Psychometric Properties of Severity of Dependence Scale (SDS) in People with Drug and Alcohol Dependency

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Abstract

Objective: The current study aimed to assess the factor structure, validity, and reliability of the Persian version of Severity of Dependence Scale in alcohol and substance dependent individuals in Iran. In addition, the SDS scores were assessed in terms of a number of demographic factors. **Method:** SDS was translated to Persian and was subsequently backtranslated into English. Furthermore, it was compared with the original scale. Essential revisions were made into the scale after its preliminary administration to 20 participants. Thereafter, 281 alcohol/ substance dependent individuals from prison, dormitory, and various rehabilitation camps were chosen and completed the questionnaire. Questionnaires of demographic information, Severity of Dependence Scale (SDS), Leeds Dependence Questionnaire (LDQ), Drug Use Disorders Identification Test (DUDIT), and Brain-Behavioral Systems Scale were used in order to obtain data. Data were analyzed via LISREL8/8 software and appropriate statistical tests. **Results:** The results supported the single-factor structure of SDS. The scale reliability coefficients were obtained equal to 0.64 and 0.58 through Cronbach's Alpha and Guttman, respectively. Convergent validity of the scale was obtained equal to 0.46 and 0.37 by correlating SDS with DUDIT and LDQ, respectively. The results also reported the existence of a significant difference in the mean of SDS scores when the history of consumption in family, the place of habitation, and the type of drug were atplay. **Conclusion:** SDS maintains acceptable reliability and validity. Hence, it appears plausible to use this questionnaire for the assessment of alcohol and substance dependency among dependent individuals in Iran. It is required to pay attention to the demographic factors affecting dependence severity planning on prevention and treatment of this disorder.

Keywords: reliability, Severity of Dependence Scale, substance dependent people, validity

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Introduction

Drug dependence is one of the major concerns and issues of today's world. Since drug dependence has inhibitory effects on the growth and prosperity of society, it is a serious and worrisome threat and one of the most important public health problems in the world (Sa'ed, Pour-Ehsan, Aslani, & Barzegar, 2011). Over the past few years, there have been significant advances in the treatment of drug-related disorders; and to prove the effectiveness of these therapies, persistent and sensitive instruments should be used to measure the changes and outcomes. Without such tools, the effectiveness of an effective treatment cannot be demonstrated; therefore, it is impossible to create right changes without proper tools and instruments (Miele, Carpenter, Cockerham, Trautman, Blaine, & Hasin, 2010). Measuring drug dependence is an important topic in the field of addiction.

From the 80s of the last century, a wealth of measurement tools, including Composite International Diagnostic Interview (CIDI), Schedules for Clinical Assessment in Neuropsychiatry (SCAN), Opiate Treatment Index, and Addiction Severity Index (ASI) have been constructed in order to assess substance dependency disorders and measure the severity of heroin/ opioid dependence. Although these instruments enjoy desired psychometric properties, their implementation takes a lot of time to be made appropriate for clinical use (Iraugi Castill, 2010; Alterman, 2001). Due to the time-consuming nature of the administration of the mentioned scales, their implementation in relation to addicts is a difficult task. Often, the tools that measure drug dependence are lengthy; given that drug-dependent individuals may not be willing to respond to these lengthy questionnaires for a variety of reasons. Therefore, a tool that can shorten the dependency of various materials, can be more effective, the need to have a short but suitable tool for assessing substance dependence has led to the emergence of some interesting tools. One of these tools is Drug Use Disorders Identification Test (DUDIT), which was developed in 2005 by Berman et al. in Sweden. This test is to help diagnose people with drug-related issues and drug dependence (Berman, Bergman, Palmstierna & Schlyter, 2004). Another tool is Leeds Dependence Questionnaire (LDQ), which was developed by Raistrick et al. in 1994. The feature of this 10-item questionnaire is that it measures the dependence on a wide range of substances, including alcohol, opioids, cocaine, and other opioid drugs (Raistrick, Bradshaw, Tober, Weiner, Allison & Healey, 1994).

