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Reliability of a questionnaire on substance use among adolescent students, Brazil

Confiabilidade de questionário sobre uso de drogas por escolares, Brasil

ABSTRACT

OBJECTIVE: To analyze reliability of a self-applied questionnaire on substance use and misuse among adolescent students.

METHODS: Two cross-sectional studies were carried out for the instrument test-retest. The sample comprised male and female students aged 11–19 years from public and private schools (elementary, middle, and high school students) in the city of Salvador, Northeastern Brazil, in 2006. A total of 591 questionnaires were applied in the test and 467 in the retest. Descriptive statistics, the Kappa index, Cronbach's alpha and intraclass correlation were estimated.

RESULTS: The prevalence of substance use/misuse was similar in both test and retest. Sociodemographic variables showed a "moderate" to "almost perfect" agreement for the Kappa index, and a "satisfactory" (>0.75) consistency for Cronbach's alpha and intraclass correlation. The age which psychoactive substances (tobacco, alcohol, and cannabis) were first used and chronological age were similar in both studies. Test-retest reliability was found to be a good indicator of students' age of initiation and their patterns of substance use.

CONCLUSIONS: The questionnaire reliability was found to be satisfactory in the population studied.

DESCRIPTORS: Questionnaires. Adolescent. Adolescent Behavior. Illicit drugs. Reproducibility of Results.

RESUMO

OBJETIVO: Analisar a confiabilidade de um questionário auto-aplicável sobre o uso e abuso de substâncias entre adolescentes escolares.

MÉTODOS: Foram realizados dois estudos transversais para teste e re-teste do questionário em amostra representativa de alunos de ambos os sexos, de 11 a 19 anos, de escolas públicas e privadas (do curso fundamental e médio) de Salvador, BA, em 2006. Foram aplicados 591 questionários na primeira aplicação e 467 na segunda. Foram calculados a estatística descritiva, o índice kappa, alfa de Cronbach e correlação intraclasse.

RESULTADOS: A prevalência do uso/abuso das substâncias foi semelhante em ambas as avaliações. Para as variáveis sociodemográficas o índice kappa indicou concordância "moderada" a "quase perfeita" e a análise do alfa de Cronbach e correlação intraclasse indicaram consistência "satisfatória". A idade de experimentação das substâncias psicoativas (tabaco, álcool e maconha) e idade dos estudantes foram semelhantes nas duas avaliações. A idade de iniciação do consumo e padrões de uso foram considerados indicadores confiáveis.

CONCLUSÕES: A confiabilidade do questionário foi satisfatória para a população estudada.

DESCRITORES: Questionários. Adolescente. Comportamento do Adolescente. Drogas Ilícitas. Reprodutibilidade dos Testes.

INTRODUCTION

Substance use and misuse and drug dependence constitute a major public health issue worldwide. Substance misuse usually begins during adolescence, but population-based studies targeting adolescent students are relatively scarce in low and middle-income countries.

The psychometric properties such as test-retest reliability of questionnaires addressing sociodemographic, behavioral and patterns of substance use/misuse depend on the characteristics of the population under evaluation, local social values and mores and the comprehensibility and cultural sensitivity of the instrument in a given context.[4]

Some factors have been explored in recent literature including proper understanding of the phrasing used in the questionnaire,[25] respondents' willingness to provide reliable answers,[1,6] interest and time available to take part in the study and statistical power of the sample under analysis.[18,21,22]

In Brazil, previous studies applied standard questionnaires to assess substance use/misuse.[3,4,9,10] These questionnaires usually consist of adaptations of instruments originally developed in English.[3,9,10]

There are few studies of questionnaire reliability on drug use in Brazil, with significant methodology differences (in sampling and statistical analysis).[3,4,10] A Brazilian reliability study adapted an American questionnaire on psychoactive drug use in general population without specifying its performance among adolescents.[3] Another study used a self-report instrument on drug use in a Brazilian sample of public elementary school children (from fifth grade on), but the instrument's reliability was not reported.[9] Considering that, the present study aimed to analyze reliability of a self-applied questionnaire on substance use and misuse among adolescent students.

