Validation of The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) Among University Students

Validação do *The Alcohol, Smoking and Substance Involvement Screening Test* (ASSIST) em Estudantes Universitários

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Acta Med Port 2019 Apr;32(4):279-288 ▪ https://doi.org/10.20344/amp.10650

ABSTRACT

Introduction: The present study aims to culturally adapt and explore the psychometric properties of Portuguese version of the Alcohol, Smoking and Substance Involvement Screening Test, among university students.

Material and Methods: A validation, cross-sectional study, with data collected through a questionnaire comprised of sociodemographic and substance consumption measures (Fagerström test for Nicotine Dependence; Drinking Motives Questionnaire – Revised, and The Alcohol, Smoking and Substance Involvement Screening Test version 3.1). The sample was composed by 338 students (51.8% male), with a mean age of 20.6 years old (standard deviation = 3.4). To examine the factor structure, an exploratory factor analysis was performed. The internal consistency and convergent validity were also evaluated.

Results: The 'Tobacco' and 'Cannabis' subscales were composed by 1 factor and 'Alcoholic Beverages' by 2 factors. Internal consistency ranged between 0.556 and 0.842 (Cronbach's α). Statistically significant associations were observed between being a current smoker, binge-drinking and drinking motives with hazardous consumption (subscales 'Tobacco', 'Alcoholic Beverages' and 'Cannabis').

Discussion: The observed associations between hazardous consumption, consumption motives and behaviors, may be explained by the relation between alcohol consumption (as part of the academic experience) with substances consumption behavior and polydrug consumption, supporting the adequate convergent validity observed. Also, peer pressure may influence these consumption behaviors.

Conclusion: The Portuguese version of the the Alcohol, Smoking and Substance Involvement Screening Test ('Tobacco', 'Alcoholic Beverages' and 'Cannabis') presented satisfactory psychometric characteristics, showing that it is an adequate instrument to assess hazardous consumption behaviors among university students.

Keywords: Alcohol-Related Disorders; Portugal; Smoking; Students; Substance-Related Disorders; Surveys and Questionnaires; Universities

RESUMO

Introdução: Este estudo objetiva adaptar culturalmente e explorar as propriedades psicométricas da versão portuguesa do *the Alcohol, Smoking and Substance Involvement Screening Test* em estudantes do ensino superior.

Material e Métodos: Estudo de validação, transversal, com dados recolhidos através de questionário composto por questões sociodemográficas e medidas para avaliação do consumo de substâncias (teste de Fagerström para dependência nicotínica; *Drinking Motives Questionnaire – Revised* e *The Alcohol, Smoking and Substance Involvement Screening Test* versão 3.1). A amostra foi constituída por 338 estudantes (51,8% homens), com uma idade média de 20,6 anos (desvio-padrão = 3,4). A análise fatorial exploratória foi utilizada para o estudo da estrutura fatorial. Foram ainda avaliadas a consistência interna e a validade convergente.

Resultados: As subescalas 'Tabaco' e '*Cannabis*' apresentaram-se ambas compostas por um único fator e a de 'Bebidas Alcoólicas' por dois fatores. A consistência interna variou entre 0,556 e 0,842 (α de Cronbach). Observaram-se associações estatisticamente significativas entre ser fumador, *binge-drinking* e motivos de consumos etílicos com consumos de risco (subescalas 'Tabaco', 'Bebidas Alcoólicas' e '*Cannabis*').

Discussão: As associações observadas entre os consumos de risco, os motivos de consumos e os comportamentos de consumo, poderão ser explicadas pela relação entre o consumo de álcool (como parte da experiência académica) com o comportamento de consumo de substâncias e consumos concorrentes, fundamentando a adequada validade convergente observada. Ainda, a pressão de pares poderá influenciar estes comportamentos relativamente a consumos.

Conclusão: A versão em Português europeu do *the Alcohol, Smoking and Substance Involvement Screening Test* ('Tabaco', 'Bebidas Alcoólicas' e '*Cannabis*') apresentou características psicométricas satisfatórias, mostrando ser uma ferramenta confiável para avaliar consumos de risco em estudantes universitários.