In the same vein, in 1995, the Gossop group designed Addiction Severity Index. The aim of this group was to provide a short and easy scale that could measure the degree of dependency experienced by consumers of different types of drugs. This tool is a self-reported 5-item questionnaire that measures the psychological components of drug dependence. The Addiction Severity Index makes it possible to conduct a mono-dimensional assessment and identifies the

individual's position throughout a continuum based on the degree of dependency (Gossop, Best, Marsden, & Strang, 1997). This scale is an index of impulsive consumption and is related to the feelings of individuals' concern and willingness to use drugs and their inadequate control over their consumption. It measures dependence on various substances, such as amphetamine, cocaine, benzodiazepine, and cannabis (Martin, Copeland, Gates, & Gilmour, 2006), opiates and alcohol (Castillo, 2010). The Addiction Severity Index differs from its predecessors in terms of concentration, and its basic advantage over the other measures of substance and alcohol dependency is its conciseness since its administration takes less than one minute (Lawinson, Coleland, Gerber, & Gilmour, 2007). This scale has been used in various studies to date and its psychometric properties have been assessed in different populations, including adolescent cannabis consumers (Martin et al., 2006), institutionalized heroin users (Gu, 2008), recreational ketamine users (Fernández-Calderón, Vidal-Giné, López-Guerrero, & Lozano-Rojas, 2016), regular Canabis users (Cuevas, Sanz, Padilla, & Berenguer, 2000), and many other studies where the internal consistency and the test-retest coefficient reliability as well as the high concurrent and convergent validity and divergent validity of it have been verified. Another study was conducted on a sample of 315 drug dependent patients, and it was revealed that the Severity of Dependence Scale can be an effective brief scale to differentiate the degree of heroin dependency in the clinical domain (Castillo, 2010). Gossop et al. used this scale on a sample of cocaine, heroin, and amphetamine users, and found its adequate internal consistency and its acceptable internal validity with other variables. Other studies, e.g., the ones carried out by Topp, & Mattick (1997), Kaye, & Darke (2001), and Cuevas et al. (2000) on amphetamine, cocaine, and benzodiazepine users identified a cut-off point that best discriminates the dependency or non-dependency on any of these substances (González-Saiz et al., 2008).

Therefore, considering the above theoretical foundations, the present study aims to confirm the factor structure of the Persian version of this scale with a sample of Iranian-dependent individuals using confirmatory factor analysis, internal consistency, and construct validity of this scale. Another aim of the current study is to evaluate the gender difference, history of use, residence status, type of substance, and method of consumption (if any) in the mean scores.

Method

Population, sample, and sampling method

The statistical population of this cross-sectional study included drug and alcohol addicts in the cities of Karaj, Qom, Faridan, Shahriar, and Tehran. The number of samples required for the conduct of the confirmatory factor analysis equals 15 for each question (González-Saiz et al., 2008). According to the five questions in this scale, the estimated sample units were obtained 75. In this study, more sample units were taken in order make the selected sample more representative

of the population. To this end, a non-random and convenience sampling method was used. By referring to clinics, prisons, and camps in these cities and obtaining the necessary permissions, we distributed 350 questionnaires among volunteer addicts, and 312 questionnaires were returned. Given that some of the questionnaires were filled in incompletely or with imprecision, they were not included in the analysis, and 281 questionnaires were finally analyzed. This number of questionnaires is justifiable due to the particular situation of addicted people, especially camp addicts who do not benefit from appropriate physical and mental conditions.

Instruments

1. Severity of Dependence Scale (SDS): This is the main instrument in this research. This instrument was designed by Gossop Group in 1995 and is a short and easy self-reported scale with one factor that includes five items. All items are scored through on a Likert scale from zero to 4, and the total score obtained from this scale varies from 0 to 15. Higher scores represent greater dependency. In various studies, the cut-off point of this instrument has been obtained equal to 4, 3, 7, 4 & 3, and 3 for amphetamine, cocaine, benzodiazepines, cannabis, and alcohol. The Cronbach's alpha reliability for this test has been reported to be 0.55 and its re-test reliability has been reported equal to 0.72 (González-Saiz et al., 2008).

