

Reliability and Validity of Chinese Version of the Addiction Severity Index among Drug Users in the Community*

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Abstract

Objective To assess the reliability and validity of a new Chinese version of the Addiction Severity Index (ASI-C) in drug users in the community.

Methods Three hundred and eighty-one drug users in the community in Chengdu, Sichuan province were recruited. They were interviewed with a questionnaire consisting of the ASI-C revised on the basis of the previous Chinese version and 38 were interviewed for the second time at an interval of 7 days to evaluate test-retest reliability.

Results Cronbach's α coefficients for the internal consistency of the scale varied from 0.49 to 0.86. Test-retest correlation coefficients ranged from 0.50 to 0.93. Criterion validity was found acceptable, as compared with the Symptom Checklist 90 (SCL-90).

Conclusion The ASI-C presented acceptable reliability and validity in a sample of drug users in the community.

Key words: Addiction severity index; Chinese version; Reliability; Validity; Community

Biomed Environ Sci, 2012; 25(6):684-689

doi: 10.3967/0895-3988.2012.06.010

ISSN:0895-3988

www.besjournal.com/fulltext

CN: 11-2816/Q

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INTRODUCTION

The Addiction Severity Index (ASI) is one of the most widely used assessment devices in the field of substance abuse^[1]. It was developed by Thomas McLellan and his colleagues at the University of Pennsylvania/Veterans Administration Center and has been used for over 30 years to explore the severity of addiction, measure treatment effectiveness and screen for factors influencing treatment outcomes at initial stages^[2-6]. The scale evaluates seven areas in addiction patients:

medical status, employment status, drug abuse, alcohol abuse, legal status, familial-social relationship, and psychiatric status. It has been translated into 14 languages^[7-12] for its good reliability and validity in different cultural contexts all over the world.

The first short Chinese version of the ASI^[13] was translated in 2003 on the basis of the first English version of the scale^[1]. The researchers^[13] revised part of the original scale and measured its reliability and validity among male drug users in custody.

In 2007, Luo Wei, an author of this paper,

*This work was supported by National Natural Science Foundation of China, Number 30800953.

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Received: February 3, 2012;

Accepted: June 4, 2012

translated the fifth English version of the ASI into Chinese(ASI-C)^[14]. This was the first complete Chinese version and was shown to be reliable and valid among drug users in methadone maintenance treatment (MMT). It has been proven that MMT could significantly decrease the severity of addiction in drug users^[15]. The characteristics of drug users in MMT are quite different from those of drug users in the community not receiving MMT^[16]. It therefore seemed of great importance to explore the applicability of the ASI-C among drug users in the community not receiving MMT before using the scale.

The purpose of this study was to measure the reliability and validity of the ASI-C in drug users in the community.

MATERIALS AND METHODS

Study Sites

Data were collected from two communities in Chengdu, Sichuan Province. There is one needle exchange program (NEP) in each community. Drug users were recruited mainly from NEP attendants and some from the two communities through snowball sampling, which meant we found the first batch of participants from the community and then obtained the second batch through introduction of the first batch, the third batch of participants was provided by the second batch, and so on, the sample grew like a snowball. This study was approved by the Institutional Review Board of the Chinese Center for Disease Control and Prevention.

Participants

All participants met the criteria for drug dependence according to the CCMD-3^[17]. Exclusion criteria were severe mental or physical deterioration. The applicability of the exclusion criteria was determined by the researchers according to their subjective evaluation. From December 2009 to March 2010, a sample of 381 drug users was recruited from the two communities. Each subject was required to provide a signed informed consent before the study.

Instrument

The ASI is a multidimensional questionnaire assessing the severity and need for treatment in seven areas: (1) medical status; (2) employment and social support; (3) drug use; (4) alcohol use; (5) legal

status; (6) family and social relationships; and (7) psychiatric status. Each of the seven sections provides a Composite Score (CS). Patient and interviewer rate the severity of each area using separate rating scales. The patient uses a scale of 0-4 to rate (1) how serious he/she thinks the problem is, and (2) how important he/she considers it is to receive treatment or counseling. The interviewer uses a nine point scale for each area to rate the patient's requirement for further treatment. The interviewer has to decide how much additional treatment the patient needs in each of the areas.