Palavras-chave: Estudantes; Fumar; Inquéritos e Questionários; Portugal; Transtornos Relacionados ao Uso de Álcool; Transtornos Relacionados ao Uso de Substâncias; Universidades

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Recebido: 12 de abril de 2018 - Aceite: 22 de novembro de 2018 |

INTRODUÇÃO

Substance use, frequent among young adults, namely in university students,[1,2] has been receiving an increasing attention and action by healthcare professionals and educators due to problems related to substance misuse[3,4] for which students may not be aware of.[5] Due to the transition period in their lives[6] related to the development of social identity[7] in addition to peer pressure,[8] university students may be more susceptible to substance use initiation (both legal and illegal).[9,10]

In Portugal, a 20.0% prevalence rate of smokers aged 15 and older has been found in the 2014 Health National Survey (*Inquérito Nacional de Saúde de 2014*).[11] In addition, a daily alcohol use has been described by 34.5% of people within the same age group, throughout the same year. A 5.1% prevalence rate of cannabis use in young adults has been found based on data from the 2017 European Drug Report.[12]

Subject of study

A maximum prevalence rate of substance use has been found between the age of 18 and 25, making university students a target population for the implementation of actions aimed at health promotion through the development and implementation of healthy policies.[13,14]

The academic environment could have an influence on student's intention and motivations for tobacco and alcohol use,[15] sometimes associated with cannabis use (polydrug use).[8,16] In addition, the study, development and validity of instruments aimed at the identification / screening of substance misuse and risk behaviours in this population is crucial due to motivations and intentions, as well as due to the risk of substance misuse in this population.

Therefore, the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST), developed by the World Health Organization (WHO) stands out from other instruments such as the Alcohol Use Disorders Identification Test (AUDIT),[17] as it is aimed at the identification of misuse of different substances and related problems (tobacco, alcohol, cannabis, cocaine, amphetamine type stimulants, inhalants, sedatives, hallucinogens, opioids and other drugs).[18]

The application of the ASSIST is therefore explained by the need for action with university students, aimed at reducing substance misuse. According to literature, brief motivation interventions, health education, among others, have been used in primary prevention, reducing the risk of the development of health consequences.[19,20] Other studies have described benefits of the use of the ASSIST in this population, due to its flexibility for the application within different settings.[21,22]

Good psychometric properties have been found with this scale in countries such as Australia, Brazil, United Kingdom, South Africa, Mexico, Spain and France, among others.[18,23–26] However, to our knowledge, the validity of the Portuguese version of the ASSIST has not yet been approached. In order to fill this gap, this study was specifically aimed at (i) the cultural adaptation and (ii) the approach to the psychometric properties of the Portuguese version of the instrument involving a group of university students.

MATERIAL AND METHODS

Participants and procedures

Data collection was carried out at the *Universidade de Aveiro*, throughout school year 2016/2017, involving 8,842 registered students. The recruiting of the participants took place between Feb and May 2017 and data were collected by use of a questionnaire including sociodemographic items and self-report measures aimed at the assessment of substance use. Questionnaires were distributed by four undergraduate psychology students (previously trained on the composition and instructions on filling the questionnaire to clarify respondent's doubts).

A total of 400 questionnaires were obtained by convenience sampling, from which 62 incomplete questionnaires were excluded. A group of 338 respondents has been included in the study (51.8% male, mean age 20.6 ± 3.4 years).

All the approvals for the study were obtained as well as an informed consent from all the respondents. The sample characteristics are shown in Table 1, including absolute and relative (%) frequencies of sociodemographic variables as well as variables related to substance use.

Study inclusion criteria were defined as follows: (i) respondents aged 18 to 27 (stage 1 and 2 of early adulthood);[27] (ii) attending the first/second cycle degree and (iii) native Portuguese speakers.

