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Original article

Anxiety symptoms in crack cocaine and inhalant users admitted to a psychiatric hospital in southern Brazil[☆]

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ABSTRACT

Objective: The occurrence of psychiatric comorbidity among individuals with crack or inhalant dependence is frequently observed. The objective of this study was to investigate anxiety symptoms among crack cocaine and inhalant users in southern Brazil.

Methods: The study investigated two groups of volunteers of equal size (n = 50): one group consisted of crack cocaine users, and the other group consisted of inhalant users. Research volunteers completed the Portuguese versions of the State-Trait Anxiety Inventory (STAI), Hamilton Anxiety Rating Scale (HAM-A), and Self-Report Questionnaire (SRQ).

Results: Both crack and inhalant users experience significant symptoms of anxiety. Inhalant users presented significantly more anxiety symptoms than crack users according to the HAM-A questionnaire only. In contrast to the results of the HAM-A, the STAI failed to demonstrate a significant difference between the two groups of substance users. SRQ scores revealed that crack and inhalants users had significant degrees of morbidity.

Conclusion: A significant difference regarding anxiety symptomatology, especially state anxiety, was observed among inhalant and crack users. Anxiety and overall mental psychopathology were significantly correlated in this sample. The results indicate that screening initiatives to detect anxiety and additional psychiatric comorbidities among crack and inhalant users are feasible and relevant.

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Sintomas de ansiedade em usuários de crack e inalantes admitidos em uma unidade psiquiátrica na Região Sul do Brasil

RESUMO

Objetivo: Investigar sintomas de ansiedade em usuários de crack e inalantes no Sul do Brasil.

Métodos: O estudo investigou dois grupos de voluntários com o mesmo número de indivíduos (n = 50): um grupo consistiu de usuários de crack e o outro grupo, de usuários de inalantes.

Palavras-chave:

Crack

Solventes

[☆] Study conducted at Universidade de Caxias do Sul and Clínica Paulo Guedes, Caxias do Sul, RS, Brazil.

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Ansiedade
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Questionários

Os voluntários da pesquisa completaram as versões em português das escalas de ansiedade *State-Trait Anxiety Inventory (STAI)* e *Hamilton Anxiety Rating Scale (HAM-A)*, e o Questionário de Autoavaliação (SRQ).

Resultados: Ambos os grupos apresentaram sintomas significativos de ansiedade. Os usuários de inalantes apresentaram escores quanto a HAM-A significativamente superiores aos usuários de crack. Ansiedade e psicopatologia geral se apresentaram significativamente correlacionados.

Conclusão: Sintomas de ansiedade são frequentes entre usuários de crack e inalantes. Um processo de triagem de sintomas de ansiedade entre usuários de crack e inalantes deve facilitar ainda mais as intervenções terapêuticas nesta área.

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Introduction

Crack and inhalant abuse have been documented as two of the most common addictive disorders in Brazil.^{1,2} Crack cocaine and inhalants have been used in Brazil by street children,³ undergraduates,⁴ and medical students.^{5,6} Inhalants abuse and dependence negatively affect youth regardless of gender, ethnicity, age, and family income.⁷ The association between inhalant dependence and other psychiatric morbidities is higher than in patients with dependence to other psychoactive drugs, including alcohol.⁸

The co-occurrence of mood and anxiety disorders has been predominantly associated with adverse outcomes among young substance users.⁹ The prevalence figures of anxiety disorders among substance users vary according to different studies.¹⁰ In the Drug Abuse Treatment Outcome Study (DATOS), which assessed over 10,000 substance users, the prevalence of generalized anxiety disorder (GAD) ranged from 2.2% to 4.2%,¹¹ while in studies with smaller sample sizes the prevalence rates of anxiety disorders varied substantially.¹²⁻¹⁴ Symptoms of anxiety were also the most common psychiatric manifestation among adolescents with substance use-related disorders (60% of both boys and girls).¹⁵ The significant association between any anxiety disorder and lifetime cocaine use has been consistently detected in an independent survey conducted in the US and Canada.¹⁶ In a Spanish cross-sectional study, nearly 42.5% of cocaine users recruited in non-clinical settings presented with a psychiatric comorbidity; anxiety disorders (13%) were the second most common comorbid disorder, after depression.¹⁷ Data from an international multicenter study revealed that the onset of anxiety disorders usually precedes the initiation of substance use disorders.¹⁸