METHODS

Test-retest reliability was assessed in a comprehensive study in 2006. The self-applied questionnaire consisted of 93 questions on basic sociodemographic information, substance use and misuse,[7,19] related behaviors, the adolescents' relationship with school and their parents, and their opinions about the media and media campaigns to prevent tobacco, alcohol, and cannabis use. The questions were based on previous studies.[2,3,13]

The target population comprised adolescents (11 to 19 years of age), both sexes, from public and private elementary, middle, and high schools in the city of Salvador, Northeastern Brazil. Salvador has approximately 740 elementary, middle (sixth through ninth
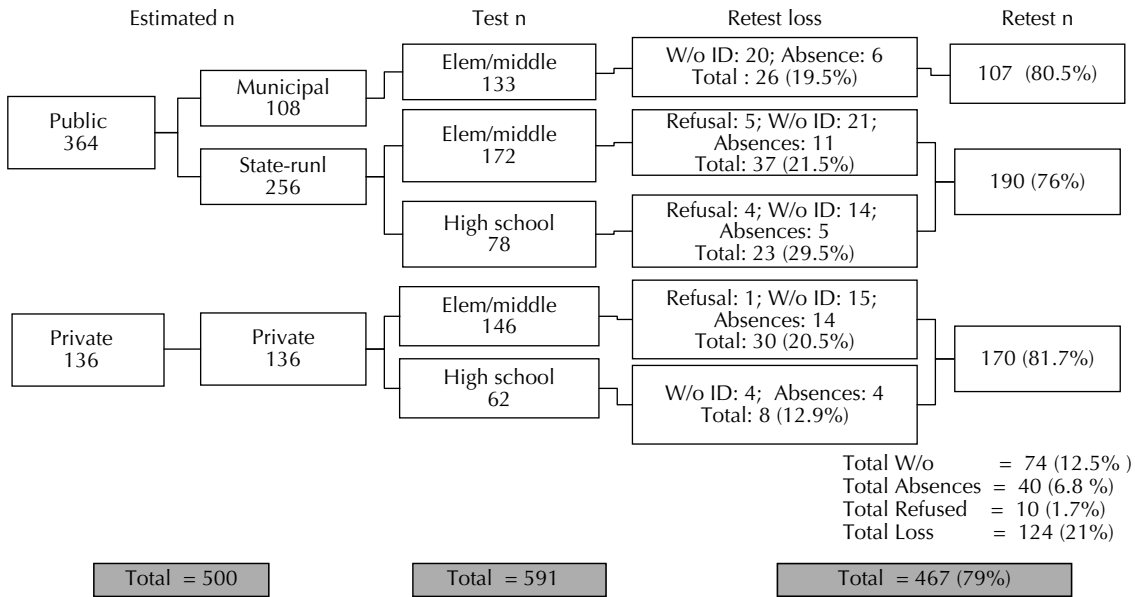
Estimated n		Test n	Retest loss	Retest n

Figure. Flowchart of questionnaire test and retest among 591 adolescent students. City of Salvador, Northeastern Brazil, 2006.

grades), and high schools (tenth, 11th, and 12th grades). A total of 715,877 students were enrolled in these schools: 538,364 in elementary and middle schools (467,961 in public and 70,403 in private schools), and 177,513 in high schools (156,784 in public and 20,729 in private schools).[a]

Five schools (two state-run schools, two private schools, and one municipal school) were randomly selected by means of an electronic drawing using education census data. An initial database was created with names, number of classes and number of enrolled students in each class. Each school was stratified according to type of school (public or private) and level (elementary, middle, or high school).

A total of three seventh grade, three eighth grade, three ninth grade, two tenth grade, two 11th grade, and one 12th grade class were selected. Students from each class were invited to participate in the study and were informed that the same questionnaire would be applied again two weeks later.

A minimum sample size of 466 students was estimated based on the following assumptions: inter-questionnaire agreement ≥0.80, with an estimated error of 0.03,[15] and a study power over 95% for the kappa index, the intraclass correlation and the Cronbach's alpha.[1,5]

The sample studied was greater than that estimated. In some schools, the number of students per class was higher than estimated in the study planning due to

inaccurate school enrollment information. We opted to include them all to prevent interference in the school routine during data collection. If part of a class were selected, many students would be idle and could interfere with school activities of non-selected classes.

