contains the results of these analyses. Again, all the effects on regressed change were in the positive direction, as predicted by the context hypothesis. In contrast to the preceding analyses, this is the only instance in which significant context effects on the relations between absorption and any hypnosis variables were observed, although again the effects were small. HGSHS:A Behavioral and HGSHS:A Subjective scores accounted for an additional 1.12% and 1.62% of the variability of the hypnosis context TAS scores (with survey context TAS scores partialed), respectively; there was no significant context effect involving the hypnotic depth scale. Similarly, HGSHS:A Behavioral scores explained an additional .76%, and HGSHS:A Subjective scores explained an additional 1.86%, of the variability in PAS scores. These same two hypnosis measures also explained 1.51% and 2.30% of variability in DES scores, respectively. Again, no moderator effect for gender was observed.

Experiment 2

Experiment 1, although it used large samples and powerful statistical techniques, yielded limited evidence for the predicted context effect on the absorption/hypnotizability correla-

Table 3
Mixed-Model Regression Analyses (Experiment 1)

Experiential variable	*r*	*F*	*p*
1. Hypnosis variable: HGSHS:A beh.			
TAS			
Main effect of context	−.14	9.31	.01
Main effect of HGSHS:A beh.	.16	12.96	.001
Context × HGSHS:A interaction	.07	2.19	*ns*
PAS			
Main effect of context	−.14	9.14	.01
Main effect of HGSHS:A sub.	.10	4.52	.05
Context × HGSHS:A Beh. interaction	.06	1.59	*ns*
DES			
Main effect of context	−.13	8.69	.01
Main effect of HGSHS:A beh.	.12	6.74	.05
Context × HGSHS:A Beh. interaction	.09	4.16	.05
2. Hypnosis variable: HGSHS: A sub.			
TAS			
Main effect of context	−.14	9.32	.01
Main effect of HGSHS:A sub.	.22	22.92	.001
Context × HGSHS:A Sub. interaction	.07	2.74	.10
PAS			
Main effect of context	−.14	9.20	.01
Main effect of HGSHS:A sub.	.13	8.52	.01
Context × HGSHS:A Sub. interaction	.10	4.80	.05
DES			
Main effect of context	−.13	8.73	.01
Main effect of HGSHS:A sub.	.15	10.48	.01
Context × HGSHS:A Sub. interaction	.11	6.45	.05
3. Hypnosis variable: FDS			
TAS			
Main effect of context	−.14	9.27	.01
Main effect of hypnotic depth	.11	5.84	.05
Context × Depth interaction	.03	<1	*ns*
PAS			
Main effect of context	−.14	9.12	.01
Main effect of hypnotic depth	.14	9.71	.01
Context × Depth interaction	.00	<1	*ns*
DES			
Main effect of context	−.13	8.63	.01
Main effect of hypnotic depth	.09	4.14	.05
Context × Depth interaction	.05	1.13	*ns*

Note. df for all effects = 1, 473. HGSHS:A beh. = behavioral response on Harvard Group Scale of Hypnotic Susceptibility, Form A; TAS = Tellegen Absorption Scale; PAS = Perceptual Alterations Scale; DES = Dissociative Experiences Scale; sub. = subjective success of the HGSHS:A; FDS = Field's Inventory of Hypnotic Depth.

tion. Nevertheless, because all the effects were in the direction predicted by the context effect hypothesis and because significant effects of context were found on the association between hypnotic response and other personality variables, it seemed prudent to return to the question again.

Experiment 2 used the TAS (in its original true/false format) as a predictor of hypnotizability; instead of the PAS and DES, Experiment 2 used a relaxation scale (true/false) as a test of the generalizability of the context hypothesis. Suggestions for relaxation are commonly used in hypnotic procedures, and subjects who have been hypnotized in this way commonly find the procedure to be relaxing (Edmonston, 1981). Thus, relaxation seemed to possess face validity as a predictor of hypnosis. Because Council et al. (1986) explicitly argue that context effects can produce an artificial (i.e., expectancy-mediated) correlation between hypnotizability and any face-valid predictor scale, we decided to use a relaxation scale, even though an earlier study failed to obtain a significant correlation between a short version of the scale and hypnotizability (Kihlstrom et al., 1989).