2. Leeds Dependence Questionnaire (LDQ): This test was designed by Raistrick et al. in 1994. There are one factor and 10 items in this scale, which are assigned the scores 3, 2, 1, and 0. The total scores below 10 show low dependency, between 10 and 22 indicate moderate dependency, and more than 22 represent high dependency. According to Raistrick et al. (1994), this questionnaire enjoys desirable internal consistency, re-test reliability, content validity, concurrent validity, divergent validity, and convergent validity. All of these psychometric features have been reported to be satisfactory via standard criteria (Heather, Raistrick, Tober, Godfrey, & Parrott, 2001). The psychometric assessment of this tool in Iran was reported to be satisfactory and its Cronbach's alpha was obtained equal to 0.90 (Habibi, et al., 2016).

3. Behavioral Inhibition/Activation systems scale (BIS/BAS): This scale was developed by Carver & White in 1994 and consists of 24 self-report items. The behavioral inhibition scale in this questionnaire consists of 7 items that measure the sensitivity of the behavioral inhibition system or response to threats and the feeling of anxiety in the face of threat symptoms. The behavioral activation scale consists of 13 items that measure the sensitivity of the behavioral activation system, and this scale has three other sub-scales, namely drive with 4 items, reward responsiveness with 5 items, and fun seeking with 4 items. The questions of this scale are scored on a 4-point Likert scale. The items numbered 1, 6, 11, and 17 have no effect on scoring and are only added to align with other items. The items numbered 2 and 22 are scored in reverse. According to Carver &

White (1994), the internal consistency of the behavioral inhibition scale equaled 0.73, and the internal consistency of the three sub-scales of drive, reward responsiveness, and fun seeking were obtained equal to 0.76, 0.73, and 0.66, respectively (Carver & White, 1994). In Habibi et al's. Research on substance and alcohol addicts, the internal consistency of this scale was calculated through Cronbach's alpha coefficient for behavioral inhibition system and the value of 0.66 was obtained for it while the coefficients of 0.57, 0.78, and 0.3 were obtained for the three sub-scales of drive, reward responsiveness, and fun seeking, respectively (Habibi, Allah-Dadi, Mohammadi, & Ghanbari, 2017).

Procedure

First, SDS was translated to Persian by four psychologists (including a bilingual psychologist) and was subsequently translated back into English by an English translator specialist. Furthermore, it was compared with the original scale where it was shown that there is a desirable match between the two versions. Then, the questionnaire was distributed among 20 drug and alcohol users in order to examine questions clearly and comprehensively. Each of the questions was assigned a four-point Likert range, which was scored from unrecognizable (zero) to completely clear (score 4). The analysis of responses showed that the questions were verified and there was no need to change the questions. For data collection, after obtaining the necessary permits, the researchers referred to prisons, dormitories, and camps. In these centers, after providing the necessary explanations, clarifying the research goals, and obtaining consent from the volunteers participating in the research, the questionnaires were distributed among them and were returned after completion. Lisrel 8/8 software was used to analyze the data.

Results

The total number of questionnaires analyzed in this study was 281. The age range of participants was between 18 and 67 years old. In terms of gender, 254 ones (90.4%) were men and 26 ones (9.3%) were women. In fact, due to limited access to female samples and fewer female addicts, the number of women was less than men. In terms of marital status, 136 of them were single (48.4%), 94 were married (33.5%), and 37 (13.2%) were divorced or widowed. In terms of the number of drug users, 109 ones (39%) were opium users, heroin users, and crack users; 39 individuals (21%) used crystal and cannabis; 58 people (21%) consumed opium, heroin, crystal, and cannabis simultaneously; 12 ones (4.3%) consumed cannabis, crystal, and alcohol; and 38 ones (13.5%) consumed hallucinogenic opiates and alcohol simultaneously. In terms of the method of use, 188 persons (66.9%) smoked drugs, 15 ones (5.3%) injected, 26 ones (9.3%) ate drugs, 23 ones (8.2%) both ate and injected drugs, 7 persons (2.5%) both smoked and injected drugs, and 15 persons (3.5%) reported all three methods of injecting, smoking, and eating. From among this sample, 214 ones (76.2%) were selected from camps, 34 ones (12.1%) were chosen from prisons, and 33 ones

(11.9%) were chosen from addicts' dorms. In terms of education, 7 ones (2.5%) were illiterate, 27 ones (9.6%) held elementary school education, 104 ones (37%) held secondary school education, 109 ones (38.8%) held bachelor's degree, and 32 ones (11.4%) held Masters or higher degrees. Moreover, 49 participants (17.4%) had a history of hospitalization due to psychiatric problems and 127 patients (45.2%) had a history of drug use among their family members.