Instruments

Description of the ASSIST

The ASSIST has been recommended by the Norm no. 36 of the General Directorate of Health (*Direção-Geral da Saúde* DGS) in 2014 for the assessment of polydrug use and brief intervention.[28] This is a 10-subscale instrument ('Tobacco', 'Alcohol', 'Cannabis', 'Cocaine', 'Amphetamine type stimulants', 'Inhalants', 'Sedatives', 'Hallucinogens', 'Opioids' and 'Other drugs'). A first question ("In your life, which of the following substances have you ever used?") is followed by questions 2 to 7 related to the assessment of a specific substance involvement (identification of the level of substance use). Responses to items 2 to 5 are scored on a five-point Likert type scale (never; once or twice; monthly; weekly; daily or almost daily) and to items 6 and 7 on a three-point scale (no, never; yes, in the past three months; yes, but not in the past three months). Scoring of each subscale (substance) is obtained by adding up the responses to the corresponding items, leading to a specific substance involvement score.[29] The higher the score the higher is the student's substance involvement.

The version 3.1 of the ASSIST[30] was selected for this study after a comparison with the version 3.0.[28] No differences were found as regards the content and structure of the items and response format. However, the version 3.1 used

Table 1 – Sociodemographic characteristics and substance use in our group of respondents (n = 338)

Variable		n (%)
Sociodemographic characteristics		
Gender	Male	175 (51.8)
	Female	163 (48.2)
Age	< 19	65 (19.3)
	[19; 21[	139 (41.4)
	≥ 21	132 (39.3)
Course year	1st *	109 (32.3)
	2nd *	92 (27.3)
	3rd *	85 (25.2)
	4th †	38 (11.3)
	5th †	13 (3.9)
Co-living	Parents	117 (34.6)
	Other family members	24 (7.1)
	Friends	81 (24.0)
	Colleagues	82 (24.3)
	Others	34 (10.1)
Place of origin	Rural	141 (41.8)
	Urban	196 (58.2)
Substance use in respondent's social networks		
At least one drinker	No	38 (11.3)
	Yes	297 (88.7)
At least one smoker	No	132 (39.5)
	Yes	202 (60.5)
More than two drinkers	No	6 (1.8)
	Yes	332 (98.2)
More than two smokers	No	21 (6.3)
	Yes	315 (93.8)
Current use or having ever used one of the following		
Tobacco	No	135 (40.3)
	Yes	200 (59.7)
Alcohol	No	18 (5.4)
	Yes	317 (94.3)
Cannabis	No	231 (70.2)
	Yes	98 (29.8)
Cocaine	No	327 (98.5)
	Yes	5 (1.5)
Amphetamine type stimulants	No	323 (97.3)
	Yes	9 (2.7)
Inhalants	No	328 (99.4)
	Yes	2 (0.6)
Sedatives	No	315 (94.9)
	Yes	17 (5.1)
Hallucinogens	No	318 (95.8)
	Yes	14 (4.2)
Opioids	No	330 (99.4)
	Yes	2 (0.6)

*: Degree; †: Masters and/or integrated master degree

the closest language to European Portuguese (for instance, Question 2: version 3.0 *"Durante os três últimos meses, com que frequência você utilizou essa(s) substância(s) que mencionou?" vs.* version 3.1: *"Durante os últimos três meses, quantas vezes usou as substâncias que mencionou?"*.

No translation was required, as the Brazilian Portuguese version of the ASSIST (version 3.1) was used, which was made available by the WHO; however, a cultural adaptation to European Portuguese was carried out[30]: i) change in sentence structure [for instance, item 5: *"Nos últimos três meses, quantas vezes não fez aquilo que normalmente se esperaria de si devido ao uso de (…)?"* changed into *"Nos últimos três meses, quantas vezes não fez aquilo que normalmente seria esperado de si (…)"*]; ii) cultural adaptation [for instance, *"Cocaína (coke, crack, etc.)"* into *"Cocaína (coca, crack, etc.)"*]

Pretesting and cultural adaptation of the ASSIST

Pretesting has been used during the development of the questionnaire, according to the guidelines of the WHO,[31] aimed at the evaluation of the cultural adaptation of the ASSIST version that was used and a group of 19 students (mean age of 22.7 ± 3.0 years) were involved. Cognitive interviewing (according to the same guidelines) was carried out after the questionnaire was filled in. Based on the results of these interviews, the questions were correctly understood and no misunderstandings occurred and therefore no changes were required.

Other measures

A questionnaire including issues related to sociodemographic aspects and consumption behaviours was used in data collection.

