

Research Paper

Investigating Factor Structure, Validity, and Reliability of the Persian Version of the Stanford Hypnotic Susceptibility Scale: Form C (SHSS: C)

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ABSTRACT

Objectives The Stanford Hypnotic Susceptibility Scale: Form C (SHSS: C) was first introduced by Weitzenhoffer and Hilgard in 1952 and then revised and completed in 1962. The given scale mainly measures behavioral compliance and suggestibility within a whole range of hypnotic phenomena (movements as well as examples of imagination and cognitive distortions) in a short time. Thus, the purpose of this study was to investigate the psychometric properties of SHSS: C in a non-clinical population.

Methods This descriptive study was conducted on 300 students from different schools of Kermanshah University of Medical Sciences in Iran selected by multi-stage cluster random sampling method and tested via research instruments such as SHSS: C, the Hypnotic Induction Profile (HIP), the Harvard Group Scale of Hypnotic Susceptibility by Spiegel, and the NEO Five-Factor Inventory (NEO-FFI). The data obtained were analyzed using descriptive statistics, correlation coefficient, exploratory factor analysis, Cronbach's alpha coefficient, and Guttman's split-half coefficient using the SPSS software version 22.

Results Factor analysis using varimax rotation from the principal component analysis extraction method for the SHSS: C could lead to the extraction of three factors of hypnotic susceptibility talents of perceptive-cognitive abilities, sensory-motor phenomena, cognitive distortions, and post-hypnotic effects. The reliability coefficients (alpha, test-retest, and internal consistency) were also equal to 0.80, 0.75, and 0.74, respectively. Moreover, three types of validity (concurrent, criterion, and correlation between subscales and total scale and inter-correlations) for the HIP, the Harvard Group Scale of Hypnotic Susceptibility by Spiegel, and the NEO-FFI were reported to be 0.89, 0.84, and 0.68, respectively.

Conclusion The results showed that the SHSS: C was endowed with desirable psychometric properties in an Iranian population, and it could be used in research studies on psychology and psychiatry.

Key words:

SHSS, Hypnotic susceptibility, Factor structure, Validity, Reliability, Psychometric properties, Persian norms

Extended Abstract**1. Introduction**

Although hypnosis is considered as an effective treatment for many diseases, a

prerequisite for its optimal efficacy is the hypnotic susceptibility of the subjects, i.e. the ability of individuals to experience a hypnotic state [1]. Based on clinical and laboratory research studies, hypnotic susceptibility is a relatively constant and measurable state, although this ability can undergo insignificant changes in different stages of life. For example,

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it can be maximized in the last years of childhood, i.e. 9 to 12 years of age, decline to some extent during puberty, reach a stable state after puberty and during adulthood, and finally, remain relatively stable at old age [2]. Related studies have revealed that gender has no significant impact on hypnotic susceptibility. However, it should be noted that suggestibility is not an absolute function of hypnotic susceptibility, but it is significantly influenced by subjects' motivation and their secondary gain or loss of the symptoms of the disease as well as their therapeutic relationships with therapists [3].

For a detailed assessment of hypnotic susceptibility, an appropriate instrument is required for determining the responses of each individual to hypnotic suggestions. A suitable scale should be in accordance with certain standards and endowed with desirable reliability and validity. On the other hand, it should be concise (brief and useful) and applicable in clinical conditions [4]. In 1959, the Stanford Hypnotic Susceptibility Scale (SHSS) in Form A and Form B was published that met most of the research objectives. The administration time of the given scale lasted for 50 minutes, and its procedure was based on eye fixation [2]. Moreover, Morgan and Hilgard (1979) developed a scale entitled as the Stanford Hypnotic Clinical Scale for adults and children (SHCSA & C) whose administration took 25 minutes, and its correlation coefficient was equal to 0.72 [5]. In this respect, Bowers designed a 12-item scale named the Waterloo-Stanford Group Scale of Hypnotic Susceptibility (WSGSHS) in 1998 whose correlation coefficient compared with the Harvard Group Scale of Hypnotic Susceptibility by Spiegel was 0.66.

