

ORIGINAL ARTICLE

Validation of the short-form brazilian version of the Addiction Severity Index 6 (ASI-6 Light)

Validação da versão brasileira do *Addiction Severity Index 6 Light (ASI-6 Light)*

Validación de la versión brasileña de forma corta del *Addiction Severity Index 6 Light (ASI-6 Light)*

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Abstract

Background: Evaluating users of psychoactive substances is complex, as it necessitates examining various aspects of the user's life affected by consumption, in addition to assessing specific drug use. The Addiction Severity Index 6 (ASI-6) is one of the most commonly used global evaluation instruments, but it has limitations regarding research outcomes. **Aim:** To validate the short-form Brazilian version of the Addiction Severity Index 6 (ASI-6 Light). **Methods:** This cross-sectional, quantitative study involved 200 individuals who participated at two different times. Participants completed a DSM-5 diagnostic interview, the ASI-6 Light, and the full sixth version of the ASI (ASI-6). The study evaluated the concurrent validity of the "alcohol" and "drugs" domains of the ASI-6 Light, its reliability and reproducibility, and the correlations between ASI-6 Light and ASI-6 scores. **Results:** The study found good evidence of concurrent validity for the "alcohol" and "drugs" domains of the ASI-6 Light ($r = 0.77$ for both). The intraclass correlation coefficients (ICCs) ranged from 0.73 to 0.98. Significant and moderate correlations were observed between the scores for the ASI-6 Light and ASI-6 in the drug, medical, alcohol, and legal domains ($r = 0.68$, $r = 0.64$, $r = 0.40$, and $r = 0.40$, respectively). **Conclusions:** The results indicate that the ASI-6 Light has good psychometric properties and may reduce biases in the use of the ASI.

Keywords: Validation studies; Addiction severity index; Reliability; Scales; Substance use disorder

Resumo

Introdução: Avaliar usuários de substâncias psicoativas é complexo, pois exige a análise de diversos aspectos da vida do usuário afetados pelo consumo, além de avaliar o uso específico de drogas. O Índice de Gravidade de Dependência 6 (ASI-6) é um dos instrumentos de avaliação global mais utilizados, mas apresenta limitações em relação aos resultados de pesquisas.

Objetivo: Validar a versão brasileira do *Addiction Severity Index 6 Light (ASI-6 Light)*. **Métodos:** Este estudo transversal, quantitativo, envolveu 200 indivíduos que participaram em dois momentos diferentes. Os participantes completaram uma entrevista diagnóstica do DSM-5, o ASI-6 Light e a versão completa do ASI (ASI-6). O estudo avaliou a validade concorrente dos domínios “álcool” e “drogas” do ASI-6 Light, sua confiabilidade e reprodutibilidade, além das correlações entre os escores do ASI-6 Light e do ASI-6.

Resultados: O estudo encontrou boas evidências de validade concorrente para os domínios “álcool” e “drogas” do ASI-6 Light ($r = 0,77$ para ambos). Os coeficientes de correlação intraclassa (ICC) variaram de 0,73 a 0,98. Correlações moderadas e significativas foram observadas entre os escores do ASI-6 Light e do ASI-6 nos domínios drogas, médico, álcool e legal ($r = 0,68$, $r = 0,64$, $r = 0,40$ e $r = 0,40$, respectivamente).

Conclusão: Os resultados indicam que o ASI-6 Light possui boas propriedades psicométricas e pode reduzir vieses no uso do ASI.

Palavras-chave: Estudos de validação; Índice de gravidade de dependência; Confiabilidade; Escalas; Transtorno por uso de substâncias

Resumen

Antecedentes: Evaluar a los usuarios de sustancias psicoactivas es complejo, ya que es necesario examinar varios aspectos de la vida del usuario afectados por el consumo, además de evaluar el uso específico de drogas. El Índice de Severidad de la Adicción 6 (ASI-6) es uno de los instrumentos de evaluación global más utilizados, pero tiene limitaciones en cuanto a los resultados de investigación.

Objetivo: Validar la versión brasileña *Addiction Severity Index 6 Light (ASI-6 Light)*. **Métodos:** Este estudio transversal y cuantitativo involucró a 200 individuos que participaron en dos momentos diferentes. Los participantes completaron una entrevista diagnóstica del DSM-5, el ASI-6 Light y la versión completa de la sexta versión del ASI (ASI-6). El estudio evaluó la validez concurrente de los dominios “alcohol” y “drogas” del ASI-6 Light, su fiabilidad y reproducibilidad, y las correlaciones entre las puntuaciones del ASI-6 Light y el ASI-6.

Resultados: El estudio encontró buena evidencia de validez concurrente para los dominios “alcohol” y “drogas” del ASI-6 Light ($r = 0,77$ para ambos). Los coeficientes de correlación intraclassa (CCI) oscilaron entre 0,73 y 0,98. Se observaron correlaciones significativas y moderadas entre las puntuaciones del ASI-6 Light y el ASI-6 en los dominios drogas, médico, alcohol y legal ($r = 0,68$, $r = 0,64$, $r = 0,40$ y $r = 0,40$, respectivamente).

Conclusión: Los resultados indican que el ASI-6 Light tiene buenas propiedades psicométricas y puede reducir sesgos en el uso del ASI.