The Drinking Motives Questionnaire – Revised (DMR-Q) was used to evaluate drinking motives. This instrument was aimed at the identification of alcohol use and its consequences within four domains: social, coping, enhancement and conformity motives.[32] The translated Portuguese version was used for the present study and 18 from the original 20 items were included.[33] Responses are scored on a five-point Likert type scale (almost never / never; some of the time; half of the time; most of the time; almost always / always). Scoring of this instrument was obtained by adding up all the scores to each response on a 0-100 scale (the higher the score, the higher the drinking motive within each domain).

An adequate internal consistency was found within the four domains (0.748 ≤ Cronbach's alpha ≤ 0.902).

Fagerström test for nicotine dependence (FTND), which was already validated for Portuguese,[35] was used in the evaluation of this dependence, as recommended by the *Circular Normativa* no. 26/DSPPS.[34] Satisfactory internal consistency (Cronbach's alpha = 0.651) was shown in the study.

Data analysis

Exploratory factor analysis (EFA) was approached by Principal Axis Factoring (PAF), aimed at the evaluation of the different subscales of the ASSIST. Bartlett's test of sphericity was used to test whether the correlation matrix is significantly different from an identity matrix, while Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was used to test factor analysis validity. Varimax rotation was used in factor extraction, while Kaiser criterion was used to determine the number of factors for consideration,[36] in addition to the percentage of explained variance and the scree-plot criterion (graph observation).[37] Upon the decision on the number of factors to be retained, each item's factorial weight and corresponding communalities were evaluated (h^2). Additionally, the factorial structure was also examined, by use of the Principal Component Analysis (PCA) in order to check for the presence of any difference associated with the method that was applied. Only data regarding the PAF were presented in the results section, as this method was considered as the most reliable, due to the fact that no different factorial structures were found with the use of other methods.[38]

The following indices were used in order to assess the adjustment of the factorial model and each value was used as an acceptable cut-off for data adjustment: Goodness of Fit Index (GFI) ≥ 0.90, adjusted GFI (AGFI) ≥ 0.90[39] and Standardized Root Mean Square Residual (SRMR) ≤ 0.08.[40] The formulas were used for the calculation of those indices, according to Marôco,[37] using Microsoft Office Excel 2016 software. In addition, maximum likelihood method was used to assess model adequacy adjustment to data.[37]

Item-total and inter-item correlation coefficients were obtained in order to assess the reliability of the models, while Cronbach's alpha was used for the evaluation of internal consistency, which was considered as adequate at alpha ≥0.700.[41]

As regards convergent validity, Pearson's (r) correlation coefficients were obtained in order to study the association between 'Tobacco', 'Alcohol' and 'Cannabis' subscales and other variables regarding substance use, considering a normal distribution of data. In addition, the association between dichotomous variables and the scores obtained within each ASSIST subscale was obtained by use of point-biserial correlation coefficient (rpb). Dichotomous variables were therefore coded (e.g. 0-No; 1-Yes and in FTND: 0-Minimally dependent; 1-Largely dependent).

Only 'Tobacco', 'Alcohol' and 'Cannabis' subscales were submitted to EFA, reliability and convergent validity analysis, in the absence of sufficient data for the analysis of the remaining substances (≤ 5,1% rate of use, as shown in Table 1).

A significance level (a) at 0.05 has been used for data analysis, which was carried out by use of the IBM SPSS Statistics, version 23 software.

RESULTS

The descriptive analysis of the scores obtained in the different ASSIST subscales is shown in Table 2.

Factorial validity

KMO values were obtained in order to evaluate the adequacy of the sample to the factorial analysis. Values above 0.60 are required, while KMO values of 0.825, 0.720 and 0.788 were obtained for 'Tobacco', 'Alcohol' and 'Cannabis' subscales, respectively, corresponding to an appropriate factorial analysis to data.[42] In addition, significant Bartlett's test of sphericity was obtained ($\chi^2_{(10)}$ = 660,532; $p < 0.001$, $\chi^2_{(15)}$ = 239,137; $p < 0.001$ and $\chi^2_{(15)}$ = 439,378; $p < 0.001$, for 'Tobacco', 'Alcohol' and 'Cannabis', respectively), showing that the EFA is executable.[42] The results of PAF have suggested that the extraction of one factor accounted for 63.0% of the explained variance regarding 'Tobacco', two factors accounted for 56.5% of 'Alcohol' and one factor for 48.8% of 'Cannabis' (Table 3).