Like the Harvard Group Scale of Hypnotic Susceptibility by Spiegel, the WSGSHS was used to obtain involuntary scores to provide more information from classical suggestibility effects [6]. The Standard Profile Scale of Hypnotic Susceptibility (SPSHS) was similarly developed to measure cognitive abilities associated with hypnosis. A limitation of this scale was that the subjects had to be tested earlier by another scale and needed to have a high level of responsiveness in terms of hypnosis. So, this scale was rejected as a measurement instrument [7]. Furthermore, Hilgard et al.

reported desirable psychometric properties for SHSS: C. Within the context of confirming hypnotic trance signals, the items of this scale could measure the recall of sensory-motor phenomena, cognitive abilities of imagination, dreams, age regression, olfactory hallucinations, forgetfulness, and post-hypnotic suggestions. All the criteria of suggestion and hypnotic induction principles have been defined by the 12 items of the given scale [2]. Despite the applicability of this scale for research purposes, it was found that the ability of pain reduction, as measured in the Washington National Rehabilitation Hospital during 2005-2006, was significantly correlated with the level of hypnotic susceptibility in an individual. In other words, individuals with higher levels of hypnotic susceptibility have a higher ability in terms of pain reduction compared with those with low hypnotic susceptibility scores in the same relaxation conditions [8].

According to the research studies on hypnotic susceptibility, different characteristics such as dual spectrum were extracted via the Electroencephalography (EGG) signal in order to classify individuals into various groups of hypnotic susceptibility. The certain frequencies wherein hypnotic symptoms were more obvious also confirmed the discriminant validity and construct validity of the SHSS: C [9]. The SHSS: C compared with all forms of the SHSS or other scales on hypnosis is based on laboratory-oriented visible hypnotic behaviors but not subjective experiences [10]. Given that no research studies have been conducted on hypnotic susceptibility using a general population prior to the present study and considering that the SHSS: C is considered as a golden measurement standard, the purpose of this study was to develop a Persian version of the SHSS: C, determine its normalization, and evaluate the validity and reliability of form C of the SHSS in a non-clinical population in Iran [4].

2. Methods

This study was a descriptive-analytic research. The statistical population included all male and female students enrolled in the Kermanshah University of Medical Sciences in 2014-2015. Based on previous studies and according to

Table 1. Frequency of scores based on the level of hypnotic susceptibility among Iranian samples

Level of Hypnotic Susceptibility	Total Raw Score	Number of Samples (Number of Individuals Obtaining the Assumed Score)	Percentage of Scores
High	42-60	57	19.1
Medium	23-41	194	64.6
Low	12-22	49	16.4

Krejcie and Morgan's sample size table, a sample size of 300 individuals (194 females and 106 males) was selected for this study via multi-stage cluster random sampling method. The inclusion criterion was that the age of the participants should be more than 17 years, and there were efforts to have individuals with quite diverse characteristics (gender, intelligence, education, occupation, etc.).

Stanford Hypnotic Susceptibility Scale (SHSS: C)

The SHSS: C was initially translated into Persian, and then experts in the English Language were asked to retranslate the Persian items into English in order to fill the existing gaps in terms of consistency of both translations. After that, the test obtained was administered in a pilot format on several subjects, and the likely problems for the final administration of the test were revised and removed. Since the SHSS: C allows researchers to apply any type of suggestibility they wish, 12 suggestions, which were not in line with Iranian social and cultural background, were properly matched through invoking professionals and conducting interviews with the subjects.

Research procedure

Given the nature of the study and in order to avoid any probable subject loss, 300 students instead of 270 ones were recruited. After choosing the classrooms in each school, the researcher introduced herself to the students and explained the purpose of the study. Following the hypnosis, the SHSS: C was distributed among the students. Then, they were asked to choose the statements implying their personal experiences and emotions during hypnosis and indicating their best states. To prove the concurrent validity of this scale, the Hypnotic Induction Profile (HIP) was also used at the first 5 seconds before administering the SHSS: C.

In terms of measuring the signals of eye rotation within the HIP, 119 individuals were selected randomly from the study samples. The test items start with eye rotation, which is considered as the potential biological ability to experience analytical conditions. Within the rotation signal measurement of the HIP, the subjects were asked to put their heads in a position looking straight ahead, then in the same state, they were asked to look up at their eyebrows. Next, they were asked to look at the tip of their head (looking upward). After that, while looking up, they were asked to close their eyes easily (rotation). Upward looking and rotation were graded by viewing the visible sclera in the contour of the lower eyelid from 0 to 4, and if there are crossed eyes, a score of 1 to 3 is awarded. The crossed-eye score is also added to the rotation score.

Eye rotation is similarly considered as a part of hypnotic induction, which is scored as an internal indicator of the power of hypnosis experience. At this stage, there was a need to administer the HIP and the SHSS: C simultaneously. For this purpose, arrangements were made to do it in the presence of experts and professors. To determine validity, experts involved in the domain of scale content were employed in order to ensure exact judgment and correct measurement of the signals of eye movement within the HIP. These individuals were also selected in accordance with the predetermined objectives of the study. Accordingly, the upcoming limitations such as withdrawal of the subjects from the study and no questionnaire return were tackled, the reliability of the results was increased, and consequently, the effects of the order of completion of both scales as well as the standardization of test conditions were controlled.

