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FACTOR ANALYSIS OF THE ELKINS HYPNOTIZABILITY SCALE

Gary Elkins², Aimee K. Johnson, Alisa J. Johnson, and Jim Sliwinski

Baylor University, Waco, Texas

Abstract

Assessment of hypnotizability can provide important information for hypnosis research and practice. The Elkins Hypnotizability Scale (EHS) consists of 12 items and was developed to provide a time-efficient measure for use in both clinical and laboratory settings. The EHS has been shown to be a reliable measure with support for convergent validity with the Stanford Hypnotic Susceptibility Scale, Form C ($r = .821, p < .001$). The current study examined the factor structure of the EHS, which was administered to 252 adults (51.3% male; 48.7% female). Average time of administration was 25.8 minutes. Four factors selected on the basis of the best theoretical fit accounted for 63.37% of the variance. The results of this study provide an initial factor structure for the EHS.

Hypnotizability refers to an “individual's ability to experience suggested alterations in physiology, sensations, emotions, thoughts, or behavior during hypnosis” (Elkins, Barabasz, Council, & Spiegel, in press). The measurement of hypnotizability has long been recognized as an important aspect in hypnosis research. Research has also shown that hypnotizability varies among individuals thus affecting individual responses to hypnotic interventions (Benham, Woody, Wilson, & Nash, 2006; Council, 2002). In clinical hypnosis research, hypnotizability measures may provide information for better understanding of the role of hypnosis in treating certain disorders (Elkins et al., 2011; Kirsch & Lynn, 1995; Patterson & Jensen, 2003; Sutcher, 2008). Further, information regarding hypnotizability may be useful to practitioners in treatment planning as well as serving as an introduction to hypnosis and providing the patient with insight into their own hypnotic ability (Barabasz & Perez, 2007; Weitzenhoffer, 2002).

The Stanford Hypnotic Susceptibility Scale, Forms A and B (SHSS:A, B; Weitzenhoffer & Hilgard, 1959) were the first well-validated scales used to measure hypnotizability (Woody & Barnier, 2008). Further scale refinement led to the development of the two most currently used scales, the Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C; Weitzenhoffer & Hilgard, 1962), considered the “gold standard” of hypnotic measures, and the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A; Shor & Orne, 1962). Since the introduction of the SHSS:A, B, the use of hypnotizability measures has increased the scientific understanding of hypnosis (Barnier & McConkey, 2004; Oakley, 2009).

²Address correspondence to Gary Elkins, Mind-Body Medicine Research Laboratory, Department of Psychology and Neuroscience, Baylor University, One Bear Place # 97334, Waco, TX 76798-7334, USA. Gary_Elkins@baylor.edu.

However, while the existing measures of hypnotizability are used widely in laboratory hypnosis research, they are seldom used in clinical research and practice (Elkins, 2014; Woody & Barnier, 2008). A review by Barnier and McConkey (2004) reported that of 137 articles published by the International Journal of Clinical and Experimental Hypnosis from 1992 to 2003, 90% of empirical hypnosis studies reported using one or more of the current standardized hypnotizability measures, whereas only 10% of clinical hypnosis research reported using a standardized hypnotizability measure. The current lack of hypnotizability measurement in clinical research and practice may be due to the length of administration, the use of controversial (age regression) and aversive items (anosmia and hallucinating a mosquito; SHSS:C), the difficulty of using a group measure in a clinical setting (such as the HGSHS:A), and the use of lengthy hypnotic inductions which may seem impractical to some clinicians (Elkins, 2014; Woody & Barnier, 2008).

The Elkins Hypnotizability Scale (EHS; Elkins, 2014) was developed to address some of the limitations noted above in accordance with the following criteria: (a) a measure of hypnotizability should be pleasant; (b) time efficient 3) include a sufficient number of items to assess low, moderate, high, and very high hypnotizability; and (c) be reliable and valid for use in both clinical and laboratory settings. Previous study has shown good test-retest reliability (Cronbach's $\alpha = .849$) and convergent validity (correlation with the SHSS:C, $r = .821$, $p < .001$) (Elkins, 2014). However, the factor structure of the EHS has not yet been explored. The purpose of this study was to examine the factor structure of the EHS.