Factorial weights ranging between 0.368 and 0.857 were found in items related to 'Tobacco' subscale; the lowest factorial weight was found in 'Health, social, legal or financial problems (past three months)' item, while factorial weights ranging between 0.399 and 0.830 were found in items related to 'Alcohol', with the application of a Varimax rotation. Within this subscale, a factorial weight of 0.399 was found in 'Failed to do what would normally be expected due to substance use (past three months)' item while factorial weights ranging between 0.456 and 0.712 were found in the items regarding the 'Cannabis' subscale (Table 4).

When looking at the factorial structure adjustment, the model for 'Tobacco' showed unmatched data ($\chi^2_{(5)}$ = 21,402; $p = 0.001$), which could suggest the removal of the 'Health, social, legal or financial problems (past three months)' item from this model. In addition, the model for 'Alcohol' showed matched data ($\chi^2_{(4)}$ = 2,936; $p = 0.569$), suggesting that the 'During the past three months, how often have you failed to do what was normally expected of you because of your substance use?' item should not be removed. The model for 'Cannabis' showed unmatched data ($\chi^2_{(9)}$ = 59,331; $p < 0.001$).

Even though a factor loading <0.400 has been found in these items (cut-off rationale provided by Field),[42] through PAF and the evaluation of the quality of these models, the indicators that were provided were considered as adequate to the adjustment. GFI values of 0.989, 0.999 and 0.970, AGFI values of 0.968, 0.997 and 0.930 and SRMR values of 0.033, 0.020 and 0.075 have been found (for 'Tobacco', Alcohol' and 'Cannabis' subscales respectively) and the items that were described before were not removed from subsequent analyses.

Therefore, 'Tobacco' (five items) and 'Cannabis' (six items) subscales consisted of a single factor called '*Consumos e problemas relacionados com Tabaco / Cannabis*' ('Consumption frequency and problems related to the use of Tobacco / Cannabis'). 'Alcohol' subscale consisted of two factors, called *'Problemas relacionados com consumo de álcool'* ('Problems related to alcohol use' – factor 1 / four items) and *'Consumo de álcool'* ('Alcohol consumption frequency' – factor 2 / two items).

Reliability

Data regarding the evaluation of ASSIST reliability are shown in Table 5.

An item-total correlation ranging between 0.347 and 0.789 and a Cronbach's alpha if item deleted ranging between 0.783 and 0.883 were found in 'Tobacco' subscale. Globally, an adequate internal consistency was shown

Table 2 – Characteristics of substance use, assessed by the ASSIST (n = 338)

ASSIST subscale	Mean (standard deviation)	Scoring n (%)	
Tobacco	3.9 (7.0)	< 4 (no intervention)	222 (73.5)
		≥ 4 (needs for intervention)	80 (26.5)
Alcohol	5.6 (5.5)	< 11 (no intervention)	264 (87.1)
		≥ 11 (needs for intervention)	39 (12.9)
Cannabis	1.7 (4.2)	< 4 (no intervention)	256 (85.3)
		≥ 4 (needs for intervention)	44 (14.7)
Cocaine	0.2 (1.5)	< 4 (no intervention)	294 (98.0)
		≥ 4 (needs for intervention)	6 (2.0)
Amphetamine type stimulants	0.2 (0.5)	< 4 (no intervention)	296 (98.7)
		≥ 4 (needs for intervention)	4 (1.3)
Inhalants	0.1 (1.4)	< 4 (no intervention)	298 (99.3)
		≥ 4 (needs for intervention)	2 (0.7)
Sedatives	0.3 (1.7)	< 4 (no intervention)	293 (97.3)
		≥ 4 (needs for intervention)	8 (2.7)
Hallucinogens	0.2 (1.8)	< 4 (no intervention)	295 (98.3)
		≥ 4 (needs for intervention)	5 (1.7)
Opioids	1.1 (1.6)	< 4 (no intervention)	298 (99.3)
		≥ 4 (needs for intervention)	2 (0.7)

Table 3 – Data values and percentages of explained variance regarding each subscale 'Tobacco', 'Alcohol' and 'Cannabis'