First, the statistical fitness of the research data was analyzed using Liserl 8/8 software. The confirmatory factor analysis verified Severity of Dependence Scale (SDS) with one single factor and loading of 5 questions on this single factor. In table 1, factor loadings, standard error of the mean, t-test for checking the significance of parameters, and explanatory coefficient of parameters have been presented.

Table 1: Confirmatory Factor Analysis Results of SDS

Item	*Factor loading*	*t*	*Z*
Have you ever thought that drug use is uncontrollable for you?	0.75	13.88	-1.93
Have you ever been anxious or nervous for losing the opportunity of drug use?	0.67	10.99	-1.39
How much have you worried about drug use?	0.44	5.94	-4.63
Have you ever wished to abstain from drug use?	0.18	2.31	-6.38
How hard is it for you to abstain from drug use or continue living without consuming it?	0.55	8.15	1.92

Investigating the values of factor loadings indicated that the factor loadings of all items on the main component were satisfactory (P.E.<0.3). The examination of the difference in the model fitness showed that the model is well suited to the data, that is, the results of the research support the single-factor model.

Table 2: Confirmatory Factor Analysis Indicators of SDS

Satorra-Bentler χ^2	*Df*	*df*/χ^2	*GFI*	*AGFI*	*CFI*	*RMSEA*	*SRMR*
1.57	2	0.78	1.00	0.99	1.00	0.0005	0.016

The evaluation of the fitness indices of the model indicates that the model has a relatively good fit with the data. Indices of CFI, AGFI, GFI indicate a very favorable fit and RMSEA and RMR indices indicate favorable and appropriate fit, and are satisfactory on the basis of the ratio of chi square to the degree of freedom (Table 2 and Fig. 1).

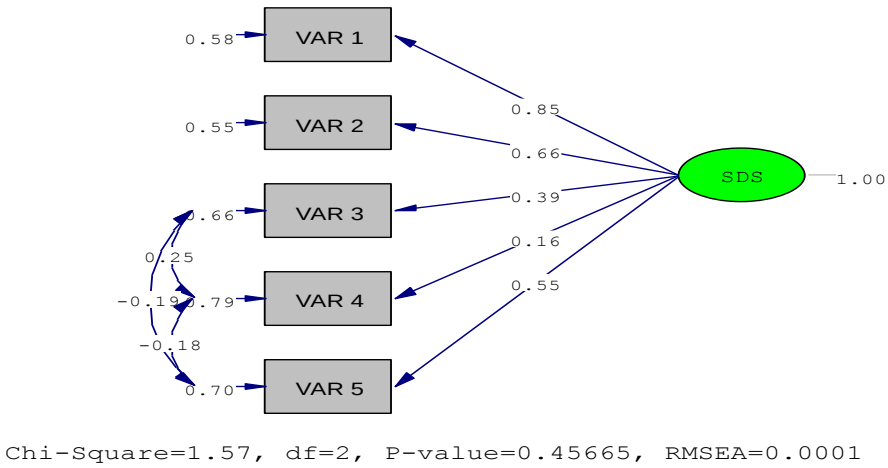

Fig. 1: Standardized Statistics of SDS Items on the Single-Factor Model

Cronbach's alpha coefficient and Guttman's split-half coefficient for the SDS were equal to 0.64 and 0.58, respectively. It is noteworthy that the number of questions in the Guttman's split-half ratio can be up to three questions (Izanlou, Habibi, & Kaveh'ea, 2012). Correlation between severity of dependence and other psychological variables in addicted people shows that there is no significant relationship between SDS and Behavioral Activation System ($p > 0.05$, $r = 0.10$). However, there was a significant correlation between SDS and Behavioral Inhibition System ($P < 0.05$, $r = 0.17$), between SDS and Leeds Dependence Questionnaire ($P < 0.001$, $r = 0.37$), and between SDS and the test scores for the diagnosis of substance abuse disorders ($P < 0.001$, $r = 0.46$).