Method

Participants

After IRB approval, 252 participants were recruited from outpatient clinical settings. Subjects were recruited through mailing and posting flyers in public places throughout a hospital and outpatient medical clinic. The mean age of participants was 41.53 years. Females ($n = 123$) ranged from 19 to 65 years ($M = 40.05$, $SD = 11.74$). Male participants ($n = 129$) age ranged from 19 to 67 years ($M = 42.96$, $SD = 11.66$). The ethnicity of participants was Caucasian (83%), Hispanic (7.5%), African-American (5.2%), Asian (1.6%), and American Indian (0.4%). Marital status was married (71.8%), divorced (13.9%), single (13.1%) and widowed (0.4%). The average education level (in years) was 15.44 (range 9-25).

Materials

Elkins Hypnotizability Scale (EHS)—The EHS consists of 12 items. The administration of the scale begins with a hypnotic induction that includes suggestions for focusing attention, eye closure, relaxation, and deepening. The participant is then guided through a series of hypnotic suggestions for experiences ranging from simple motor responses to more involved imagery and posthypnotic amnesia. Items are administered in order of progressing difficulty within the context of a continuous hypnotic procedure. Participant responses to items are scored numerically based upon extent of response to the hypnotic suggestion given. A total score (ranging from 0 to 12) indicates the participant's level of hypnotizability. The items of the EHS are as follows:

- EHS 1 (subjective arm heaviness);
- EHS 2 (arm immobility);
- EHS 3 (subjective arm lightness);
- EHS 4 (arm levitation);
- EHS 5 (elbow lift);
- EHS 6 (clear imagery);
- EHS 7 (dissociation experience);
- EHS 8 (faint rose smell);
- EHS 9 (distinct rose smell);
- EHS 10 (vague visual hallucination);
- EHS 11 (distinct visual hallucination);
- EHS 12 (posthypnotic amnesia).

The scale and administration protocol along with scoring criteria have been previously published (Elkins, 2014). As reported elsewhere (Elkins, 2014) the EHS has been shown to be a reliable measure of hypnotizability, $\alpha = .849$, and it is generally rated as “pleasant” by subjects with rating of 8.97 on a 0-to-10 scale (with 10 representing *very pleasant* and 0 representing *very unpleasant*). It has also been shown that the EHS has a strong convergent validity with the SHSS:C, $r = .821$, $p < .001$ (Elkins, 2014).

Procedure

After completing written informed consent, participants were administered a demographic questionnaire and the EHS. Administration and scoring of the scales were performed by master's- or doctoral-level practitioners who were trained in clinical hypnosis following recognized guidelines (Elkins & Hammond, 1998). The average time of administration of the EHS was 25.8 minutes.

Statistical analyses were conducted using PASW Statistics v 19.0 (SPSS: An IBM Company). Cronbach's alpha was used to measure the reliability of the scale. Estimates of internal consistency/reliability above .70 were considered adequate. All statistical analyses were two-tailed, with alpha set at .05. The factor structure of the measure was examined using principal components analysis.

Results

Item and Reliability Analyses

Descriptive and item analyses were conducted on each item of the EHS. Means and standard deviations are displayed in Table 1 for both genders. The average EHS score for females was 5.95 ($SD = 3.27$). Male participant scores showed a mean total score of 5.71 ($SD = 3.27$). There was no significant difference in gender on EHS scores, $F(1,249) = 0.563$, $p = .563$. Percent pass for each item is displayed in Table 1.

An item analysis was conducted to assess each item for normality and skewed distributions. All items were normally distributed and indicated good reliability ($\alpha = .849$). Table 2 shows the inter-item correlations of the EHS. All of the EHS items are significantly correlated.

Principal-Components Analyses

Bartlett's test of sphericity was performed and the null hypothesis that the correlation matrix was an identity matrix was rejected, $\chi^2 (n = 66) = 915.68, p < .0001$; thus the data were deemed suitable for factor analysis. A principal-components analysis was performed utilizing PASW Statistics v 19.0 (SPSS: An IBM Company) for the items of the scale using an oblique (direct oblimin) rotation. This part of the analysis was performed in accordance with the Kaiser criterion, only retaining factors with eigenvalues greater than 1 (Kaiser, 1960). This analysis indicated a four-factor solution in 11 iterations (eigenvalues were 4.53, 1.31, 1.28, and 1.0). Additionally, four factors were selected for the final analyses on the basis of the scree test and best theoretical fit (Cattell, 1966). The four extracted factors accounted for 65.37% of the variance. Based on best theoretical fit, the four-factor solution was adopted; loadings for the principal-components analysis are represented in Table 3.