Exclusion criteria included the absence of the standard labels provided by the study coordination codes, being older than 19 or younger than 11, and incomplete questionnaires. Incomplete questions were excluded, as well as those with unmatched answers to the questions.

The questionnaire was applied to 591 students in the test and 467 in the retest with a two-week interval in-between.[20] It was applied by medical students during regular school hours.

The students were informed about the study confidentiality and that they could choose to participate or not, or skip questions they consider too sensitive or inappropriate. Two labels with a code were given to each student to be used in the test and retest.

The refusal rate was lower than 1.0% in the test and 1.7% of the questionnaires were excluded from the analysis (respondents were 19 years old or older). Among those who did not participate in the retest (124), 59.7% had lost their code labels or forgotten their confidential identification number, 32.3% missed class on the day of retest, and 8.1% refused to participate in the retest (Figure).

[a] Brasil. Ministério da Educação e Cultura. Censo Educacional 2000.

Of those who did not participate in the retest, 71% attended public schools, 60.5% were male, 73.4% were enrolled in elementary and middle schools with a mean age of 15.1 years (SD= 1.9). There were no statistical differences between those who participated and those who did not participate in the retest regarding type of school (p=0.14) and grade (p=0.268), but differences were seen regarding gender (p<0.001) and mean age (p<0.005).

A complete questionnaire was considered valid when it had a label with a valid code and was filled out with pen, as required.

A draft instrument was tested among junior students at a federal university aiming at adjusting the questionnaires' phrasing and structure. A revised version was then applied to sophomore students from a private high school to amend language usage issues and other problems found by the respondents. The respondents' questions and their receptiveness were recorded and examined.

The "bogus pipeline" technique in the form of a sham lie detector (fake question) was used to check for accuracy of responses.[17]

The study variables were classified as follows: type of school (public, private), gender (male, female), grade (elementary, middle, or high school), ethnicity (Caucasian, African Brazilian, Native, or Asian), living situation (living with parents, grandfather and/or grandmother, living with other relatives e.g. uncle/aunt, living with friends), parents' education level (illiterate, complete elementary, middle, or high school, college, university education), and their mother's and/or father's habits regarding smoking, alcohol, and/or cannabis use (yes/no).[2]

The study used the kappa index, Cronbach's alpha, and intraclass correlation (ICC) to measure the questionnaire's reliability. Due to limitations of the exclusive use of the kappa index in the assessment of reliability and the comprehensiveness of analyses, the three indices were used in a concerted manner.[11,12,16] The criteria used in the interpretation of kappa index, intraclass correlation and Cronbach's alpha findings are summarized in the Annex.[21] There were estimated 95% confidence intervals (95% CI) as well as the prevalence point for each variable studied.

EpiData 6.0® was used for tabulating the data. Data were analyzed with SPSS 10®, EpiInfo 6.0® and Winpepi®.

The ICC was calculated using a mixed-effects model and means after assessing putative interactions.[14, 15]

Prevalence ratios and chi-square statistics were calculated for the different substances in order to assess if losses in the test-retest were significantly associated with the use of each substance.

The study was approved by the Research Ethics Committee of Universidade Federal da Bahia (Protocol 01/04 – March 3, 2004). We obtained the consent of the principal of each participating school and they were asked to sign an informed consent form and schedule the application of the instrument in the classroom. Following the Research Ethics Committee guidelines it was not necessary to obtain a signed informed consent from each student individually, given the self-applicable and anonymous character of the instrument.

RESULTS

Lifetime, yearly or monthly substance use, with the exception of cannabis, was similar among the students who participated in the test and retest.

The mean age (n=451) was 14.4 years (SD=1.6) (minimum=11 and maximum=19) for the entire sample. The distribution of enrolled students per administrative unit was: 40.6% students were enrolled in state-run schools, 22.9% in municipal schools, and 36.4% in private schools (Figure). The distribution of sociodemographic variables in the test and retest is summarized in Table 1.