The use of cocaine may precipitate panic attacks, phobia reactions, obsessions, and compulsions, which may persist after discontinuation of use.^{19,20} The comorbidity between cocaine use and social phobia²¹ and post-traumatic stress disorder (PTSD)^{22,23} tends to occur among individuals with severe cocaine use, with personal background and family history of psychiatric disorders.²⁴ The association between anxiety disorder and cocaine use has been described in the context of affective disorder,^{25,26} and documented extensively among people with panic attacks.²⁷⁻²⁹ Treatment-seeking cocaine users also report significant levels of anxiety.¹⁴ Anxiety and mood disorders were the most common comorbid Axis I disorders diagnosed in a sample of male inpatients in Iowa.³⁰ Anxiety is also a prominent clinical feature during the

abstinence phase of cocaine withdrawal.³¹ In comparison with users of heroin only, users of both heroin and cocaine present significantly more symptoms of anxiety.³² Anxiety has also been considered as a risk factor for the occurrence of cocaine-induced paranoia.³³

Anxiety disorders are commonly associated with inhalant use. The reported prevalence rate of generalized anxiety disorder among inhalant users is 20.5%.⁸ Data from a national epidemiological survey revealed that inhalant users had a significant lifetime prevalence of anxiety disorders (36%).³⁴ Female inhalant users presented higher lifetime prevalence rates of any anxiety disorder in comparison with male users (53% versus 30%), including panic disorder without agoraphobia (25% versus 11%), and specific phobia (28% versus 14%). Female inhalant users also were more likely to have met the criteria for three or more anxiety disorders (15% versus 8%) in the past year.³⁴ In addition, adolescents with inhalant abuse or dependence are significantly more likely to have abuse or dependence of alcohol, hallucinogens, nicotine, cocaine, and/or amphetamines, and are more likely to have attempted suicide compared with other adolescent patients who reported never using inhalants.³⁵ Toluene is the main component of inhalants used by youth in Brazil, including homeless youth, as confirmed by urinary levels of hippuric acid.^{36,37}

Considering the frequent occurrence of psychiatric comorbidity among individuals with crack or inhalant dependence, as well as the compounding and detrimental effects of this association, it is essential to carefully screen these drug users for anxiety.^{35,38} Furthermore, the majority of individuals affected by anxiety disorders have never obtained effective treatment despite the significant level of disability imposed by these conditions.³⁹ The objective of this study was to investigate anxiety symptoms among crack cocaine and inhalant users in southern Brazil. To the authors' knowledge, this is the first time that crack and inhalant users have been simultaneously assessed with two anxiety-specific measures in southern Brazil.

Methods

Sample

The study investigated two groups of volunteers of equal size ($n = 50$): one group consisted of crack cocaine users and the other group consisted of inhalant users. Both groups were

interviewed as inpatient volunteers in wards of a tertiary care mental health facility and a higher education training site associated with the Universidade de Caxias do Sul. Drug users fulfilled the Diagnostic and Statistic Manual of Mental Disorders, 4th edition (DSM-IV) diagnostic criteria for crack cocaine or inhalant dependence, according to a psychiatric interview conducted upon admission by psychiatrists who were completely unfamiliar with this research protocol. Patients with polydrug dependence had to satisfy the inclusion criteria of using either crack cocaine or any type of inhalant drug as (a) the main addictive substance, and (b) the one causing the most salient dependence.

All patients who volunteered to participate in this investigation were assisted via the Brazilian public health system. Taking into account that a substantial fraction of the sample was illiterate or semi-illiterate, all drug users completed the questionnaires under minimal guidance by trained interviewers, who followed standardized instructional procedures. Uncompleted or inappropriately completed questionnaires were excluded from analysis. All volunteers spoke Portuguese as their first language.