Factor	Tobacco		Alcohol		Cannabis	
	Eigenvalue	Cumulative percentage of variance	Eigenvalue	Cumulative percentage of variance	Eigenvalue	Cumulative percentage of variance
1	3.151	63.011	2.038	38.869	2.930	48.833
2	0.835	79.720	1.041	56.485	0.943	64.557
3	0.460	88.921	0.792	70.470	0.702	76.257
4	0.342	95.760	0.627	81.467	0.599	86.238
5	0.212	100.000	0.502	91.886	0.470	94.072
6			2.038	100.000	0.356	100.000

alpha = 0.842). The lowest item-total correlation was found in 'Health, social, legal or financial problems (past three months)' item with a higher Cronbach's alpha if item deleted when compared to the factor's Cronbach's alpha. In addition, inter-item coefficients for 'Tobacco' have ranged between 0.279 and 0.786.

As regards 'Alcohol', factors have shown a Cronbach's alpha ranging between 0.641 and 0.556 (factor 1 and 2 respectively), while item-total correlation values ranged between 0.334 and 0.501 and alphas if item deleted ranged between 0.603 and 0.662. Inter-item correlation coefficient values ranged between 0.112 and 0.387.

As regards 'Cannabis' subscale, a 0.788 internal consistency has been found (Cronbach's alpha). The item-total correlation in this factor has ranged between 0.399 and 0.619 and Cronbach's alpha if item deleted between 0.716 and 0.779. In addition, inter-item correlation coefficient values for this subscale have ranged between 0.205 and 0.630.

Convergent validity

The correlations between ASSIST 'Tobacco', 'Alcohol' and 'Cannabis' subscales and the variables regarding consumption patterns are shown in Table 6.

Globally, statistically significant associations have been found between binge-drinking and ASSIST subscales (('Tobacco': rpb = 0.342; $p < 0.001$ 'Alcohol': rpb = 0.455; $p < 0.001$ and 'Cannabis': rpb = 0.262; $p < 0.001$) and between current cigarette smoking and the same subscales ('Tobacco': rpb = 0.766; $p < 0.001$ 'Alcohol': rpb = 0.405; $p < 0.001$ and 'Cannabis': rpb = 0.459; $p < 0.001$). In addition, statistically significant associations were found between all drinking motives (evaluated by the different domains of the DMQ-R) and 'Tobacco', 'Alcohol' and 'Cannabis' subscales.

DISCUSSION

This study was aimed at the cultural adaptation and the analysis of factorial structure and convergent validity of the Portuguese version of the ASSIST (version 3.1),[30] regarding 'Tobacco', 'Alcohol' and 'Cannabis'. Adequate psychometric characteristics have been found with this measure involving a group of university students.

The approach to psychometric properties of 'Cocaine', 'Amphetamine type stimulants'; 'Inhalants'; 'Sedatives'; 'Hallucinogens' and 'Opioids' subscales was not possible, due to the low rate of substance use found in our group of respondents. This constraint was found in other studies, when applied to the general population[23,26] or to specific

Table 4 – Factorial weights and communalities (h^2) of each item in retained factors, by substance, following an EFA with factor extraction by the Principal Axis Factoring method

Item	Tobacco	h^2	Alcohol*		h^2	Cannabis	h^2
	Factor 1¶		Factor 1¤	Factor 2●		Factor 1■	
Substance use (past three months)	0.857	0.734	0.136	**0.432**	0.205	0.666	0.444
Desire/urge for substance use (past three months)	0.857	0.735	0.173	**0.830**	0.719	0.712	0.506
Health, social, legal or financial problems (past three months)	0.368	0.135	**0.775**	0.023	0.602	0.456	0.208
Not doing what would be expected due to substance use (past three months)	N/A	N/A	**0.399**	0.178	0.191	0.625	0.391
Expressed concern by friends/family/other due to substance use	0.756	0.572	**0.488**	0.355	0.364	0.614	0.377
Failed attempt to reduce substance use	0.783	0.612	**0.444**	0.278	0.275	0.642	0.412

N/A: not applicable; * Varimax rotation. ¶: Factor 1 (Consumption frequency and problems related to tobacco use); ¤: Factor 1 (problems related to alcohol use); ●: Factor 2 (alcohol consumption frequency) ■: Factor 1 (Consumption frequency and problems related to cannabis use).
Factorial weights regarding 'Alcohol' subscale are shown in bold, referred to the factor that best correlates.