The prevalences of ever use of substances in the test and retest were similar for most substances. There was a non-significant trend toward higher prevalences in the retest, except for the use of inhalants, which was lower than that reported in the test. The prevalence of use of most substances studied in the year and month prior to the questionnaire application was similar in the test and retest, except for alcohol and tobacco use, which was significantly higher in the retest. The prevalence of drug use was inaccurate since some substances reported by the students (hashish, LSD, steroids, heroin, amphetamines, crack, and erectile dysfunction drugs) showed wide 95% CIs (Table 2).

Gender, ethnicity, living situation, parents' education level, cigarette smoking by the father and/or the mother, alcohol consumption by the father and/or the mother had a reliability that ranged from acceptable to quite good, with a Cronbach's alpha >0.6 (Table 1).

The kappa index for lifetime, prior year, and prior month use of substances in the test and retest ranged from "moderate" (0.43) to "almost perfect" (0.83) correlation for alcohol, tobacco, inhalants, appetite depressants, cocaine, ecstasy, and other drugs (such as herbal infusions with hallucinogenic properties). The kappa index was inaccurate for cannabis use (in the prior month), hashish (in the prior month and year), and other drugs (in the prior month and year). LSD, hashish, benzodiazepines, steroids, heroin, amphetamines,

Table 1. Frequency and reproducibility indicators (kappa, Cronbach's alpha, and intraclass correlation) according to sociodemographic variables among 459 adolescent students. City of Salvador, Northeastern Brazil, 2006.

Variable	Test		Retest		Kappa	Cronbach's alpha	ICC
	n	%	n	%	95% CI	95% CI	
Gender	459		463		0.92	0.96	0,96
Male	183	39.9	175	37.8	0.88;0.95		0.95;0.96
Female	276	60.1	288	62.2			
Grade	454		462		0.88	0.94	0.94
Elementary/Middle School	352	77.5	353	76.4	0.83;0.93		0.93;0.95
High School	102	22.5	109	23.6			
Ethnicity	444		450				
Caucasian	159	35.8	162	36	0.87	0.92	0.92
African Brazilian	255	57.4	251	55.3	0.83;0.91		0.91;0.94
Asian	4	0.9	3	0.7			
Native	26	5.9	34	7.6			
Living situation	449		451				
Parents	392	87.3	392	86.9	--	0.8	0.8
Aunt/uncle	33	7.3	33	7.3			0.61;0.81
Classmates/friends	1	0.2	0	0			
Alone	1	0.2	1	2.2			
Other	22	4.9	25	5.5			
Father education level	400		426				
Illiterate-middle school	79	19.8	85	20	0.70	0.90	0.90
High school	134	33.5	148	34.5	0.65;0.75		0.88;0.92
College	80	20	87	20.4			
University	29	7.3	31	7.3			
Do not know	78	19.5	75	17.6			
Mother education level	409		428				
Illiterate-middle school	86	21.3	87	20.3	0.70	0.91	0.91
High school	130	31.8	140	32.7	0.64;0.74		0.89;0.92
College	83	20.3	88	20.6			
University	37	9	42	9.8			
Do not know	73	17.8	71	16.6			
Smoking							
Father	398		357		0.81	0.9	0.9
	59	14.8	53	14.8	0.73;0.90		0.87;0.90
Mother	392		353		0.86	0.93	0.93
	40	10.2	39	11	0.77;0.94		0.77;0.94
Alcohol use	429		425		0.64	0.79	0.79
Father	279	65	254	59.8	0.57;0.52		0.74;0.82
	392		385		0.71	0.83	0.83
Mother	162	42.6	168	43.6	0.63;0.78		0.79;0.86
Cannabis use	386		347		0.66	0.8	0.8
Father	5	1.3	6	1.7	0.30;1.0		0.75;0.84
	385		344		Inaccurate	Inaccurate	Inaccurate
Mother	1	0.3	1	0.3			

crack, and erectile dysfunction drugs were seldom reported and had values ranging from 0.21 to 1.0, with wide 95% CIs (Table 3).