The ASI-C was further revised according to characteristics of drug users in the community. No items related to calculation of composite score were modified. More comments and instructions for items were added in the scale to make it easier to understand.

The *Symptom Checklist 90 (SCL-90)*^[18] and the *Family Adaptability and Cohesion Evaluation Scale II-Chinese Version (FACES II-CV)*^[19] were used to measure the criteria validity of the scale. The SCL-90 is a 90-item self-reported questionnaire designed for evaluating psychological health status. Each client answers 90 questions related to the severity of various symptoms. The FACES II-CV is a 30-item self-reported questionnaire to measure relationships among family members. Each subject answers 30 questions related to the frequencies of various situation.

Procedures and Analysis

Subjects were interviewed face-to-face by two interviewers who had finished a half-day training program that included reviews of the ASI manual, thorough discussions, and practice sessions. Thirty eight of the subjects agreed to attend test-retest assessment. The second interview was conducted in the 7-day interval after the first investigation.

Data were analyzed according to international practice^[20]. Composite scores were calculated for the seven areas^[21]. The test-retest reliability and internal consistency were examined for the reliability assessment. Correlations were calculated between interviewer severity ratings (ISRs) and CSs, between CSs across different areas, as well as between 'critical items' constituting the different areas and the CSs within sections.

Data were analyzed using SPSS for Windows 16.0. Internal consistency was calculated by Cronbach's α test. The Spearman correlation test was used to calculate reliability coefficients and the

validity of similar scales. The significance level was set at 0.05.

RESULTS

Characteristics of Subjects

A total of 381 subjects who were drug users were recruited between December 2009 and March 2010, of whom 74.8% (285) were male and 25.2% (96) female. The average age was 39.6 (standard deviation=7.6) years. Of the total, 76.5% (290) were unemployed and 98.7% (376) were of the Han ethnic group. The majority of the drug users participating in the investigation (50.9% or 194) had finished nine years of education, and only 3.4% (13) had fifteen years or more of education. For marital status, 41.7% (159) of the subjects were divorced or widowed and 30.2% (115) were married at the time of interview. The average duration of heroin use was 9.5 years. All of the subjects were injection drug users (Table 1).

Table 1. Characteristics of Study Subjects (n=381)

Variable	Statistic
Age	39.6±7.6
Gender	
Male	285 (74.8%)
Female	96 (25.2%)
Occupation	
Unemployed	290 (76.5%)
Employed	89 (23.5%)
Ethnic	
Han	376 (98.7%)
Others	5 (1.3%)
Education (years of education finished)	
6 years	63 (16.5%)
9 years	194 (50.9%)
12 years	111 (29.1%)
15 years or more	13 (3.4%)
Marital Status	
Single	107 (28.1%)
Married	115 (30.2%)
Divorced/ Widowed	159 (41.7%)
Duration of heroin use (years)	9.5±6.6
Route of heroin use in jection	381 (100%)

Internal Consistency

The standardized Cronbach’s α coefficient was used to evaluate the internal consistency of the ASI-C. Cronbach’s α coefficient of each area of the ASI-C ranged from 0.49 to 0.86, with the lowest in the area of drug use and the highest in the area of medical status. Cronbach’s α coefficient for the seven areas measured by ASI-C averaged 0.69. Nunnally recommended that a Cronbach’s α coefficient of 0.6 or higher was acceptable^[7]. In this study, Cronbach’s α in the area of drug use (Cronbach’s α =0.49) and in the area of employment (Cronbach’s α =0.55) were lower than 0.6. Results suggested that medical, alcohol, legal, family/social, and psychiatric areas had satisfactory indices of homogeneity. The drug use and employment areas had weak coefficients (Table 2).