Informed consent and recruitment

This study was endorsed by the institutional Ethics and Research Committees of the Universidade de Caxias do Sul (UCS), which regulate all scientific activities at UCS. All volunteers signed a informed consent. A certificate of confidentiality was guaranteed to all research participants. Consent from parents or legally responsible adults was obtained before minor participants were formally enrolled in the present study. All respondents were treated anonymously. Research participants were recruited via word-of-mouth. Drug users were approached to participate in this study after having achieved a stable clinical course, as determined by their own physician. The recruitment process took place during various consecutive months, according to the rate of hospital admissions of prospective participants. Research participants were interviewed only once for the purpose of this investigation.

Research tools

The State-Trait Anxiety Inventory (STAI) is one of the most widely used self-report measures of anxiety in clinical and research settings.⁴⁰ The STAI measures two different components: state anxiety, which refers to a transitory and subjective emotional state that varies over time; and trait anxiety, which refers to a relatively stable pattern of reaction to stress with anxiety and a tendency to perceive situations as threatening.⁴¹ The Portuguese version of the STAI was validated in a sample of university students in Brazil.⁴² Each part varies from 20 to 80 points, and the scores indicate low (0-30), medium (31-49), or high (50 or more) anxiety levels.⁴¹

The Hamilton Anxiety Rating Scale (HAM-A) was conceived as an easy-to-use instrument to measure state anxiety.⁴³ The HAM-A has been used extensively to investigate symptoms of anxiety as well as the result of interventions aimed at reducing levels of anxiety.⁴⁴ The Portuguese version of the HAM-A has been widely used for measuring mainly state anxiety.⁴⁵ A score of 17 or below indicates absence of or low levels of

anxiety; a score from 18 to 24 indicates low to moderate anxiety levels; while a score from 25 to 30 indicates moderate to severe anxiety levels.⁴⁶

The Self-Reporting Questionnaire (SRQ) was used to identify minor and general psychiatric morbidity.⁴⁷ The SRQ was derived from research instruments used by the World Health Organization (WHO) for studying psychiatric morbidity in primary care settings in developing countries.^{48,49} According to SRQ, respondents were classified as high (≥ 8) or low (≤ 7) scorers.⁵⁰

The socio-economic status (SES) of research participants was assessed via a scale previously tested in Brazil.⁵¹ This instrument classifies SES into six categories: lower-lower, upper-lower, lower-middle, upper-middle, lower-upper, and upper-upper class.

Statistical analyses

Analysis of demographic variables was performed in relation to age and socioeconomic status. The overall scores of the HAM-A, STAI, and SRQ were computed and subsequently transformed into Z-scores for correlation and regression analyses. Student's *t*-test for independent samples was performed to examine differences between two groups of drug users. Analyses of correlation via Pearson's product-moment and Spearman's rank coefficients were computed between the questionnaires' scores and categories, respectively. Logistic regression analyses were also conducted to explore predictive effects of anxiety scales (HAM-A and STAI) on general psychopathology (SRQ). Statistical analyses were conducted using the Statistical Package for Social Sciences (SPSS®).

Results

Demographic data

The mean age in the overall sample was 20.2 years of age. The mean ages in the groups of crack users and inhalant users were 22.8 and 17.3 years of age, respectively. Regarding gender, the overall sample had 12% and 88% of female and male volunteers, respectively. Table 1 shows a summary of all demographic information.

Regarding SES, most of the total sample was classified as upper-lower class (30%) and lower-middle class (59%). A nonparametric analysis via Kruskal-Wallis test of the two subgroups differentiated according to SES strata revealed an absence of a significant difference in the medians between the two groups, with $\chi^2(1, n = 100) = 2.15, p = 0.142$.

Anxiety

The mean scores of the both anxiety rating scales used in this study (HAM-A and STAI), in the combined sample of crack and inhalant users and in each separate group are shown in Table 2. According to the HAM-A classification, 71.7% of the sample did not have or had low levels of anxiety, while 28.3% presented anxiety. Considering each group separately, crack users and inhalants users presented the following results, respectively: 90% and 53.1% (absence or low

Table 1 – Sociodemographic characteristics of the total sample of substance users