The Harvard Group Scale of Hypnotic Within the simultaneous completion of the questionnaires, there were arrangements to help the subjects to complete the questionnaires of the SHSS: C, the Harvard Group Scale of Hypnotic Susceptibility by Spiegel, and the NEO-FFI. In order to encourage the study subjects to collaborate and have a better readability of the retests, they were informed orally that they could receive the results through email or SMS if they wanted. Among those who had written their cell phone numbers, 45 individuals were randomly selected and contacted two weeks later in the retest stage to recomplete the SHSS: C. To observe ethics in research, the confidentiality of the responses and the voluntary participation of the subjects were mentioned at the top of the questionnaires. It should be noted that there were no time limitations in terms of completion of the questionnaires.

Data analysis

To determine the validity and the internal consistency and the repeatability of the SHSS: C, the data were analyzed using descriptive statistics, correlation coefficient, exploratory factor analysis, analysis of variance (ANOVA), Cronbach's alpha coefficient, and Guttman's split-half coefficient using the SPSS software version 22.

The demographic characteristics of the 12-item SHSS: C were also considered at three levels (high, moderate, and low) based on individuals' responses to these 12 items. The scores between 12 and 60 indicated the hypnotic susceptibility of the individuals.

Validity

To check the factor structure of the questionnaire, exploratory factor analysis method and varimax rotation from the

principal component analysis extraction method were used. Before performing the factor analysis method, it was necessary to ensure higher correlation coefficients between the scale items. Given that the high correlation coefficients between scale items were equal to 0.84 and 0.780346 based on the Kaiser-Meyer-Olkin test and Bartlett's test, the values showed that the present sample was endowed with desirable adequacy and sufficiency (significance level of $P > 0.001$ and degree of freedom of 66).

To determine the construct validity and investigate the factor structure of SHSS: C, the exploratory factor analysis method was used. By employing varimax rotation from the principal component analysis extraction method, the entire statistical sample ($N=300$ individuals) was entered into the factor analysis. The items with the factor loadings of 0.30 or higher included one factor. Overall, three factors had eigenvalues higher than one, i.e. 3.81, 1.29, and 1.27. These three factors could explain 31.87% of the observed variances, indicating the relatively good validity of the SHSS: C. Drawing a special diagram for the eigenvalues (screen test) could suggest more power in terms of determining the number of factors and the pattern of the factor loadings of the three factors. These factors were reserved, and then, they were exposed to the varimax rotation. As a whole, the three factors could account for 53.18% of the total variance.

The first factor (5 items), i.e. "perceptive-cognitive abilities", had an eigenvalue equal to 3.81, which could explain 31.87% of the observed variance. The factor loadings of these items were between 0.49 and 0.74.

The second factor (4 items) was endowed with an eigenvalue of 1.29, which could account for 10.79% of the variance. The factor loadings of these items were from 0.54 to 0.82, and this factor was called "sensory-motor phenomena."

The third factor named "cognitive distortions" included 3 items whose eigenvalue was equal to 1.27. This factor could explain 10.60% of the variance. The factor loadings of the items were also between 0.54 and 0.80.

Concurrent validity

To examine the SHSS: C, the HIP was simultaneously implemented. For this purpose, both scales were administered to 119 subjects who were randomly selected from the study sample, and then they were scored. The results of the analysis showed that the SHSS: C was significantly and positively correlated with the HIP ($P=0.001$ and $r=0.66$).

In order to evaluate the criterion validity and the concurrent validity, the Harvard Group Scale of Hypnotic Susceptibility

by Spiegel and the NEO-FFI were employed. In this study, the correlation of the subscale scores of the NEO-FFI and the SHSS: C was extracted as summarized. The results of the analysis showed that people with warm and loving personality traits, sociable, flexible, emotionally stable and agreeable, and endowed with open values could experience different hypnotic phenomena. These phenomena refer to the level and ability of hypnotic susceptibility including cognitive abilities (imagination, dreams, age regression, and strong memory), perceptive-cognitive distortions of pain reduction, intellectual-motor activities, catalepsy, distorted time and decomposition, as well as somnambulism. The information in showed that the observed correlation between extrovert and open personality types and the SHSS: C and its factors were significant and positive. Happiness and satisfaction with life were also correlated with N and E, and positive emotions were highly associated with happiness.