Cronbach's alpha and ICC were considered acceptable and satisfactory for most substances, regardless of time of use (lifetime, in the prior year or month). ICC values ranged from 0.44 (satisfactory) to 0.94 (excellent) for lifetime substance use. On the other hand, regarding the use in the prior year, they ranged between 0.57 and 0.94, and in the prior month they ranged from 0.35 (unacceptable) to one. With respect to the use of benzodiazepines in the prior month, reproducibility was

unacceptable (0.35) (Table 3).

The kappa index for alcohol, tobacco, and cannabis use (for different time of use) did not show any significant association with type of school, gender, age, grade, parents' education level and parental substance use (alcohol, tobacco, and cannabis).

A significant difference in the kappa index was seen for cannabis use in the prior month. The kappa index was 0.66 (95% CI: 0.04;1.00) among public school students and 0.31 (95% CI: 0.00;0.80) among private school students, with a kappa adjusted by sample size of 0.47 (95% CI 0.08;0.85).

Table 2. Frequency of psychoactive substance use (test and retest) for lifetime, in the prior year, and prior month by substance among 459 adolescent students. City of Salvador, Northeastern Brazil, 2006.

Variable	Lifetime use		Use in the prior year		Use in the prior month	
	Test	Retest	Test	Retest	Test	Retest
	% (n) 95% CI	% (n) 95% CI	% (n) 95% CI	% (n) 95% CI	% (n) 95% CI	% (n) 95% CI
Alcohol	54.4 (247) 49.7;59.1	57.3 (255) 52.6;61.9	46.9 (184) 41.9;52.0	57.7 (192) 52.2;63,0	29.0 (112) 24.5;33.8	40.1 (131) 34.7;45.6
Tobacco	12.6 (55) 9.4;15.8	15.6 (65) 12.2;19.3	8.2 (26) 5.4;11.7	14.8 (34) 10.0.5;20.1	4.4 (14) 2.4;7.3	8.6 (19) 5.2;13
Inhalants	4.8 (17) 2.8;7.6	3.7 (13) 1.9;6.2	2.6 (9) 1.2;4.8	2.9 (10) 1.4;5.3	1.7 (6) 0.6;3.7	1.8 (6) 0.7;3.8
Appetite depressants	3.4 (14) (2.2;6.5)	4.0 (14) 2.2;6.6	2.6 (9) 1.2;4.8	2.7 (9) 1.2;5.0	1.1 (6) 0.3;3.0	1.8 (6) 0.7;3.8
Benzodiazepines	2.8 (10) 1.4;5.1	3.7 (13) 1.9;6.2	2.0 (7) 0.81;4.1	2.9 (10) 1.4;5.3	1.4 (5) 0.5;3.3	1.5 (5) 0.5;3.4
Cannabis	2.7 (12) 1.41;4.69	3,6 (15) 2,1;5,9	2.6 (8) 1.1;5.1	4.8 (10) 2.3;8.7	0.7 (3) 0;2.4	3.4 (7) 1.4;7.0
Cocaine	1.4 (5) 0.5;3.27	1.7 (6) 0.6;3.7	1.1 (4) 03;2.9	1.8 (6) 0.7;3.8	0.9 (3) 1.8;2.5	1.2 (4) 0.3;3.0
Ecstasy	1.3 (4) 0.31;2.9	1.7 (6) 0,6;3,7	0.6 (2) 0.1;2.1	1.8 (6) 0.7;3,8	0.9 (3) 0.2;2.5	0.9 (3) 0.2;2.6
Hashish	0.9 (3) 0.2;2.5	1.4 (5) 0.5;3.3	0.6 (2) 0.1;2.0	0.9 (3) 0.2;2.6	0.3 (1) 0;1.6	0.6 (2) 0.1;2.1
LSD	0.9 (3) 0.2;2.5	1.4 (5) 0.5;3.3	0.3 (1) 0;1.6	0.9 (3) 0.2;2.6	0.3(1) 0;1.6	0.3(1) 0;1.6
Steroids	0.6 (2) 0;2.0	0.9 (3) 0.1;2.5	0.3 (1) 0;1.6	0.9 (3) 0.2;2.6	0.3(1) 0;1.6	0.3(1) 0;1.6
Heroin	0.6 (2) 0.2;2.5	0.9 (3) 0.7;2.0	0.3 (1) 0;1.6	0.9 (3) 0.2;2.6	0.3(1) 0;1.6	0.6 (2) 0.1;2.1
Amphetamines	0.3 (1) 0;1.6	0.9 (3) 0.2;2.5	0.3 (1) 0;1.6	0.6 (2) 0.1;2.1	0.3(1) 0;1.6	0.6 (2) 0.1;2.1
Crack	0.3 (1) 0;1.6	1.1 (4) 0.3;2.9	0.3 (1) 0;1.6	1.8 (4) 0.3;3.0	0.3(1) 0;1.6	0.6 (2) 0.1;2.1
Erectile dysfunction drugs	0.3 (1) 0;1.6	0.6 (2) 0.7;2.0	0.3 (1) 0;1.6	0.6 (2) 0.1;2.1	0.3 (1) 0;1.6	0.3 (1) 0;1.6
Other	1.4 (5) 0.5;3.3	2.0 (7) 0.8;4.1	0.9 (3) 0.2;2.5	1.5 (5) 0.5;3.4	0.9 (3) 0.2;2.5	0.9 (3) 0.2;2.6