Palabras clave: Estudios de validación; Índice de severidad de la adicción; Fiabilidad; Escalas; Trastorno por uso de sustancias

Introduction

Studies have advanced and increasingly contributed to the knowledge on Substance Use Disorders (SUD). An unmet need in this field is the use of instruments capable of supporting both research and clinical care for individuals who use psychoactive substances (PAS). Assessing a substance user is an extremely complex task, as it requires not only investigating the specific drug use but also examining the various life domains that may be impacted by such consumption¹.

In this context, the *Addiction Severity Index* (ASI) was developed in 1980 by A. Thomas McLellan et al. to collect information on various aspects of the life of individuals with problems associated with PAS use, for example, medical problems, occupational status, and legal, socio-family and psychiatric aspects, in addition to alcohol and other drug use. Due to its wide use, this instrument has been translated into several languages²⁻⁴, in addition to being the subject of validity and reliability studies in different contexts⁵⁻⁹. More recently, the ASI was adapted to short-form and self-applied versions¹⁰⁻¹².

Since its inception, the ASI has undergone several review processes. Until recently, the fifth version (ASI5), which had undergone few review processes, was the most used and was widely used in Brazil in the 1990s. The combination of changes in the field, new knowledge and research revealed limitations to the instrument and led to a major revision¹³⁻¹⁵.

Subsequent important modifications to the ASI resulted in the sixth version (ASI-6)^{1,13,15}. The ASI-6 consists of 252 questions grouped into the same seven assessment areas. The objective and subjective items related to problems occurring in the last 30 days and in life were maintained, and there was an increase in questions related to the last six months. The response format (numerical, dichotomous and ordinal responses) was retained, with a Likert scale used responses by individuals. The subjective assessment by the interviewer was removed; in previous versions, this assessment was previously weighted with the patient self-assessment. Therefore, the Interviewer Severity Ratings has been replaced with Respondent Severity Ratings. The composite scores (obtained from objective data referring to problems occurring in the last 30 days) were replaced with *Summary Scores for Recent Functioning* (SS-Rs). The SS-Rs were derived from an analysis of the instrument using a combination of nonparametric item response theory (IRT) and classical test theory methods.

A previous study conducted by Denis and colleagues compared the characteristics and validity of the composite scores (CSs) of the ASI5 and the SS-Rs of the ASI-6 in a subsample of 82 patients from PAS treatment programs. Spearman's correlations were significant and substantial between the SS-Rs and their corresponding CSs, ranging from $\rho = 0.84$ to $\rho = 0.38$, indicating that the ASI5 and ASI-6 scores, although not interchangeable to varying degrees, measure the same construct¹².

In Brazil, Kessler and colleagues conducted a cross-sectional and multicenter study to evaluate the

psychometric properties of the ASI-6. The sample consisted of 740 individuals diagnosed with substance abuse or dependence. In that study, Cronbach's alpha for the ASI-6 subscales ranged from 0.64 to 0.95. The correlations between the scores for the "alcohol" and "drugs" domains of the ASI-6 and the competing instrument *Alcohol, Smoking and Substance Involvement Screening Test* (ASSIST) were high (0.72 and 0.89, respectively), and most of the ASI showed good reliability between the instrument and the interviewers, with no statistically significant differences between the SS-Rs of the ASI-6¹. The study indicated good reliability and validity of the ASI-6 in the Brazilian context, both for inpatient and outpatient treatment. The ASI-6 was also validated for other countries^{16,17}.

However, three questions have been raised regarding the use of the instrument. Its use in research has been questioned because of the use of subjective scores, which causes bias in the results¹⁴. In addition, studies that use specific analyses for the evaluation of constructs and items are limited¹⁸. Furthermore, the application of ASI requires the availability of professionals, which is not always possible, and requires thorough training for interviewers to ensure the reliability of the data collected^{1,14}.

In this context, Sartes and colleagues conducted a study that aimed to evaluate the psychometric properties of the seven areas of the Brazilian version of the ASI-6 using IRT models and, based on this analysis, select the best items, aiming to propose a short-form version of the ASI-6¹⁹. The data from the 740 drug users who participated in the validation of the ASI-6 for Brazil, conducted by Kessler, mentioned above, were used. Factorial Analysis (FA) was performed to evaluate the existence of unidimensionality, and when confirmed, two parametric IRT models were applied. Each item was evaluated in relation to two parameters: a) its ability to differentiate people by the intensity of the latent trait (severity of problems in each area evaluated) and b) difficulty generating affirmative responses to an item. Using these parameters, the distribution of items and responses on a scale of different levels of latent trait severity was studied for each domain¹. The characteristics of the individuals at each severity level were described considering the items that compose the domain. The analyses based on IRT revealed that, except for the "employment/livelihood" domain, the other six domains had good psychometric properties. Approximately one-third of the original items showed adequate differentiation and difficulty indices. Thus, to compose a short-form version of the ASI, 96 of the 344 items were selected (including the subitems of the 252 original questions) by eliminating the items that were not very differentiating or extremely difficult to generate affirmative responses. For the "employment/livelihood" domain, the selection of items was based on FA. The structure of the constructs of each of the seven domains of the ASI-6 was evaluated based on the associations revealed through the IRT analysis and FA. This analysis indicated that each domain can be considered one-dimensional using a subset of items because each has an identifiable main construct.