Table 5 – Internal consistency for 'Tabaco', 'Alcohol' and 'Cannabis'

Item	Tobacco		Alcohol*		Cannabis	
	Item-total correlation	Cronbach's alpha if item deleted	Item-total correlation	Cronbach's alpha if item deleted	Item-total correlation	Cronbach's alpha if item deleted
Substance use (past three months)	0.787	0.786	0.334	0.662	0.598	0.722
Desire/urge for substance use (past three months)	0.789	0.783	0.449	0.627	0.619	0.716
Health, social, legal or financial problems (past three months)	0.347	0.883	0.416	0.638	0.399	0.779
Not doing what would be expected due to substance use (past three months)	N/A	N/A	0.349	0.659	0.542	0.746
Expressed concern by friends/family/other due to substance use	0.704	0.809	0.501	0.603	0.548	0.735
Failed attempt to reduce substance use	0.728	0.803	0.434	0.629	0.541	0.738
Cronbach's alpha	---	0.842	---	0.671	---	0.788

N/A: not applicable; * Varimax rotation

populations (university students, for instance).[24]

A low factorial weight has been found in the analyses of the factorial structure and internal consistency of 'Health, social, legal or financial problems (past three months)' item (< 0.400) and a Cronbach's alpha if item deleted higher than a factor's Cronbach's alpha, suggesting the removal of this item. This conclusion may be due to the fact that smoking-related problems (financial, social, legal and health problems) could have not been correctly regarded by students as a consequence of their own tobacco use.

Therefore, as regards health consequences, these usually develop over the medium and long term and sometimes with no symptoms,[43] with a possible influence on student's perception, underestimating the identification of smoking-related problems. In social context, the definition of substance use self-concept (for instance, regular smoker, social smoker) is influenced by the number of cigarettes smoked and smoking frequency as well as by the perception of the associated problems.[44,45] In addition, social smoking[45] is a common habit in the academic environment[46] and therefore, smoking experimentation and/or initiation could be encouraged by social environment (peer pressure).[47] In addition, as regards financial problems associated with smoking, students' perception could have been influenced by the presence of financial dependence from their parents, by student's purchasing power[48] as by smoking frequency and number of cigarettes smoked. As regards legal problems, these perceptions could have been influenced by student's self-concept[49] and compliance or non-compliance with antismoking policies within certain locations (for instance, public buildings, university campus, restaurants, bars, etc.).[49,50]

Therefore, considering the relationships between health, social, legal or financial problems with substance misuse and the outcomes in terms of quality indicators of

Table 6 – Correlations between ASSIST 'Tobacco', 'Alcohol' and 'Cannabis' subscales and other evaluation instruments of substance use (DMQ-R and Fagerström test)

	ASSIST Tobacco	ASSIST Alcohol	ASSIST Cannabis
Current drinker	**0.144***	**0.276****	0.104
Binge-drinking	**0.342****	**0.455****	**0.262****
Current smoker	**0.766****	**0.405****	**0.459****
Nicotine dependence	**0.303***	0.174	0.288
DMQ-R Enhancement	**0.330****	**0.288****	**0.283****
DMQ-R Coping	**0.311****	**0.308****	**0.194****
DMQ-R Conformity	**0.134***	**0.172****	**0.161****
DMQ-R Social	**0.280****	**0.269****	**0.273****
ASSIST Tobacco	1.000	**0.582****	**0.627****
ASSIST Alcohol	---	1.000	**0.468****
ASSIST Cannabis	---	---	1.000

*: Correlation is significant at the 0.05 level (bilateral); **: Correlation is significant at the 0.01 level (bilateral)

each model (GFI, AGFI and SRMR), these may give a reason for item's non-exclusion.