The results of the analysis indicated a direct relationship between the level of hypnotic susceptibility and personality type (Apollonian, Dionysian, and Odyssean). It seems that the choices of the individuals are somewhat limited at both ends of the spectrum. In other words, in the inflexible end of the spectrum (low Apollonian hypnotic susceptibility), the extreme dependence of the individual to the content and lack of flexibility makes the hypnotic intervention very difficult (except in the case of high motivation). While in the flexible end of the spectrum (from moderate hypnotic susceptibility of Dionysian to high Odyssean), the individual shows the greatest hope for change using hypnotic methods. This study revealed a significant relationship between personality and hypnotic susceptibility such that an interview lasting for a few minutes could determine personality type and relative hypnotic susceptibility of the subjects and also predict their vulnerability in the face of various psychiatric illnesses, and consequently select the most effective interventions.

Test-Retest Reliability

To determine the test-retest reliability of the scale, 45 individuals were selected from the statistical sample using voluntary sampling method and then retested within two weeks. The reliability coefficient of the total scale was 0.75, and it was equal to 0.009, 0.50, and 0.60 for the subscales of perceptive-cognitive abilities, sensory-motor phenomena, and cognitive distortions, respectively.

All the coefficients were statistically significant at the level of 0.01. The split-half method was also employed to determine the reliability of the scale using all the study samples ($N=300$ individuals). For this purpose, the items were divided into two parts, and the scores of the subjects were calculated for each part. Then, the correlation coefficient between

both parts was calculated based on the corrected correlation coefficient of Spearman-Brown prophecy formula. These coefficients for the total scale were 0.75, and they were equal to 0.51, 0.52, and 0.35 for the subscales of perceptive-cognitive abilities, sensory-motor phenomena, and cognitive distortions, respectively. All the results were significant at the level of 0.01.

Internal consistency

Cronbach's alpha coefficient was used to measure the internal reliability of the scale. To this end, the data for the entire sample (N=300 individuals) were entered into the analysis. Based on the results, Cronbach's alpha coefficient for the total scale was equal to 0.79, and it was 0.45, 0.44, and 0.66 for the subscales of perceptive-cognitive abilities, sensory-motor phenomena, and cognitive distortions; respectively. All the coefficients were also at a desirable level.

3. Results

Factor analysis using varimax rotation from the principle component analysis extraction method for the Stanford Hypnotic Susceptibility Scale (SHSS: C) could lead to the extraction of three factors of hypnotic susceptibility talents of perceptive-cognitive abilities, sensory-motor phenomena, cognitive distortions and post-hypnotic effects. The reliability coefficients (alpha, test-retest, and internal consistency) were 0.80, 0.75, and 0.74, respectively. Moreover, three types of validity (concurrent, criterion, and correlation between subscales and total scale and inter-correlations) for the Hypnotic Induction Profile (HIP), Harvard Group Scale of Hypnotic Susceptibility by Spiegel, and NEO Five-Factor Inventory (NEO-FFI) were reported as 0.89, 0.84, and 0.68, respectively.

4. Conclusion

The results of the present study showed that the SHSS: C was a multi-dimensional instrument comprised of perceptive-cognitive abilities, sensory-motor phenomena, and post-hypnotic cognitive distortions in a non-clinical population. The factor characterized "intellectual-sensory activities and cognitive abilities", which were consistent with the study in the original culture (the study by Weitzenhoffer and Hilgard) and the results of the present study in terms of comparing the factors obtained [2]. The second factor within the SHSS: C was entitled as "intellectual-motor activities", which contains 0.66% of the number of items loaded on the second factor. The third factor was known as "hypnotic oblivion" [20]. The statement of "I could see the balls clearly. -- I only saw two balls" could not account for positive visual illusions, but it showed the lack of vision or no sense of existing stimu-

lators, which could lead to negative visual illusions as the hardest delusions occurred in 9-17% of the research subjects [4]. Moreover, it represented the high percentage of the statement of spontaneous forgetfulness, indicating high levels of hypnotic responses within the third factor. Oblivion is considered as one of the most difficult hypnotic phenomena that can facilitate the occurrence of post-hypnotic suggestions by reducing control over self-awareness [11]. It should be noted that more than 7% of individuals do not experience it, only 20-25% of people can go through complete forgetfulness through suggestibility, and 40% of them may experience some degree of oblivion.

The results of this study demonstrated that gender had no significant impact on hypnotic susceptibility. In line with previous research studies, the Persian version of the SHSS: C did not show any differences between the scores of male and female groups both in terms of the order of factors and the mean scores. Although the male and female subjects were in different age ranges, age did not affect the variability of scores; so, the impact of age difference among samples was negligible [12, 13]. In this respect, Nearing Rolfé et al. (2001) reported the Cohen's kappa coefficient for each pair of observers using the Dutch version of the SHSS: C equal to 0.84 [14].