A study was conducted to develop and evaluate the psychometric properties of the short-form version of the ASI-6 (ASI-6 Light)²⁰, which was initially proposed by Sartes in 2010¹⁹. The results showed high to moderate correlations between the alcohol and drug domains of the ASI-6 Light and ASSIST scores. The area under the ROC curve for the "alcohol" domain was 0.93, and that for the "drugs" domain was 0.88. The results were

satisfactory, with good psychometric properties, suggesting that the ASI-6 Light may be a useful instrument for evaluating the use of PASs and related problems.

More practical and easier to manage, this instrument also led to a significant reduction in application time. However, some gaps remained, such as the need to compare the ASI-6 Light and DSM-5 diagnostic interview because both, in the “alcohol” and “drugs” domains, provide a *continuum* view of severity. In addition, we studied the correlations of severity level scores derived from the IRT analysis of the ASI-6 Light and the SS-Rs of the ASI-6 and evaluated the reproducibility of the short-form version of the ASI-6²⁰.

Thus, the aim of this study was to evaluate new psychometric properties of the Brazilian version of the ASI-6 Light related to evidence of validity based on correlations with external variables and relative to reliability. In addition, we investigated whether the ASI-6 Light is a short-form version of the traditional ASI-6, i.e., measures the same construct, or a new instrument. Notably, the evaluation of the psychometric properties performed in this study was based on the concepts developed by the *Standards for educational and psychological testing*²¹.

Methodology

The ASI-6 Light validation process was performed using a cross-sectional, correlational, quantitative study.

Sample

A total of 200 individuals were interviewed at specialized services (inpatient and outpatient clinics) for alcohol and other drug use disorders in the cities of Juiz de Fora (MG) – including the Center for Psychosocial Alcohol and Drugs Care (Centro de Atenção Psicossocial Álcool e Drogas – CAPS ad) and Ana Nery Hospital – and Porto Alegre (RS), at the Clinical Hospital of Porto Alegre (Hospital de Clínicas de Porto Alegre – HCPA). The interviews took place from May 2016 to September 2018. The sample was not probabilistic and was selected based on convenience criteria. The sample size was calculated based on a previously proposed methodology, which suggests that including 200 participants is sufficient for identifying stable correlations in correlational studies²².

The inclusion criteria were age older than 18 years; evaluated or receiving treatment at clinics and/or inpatient units that specialized in the treatment of SUD; and alcohol and/or drug use in the last 30 days prior to the date of the interview. Patients from outpatient clinics and CAPS ad were in the beginning of treatment (maximum two weeks), and patients who were hospitalized were included if they had been in the institution for a maximum of 10 days; therefore, the interview referred to the period prior to admission and not to the date of the interview.

The exclusion criteria were individuals with severe psychiatric disorders with symptoms at the time of the interview that made it impossible to perform the interview and individuals who did not agree to participate in the study or did not sign an informed consent form (ICF).

Ethics

Before the application of the instruments, each participant was informed about the objectives of the study and was assured about the confidentiality of the data. Each respondent signed an ICF. This study was approved by the Research Ethics Committee of the Federal University of Juiz de Fora (Universidade Federal de Juiz de Fora – UFJF) under number CAAE 51927615.6.0000.5147.

Instruments

A sociodemographic data questionnaire was used to obtain information from the participants regarding their age, gender, educational level, work status, religion, monthly income, marital status and number of dependent children.

DSM-5 diagnostic interview: A questionnaire was developed based on the diagnostic criteria for SUD in the Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5)²³. In general, the diagnosis of SUD is based on a pathological pattern of behaviors related to substance use. The interview evaluated symptoms that occurred in the last 12 months, covering eight classes of drugs: alcohol; cannabis (marijuana); hallucinogens; inhalants; opioids; sedatives, hypnotics and anxiolytics; stimulants; and tobacco. The essential characteristic of SUD is the presence of a cluster of cognitive, behavioral and physiological symptoms indicating continuous use by the individual, despite significant problems related to the substance. For certain classes, some symptoms are less prominent, and not all symptoms manifest (e.g., withdrawal symptoms are not specified for hallucinogen or inhalant use disorders). SUDs occur in a *continuum* of severity, from mild to severe, a categorization based on the number of confirmed symptom criteria. In a general estimate of severity, *mild*, *moderate*, and *severe* SUD is suggested by the presence of two or three symptoms, four or five symptoms, and six or more symptoms, respectively.

Addiction Severity Index 6 (ASI-6, Brazilian version)¹. The traditional version of the ASI-6 is a questionnaire composed of 252 questions (344 subitems) divided into seven domains: housing situation, medical problems, employment/livelihood, use of alcohol and drugs, legal problems, social-family relationships and psychiatric situation. It consists of a semi structured interview lasting 45 to 60 minutes that evaluates the severity of problems related to alcohol and other drug dependence. The objective and subjective items are related to problems that occurred in the last 30 days, in the last 6 months and in life¹.