The first factor was defined by arm heaviness (EHS 1), arm immobilization (EHS 2), clear imagery (EHS 6), and clear imagery with dissociation (EHS 7). These factor loadings represent different theoretical constructs, direct motor levitation/imagery that load onto a single factor. From this factor, EHS 1 and EHS 6 display the strongest factor loadings. Overall, the loadings were moderate and did not cross-load on other factors with the exception of EHS 3. Replication is necessary to further determine if it is necessary to consider factor 1 as a single factor or as two distinct constructs.

The second factor included the items vague visual hallucination (EHS 10), and distinct visual hallucination (EHS 11). Factor 2 represents the theoretical construct of visual/perceptual. While both of the items strongly loaded, post hypnotic amnesia (EHS 12) showed moderate cross loading onto factor 2. Replication is necessary to determine if post-hypnotic amnesia, which did not strongly load onto any factor, should be considered a separate fifth factor.

The third factor was identified with the items of faint olfactory hallucination (EHS 8) and distinct olfactory hallucination (EHS 9). This factor represents the theoretical construct of olfactory/perceptual. Items were strongly loaded and did not show any cross-loadings. Future studies examining the factor structure of the EHS will focus on determining if EHS factors 3 and 4 should be considered as a single perceptual factor.

The fourth factor was defined by arm lightness (EHS 3), arm levitation (EHS 4), and effortless elbow lift (EHS 5). Factor 4 represents the theoretical construct of Motor Challenge. Items were moderately to strongly loaded; however, the arm lightness item (EHS 3) showed cross-loading with factor 1. This suggests that factor 1 may actually be two distinct factors characterized as direct motor/levitation and imagery/dissociation. Further investigation is warranted.

Discussion

The EHS takes approximately 30 minutes to administer and score, providing a brief and reliable measure of hypnotizability. The EHS is generally rated as pleasant by participants and contains enough motor, motor challenge, and perceptual-cognitive items to cover a full range of hypnotizability. The present study described the development and principal-component analysis of this brief measure of hypnotizability. Four factors were selected for the final analyses on the basis of the scree test and best theoretical fit (Cattell, 1966). The four extracted factors accounted for 65.37% of the variance. The 4-factor solution (direct motor/imagery; visual/perceptual; olfactory/perceptual; motor challenge) suggests that multiple factors or abilities may be involved in the EHS. However, this study represents the initial stage in the development of the EHS; confirmatory analyses and subsequent cross-validation are needed before the underlying structure of the EHS can be fully determined.

Hypnotizability measures are generally conceptualized as measuring a unitary underlying domain or trait (Woody, Barnier, & McConkey, 2005). Currently, there is debate among researchers as to how hypnotizability scales should be conceptualized (i.e., whether hypnotic ability is better conceptualized as unitary domain or as multiple factors or sub-skills). For example, Woody et al. (2005) conducted a factor analysis on a large dataset of 616 college students' scores from the SHSS:C and HGSHS:A. Results of this analysis yielded a 4-factor solution (direct motor, motor challenge, perceptual-cognitive, and posthypnotic amnesia), indicating hypnotizability comprises multiple factors or abilities. The findings from the present study suggest that the EHS factor structure may be generally consistent with the multiple-factor conceptualization of hypnotic ability.

The aim of the developing the EHS was to make available a brief measure that is useful in both clinical and research settings, is time efficient, pleasant, and easy to interpret, and provides valid data regarding hypnotizability. In addition, the present study provides some initial data on the factor structure of the scale. However, there are several limitations to the current study that should be noted. First, it involves the participation of an adult general population, while many of the current measures implement the use of college samples for validation (Barber, 1965; Hilgard, Weitzenhoffer, Landes, & Moore, 1961; Morgan & Hilgard, 1978; Shor & Orne, 1962; Spanos, Radtke, Hodgins, Stam, & Bertrand, 1983; Weitzenhoffer & Hilgard, 1962). Therefore, it is important that the EHS is replicated in a college sample to provide comparison data. The sample size of the clinical sample is another limitation of the study, with a substantially larger sample warranted as a next step in research on the scale. Should further analyses prove successful, future populations will be targeted in the long-range goal of creating a brief measure of hypnotizability that is pleasant, time efficient, and discriminates between various levels of hypnotizability.