When stratified by type of school (public vs. private), the kappa index, Cronbach's alpha, and ICC were not accurate among public school students regarding the use of ecstasy, crack, heroin, LSD, amphetamines, and erectile dysfunction drugs (regardless of time of use) (data not shown). Among private school students there was a clear higher prevalence of lifetime use of these substances (with the exception of cannabis), and use of these substances in the prior year and month (p<0.001). The proportion of students who reported the use of these substances was quite low with zero prevalence among public school students.

The students' mean age and mean age of initiation of substance use (tobacco, alcohol, and cannabis) were similar in the test and retest (Table 4). The ICC was excellent for age, age of initiation of substance use (tobacco, alcohol, and cannabis), and age of initiation of regular alcohol use. The coefficients were found to be inaccurate with respect to age of regular tobacco and cannabis use, and the number of days of heavy alcohol consumption in the prior month, with wide 95% CIs (Table 4).

Table 3. Indicators of reproducibility (kappa, Cronbach's alpha, and intraclass correlation) of the frequency of psychoactive substance use (test and retest) for lifetime, in the prior year, and prior month by substance among 459 adolescent students. City of Salvador, Northeastern Brazil, 2006.

Psychoactive substance	Kappa			Cronbach's alpha			ICC		
	Lifetime use 95% CI	Use in the prior year 95% CI	Use in the prior year 95% CI	Lifetime use	Use in the prior year	Use in the prior year	Lifetime use 95% CI	Use in the prior year 95% CI	Use in the prior year 95% CI
Alcohol	0.83	0.62	0.58	0.91	0.76	0.74	0.91	0.76	0.74
	0.78;0.88	0.53;0.51	0.49;0.68				0.89;0.94	0.70;0.81	0.67;0.79
Tobacco	0.8	0.76	0.57	0.92	0.86	0.73	0.92	0.86	0.73
	0.78;0.93	0.62;0.89	0.36;0.78				0.91;0.94	0.81;0.90	0.66;0.8
Inhalants	0.75	0.66	0.72	0.86	0.67	0.84	0.86	0.79	0.84
	0.57;0.93	0.40;0.91	0.42;1				0.82;0.89	0.74;0.84	0.8;0.87
Appetite depressants	0.78	0.49	0.66	0.87	0.87	0.8	0.87	0.65	0.8
	0.60;0.95	0.18;0.79	0.3;1				0.84;09	0. 4;0.57	0.74;0.84
Benzodiazepines	0.69	0.79	0.21	0.82	0.89	0.35	0.82	0.89	0.35
	0.45;0.92	0.57;1	0.0;0.57				0.77;0.85	0.86;0.91	0.17;0.48
Cannabis	0.89	0.88	0.43	0.94	0.94	0.63	0.94	0.94	0.6
	076;1	0.72;1	0.02;0.84				0.93;0.95	0.92;0.96	0.46;0.71
Cocaine	0.8	0.75	0.86	0.9	0.87	0.93	0.9	0.86	0.92
	0.52;1	0.41;1	0.58;1				0.86;0.91	0.82;0.89	0.9;0.94