Table 2. Internal Consistency of ASI-C (Cronbach’s α coefficient, n=381)

ASI Areas	Composite Scores($\bar{x} \pm s$)	Standardized Cronbach’s α
Medical	0.11±0.18	0.86
Employment	0.41±0.22	0.55
Alcohol	0.03±0.09	0.79
Drug	0.24±0.05	0.49
Legal	0.38±0.31	0.76
Family/social	0.37±0.14	0.66
Psychiatric	0.23±0.15	0.71

Test-retest Reliability

Test-retest reliability measures the extent to which questions in an instrument yielded consistent responses from the same subject over two separate time points. Spearman’s ρ correlation was used. The results in Table 3 show that Spearman’s ρ correlation for the test-retest ranged from 0.50 to 0.93.

Table 3. Test-retest Reliability of Composite Scores (n=38)

ASI Areas	Spearman’s ρ Correlation
Medical	0.74**
Employment	0.77**
Alcohol	0.82**
Drug	0.53**
Legal	0.93**
Family/social	0.80**
Psychiatric	0.50**

Note. ** $P<0.01$.

Comparison between the two interviews indicated that there was no significant difference ($P>0.05$), indicating that the ASI-C was stable.

Correlations between Interviewer Severity Ratings and Composite Scores

The correlations between ISRs and CSs for the same problem areas presented one potential indicator of the concurrent validity of ASI-C measures. Results in Table 4 show that there was always a high Pearson’s correlation coefficient between ISRs and CSs

for the same area, ranging from 0.45 to 0.89 except for drug use, with a correlation of only 0.14. The relationships between ISRs and CSs for the different areas were relatively lower.

Relationship between Composite Scores

To demonstrate that different ASI areas reflected distinct problem areas with minimal overlaps, correlations between areas were evaluated. The correlation coefficients were low, ranging from 0.00 to 0.35 (Table 5).

Table 4. Correlations between Interviewer Severity Ratings and Composite Scores ($n=381$)

ASI Areas	Medical	Employment	Alcohol	Drug	Legal	Family/Social	Psychiatric
Medical	0.79**	0.27**	0.20**	-0.24**	-0.07	-0.18**	0.28**
Employment		0.50**	0.09	0.02	0.25**	0.10	0.17**
Alcohol			0.89**	-0.04	-0.02	-0.03	0.19**
Drug				0.14**	-0.06	0.11*	0.29**
Legal					0.86**	0.01	0.16**
Family/social						0.45**	0.27**
Psychiatric							0.63**

Note. * $P<0.05$, ** $P<0.01$.

Table 5. Inter-correlation between Composite Scores ($n=381$)

ASI Areas	Medical	Employment	Alcohol	Drug	Legal	Family/Social	Psychiatric
Medical	1.00	0.22**	0.20**	-0.09	-0.05	-0.16**	0.29**
Employment		1.00	0.04	-0.08	0.34**	-0.03	0.19**
Alcohol			1.00	0.00	0.05	-0.06	0.13*
Drug				1.00	0.05	0.35**	0.18**
Legal					1.00	0.01	0.10
Family/social						1.00	0.29**
Psychiatric							1.00

Note. * $P<0.05$, ** $P<0.01$.

Association between Items and Composite Scores

Each of the seven ASI areas reflected a separate problem area of drug/alcohol abuse. It could be expected that each would be highly correlated with a conceptually related standard measure and at the same time would have low correlations with conceptually unrelated standard measures. The results in Table 6 reveal that the Pearson’s coefficients between items and the related CSs were much higher than those between items and other

CSs. It was also found that correlations between some items and the related CSs were quite low, especially for the drug use and family/social areas.

Criterion Validity

Criterion validity refers to the extent to which the measurements correlated with the external criterion. The correlation of the psychiatric score with the *SCL-90* was 0.56 ($P<0.001$). The correlation of the family/social score with the *FACES II-CV* was 0.26 ($P<0.05$).