Addiction Severity Index 6 Light (ASI-6 Light, Brazilian version)²⁰: short-form Brazilian version of the ASI-6: The questionnaire is composed of 96 questions that assess the severity of problems associated with the abuse of or dependence on alcohol and other drugs. These questions are divided into the same seven domains as those in the original version. The interview provides an overall assessment of the current situation (last 30 days), the past situation (6 months) and problems in the individual's life. In addition to the severity scores generated for each of the domains, the scale includes questions about the degree of concern of the individual

with regard to difficulties in those domains and the need for treatment in those domains. Different from the original version of the ASI-6, the subject reports their degree of concern using a 4-point scale (0-3), for which their degree of concern is questioned and to what extent they feel that treatment is important: 0 - nothing, 1 - slightly, 2 - considerably and 3 - extremely. The scores were generated using Item Response Theory (IRT), as demonstrated in previous work²⁰.

Procedures

After approval by the ethics committee in the city of Juiz de Fora, a pilot study was conducted with 10 participants to verify the research plan, i.e., the adequacy of the instruments used, the interval between applications and the time required for each approach. The data from these interviews were not included in the database because sociodemographic data questionnaires were not applied. Considering the duration of the interviews in the pilot study, causing fatigue in the interviewees and possibly bias in the data, the ASI-6 was not applied in all interviews, nor was the ASI-6 Light repeated in all interviews. Thus, the application of the ASI-6 occurred in a subsample of 50 patients, and the repetition of the ASI-6 Light occurred in another subsample of 50 individuals. In Juiz de Fora, 155 subjects were interviewed, and in Porto Alegre, 45 individuals were interviewed. The interviews were conducted by a psychologist and psychology students properly trained for the application of the instruments in an isolated location, with only the interviewer and the interviewee present.

In the city of Juiz de Fora, first, the sociodemographic data questionnaire was applied, followed by the DSM-5 diagnostic interview and the ASI-6 Light. The questionnaires were reapplied to a subset of participants. A randomization list composed of a numerical sequence from 1 to 155 (total number of individuals who were interviewed in Juiz de Fora) was generated. Among the 155 participants, 30 were selected for reapplication of the ASI-6 Light and 25 for application of the ASI-6. The second interview was scheduled during the first interview. The reapplication of the ASI-6 Light occurred at an interval between 3 and 7 days after the first interview and, for the ASI-6, application occurred at an interval of 7 to 15 days after the first interview.

In the city of Porto Alegre, it was not possible to use a randomization list due to the small number of patients in the outpatient clinic. All 45 interviews were conducted in two stages. First, the sociodemographic data questionnaire, DSM-5 diagnostic interview and the ASI-6 Light were applied, and the second application was scheduled, following the predetermined interview intervals. The ASI-6 Light was completed by 20 individuals in the second encounter, and the traditional ASI-6 was completed by 25 individuals. A flowchart for the interviews is provided in Figure 1.