Ecstasy	0.56	0.50	0.66	0.75	0.67	0.8	0.75	0.67	0.8
	0.23;0.96	0.07;0.52	0.22;1				0.68;0.80	0.58;0.73	0.74;0.84
Hashish	0.75	0.50	0.39	0.86	0.67	0.8	0.86	0.67	0.80
	0.41;1	0;1	0;0.94				0.82;0.89	0.58;0.74	0.75;0.84
LSD	0.28	0.5	1	0.44	0.67	1	0.44	0.67	1
	0.16;0.72	0;1	0.24;1				0.3;0.55	0.58;0.74	1;1
Steroids	0.8	0.5	1	0.88	0.67	1	0.88	0.67	1
	0.41;1	0;1	0.24;1				0.85;0.91	0.58;0.74	1;1
Heroin	0.4	0.5	0.67	0.57	0.67	0.8	0.57	0.67	0.8
	0;0.94	0;1	0.05;1				0.45;0.65	0.58;0.54	0.75;0.84
Amphetamines	0.5	0.67	0.67	0.67	0.8	0.8	0.67	0.8	0.8
	0;1	0.05;1	0.05;1				0.58;0.73	0.75;0.84	0.75;84
Crack	0.4	0.4	0.67	0.57	0.57	0.8	0.57	0.57	0.8
	0;0.94	0;0.94	0.05;1				0.46;0.65	0.46;0.66	0.75;0.84
EDD	0.67	0.21	1	0.79	0.8	1	0.79	0.8	1
	0.1;1	0;0.57	0.24;1				0.75;0.74	0.75;0.84	1;1
Other	0.66	0.57	0.66	0.8	0.72	0.8	0.8	0.72	0.8
	0.35;0.97	0.12;1	0.22;1				0.74;0.84	0.65;0.78	0.74;0.84

EDD: Erectile dysfunction drugs

Table 4. Average and standard deviation (test and retest) and intraclass correlation (ICC) according to age, age of experimentation, age of regular use, and number of days of heavy alcohol use of 459 school-age adolescents. Municipality of Salvador, Northeastern Brazil, 2006.

Variable	Average and standard deviation (SD)		ICC 95% CI
	Test 95% CI	Retest 95% CI	
Age (years)	14.4 (1.6)	14.5 (1.6)	0.985
n (test = 451/retest = 447)	14.3;14.6	14.3;14.6	0.984;0.989
Age of experimentation (years)			
Alcohol	12.8 (2.1)	12.5 (2.4)	0.894
n (test = 227/retest = 235)	12.6;13.1	12.2;12.8	0.860;0.920
Tobacco	13.4 (2.1)	13.1 (2.2)	0.97
n (test = 51/retest = 50)	12.8;14	12.5;13.7	0.947;0.983
Cannabis	14.9 (1.3)	14.6 (1.4)	0.943
n (test = 10/retest = 12)	14.1;15.7	13.8;15.4	0.771;0.986
Age of regular use[a]			
Tobacco	13.5 (2.3)	13.8 (1.7)	0.628
n (test = 13/retest = 13)	12.3;14.8	12.9;14.8	-0.857;0.862
Alcohol	13.5 (1.6)	13.2 (2.3)	0.924
n (test = 72/retest = 75)	13.1;13.9	12.7;13.7	0.867;0.956
Cannabis	15.3 (0.6)	15.3 (1.0)	0.57
n (test = 3/retest = 4)	14.2;16.3	14.2;16.3	0;0.978
Number of days of heavy use in the prior month[b]	6.3 (4.5)	6.8 (5.7)	0.286
n (test = 62/retest = 84)	5.1;7.5	5.6;8.0	-0.089;0.717

[a] at least 5 times per month
[b] 5 or more doses

DISCUSSION

Our results can be extrapolated to adolescents enrolled in schools in Salvador from the last year of elementary school to the last year of high school. However, they cannot be extrapolated to adolescents out of the educational system or in other contexts, outside the city of Salvador.