Although we intended to perform a fair conceptual replication of the Council et al. (1986) study, our failure to replicate their findings in either experiment could be attributed to our choice of within-subjects rather than between-groups designs. As Council et al. discussed, their design did not permit an informed choice between two alternative explanations of their findings. The context effect that they observed could have been due to the reactivity of the absorption measure—that is, subjects who differed in hypnotizability may have responded differentially to the absorption measure, depending on the context in which it was administered. Our results of Experiment 1 argue against this hypothesis; change in absorption scores across contexts did not vary systematically with hypnotizability.

Experiment 1, however, did not permit the evaluation of the alternative hypothesis proposed by Council et al. (1986) and the one that they favored. By this account, completing the absorption measure in the hypnotic context changes how subjects respond to the hypnosis measure; according to this view, prior completion of the absorption measure in a context divorced of hypnosis does not create response expectancies for hypnotic performance and thus does not affect subjects' hypnotic responses. To address these questions, Experiment 2 was designed to permit two types of between-groups analyses and to replicate the mixed-model analyses of Experiment 1.

Method

Four hundred thirty-four subjects were administered the TAS and a 34-item relaxation questionnaire (RQ) devised especially for the pres-

Table 4
Regressed Change Analyses (Experiment 1)

Correlation	*r*	*F*	*p*
1. Experiential variable: TAS			
Test/retest	.82	1003.52	.001
Behavioral Response/Regressed Change	.11	5.30	.05
Subjective Success/Regressed Change	.13	7.83	.01
Field Depth Scale/Regressed Change	.06	1.61	*ns*
2. Experiential variable: PAS			
Test/retest	.76	643.24	.001
Behavioral Response/Regressed Change	.09	3.60	.10
Subjective Success/Regressed Change	.14	8.96	.01
Field Depth Scale/Regressed Change	.06	1.74	*ns*
3. Experiential variable: DES			
Test/retest	.75	592.71	.001
Behavioral Response/Regressed Change	.12	7.20	.01
Subjective Success/Regressed Change	.15	11.15	.001
Field Depth Scale/Regressed Change	.07	2.50	*ns*

Note. df for test/retest = 1, 473; *df* for all others = 1, 472. TAS = Tellegen Absorption Scale; PAS = Perceptual Alterations Scale; DES = Dissociative Experiences Scale.

Table 5
Correlation Matrices for Total Sample and for Women and Men (Experiment 2)

Measure	Group 1[a]						Group 2[b]						
	1	2	3	4	5	6	1	2	3	4	5	6	7
Total sample													
1. HGSHS:A beh.	—	.77	.22	*.25*	*.16*	**.24**	—	.76	.15	*.18*	*.22*		**.18**
2. HGSHS:A sub.		—	.29	*.24*	*.16*	**.21**		—	.20	*.05*	*.20*		**.13**
3. Field Depth			—	*.14*	*.05*	**.12**			—	*.19*	*.06*		**.04**
4. TAS (survey)				—	.12	.81				—	.13		.14
5. RQ (survey)					—	.04					—		.77
6. TAS (hypnosis)						—						—	
7. RQ (hypnosis)													—
By gender													
1. HGSHS:A beh.	—	.70	.24	*.27*	*.16*	**.28**	—	.80	.06	*.18*	*.21*		**.10**
2. HGSHS:A sub.	.83	—	.24	*.23*	*.22*	**.20**	.68	—	.16	*.10*	*.27*		**.12**
3. Field Depth	.16	.34	—	*.21*	*.14*	**.20**	.21	.21	—	*.11*	*.01*		**−.04**
4. TAS (survey)	*.16*	*.20*	*−.03*	—	.16	.81	*.13*	*−.05*	*.21*	—	.21		.18
5. RQ (survey)	*.20*	*.14*	*−.11*	.10	—	.10	*.30*	*.13*	*.17*	.08	—		.75
6. TAS (hypnosis)	**.16**	**.18**	**−.08**	.81	−.03	—						—	
7. RQ (hypnosis)							**.38**	**.20**	**.19**	.21	.78		—

Note. HGSHS:A = Harvard Group Scale of Hypnotic Susceptibility, Form A; beh. = Behavioral response; sub. = subjective success; Field Depth = Field's Inventory of Hypnotic Depth; TAS = Tellegen Absorption Scale; survey = survey context; RQ = relaxation questionnaire; hypnosis = hypnosis context. For the total-sample matrices, $r > .13$, $p < .05$. For the by-gender matrices, values above the diagonal are for women; values below the diagonal are for men. n (women; TAS twice) = 127, $r > .17$, $p < .05$. n (men; TAS twice) = 82, $r > .21$, $p < .05$. n (women; RQ twice) = 132, $r > .16$, $p < .05$. n (men; RQ twice) = 93, $r > .20$, $p < .05$. Values in italics are from the survey context; values in bold are from the hypnotic context. All tests were two-tailed and uncorrected for multiple comparisons.