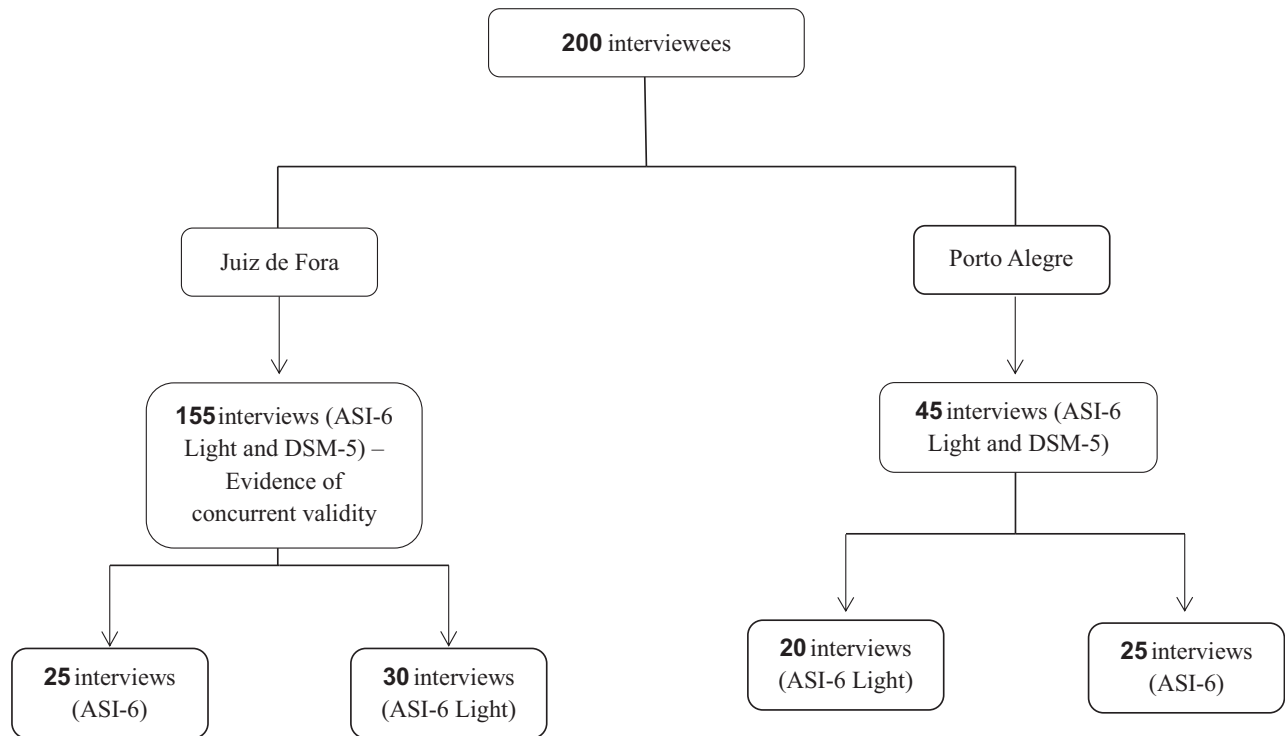


Figure 1. Flowchart for interviews

Data analysis

The data were transferred to SPSS, version 21.0. To suppress extraneous values and eliminate errors, critical analysis of the data was performed through cross-typing. Descriptive analyses were performed: for count variables, means and standard deviations were used, and for categorical variables, frequencies and percentages were used.

To analyze the evidence of concurrent validity of the “alcohol” and “drugs” domains of the ASI-6 Light and the DSM-5 diagnostic interview, Pearson’s correlation was used to investigate the relationship between severity level scores (based on the IRT) for the ASI-6 Light and the scores for the DSM-5 diagnostic interview. The classification of correlation coefficients into weak, moderate, and strong levels followed the guidelines established by prior research²⁴.

To analyze evidence of concurrent validity of the ASI-6 Light, considering the ASI-6 as an external measure, Pearson’s correlation was used to investigate the relationship between the SSI-Rs of the ASI-6 and the severity levels scores (based on the IRT) for the ASI 6 Light.

To study the reliability estimates based on the intraexaminer reliability of the ASI-6 Light, the intraclass correlation coefficient (ICC) was calculated. The ICC was obtained by a two-way mixed model, considering the mean measure. The categorization of the values obtained for the ICC values was as follows: weak agreement, $ICC < 0.40$; moderate agreement, $ICC \leq 0.75$; and excellent agreement, $ICC > 0.75$ ²⁵. The paired t test was also used for one sample.

The analysis of the independence of the domains of the ASI-6 Light was performed by calculating the Pearson correlation between the severity level scores (based on the IRT) for each domain of the instrument.

Generation of ASI-6 Light scores

The items included in the short-form version of the ASI-6 Light were chosen based on an analysis of the psychometric properties performed by Sartes and colleagues using the IRT and a factor analysis of each domain¹⁹. One of the advantages of using these methods is the proposal of a set of items that measure the proposed construct, i.e., showing evidence of internal structure validity. The scores for individuals were generated from the IRT (with the exception of the employment and livelihood domain, for which the evaluation of the psychometric properties did not yield good results). For this purpose, the polytomous items of k categories were transformed into k indicator variables for each domain. The coefficients for these items, generated in the calibration from the GRM²⁶, were assembled in the respective order of each domain. The scores for the ASI-6 Light instrument, in its six domains, were estimated using the maximum likelihood method (Lord, 1980) with the thetaEst function of the CatR package²⁷. The scores are provided in the supplementary materials.

The scores for individuals are presented in a distribution graph in which the x-axis is the severity levels of problems in that domain and the y-axis is the frequency.

Results

Characteristics of the sample

The sample consisted of 200 respondents with a mean age of 41 (± 11) years. Most were male ($n = 167$, 83.5%), were not in school ($n = 189$, 94.5%), did not work ($n = 152$, 76%) and were single ($n = 108$, 54%). In addition, most respondents had a monthly income of R \$880 or less ($n = 124$, 62%), and almost 50% of the sample ($n = 93$) were illiterate or studied up to the 4th grade.

Overall estimate of SUD severity

Table 1 shows the overall estimate of SUD severity, from *mild* to *severe*, provided by the DSM-5 diagnostic interview. Most respondents ($n = 139$, 69.5%) were diagnosed with *severe* SUD for alcohol, followed by tobacco ($n = 94$, 47%), stimulants (including cocaine and crack) ($n = 89$, 44.5%) and marijuana ($n = 42$, 21%). In addition, 30 (15%) individuals were diagnosed with *moderate* SUD for tobacco, followed by alcohol ($n = 16.8\%$).

Table 1. Overall estimate of substance use disorder severity for the 200 individuals evaluated (DSM-5 diagnostic interview). Data are expressed as frequencies and percentages.

Substance	No use in the last 12 months	Light	Moderate	Severe
<i>Alcohol</i>	31 (15,5)	14 (7)	16 (8)	139 (69,5)
<i>Marijuana</i>	137 (68,5)	7 (3,5)	14 (7)	42 (21)
<i>Hallucinogens</i>	189 (94,5)	2 (1)	4 (2)	5 (2,5)

Substance	No use in the last 12 months	Light	Moderate	Severe
<i>Inhalants</i>	188 (94)	6(3)	1 (0,5)	5 (2,5)
<i>Opioids</i>	198 (99)	1 (0,5)	0	1 (0,5)
<i>Sedatives, Hypnotics or Anxiolytics</i>	191 (95,5)	2 (1)	2 (1)	5 (2,5)
<i>Stimulants</i>	98 (49)	6 (3)	7 (3,5)	89 (44,5)
<i>Tobacco</i>	52 (26)	24 (12)	30 (15)	94 (47)

Evidence of concurrent validity of the “alcohol” and “drugs” domains of the ASI-6 Light