As regards the factorial validity of 'Tobacco' and 'Cannabis', factorial structures with one factor have been found in other studies.[24] Two factors have been obtained as regards the factorial structure of 'Alcohol' item. However, a factor accounted for 35% of the explained variance, with a 0.760 internal consistency, in a different validity study.[23]

'Alcohol' subscale was divided into 2 factors in our group of respondents: *'Problemas relacionados com o consumo de álcool'* and *'Consumo de álcool'*. The factors that were obtained can be explained and confirmed by the relationship between alcohol use and alcohol-related problems. There is an association between use problems aimed at the regulation of negative effects (coping motives) and with the use involving drinking to enhance positive moods (enhancement motives).[51] In addition, it has been found that those who experience negative consequences are willing to repeat those experiences, suggesting that negative consequences are considered as a mean to reach positive consequences.[52]

In this context, the relationship between alcohol use and alcohol-related problems is mediated both by the type of drink (in which negative personal and social consequences can be found) and by age (an early use is associated with negative personal and social consequences).[53]

As regards reliability, internal consistencies have been found in other studies, evaluated by the Cronbach's alpha, ranging between 0.740[54] and 0.860[23] for 'Tobacco' and between 0.730[24] and 0.870[23] for 'Cannabis'. Other studies have found an internal consistency ranging between 0.660[54] and 0.840[55] in 'Alcohol' subscale. Similar characteristics of internal consistency were found in our group of respondents.

As regards convergent validity of the study subscales, students with higher levels of tobacco misuse were those who (i) were current drinkers; (ii) present with binge-drinking behaviours; (iii) with higher nicotine addiction and (iv) higher levels of motives for alcohol use. As regards alcohol, students presenting with higher levels of misuse are those who (i) present with binge-drinking behaviours; (ii) current smokers and (iii) with higher levels of drinking motives. As regards cannabis, students with higher levels of risk behaviours of consumption are those who (i) present with binge-drinking behaviours, (ii) current smokers and (iii) with higher levels of drinking motives. These were statistically significant associations between the use of different substances and could be explained by the findings obtained by Bravo *et al.*,[56] in which significant associations were found between alcohol use beliefs as part of an academic experience and the different drinking motives (as evaluated by the DMQ-R) as with binge-drinking.

Significant positive associations between the different ASSIST subscales regarding the convergent validity have been found which could reflect the presence of polydrug use. A-type polydrug use (alcohol and cigarettes) and B-type (cannabis together with alcohol and/or cigarettes) have been found in this group of respondents, according to the EMCDDA polydrug tipology,[57] in line with other studies.[58,59]

Limitations of the study

Geographical restriction was a major limitation of the study, with an influence on the evaluation of substance misuse. In addition, divergent validity was not evaluated (only internal consistency and convergent validity were), in order to reach a more comprehensive evaluation of the construct validity.

In addition, the low use rate of other substances prevented the study of psychometric properties of the remaining subscales. Such low rate could have been biased by socially desirable responding, as sensitive matters such as substance use were involved.[60]

Therefore, these limitations could be minimised with a study covering other universities as well as with the use of the scale in other populations, specifically involving patients with addictive disorders.

CONCLUSION

The cultural adaptation of the ASSIST questionnaire version 3.1 for European Portuguese was made possible with this study and adequate factorial characteristics, internal consistency and convergent validity for 'Tobacco', 'Alcohol' and 'Cannabis' subscales have been shown. However, the evaluation of the psychometric properties of 'Cocaine' 'Amphetamine type stimulants'; 'Inhalants'; 'Sedatives'; 'Hallucinogens' and 'Opioids' were not possible due to the low use rate found in this group of respondents. The use of 'Tobacco', 'Alcohol' and 'Cannabis' subscales could be adequate for the evaluation of the involvement of university students with those substances. Further studies should be focused on the discriminatory power, among other properties, for the screening of substance misuse in this population. In addition, these should be aimed at other methodologies, deepening the study of construct validity.

HUMAN AND ANIMAL PROTECTION

The authors declare that the followed procedures were according to regulations established by the Ethics and Clinical Research Committee and according to the Helsinki Declaration of the World Medical Association.

DATA CONFIDENTIALITY

The authors declare that they have followed the protocols of their work centre on the publication of patient data**.** Informed consents were obtained.

CONFLICTS OF INTEREST

The authors declare that there were no conflicts of interest in writing this manuscript.

FINANCIAL SUPPORT

The authors declare that there was no financial support in writing this manuscript.

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