To investigate the difference in the mean of SDS between two groups of addicted women and men, according to the results of the Levene's test ($P > 0.05$, $F = 0.39$) and also the homogeneity of the variance of the two groups, independent t test was used. The results showed that there was no significant difference between men and women mean in score of SDS ($P > 0.05$, $t = 0.09$). Independent t-test was also used to compare the severity of dependence between substance abusers with and without a family history of substance abuse. The results indicated that there was a significant difference in severity of dependency between the mean score of subjects with a history of substance abuse in the family ($M = 9.73$) and without a history of substance abuse in the family ($M = 9.9$) ($P < 0.05$, $t = 2.01$). One-way ANOVA was used to examine the difference in the severity of dependence among three groups of addicts in camp, prison, and dormitory. The homogeneity variance assumption of the groups was not met ($P > 0.05$, $F = 7.7$). Therefore, Welch's F-ratio was used. The results of Welch test indicated that there was a significant difference between the mean scores of

addicts living in camp, prison, and dormitory (P <0.001, F (278, 2) = 6.7). In order to compare the groups in the event of the inequality of sample size and variance, Games-Howell post-hoc test was used and it was shown that dormitory addicts' dependency severity was higher than that of drug addicts living in prison (P <0.001). The severity of dependency among addicts residing in camp was higher than that of drug addicts living in prison (P <0.001). However, there was no difference in the severity of dependence between the addicts living in camp and the addicts living in dormitory (P <0.05).

Table 3: The mean difference between addicts living in camp, prison, and dormitory in terms of severity of dependence

Group	*N*	*Mean*	*SD*	*F*	*Df*	*Sig.*
Camp	214	9.49	3.28			
Prison	36	7.58	1.9	6.7	27.8	0.001
Dormitory	33	10.12	2.9			

One-way ANOVA was used to investigate the difference in the severity of dependency among six groups of addicts in terms of the type of drug. The results of Levene's test showed that the homogeneity assumption of the groups was not met (P≤0.05, F = 3.03). Therefore, Welch's F-ratio was used. The results of this test indicated that there is a significant difference in terms of severity of dependence among the sic groups of opiate addicts (heroin, opium, and crack), hallucinogenic substance users (crystal and cannabis), opiate and hallucinogenic substance users, hallucinogenic substance users and alcohol consumers and opiate users, and hallucinogenic substance users and alcohol users (P≤0.01, F = 3.48). In order to compare the groups in the event of the inequality of sample size and variance, Games-Howell post-hoc test was used and it was shown that the dependency severity was higher in users of three substances, namely opiates, hallucinogenic, and alcohol than that in opiate users (heroin, opium, and crack) (P <0.01). In addition, the severity of dependency in consumers of three substances (opiates, hallucinogenic, and alcohol) was higher than that in the consuming group of hallucinogenic substances (crystal and cannabis) (P <0.05). Other binary comparisons of groups were not significant in terms of severity of dependency.

Table 4: One-way ANOVA Examining Dependency Severity in terms of Type of Substance

Group	*N*	*Mean*	*SD*	*F*	*Df*	*Sig.*
Opiate (heroin, opium, and crack)	109	8.97	3.14			
Hallucinogenic (crystal and hashish)	39	8.76	3.65			
Opiate and hallucinogenic	58	9.6	3.13	3.48	4-251	0.01
Hallucinogenic and alcohol	12	9.41	2.06			
Three types of opiate, hallucinogenic, and alcohol	38	11	2.65			

One-way ANOVA was used to examine the difference in the mean of the dependency severity based on the type of consumption, i.e. smoking, eating, injection, smoking and eating, smoking and injection, eating and injection, and

smoking and injection. Levene's test was run to examine the homogeneity assumption of the groups where the results showed that this assumption has been met (P> 0.05, F = 0.46). The results indicated that there was a difference between the addicts who used the methods of smoking, sap eating, injection, smoking and eating, smoking and injection, eating and injection, and three modes at the same time in terms of dependency severity (P> 0.05, F = 31.1).