Table 2 provides the correlations between the scores for the “alcohol” and “drugs” domains of the ASI-6 Light and the DSM-5 diagnostic interview scores. There was a strong correlation between the severity level scores (based on the IRT) for the “alcohol” domain of the ASI-6 Light and the DSM-5 scores in relation to alcohol ($r = 0.77$). For the DSM-5 scores and severity levels for the “drugs” domain of the ASI-6 Light, a strong correlation was obtained for stimulants (including cocaine and crack) ($r = 0.77$), a moderate correlation was obtained for marijuana ($r = 0.49$), and weak but significant correlations were observed for hallucinogens, inhalants, sedatives and tobacco. The correlation was moderate and negative between the alcohol domain of the DSM-5 and drug domain of the ASI-6 Light. The “alcohol” domain of the ASI-6 Light was weakly and significantly correlation with stimulants.

Table 2. Pearson correlation coefficients for the scores for each ASI-6 Light domain and the DSM-5 scores

DSM-5	ASI-6 Light					
	<i>Alcohol</i>	<i>Drugs</i>	<i>Medical</i>	<i>Psychiatric</i>	<i>Legal</i>	<i>Family</i>
<i>Alcohol</i>	0.77**	-0.31**	0.07	0.05	-0.15*	0.02
<i>Marijuana</i>	-0.12	0.49**	-0.03	0.19**	0.32**	0.16**
<i>Hallucinogens</i>	0.08	0.19**	0.01	0.15*	0.24**	0.14*
<i>Inhalants</i>	-0.04	0.21**	0.02	0.18**	0.24**	0.20**
<i>Opioids</i>	0.05	0.09	0.08	0.03	0.07	0.02
<i>Sedatives, Hypnotics or Anxiolytics</i>	0.09	0.12*	0.02	0.14*	0.06	0.06
<i>Stimulants</i>	-0.27**	0.77**	-0.09	0.21**	0.33**	0.12*
<i>Tobacco</i>	-0.13*	0.19**	0.05	0.08	0.17**	0.12*

* $p < 0.05$ ** $p < 0.001$

Correlations between traditional ASI-6 scores and DSM-5 scores

Table 3 provides the correlation coefficients for the SS-Rs of the “alcohol” and “drugs” domains of the traditional ASI-6 and the DSM-5 scores. We observed significant and moderate correlations between the scores for the “alcohol” domain of the ASI-6 and the DSM-5 scores in relation to alcohol ($r = 0.46$) and between the scores for the “drugs” domain in relation to stimulants ($r = 0.53$).

Table 3. Pearson correlation coefficients for the scores for the alcohol and drug domains of the traditional ASI-6 and the DSM-5 scores

DSM-5	ASI-6	
	Alcohol	Drugs
Alcohol	0.46**	-0.20
Marijuana	-0.31**	0.19
Hallucinogens	-0.17	0.14
Inhalants	0.05	0.22
Opioids	0.05	-0.11
Sedatives, hypnotics or Anxiolytics	--	--
Stimulants	-0.17	0.53**
Tobacco	-0.05	0.12

** $p < 0.001$

Evidence of concurrent validity of the ASI-6 Light

Table 4 provides the correlation coefficients for the six SS-Rs of the ASI-6 and the scores for the six severity levels (based on the IRT) of the ASI-6 Light for each domain. The correlations were significant and moderate for the drug, medical, alcohol and legal domains ($r = 0.68$, $r = 0.64$, $r = 0.40$ and $r = 0.40$, respectively). In the family domain, there was a moderate correlation between the “family-social problem” score ($r = 0.36$) for the ASI-6 and the “family” domain of the ASI-6 Light and a moderate and negative correlation between the “family-social support” score and the “family” domain of the ASI-6 Light. A significant, moderate and negative correlation was observed between the “medical” domain of the ASI-6 Light and the “family-social support” score for the ASI-6 ($r = -0.48$). Notably, the ASI-6 Light has only one score for the family domain.

Table 4. Pearson correlation coefficients for the scores for each domain of the ASI-6 Light and the scores for each domain of the traditional ASI-6

ASI-6	ASI-6 Light					
	Alcohol	Drugs	Medical	Psychiatric	Legal	Family
Alcohol	0.40**	-0.08	0.16	0.02	0.12	0.18
Drugs	-0.12	0.68**	-0.13	0.15	0.34	0.11
Medical	0.09	-0.05	0.64**	0.18	-0.09	0.11
Psychiatric	0.05	0.11	0.10	0.15	0.05	-0.08
Legal	-0.11	0.26	0.23	0.25	0.40**	0.31*
Employment	-0.04	0.19	-0.15	0.26	0.10	0.14
Family-social problem	0.29*	-0.05	0.21	0.45**	0.28	0.36**
Family/children	-0.26	0.06	-0.07	0.01	0.05	0.07
Family-social support	-0.20	0.15	-0.48**	0.01	-0.10	-0.30*

* $p < 0.05$ ** $p < 0.001$

Evidence of reliability from intraexaminer reliability

The evidence of reliability from the correlation between scores from the same evaluator measured twice indicated that there were no significant differences between the scores for severity levels of the ASI-6 Light for the two interviews, as shown in Table 5. All correlations were strong, especially among responses corresponding to the domains “alcohol” and “drugs.” The intraclass correlation coefficients (ICCs) ranged from 0.73 to 0.98.