[a] Subjects who received TAS twice (n = 209).

[b] Subjects who received RQ twice (n = 225).

ent study.[3] Both questionnaires were administered to all subjects in the introductory psychology survey. Of these subjects, 209 received the TAS, and 225 received the RQ approximately 2 weeks later, immediately prior to hypnosis testing. Otherwise, the conditions of testing were identical to those reported for Experiment 1.

Results

Comparison of correlations. This first set of analyses followed the procedures outlined in Experiment 1. Table 5 contains the correlation matrix for all measures for the total sample and also by gender. For the total sample, three of six correlations between the hypnosis and the experiential measures administered in the hypnotic context, compared with five of six correlations obtained outside the hypnotic context, were significant. Both instances in which correlations were statistically significant in one context but not the other showed an effect opposite to that predicted by the contextual hypothesis—that is, significance was obtained when the experiential scales were administered in the survey context. Although these results generally run counter to the context hypothesis, the most important finding was that of no significant differences between corresponding correlations. Also, as in Study 1 and contrary to de Groot et al.'s (1988) findings, no evidence was found for a gender moderator effect; when the correlation coefficients for men and women were examined separately, none reached uncorrected levels of statistical significance in one context but not the other, and none of the correlations differed across contexts. Moreover, similar results were obtained with the type of regression analyses reported in Experiment 1. None of the regressed change analyses showed overall or gender-moderated context effects; two mixed-model analyses of the RQ showed gender effects, but opposite to those reported by de Groot et al.

Between-groups analyses. Various correlation coefficients were examined for context effects. Subjects were divided into two groups. Those who were administered the TAS twice (but the RQ only in the survey context) formed Group 1; those who received the RQ twice (but the TAS only in the survey context) formed Group 2. The correlations between the hypnosis measures and the TAS administered before hypnosis (Group 1) were compared with the correlations between the same hypnosis measures and the TAS administered in the survey (Group 2). Similarly, the correlations between the hypnosis measures and the RQ administered before hypnosis (Group 2) were compared with the correlations between the hypnosis measures and the RQ administered in the survey (Group 1). None of the correlations were found to differ significantly from each other for the total sample. When divided according to gender, two correlations were found to differ for men; the correlation between

[3] The relaxation questionnaire was an expanded version of the Relaxation subscale of the Wisconsin Experience Questionnaire (Kihlstrom et al., 1989).

Table 6
Between-Groups Regression Analyses (First Series; Experiment 2)

Experiential variable	*r*	*F*	*p*
1. Hypnosis variable: behavioral response			
Absorption			
Main effect of context	.03	<1	*ns*
Main effect of TAS	.21	20.46	.001
Context × TAS interaction	.02	<1	*ns*
Relaxation			
Main effect of context	.03	<1	*ns*
Main effect of RQ	.17	13.02	.001
Context × RQ interaction	.00	<1	*ns*
2. Hypnosis variable: subjective success			
Absorption			
Main effect of context	.06	1.45	*ns*
Main effect of TAS	.13	7.34	.01
Context × TAS interaction	.07	2.05	*ns*
Relaxation			
Main effect of context	.06	1.45	*ns*
Main effect of RQ	.15	9.44	.01
Context × RQ interaction	.02	<1	*ns*
3. Hypnosis variable: Field's Inventory of Hypnotic Depth			
Absorption			
Main Effect of context	.02	<1	*ns*
Main Effect of TAS	.16	10.34	.001
Context × TAS interaction	.05	1.19	*ns*
Relaxation			
Main effect of context	.02	<1	*ns*
Main effect of RQ	.04	<1	*ns*
Context × RQ interaction	.00	<1	*ns*

Note. Behavioral response and subjective success refer to the Harvard Group Scale of Hypnotic Susceptibility, Form A; TAS = Tellegen Absorption Scale; RQ = relaxation questionnaire. $df = 1, 430$.