A questionnaire to be applied in a future comprehensive study on this population in Salvador was developed and reviewed through successive adjustments and improvements. The final instrument was a scannable form allowing more reliable results and minimizing data entry errors.[3]

According to the literature,[3,20] intervals of two to 14 days can be used between test and retest. In the present study, a two-week interval between assessments was used since smaller intervals seemed to increase memorization bias.[25] A previous Brazilian study retested a questionnaire within an interval of 30 days and proved reproducible by kappa analysis.[3]

The sample size is a key aspect for epidemiological and test-retest studies.[1,15,25] Overestimated samples are time and money consuming, and small samples may compromise accuracy of the findings, yielding estimates with too broad confidence intervals.[1,25] In a test-retest assessment, sample size must be estimated for each specific statistics (kappa, Cronbach's alpha and the ICC),[1] and in the present study the sample had enough power to properly assess the three indices.[1,24]

Among those students who did not participate in the retest, statistically significant differences were seen concerning gender and age, but no significant difference was found associated with the use of any specific substance.

Different studies have shown that the use of a "bogus pipeline" method for anonymous instruments tends to increase the reliability of cross-sectional and prospective studies on drug use.[17] This technique enhances the likelihood of positive answers when substance use and misuse is concerned.[26]

In the present study, the reported prevalences of substance use tended to be higher (with no statistical significance) in the retest. This finding may be explained by: a favorable impact (motivation) of the previous successful test on retest;[15,17] students' increased trust on the research team after a prior positive experience; and the use of the "bogus pipeline" as a check for putative biases. The reported prevalence of use was too low for some substances, making such estimates inaccurate,[20,25] and precluding further analyses.

The kappa index had moderate to substantial correlation between sociodemographic variables for most substances (and different times of use), except for LSD, steroids, heroin, amphetamines, crack, and erectile dysfunction drugs. This inaccuracy seems to be secondary to a low prevalence of use of these substances.[8,23]

The first study on substance use and misuse in Brazil used exclusively the kappa index for the assessment of reliability with a mean value of 0.79 (95% CI 0.50;1.00).[3] Although this index was similar in the present study, the findings from the two studies were not fully comparable. In the current study 95% CIs were provided, as well as the results for the ICC and Cronbach's alpha, but such information are absent in the previous one, compromising a comprehensive comparison of the psychometric properties of the respective questionnaires.

ICC was found to be satisfactory to excellent and Cronbach's alpha measures were acceptable. These indices are more accurate than the kappa index since they rely less on the prevalence and symmetry of the events under analysis and probe the internal consistency of the instruments under analysis.[4,16] ICC showed high values for most continuous variables, except for age of initiation of regular use (tobacco and cannabis) and heavy use of alcohol, probably due to the low prevalence of such harmful habits.[1]

Missing information and/or participant losses between test and retest may have biased findings and may constitute a limitation of the present study.[25] Even considering the limitations associated with underestimating or overestimating substance use, our questionnaire showed reliability among adolescent students in the city of Salvador, and may be a useful and culturally-sensitive instrument for the assessment of substance use and misuse in this population.

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Annex. Values and interpretation of the kappa index, intraclass correlation, and Cronbach's alpha.

Value	Interpretation
Kappa index	
<0	No agreement
0;0.19	Poor agreement
0.20;0.39	Fair agreement
0.40;0.59	Moderate agreement
0.60;0.79	Substantial agreement
0.80;1.00	Almost perfect agreement
Intraclass correlation	
<0.4	Poor reproducibility
0.4;0.75	Satisfactory reproducibility
>0.75	Excellent reproducibility
Cronbach's alpha	
<0.6	Unacceptable reproducibility
0,6;0,79	Acceptable reproducibility
0.8;0.94	Good reproducibility
≥0.95	Quite good reproducibility