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REFERENCES

- Barabasz A, Perez N. Salient findings: Hypnotizability as core construct and the clinical utility of hypnosis. *International Journal of Clinical and Experimental Hypnosis*. 2007; 55(3):372–379. doi: 10.1080/00207140701339793. [PubMed: 17558724]
- Barber TX. Measuring hypnotic-like suggestibility with and without hypnotic induction: Psychometric properties, norms, and variables influencing response to the Barber Suggestibility Scale (BSS). *Psychological Reports*. 1965; 16(3):809–844. doi:10.2466/pr0.1965.16.3.809. [PubMed: 14303013]
- Barnier, AJ.; McConkey, KM. Defining and identifying the highly hypnotizable person.. In: Heap, M.; Brown, RJ.; Oakley, DA., editors. *The highly hypnotizable person: Theoretical, experimental, and clinical issues*. Brunner-Routledge; London: 2004. p. 30-60.
- Benham G, Woody EZ, Wilson KS, Nash MR. Expect the unexpected: Ability, attitude, and responsiveness to hypnosis. *Journal of Personality and Psychology*. 2006; 91(2):342–350. doi: 10.1037/0022-3514.91.2.342.
- Cattell RB. The scree test for the number of factors. *Multivariate Behavioral Research*. 1966; 1:245–276.
- Council JR. A historical overview of hypnotizability assessment. *American Journal of Clinical Hypnosis*. 2002; 44(3-4):199–208. doi:10.1080/00029157.2002.10403480. [PubMed: 11799534]
- Elkins, GR. *Hypnotic Relaxation Therapy: Principles and Applications*. Springer Publishing Company; NY: 2014.
- Elkins GR, Barabasz AF, Council JR, Spiegel D. Advancing research and practice: The revised APA Division 30 definition of hypnosis. *International Journal of Clinical and Experimental Hypnosis*. in press.
- Elkins GR, Fisher W, Johnson A, Marcus J, Dove J, Perfect M, Keith T. Moderating effect of hypnotizability on hypnosis for hot flashes in breast cancer survivors. *Contemporary Hypnosis and Integrative Therapy*. 2011; 28(3):187–195. [PubMed: 24523957]
- Elkins GR, Hammond DC. Standards of training in clinical hypnosis: Preparing professionals for the 21st century. *American Journal of Clinical Hypnosis*. 1998; 41(1):55–64. [PubMed: 9868817]
- Hilgard ER, Weitzenhoffer AM, Landes J, Moore R. The distribution of susceptibility to hypnosis in a student population: A study using the Stanford Hypnotic Susceptibility Scale. *Psychological Monographs: General and Applied*. 1961; 75(8):1–22. doi:10.1037/h0093802.
- Kaiser H. The application of electronic computers to factor analysis. *Educational and Psychological Measurement*. 1960; 20:141–151.
- Kirsch I, Lynn SJ. The altered state of hypnosis: Changes in the theoretical landscape. *American Psychologist*. 1995; 50(10):846–858. doi:10.1037/0003-066X.50.10.846.
- Morgan AH, Hilgard JR. The Stanford Hypnotic Clinical Scale for Adults. *The American Journal of Clinical Hypnosis*. 1978; 21(2-3):134–147. doi:10.1080/00029157.1978.10403968. [PubMed: 747162]
- Oakley, D. Hypnosis and suggestion. In *Encyclopedia of consciousness*. 2009. Retrieved from http://ezproxy.baylor.edu/login?url=http://literati.credoreference.com/content/entry/estcon/hypnosis_and_suggestion/0
- Patterson DR, Jensen MP. Hypnosis and clinical pain. *Psychological Bulletin*. 2003; 129(4):495–521. [PubMed: 12848218]
- Shor, RE.; Orne, EC. *The Harvard Group Scale of Hypnotic Susceptibility, Form A*. Consulting Psychologists Press; Palo Alto, CA: 1962.
- Spanos NP, Radtke HL, Hodgins DC, Stam HJ, Bertrand LD. The Carleton University Responsiveness to Suggestion Scale: Normative data and psychometric properties. *Psychological Reports*. 1983; 53:523–535. doi:10.2466/pr0.1983.53.2.523. [PubMed: 6647700]
- Sutcher H. Hypnosis, hypnotizability and treatment. *American Journal of Clinical Hypnosis*. 2008; 51(1):57–67. [PubMed: 18714892]