Field's Inventory of Hypnotic Depth and the TAS administered in hypnosis, $r(80) = -.08$, was lower than the correlation between Field's measure and the TAS administered in the survey, $r(91) = .19$, $z = 1.96$, $p = .05$.

Hierachical regression analyses of the type performed by Council et al. (1986) mirrored these results. As in their study, the hypnosis measures served as criterion variables; a context hypothesis would be supported in these analyses by significant Group × Experiential Measure interactions, meaning that the slopes of the relations between hypnotic and experiential measures depended on the context in which the latter were assessed. Table 6 contains the analysis summaries. None of the interactions for the total sample were found to be significant.

As in the correlation comparisons, one analysis gave evidence of moderator effect for gender. Examination of the relation between the Field measure and RQ separately for men and women showed no change in slopes across contexts for women (.021 vs. .090), $F(1, 255) = 2.54$; $p > .10$, and a decrease for men (from .116 to −.052), $F(1, 171) = 4.32$; $p < .05$.

The response expectancy interpretation of the context hypothesis favored by Council et al. (1986), however, still could account for our failure to replicate the context effect in the preceding analyses in terms of design differences. Because the subjects who received a particular experiential measure only in the survey (e.g., TAS) nonetheless received the other measure before hypnosis (e.g., RQ), the second measure could then be seen as creating response expectancies in its own right. It then could be argued that the relation between the first experiential measure administered out of context and the hypnosis variable was a direct consequence of response expectancies established before hypnosis rather than a genuine relation.

To test this hypothesis, we conducted a second series of between-groups analyses, using an incremental (Model I) strategy. For these analyses, the hypnosis measures were again the criterion variables. The experiential measure administered before hypnosis was entered first into the analysis, followed by the other experiential measure, which had been administered earlier in the survey. If the relation between the hypnosis variable and the measure administered during the survey were solely a result of expectancies created by the measure administered before hypnosis, the survey measure would necessarily explain no significant variance over that predicted by the measure administered before hypnosis. Table 7 contains the results. The measure administered in the survey failed to explain significant additional variance for only two of the analyses: TAS in predicting HGSHS:A Subjective and the RQ in predicting the Field depth score. No moderator effects of gender, however, were found.

Discussion

Despite searching for context effects with powerful mixed-model designs and using large subject samples, we found little evidence for context effects on the relations between various experiential and hypnosis measures; when effects were found, they were small and unreliable. Moreover, no evidence was found for the type of moderator effect for gender described by de Groot et al. (1988). Similar results were found by Perlini, Lee, and Spanos (1990), who reported replication of our mixed-model results and failures to replicate the Council et al. (1986) and the de Groot et al. findings. Jointly, the findings suggest that both omnibus and gender-moderated context effects, if genuine, are more fragile than the relations that earlier findings ostensibly undermined.

Similar to an earlier controversy concerning gender effects on the relation between self-reported imagery and hypnotizability (e.g., J. R. Hilgard, 1979; Sutcliffe, Perry, & Sheehan, 1970), the significant/nonsignificant dichotomy does not appear to be a reliable indicator of gender effects. This unreliability buttresses our argument that this type of finding (whether it refers to context effects per se or to moderator effects of other variables) sidesteps the crucial issue of differences between contexts or between women and men. Clearly, for example, Council et al. (1986) would have argued (correctly) for a context effect, had they found that the relation between absorption and hypnotic response was significantly different from zero in both the hypnotic and nonhypnotic contexts but that the relation was significantly more pronounced in the hypnotic context. Thus, the important issue is one of different relations between absorption and hypnosis variables across contexts or between genders in demonstrating this effect (i.e., an issue of interac-

Table 7
Between-Groups Regression Analyses (Second Series: Experiment 2)

Experiential variable	Increase in R^2	F for increase	df	p
1. Hypnosis variable: behavioral response				
Absorption				
Main effect of RQ (in context)	.03	7.27	1, 224	.01
Main effect of TAS (in survey)	.03	5.99	1, 223	.05
Relaxation				
Main effect of TAS (in context)	.06	12.94	1, 207	.001
Main effect of RQ (in survey)	.02	5.17	1, 206	.05
2. Hypnosis variable: subjective success				
Absorption				
Main effect of RQ (in context)	.02	3.72	1, 224	.10
Main effect TAS (in survey)	.00	<1	1, 223	*ns*
Relaxation				
Main effect of TAS (in context)	.04	9.61	1, 207	.01
Main effect of RQ (in survey)	.02	5.26	1, 206	.05
3. Hypnosis variable: Field depth scale				
Absorption				
Main effect of RQ (in context)	.00	<1	1, 224	*ns*
Main effect TAS (in survey)	.03	7.71	1, 223	.01
Relaxation				
Main effect of TAS (in context)	.01	2.97	1, 207	.10
Main effect of RQ (in survey)	.00	<1	1, 206	*ns*