Table 6. Correlation between Items and Composite Scores ($n=381$)

ASI Areas	Number of Items	Correlation between Items and Related Composite Scores		Correlation between Items and Unrelated Composite Scores	
		Minimum	Maximum	Minimum	Maximum
Medical	3	0.86	0.91	0.03	0.3
Employment	4	-0.47	-0.78	-0.01	-0.46
Alcohol	6	0.43	0.92	0	0.2
Drug	13	-0.02	0.66	0	0.48
Legal	3	0.72	0.9	0.02	0.31
Family/social	13	0.01	0.77	0	0.38
Psychiatric	11	0.19	0.6	0	0.43

DISCUSSION

Findings with the new version of the ASI-C among drug users in the community were consistent with many other studies^[4,9,22]. According to the Cronbach indices, the internal consistency was moderate to weak for the 'drug use' and 'employment' areas. For the other five areas of the ASI-C, the Cronbach's α coefficient was acceptable (higher than 0.6) and similar to the results in the reported literature^[23-26]. The reason for the poor internal consistency of the 'drug use' and 'employment' areas may be the pseudo responses of interviewees. Drug use is illegal in China. Drug users might conceal their real activities on purpose. A similar situation might have happened for the participants when answering questions about 'illegal income' in the 'employment' area.

An appropriate time interval between the two tests should be chosen when measuring the test-retest reliability. It should be long enough to avoid the results of the first test affecting the second one, while at the same time, short enough to avoid significant subject changes during the chosen time interval^[27]. This has varied in different studies^[23,28-29]. One week was chosen in this study. The test-retest reliability indicators corresponded to the values found in other studies^[30-32].

The close correlations between ISRs and CSs in the same problem areas indicated that good concurrent validity existed in the ASI-C. Despite the significant correlations between different areas of ASI-C, the correlation coefficients were relatively low, which indicated the independence of the areas. Similar results have been found in a number of other studies^[4,33].

CSs and items within same area were significantly

correlated while the correlation between items and other CSs was quite low, which confirms the validity of the ASI original scale construct^[1].

The criterion validity of CSs with the SCL-90 was acceptable. The correlation between CSs and the SCL-90 in this study was similar to the results of Hendriks^[9]. The correlation between CSs and the *FACES II-CV* was a little weak.

The previous version of the ASI-C has been proven to be reliable and valid among drug users in MMT^[14], as it was evaluated among drug users in MMT. Subjects selected had already been in treatment for more than 6 months when the scale was first administered. This situation would perhaps result in a lower need for further treatment, weakening internal validity. This deficiency has been remedied to a great extent in this study. Subjects were recruited from among drug users in the community who were not being treated for drug use.

One limitation that should be considered was that most of the drug users recruited for this study seldom used drugs other than heroin. This similar status of drug use reduced variance of the items in the drug use area and then affected assessment of the reliability. Further study is needed to explore the applicability of the ASI-C among those drug users who use drugs other than heroin. Other limitations were that the investigation was only conducted in one area and that less than 40 subjects attended the test-retest assessment, which may have a certain influence on the test-retest reliability measurement. More areas and larger sample sizes should be included when further investigation is implemented.

In spite of these limitations, the ASI-C appeared to have acceptable reliability and validity in drug users from the community. Compared with the previous version of the ASI-C, the new version had a larger applicable population including drug users in

the community whether or not they attended MMT, and thus could be more widely used. It should be pointed out that there may be an unacceptable degree of reliability and validity when using the ASI-C among specific populations such as drug users with severe mental illness, adolescents, et al.^[34]. More work should be considered.

ACKNOWLEDGMENTS

We express our thanks to the staff of the Chengdu Municipal Center for Disease Control and Prevention, Sichuan Province for their contribution to the organization and implementation of the field interviews.

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