Table 5. Intrarater reliability (ICC) between the ASI-6 Light scores (3 to 7 days after the first interview) (n = 50)

ASI Light subscales	Mean scores* interview 1	Mean scores* interview 2	<i>p</i> value	95% CI**	ICC *** (95% CI)
<i>Alcohol</i>	-0.51 (0.87)	-0.60 (1.07)	0.15	0.09 (-0.03 a 0.22)	0.95 (0.90 a 0.97)
<i>Drugs</i>	-0.61 (0.71)	- 0.66 (0.68)	0.16	0.05 (-0.02 a 0.12)	0.98 (0.94 a 0.98)
<i>Medical</i>	-1.16 (1.66)	-1.22 (1.76)	0.65	0.06 (-0.21 a 0.34)	0.91 (0.84 a 0.95)
<i>Psychiatric</i>	-1.02 (1.24)	- 1.00 (1.18)	0.85	-0.02 (-0.19 a 0.15)	0.93 (0.89 a 0.96)
<i>Legal</i>	-2.77 (1.52)	-2.64 (1.64)	0.51	-0.14 (-0.55 a 0.28)	0.73 (0.53 a 0.85)
<i>Family</i>	-2.13 (1.38)	-1.97 (1.29)	0.35	-0.16 (-0.49 a 0.18)	0.76 (0.58 a 0.87)

* Scores described as the mean (standard deviation)

** Confidence interval

*** Intraclass correlation coefficient

Analysis of the independence of ASI-6 Light domains

Table 6 provides the correlations between the scores for the six ASI-6 Light domains. Weak correlations were observed; however, some were significant.

Table 6. Correlations between scores for each ASI-6 Light domain

ASI-6 Light Subscales	Alcohol	Drugs	Medical	Psychiatric	Legal	Family
<i>Alcohol</i>	1	-0.31**	0.10	0.07	-0.16*	-0.03
<i>Drugs</i>		1	-0.08	0.24**	0.37**	0.14*
<i>Medical</i>			1	0.19**	-0.01	0.14*
<i>Psychiatric</i>				1	0.22**	0.36**
<i>Legal</i>					1	0.25**
<i>Family</i>						1

* $p < 0.05$ ** $p < 0.001$

Discussion

The main objectives of this study were to evaluate the evidence of validity based on the external structure of the ASI-6 Light, analyzing the evidence of concurrent validity between the ASI-6 Light and the ASI-6 to verify whether these two instruments measure the same construct and to study the evidence of concurrent validity of the “alcohol” and “drug” domains of the ASI-6 Light with the scores generated by the DSM-5 diagnostic interview. In addition, we verified the reliability and reproducibility of the ASI-6 Light.

Regarding the evidence of concurrent validity of the “alcohol” and “drug” domains of the ASI-6 Light with the scores for the DSM-5 diagnostic interview, the results were satisfactory and confirmed our initial hypothesis. This relationship between these instruments is relevant because the scores generated by the IRT for the ASI-6 Light make it possible to position individuals on the scale of problem severity for each domain, allowing the identification of the characteristics that describe severity. The severity scale for each domain is the latent trait of the ASI-6 Light. In the “alcohol” and “drug” domains, the severity scale provides a *continuum* of severity like that proposed in the DSM-V because there is no longer differentiation between the diagnoses of substance abuse and dependence, as in the DSM-IV, bringing the diagnoses together as SUD²⁸. This indicates that the ASI-6 Light items that best differentiate individuals with problems related to the use of alcohol and other drugs are in accordance with the DSM-5 diagnostic criteria, including the new *craving* criterion or a strong desire or impulse to use a substance. Importantly, the “alcohol” and “drug” domains of the ASI-6 Light were highly correlated with the DSM-5 scores regarding alcohol and stimulants and moderately correlated regarding marijuana. Among stimulants, cocaine and crack were the most consumed by the participants in this study. Together with marijuana, they were included in the interpretation of the latent trait of the ASI-6 Light presented by Sartes¹⁹. These results corroborate the good correlations found between ASSIST and the alcohol and drug domains of the ASI-6 Light in a previous study²⁰. Notably, to date, no other alcohol- and drug-related instruments published in Brazil that have high correlations with the DSM-5 have been found, this highlighting the important contribution of this study.

Regarding the evidence of concurrent validity between the ASI-6 Light and the traditional ASI-6, the moderate to high correlations of the drug and medical domains are close to the initial hypothesis, i.e., the correlation between the scores for the two instruments would be moderate. However, the moderate to weak correlations of the other domains indicate that the instruments may be measuring similar but not completely equal constructs. Although the ASI-6 Light was derived from the ASI-6, this hypothesis was proposed because the items were selected from the IRT, generating scores that allow individuals to be placed on a scale related to the construct of problem severity for each domain (latent trait). In this sense, the ASI-6 Light measures specific constructs in each domain. Conversely, the traditional ASI-6 includes practical items that do not necessarily refer to the severity construct, in addition to subjective items. This relationship can be demonstrated by the correlations with the DSM-V, which were high with the ASI-6 Light and moderate with the ASI-6. These results may indicate that in fact, the measurement of at least two domains via the ASI-6 Light is closer to that via the DSM-5 than via the traditional ASI-6. The correlation between the family domains of the traditional ASI-6 and the ASI-6 Light was the least satisfactory, indicating that this domain is in fact measuring completely different constructs. This domain has encountered problems in several other ASI studies^{1,14,18}. A moderate to weak, but significant, correlation was observed with social problems, which, in fact, has a stronger relationship with the items included in the ASI-6 Light¹⁹.