Sociodemographic characteristics	Total (n = 100)	Crack (n = 50)	Inhalant (n = 50)
<i>Age</i>			
Mean (\pm SD)	20.1 (6.2)	22.8 (6.4)	17.3 (4.5)
Range	29 (11-40)	17 (11-28)	25 (15-40)
<i>Gender</i>			
Male	88	43 (86%)	45 (90%)
Female	12	7 (14%)	5 (10%)
<i>Socio-economic status</i>			
Lower-lower	3	1 (2%)	2 (4%)
Upper-lower	32	15 (30%)	17 (34%)
Lower-middle	57	28 (56%)	29 (58%)
Middle	8	6 (12%)	2 (4%)

levels of anxiety), and 10% and 46.9% (presence of anxiety). Among crack users who experienced anxiety, 4% presented light to moderate levels of anxiety, while 6% presented moderate to severe levels of anxiety. Among inhalant users who experienced anxiety, 28.6% reported light to moderate levels of anxiety, while 18.4% presented moderate to severe levels of anxiety.

The STAI classified crack and inhalant users, in terms of presence or absence of anxiety, taken together, as follows: 9% (absence or low levels of anxiety) and 91% (presence of anxiety). The distribution according to the presence or absence of anxiety as classified by the STAI in the groups of crack and inhalant users, respectively, was as follows: 14% and 4% (absence or low levels of anxiety), and 86% and 96% (presence of anxiety). Among crack users who experienced anxiety, 72% presented medium levels of anxiety, while 14% presented high levels of anxiety. Among inhalant users who experienced anxiety, 78% reported medium levels of anxiety, while 18% presented high levels of anxiety.

A parametrical analysis using Student's *t*-test for independent samples revealed a significant statistical difference between the two groups of drug users according to the scores of the HAM-A anxiety ratings scale: $t(97) = -4.62$, $p < 0.001$. A nonparametric analysis using the Mann-Whitney test of HAM-A scores according to a categorical distinction (absence or presence of anxiety, based on a cut-off point of > 17 , as explained in the Methods section) also revealed a significant difference among the groups of crack and inhalant users, with $z = -4.06$, $p < 0.001$. This significant difference persisted when the three different categories of intensity were taken into account ($z = -3.9$, $p < 0.001$).

A parametrical analysis using Student's *t*-test for independent samples revealed an absence of significant statistical

difference between the two groups of drug users according to the STAI scores: $t(98) = -1.54$, $p = 0.13$. A nonparametric analysis using the Mann-Whitney test of STAI scores according to a categorical distinction (absence or presence of anxiety, based on a cut-off point of ≥ 31 , as explained in the Methods section) also revealed an absence of significant difference between the groups of crack and inhalant users, with $z = -1.74$, $p = 0.8$. The absence of significant difference persisted when the different categories of intensity were analyzed ($z = -1.37$, $p = 0.17$).

Correlation analyses

Pearson product-moment correlation coefficients were computed among the overall scores of all questionnaires completed by the three groups. The Bonferroni method was used to control for type I error for all pair wise comparisons: $\alpha_{PC} = 0.05/3 = 0.17$.

A significant correlation was found between the scores of the HAM-A and the scores of the STAI in the combined sample of drug users ($r = 0.43$, $p < 0.001$). Spearman's rank correlation analysis also revealed a significant association between the caseness (presence or absence of anxiety) generated by the HAM-A and the STAI ($\rho = 2$; $p < 0.05$).

Significant correlations were also found between the scores of HAM-A and SRQ ($r = 0.44$, $p < 0.001$) and between the scores of STAI and SRQ ($r = 0.67$, $p < 0.001$).

Linear regression analyses

Bivariate linear regression analyses were conducted, separately, to evaluate the prediction of general psychopathology scores (SRQ) according to the scores of the anxiety rating scales among crack and inhalant users.

Table 2 – Scores and case details of crack and inhalants users according to the HAM-A and the STAI questionnaires

	HAM-A			STAI		
	Mean (SD)	Absence/low levels of anxiety (%)	Presence of anxiety (%)	Mean (SD)	Absence/low levels of anxiety (%)	Presence of anxiety (%)
Crack (n = 50)	8.38 (8.07)	90	10	48.06 (10.52)	14	86
Inhalant (n = 50)	16.45 (9.28)	53.1	46.9	51 (8.39)	4	96
Both groups	12.37 (9.54)	71.7	28.3	49.53 (9.58)	9	91

HAM-A, Hamilton Anxiety Rating Scale; STAI, State-Trait Anxiety Inventory.