Table 5: The Difference in Dependency Severity between Addicts in terms of Consumption method

Group	*N*	*Mean*	*SD*	*F*	*Df*	*Sig.*
Smoking	188	9.29	3.13			
Eating	26	9.11	3.68			
Injection	15	9.26	3.23			
Smoking and eating	23	9.17	962	1.31	273	0.24
Smoking and injection	7	9.85	3.43			
Eating and injection	1	4	0			
Injection, smoking, and eating	15	11.13	2.55			

Discussion and Conclusion

The aim of this study was to investigate the psychometric properties of the Severity of Dependency Scale. The investigation of the values of factor loadings indicated that the factor loadings of all questions on the main component were satisfactory. The findings of the study confirmed the psychometric properties of the SDS, including the internal consistency of the questionnaire and convergent validity. Convergent validity was assessed by correlating SDS with Leeds Dependence Questionnaire and Test for Diagnosis of Substance Disorders where the results indicated that this scale enjoyed a moderate convergent validity. The results also showed that there is a relationship between severity of dependency and behavioral inhibition system. In general, the findings regarding the validity and reliability of SDS were consistent with the previous results regarding the satisfactory psychometric properties of this scale (Miele et al., 2000; Gossop et al., 1997; Martin et al. 2006; Fernandez et al., 2016; Cuevas et al., 2000; Kelly, Magill, Slaymaker & Kahler, 2010).

Another purpose of the study was to evaluate the difference in the mean scores of dependency severity on a number of demographic factors. The results of statistical analyses showed that there is a difference between the history of consumption in the family, the addicts' place of residence, and the type of substance consumed with regard to the mean scores of the severity of dependency; however, there was no difference in terms of gender and consumption method. Individuals with a history of consumption in the family obtained higher scores in SDS than those without a history of consumption in the family, indicating a higher degree of dependence among these individuals. People with a history of consumption in the family were revealed to have more access to the substance and, thereby, could freely consume substance, which

ultimately would lead to a greater dependence among these individuals (Khaza'ea, Najafi, & Alavifar, 2014).

The findings of this research also showed that the severity of dependency among the addicts living in dormitory was higher than that in addicts living in prison. In the same way, the severity of dependency among addicts residing in camp was higher than that in addicts living in prison. However, there was no difference among addicts living in camp and living in dormitory in terms of the severity of dependency. Addicts living in dormitory have free access to substances and, thereby, they have been reported with high levels of consumption; therefore, the severity of dependency is high among them. Patients living in camp have a high level of dependency severity since they have recently abstained from drug use. But addicts in prisons have not used drugs for a long time and do not have free access to drugs; therefore, their severity of dependency is low. According to the current researchers' review, no similar study was found in this field that had compared these groups.

Also, there was a significant difference between the scores of the type of substances in such a way that consumers of three substances, namely opiates, hallucinogens, and alcohol obtained the highest score in the severity of dependency, which indicates that the severity of dependency in the subjects dependent on different substances is significantly higher than those who are only dependent on one group of substances. Subsequently, the simultaneous consumers of hallucinogens and alcohol, opiates and hallucinogens, hallucinogens (crystal and cannabis), and, ultimately, drug users (heroin, opium, and crack) showed the highest severity of dependency, respectively. These findings are consistent with those of the previous research (Kelly et al., 2010; Ford, 2003).

One of the limitations of this study was the lack of access to a larger sample of people consuming substances and alcohol. In addition, due to the limited access to female addicts, the number of people in the sample was low. It was also not possible to randomize the sampling, which could have led to more precise results. Further studies can achieve more precise results if they tackle these limitations. Another limitation of this research is the small number of items of Severity of Dependency Scale (only 5 questions). Since Cronbach's alpha coefficients and Guttman's ratio are influenced by the number of test items and the reduced number of questions decreases the value of coefficients, this issue should be taken into account in interpreting the results.

In general, the findings of this study indicated the suitable reliability and validity of Severity of Dependency Scale among the addicted population in Iran, and, therefore, this tool can be used for various research and therapeutic purposes. Also, demographic factors, such as the history of consumption in the family, addicts' place of residence, and the type of substance were associated with higher scores of SDS, which indicates a greater degree of dependency among these groups. Thus, it is required to pay attention to these issues planning

for prevention, treatment, and harm reduction associated with substance and alcohol consumption.

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