To compare the instruments in their traditional and short-form versions and considering the results of the present study, with the analyses performed by Sartes to select the best ASI-6 items from the IRT models, many practical questions were excluded from the short-form version of the ASI-6¹⁹. These items can be useful

for a multidimensional evaluation of substance abuse problems before starting treatment, allowing the development of a therapeutic plan and the monitoring of the clinical changes in patients. In this case and if there is time available for the health team, the use of the traditional ASI-6 can be prioritized, allowing a more detailed view of an individual's problems. However, the ASI-6 Light best evaluates the construct of problem severity, being especially useful in clinical research and scientific studies. In addition, the instrument may also be useful for brief professional evaluations. Another difference between the two versions is the possibility of interpreting the ASI-6 Light scores, which is not possible for the ASI-6.

Regarding intraexaminer reliability, the results showed that there was no significant difference between the scores for the two interviews conducted by the same interviewer, demonstrating high reproducibility of the ASI-6 Light. These results are consistent with those from studies of the most recent versions of the traditional ASI, which showed good reproducibility^{1,17,29}. In these more recent studies, the removal of the interviewer's severity score improved the reproducibility of the instrument. In this study, the evaluation did not use these scores, but good results were still obtained. In the present study, very high ICCs were observed, especially in the alcohol, drug, psychiatric and medical domains. Importantly, the ICC values for the domains "alcohol" and "drugs" (0.95 and 0.98, respectively) were high. This is probably related to the fact that the short-form version of the ASI-6 has become an easy-to-use instrument that can be applied rapidly, not requiring extensive training of interviewers and with little influence from fatigue bias. In this study, the time required to train individuals to administer the ASI-6 Light was not determined because training for the administration of the traditional ASI-6 occurred concurrently. It is important to have prior training before administering the instrument or to study the application manual; it is assumed that the training time will be shorter and less detailed for the ASI-6 Light than for the ASI-6.

The correlations between the domains of the ASI-6 Light were weak, although some were significant, which demonstrates that the areas are independent. The literature indicates a low correlation between the domains of the ASI, including the traditional versions¹. Importantly, the low correlation between different ASI-6 domains, as also found in the ASI-6 Light, precludes the development of a general severity score³⁰. This, however, allows a specific evaluation of each domain and the use of each domain independently. This characteristic, therefore, is also present in the ASI-6 Light.

The results of this study, which show good reproducibility along with solid evidence of external validity and a robust evaluation of the constructs, suggest that the ASI-6 Light can potentially reduce biases associated with the use of the ASI, particularly in research contexts, as noted in previous studies¹⁴.

The limitations of this study include, first, the use of a non-probabilistic convenience sample, which restricts the ability to generalize the findings to the broader population of individuals with substance use disorders. This limitation suggests that the results should be interpreted cautiously concerning applicability to other contexts or population groups. Another relevant aspect is the need for trained evaluators to administer the ASI-6 Light, which may limit the instrument's feasibility in resource-limited settings and hinder large-scale implementation. Additionally, the use of subjective scores in the instrument may introduce biases, especially in

research contexts, partially compromising the accuracy of results by reflecting the individual interpretations of interviewers. These limitations indicate that, although the ASI-6 Light shows potential in terms of validity and reliability, its use should consider these constraints to ensure that the data obtained are applied appropriately and representatively.

Final considerations

This study had some limitations. For the concurrent validity of the “alcohol” and “drug” domains of the ASI-6 Light, it was not possible to use a gold standard instrument as an external measure because of the unavailability of validated scales based on the DSM-5 to estimate the diagnosis of SUD. For this purpose, a questionnaire was developed based on DSM-5 criteria and had a theoretical perspective similar to the ASI-6 Light to meet the demand. The “employment” domain did not present good psychometric properties, as determined by IRT; therefore, it was not possible to generate scores from individuals using this method for this domain.

In summary, the short-form version of the traditional ASI-6 presents good reliability estimates (intrarater reliability) and evidence of validity based on the relationship with external variables (evidence of concurrent validity with the DSM-5). However, further studies on the psychometric properties of the ASI-6 Light should be performed, given that the evidence of validity is intrinsically related to the context in which they were obtained. Thus, researchers should plan studies with caution and, when determining whether an instrument evaluates the construct for which it is proposed, select variables that have a consensus in the literature regarding their relationship with the construct and pay attention to the limitations of the methods of analysis used³¹. It is also necessary to evaluate the use of the ASI-6 Light in clinical practice to assess its ability to capture changes in the level of severity throughout treatment and to evaluate interrater reliability to study the impact of prior training in the application of the instrument.

It is expected that the use of the Brazilian version of the ASI-6 Light will make an important contribution to advancements in the evaluation of users of psychoactive substances and may contribute to prevention, treatment, rehabilitation and clinical research policies.

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