- Weitzenhoffer AM. Scales, scales, and more scales. *American Journal of Clinical Hypnosis*. 2002; 44(3-4):209–219. doi:10.1080/00029157.2002.10403481. [PubMed: 11799535]
- Weitzenhoffer AM, Hilgard ER. *Stanford Hypnotic Susceptibility **. 1959
- Weitzenhoffer, AM.; Hilgard, ER. *Stanford Hypnotic Susceptibility Scale: Form C*. Consulting Psychologists Press; Palo Alto, CA: 1962.
- Woody, EZ.; Barnier, AJ. Hypnosis scales for the twenty-first century: What do we need and how should we use them?. In: Nash, MR.; Barnier, AJ., editors. *The Oxford handbook of hypnosis: Theory, research, and practice*. Oxford University Press; Oxford, UK: 2008.
- Woody EZ, Barnier AJ, McConkey KM. Multiple hypnotizabilities: Differentiating the building blocks of hypnotic response. *Psychological Assessment*. 2005; 17:200–211. doi: 10.1037/1040-3590.17.2.200. [PubMed: 16029107]

Table 1

Means, Standard Deviations, and Percent Pass by Gender

Item	Female			Male		
	M	SD	% Pass	M	SD	% Pass
EHS 1	0.93	0.24	93.5	0.87	0.34	86.6
EHS 2	0.68	0.46	68.3	0.60	0.49	60.5
EHS 3	0.70	0.46	69.9	0.76	0.42	76.0
EHS 4	0.41	0.49	40.7	0.44	0.49	44.2
EHS 5	0.27	0.44	26.8	0.22	0.41	21.7
EHS 6	0.84	0.37	83.7	0.79	0.41	79.1
EHS 7	0.56	0.48	56.1	0.50	0.51	50.4
EHS 8	0.51	0.5	51.2	0.57	0.49	57.4
EHS 9	0.16	0.37	16.3	0.21	0.41	20.9
EHS 10	0.42	0.49	42.3	0.34	0.47	34.1
EHS 11	0.12	0.32	12.2	0.12	0.32	11.6
EHS 12	0.34	0.46	34.1	0.35	0.47	34.9
EHS Total	5.95	3.27	--	5.71	3.12	--

Table 2

Inter-item Correlations of the Elkins Hypnotizability Scale

	EHS 1	EHS 2	EHS 3	EHS 4	EHS 5	EHS 6	EHS 7	EHS 8	EHS 9	EHS 10	EHS 11	EHS 12
EHS 1												
EHS 2	.418											
EHS 3	.396	.368										
EHS 4	.258	.422	.522									
EHS 5	.188	.363	.344	.658								
EHS 6	.386	.323	.375	.288	.223							
EHS 7	.327	.429	.397	.404	.363	.510						
EHS 8	.282	.398	.297	.271	.276	.359	.433					
EHS 9	.125	.229	.153	.207	.324	.203	.225	.418				
EHS 10	.260	.380	.256	.318	.282	.292	.392	.243	.128			
EHS 11	.122	.248	.223	.304	.279	.145	.271	.140	.170	.433		
EHS 12	.186	.387	.293	.456	.368	.264	.367	.351	.326	.409	.351	

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed).

Table 3

Principal Component Analysis, Rotated Factor Loadings

Item	Factor 1	Factor 2	Factor 3	Factor 4
EHS 1	0.780	−0.032	−0.90	−0.044
EHS 2	0.435	0.212	0.125	−0.213
EHS 3	0.472	−0.061	−0.158	−0.564
EHS 4	0.052	0.068	−0.030	−0.870
EHS 5	−0.119	0.029	0.175	−0.826
EHS 6	0.727	0.040	0.148	0.056
EHS 7	0.527	0.236	0.170	−0.101
EHS 8	0.386	−0.016	0.679	0.054
EHS 9	−0.102	−0.035	0.867	−0.093
EHS 10	0.216	0.810	−0.059	0.095
EHS 11	−0.139	0.850	−0.058	−0.059
EHS 12	−0.016	0.466	0.320	−0.231

Note: Rotation method: Oblique with Kaiser Normalization; rotation converged in 6 iterations.