Note. Behavioral response and subjective success refer to the Harvard Group Scale of Hypnotic Susceptibility, Form A; RQ = relaxation questionnaire; TAS = Tellegen Absorption Scale; Field depth scale = Field's Inventory of Hypnotic Depth.

tion). There are many different types of patterns that can emerge from interactions, but as Council et al. recognized, evidence for context or gender effects requires an interaction (see also Nadon, Laurence, & Perry, 1989).

The most important analyses in the present study were those involving the relation between absorption and hypnotic behavior, because this relation's (and its theoretical implications') validity was questioned most vigorously by Council et al. (1986). Only the most powerful statistical analysis in one of the samples (the regressed change analysis in Experiment 1) showed a vanishingly small context effect. Even this effect may reflect a Type I error, given the number of statistical analyses used. These results suggest strongly that the relation between absorption and hypnotic behavior is much more than an artifact of the testing context: a conclusion that is also supported by Council et al.'s and by de Groot et al.'s (1988) data.

Our findings differ substantially from Council et al.'s (1986) in that we did not find reliable context effects concerning the relations between absorption and the two subjective hypnosis measures reported by these authors—that is, subjective response to hypnotic suggestions and hypnotic depth. This suggests that the effects reported by them concerning absorption may have reflected sampling and measurement error in studies of fragile, though nonetheless systematic and reliable, correlations between measures. These types of relations require relatively large sample sizes to be detected consistently.

Consistent with Council et al.'s (1986) speculation, the mixed-model and regressed-change analyses in the present study suggest that any contextual reactivity of the absorption measure is not systematically related to hypnosis variables.[4] Nonetheless, we appreciate the argument that assessment of Council et al.'s preferred hypothesis of a relation between absorption and any reactivity of hypnosis measures could have been obscured in our mixed-model and regressed-change analyses by the fact that all subjects were tested twice on the various experiential measures. The results of the between-groups comparisons in Experiment 2, however, are inconsistent with this view. Comparisons between the relevant correlation coefficients and the first series of regression analyses showed no context effects at all; although two of the incremental analyses in the second series were consistent with a contextual hypothesis, neither analysis involved the absorption measure and the behavioral hypnotizability score.

The argument has been advanced that our first series of between-groups analyses may have negated any context effect by the fact that the second questionnaire, which was administered before hypnosis, may have created response expectancies for hypnotic performance, which in turn created correlations between the survey measure and the hypnosis variables—that is, the observed relations may have been indirect and mediated directly by response expectancies. This argument would have been compelling had the survey measures in the second series of between-groups analyses not predicted additional variance in hypnosis scores beyond that accounted for by the measure administered just prior to hypnosis testing.

In our view, a strong contextual account of these analyses, in which the relation between absorption and hypnotizability is explained solely in terms of response expectancies, requires

[4] We thank Auke Tellegen and an anonymous reviewer for their cogent comments on this point.

that no additional variance in hypnotic responses be explained by the questionnaire administered in the survey; our data are at odds with this account of the analyses. Thus, whatever interpretation is given to the results of our within-subjects analyses, the second series of between-groups analyses is inconsistent with a response expectancy explanation, as it has been presented by Council et al. (1986).

In summary, the relatively small context effects we observed in the present study and the fact that no one to our knowledge has found the same context effect twice do not appear to warrant what often amounts to extraordinary measures to conceal the nature of studies of hypnotizability conducted in laboratories known for their hypnosis work. A substantial literature and the present study suggest strongly that various experiences and individual characteristics are systematically related to hypnotic ability and that study of these experiences and characteristics can be profitably pursued within hypnotic contexts. In particular, the present research reaffirms the validity of the absorption construct. Further empirical efforts to understand the relations among absorption, imaginative involvement, fantasy proneness, and openness to experiences; their role in hypnotizability; and their place in the wider structure of personality appear justified.

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