Concerning the concurrent validity, the results of this study revealed that the SHSS: C was correlated with a 0.66 value with the main core of the HIP established on hand-flying. These findings were in agreement with the results of the original version of the scale developed by Spiegel. According to Rousseau et al. (2000), intellectual-motor activities using the involuntary signals of hand were a quick way to check unconsciousness [15].

In terms of criterion validity, the SHSS: C and its three subscales could best characterize the relationship between the three groups of hypnotic personality (Apolonian, Dionysian, and Odyssean) as well as hypnotic susceptibility [8]. According to Spiegel's Theory of Personality Clusters equivalent to groups of high, moderate, and low hypnotic susceptibility, the personality types are interacting with each other based on identified patterns and they can appear in the form of foreseeable clinical syndromes on axis I or certain personality disorders on axis II if disorders occur [16]. Within laboratory and clinical research studies, the level of hypnotic susceptibility and personality type are very useful in selecting the most appropriate therapeutic interventions since the flexible and resistant-to-change aspects of the patients are determined. In this regard, Del Rosario et al. (2002) used three tools of hypnotic susceptibility on Asian samples and de-

veloped the scientific value to determine high, moderate, and low hypnotic susceptibility [17].

In general, it can be stated that the primary conflict area in the group with low hypnotic susceptibility (Apollonian) was related to the cognitive domain. The primary conflict area in the group of high hypnotic susceptibility (Dionysian) was the concept of "ego integration." This group plays a dependent role in interpersonal interactions. These individuals are highly sensitive to psychological trauma and prone to mental failure and inflection with psychological decomposition disorders [18]. The primary conflict area in the group of moderate hypnotic susceptibility (Odyssean) is the interpersonal space [19]. These individuals have difficulty in terms of establishing intimacy and close relationships with others and are vulnerable to mood swings due to their shifting beliefs and perceptions [20].

Considering the discriminant validity, the NEO-FFI could best distinguish groups of people who had earned high scores on indicators of extraversion, openness, and agreeableness. Therefore, it was stated that the relationship between extroversion and hypnotic susceptibility was clear and obvious because self-expression, activity, and catching behaviors could emerge in an outgoing individual, but each extroverted person does not necessarily possess hypnotic susceptibility [21]. Given the lack of difference between agreeable people in terms of hypnotic susceptibility scores, it was concluded that the SHSS: C could measure personality traits of extroversion, openness, and agreeableness and the point that hypnotic susceptibility could remain constant in the passage of time according to Trait Theory (Dispositional Theory). This is because one of the key components of agreeableness is flexibility and one of the main characteristics is the emergence of hypnotic suggestibility trance in which the hypnotized person tends to accept the symptoms and the information accompanied by a relative suspension of critical judgment [13].

Reliability coefficient for the SHSS

C within two weeks was 0.75, which was a desirable coefficient and consistent with the coefficient reported in the original culture by Weitzenhoffer and Hilgard [2]. Sanchez et al. also assessed the reliability of the Mexican version of the SHSS: C in 2005 and reported reliability coefficient of 0.95 [22]. The coefficient for the factors was similarly reported between 0.50 and 0.60. Moreover, the reliability coefficient using the split-half method and internal consistency for the total scale and its factors were reported from 0.73 to 0.79, indicating alignment and similarity of reliability coefficients of the SHSS: C as reported in various studies. This also suggested that the SHSS: C had not changed in terms of con-

ditions and states because it measures talent and indicators of hypnotic susceptibility trance, it is endowed with enough stability over time, and it is applicable in research studies associated with hypnotic susceptibility.

Among the limitations of this study were the presence of false beliefs and no awareness about hypnosis. In addition, the generalizability of the findings of this study to other populations was restrained; so, it is suggested to conduct future research on clinical samples. The domain of studies on hypnosis and psychiatry was also so extensive that it could potentially account for the differences in terms of hypnotic susceptibility among certain populations and cultures.

Overall, the results of this study revealed that the SHSS: C as a multidimensional instrument was endowed with desirable psychometric properties for assessing hypnotic susceptibility in non-clinical populations. It can be expected that the resulting research instrument can be effectively applicable to future research studies in order to collect data related to hypnotic susceptibility in normal (non-clinical) populations in Iran.

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Conflict of Interest

As stated by the corresponding author of the study, there was no conflict of interest.