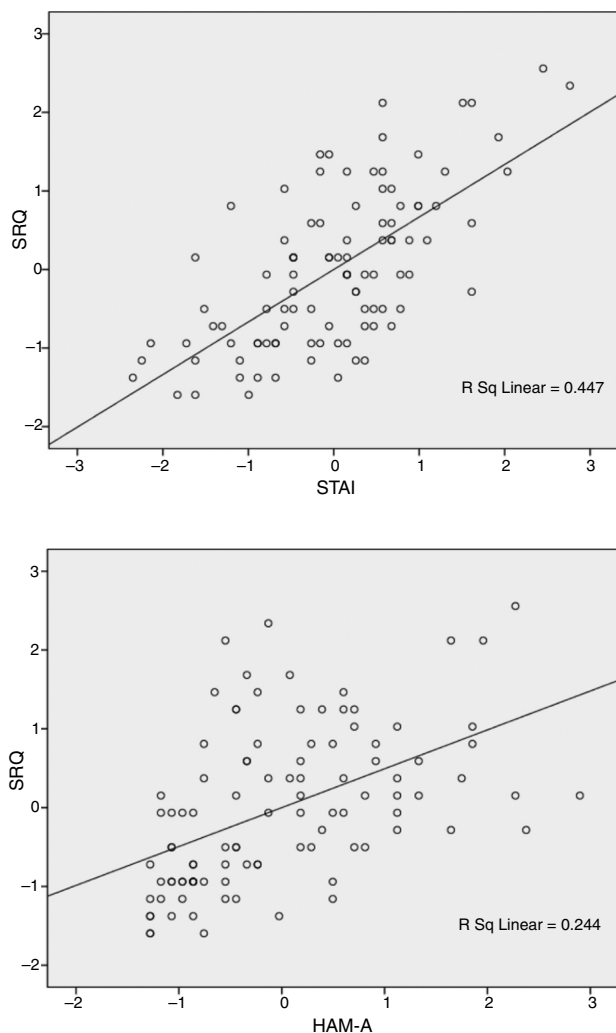


Fig. 1 – Scatter plots demonstrating the linear correlation between the SRQ (general psychopathology) and the STAI and HAM-A (anxiety) questionnaires. SRQ, Self-Report Questionnaire; STAI, State-Trait Anxiety Inventory; HAM-A; Hamilton Anxiety Rating Scale.

An initial analysis to predict changes in the SRQ scores, having the HAM-A scores as a predictor, revealed that the two variables were linearly related, such that as the overall anxiety symptomatology increases, the magnitude of general psychopathology also increases. The linear predictive ability was significant (95% CI: 0.32-0.67). Approximately 24% of the variance of the SRQ scores was accounted for by its linear relationship with the HAM-A. A similar linear regression analysis was conducted to evaluate the prediction of the SRQ scores using the STAI scores as a predictor. The results indicated that the SRQ scores and the STAI scores are also linearly related. The correlation was significant (95% CI: 0.52-0.82). Approximately 45% of the variance of the SRQ score was accounted for by its linear relationship with the STAI.

The scatter plots of the two bivariate linear regression analyses mentioned above are presented in Fig. 1.

Discussion

The results presented in this study indicate that both crack and inhalant users experience significant symptoms of anxiety. The prevalence of anxiety among crack users varies from 10% (HAM-A) to 86% (STAI), while among inhalant users the figures vary from 46.9% (HAM-A) to 96% (STAI). Crack users presented significantly more anxiety symptoms than inhalant users according to the HAM-A questionnaire only. This difference was observed when results were treated parametrically and non-parametrically. These findings are consistent with results obtained by other studies, which revealed that anxiety is, among other psychiatric symptoms, a frequent comorbidity among crack cocaine users.¹⁷ Crack cocaine users, in particular, are known to present with significant psychiatric comorbidities, including depression, anxiety disorders, bipolar disorder, and attention-deficit/hyperactivity disorder, with eventual fatal outcomes.^{52,53} In Brazil, treatment-seeking non-intravenous cocaine users presented a lifetime prevalence of Axis I or Axis II disorders of 69%, and anxiety disorders were the most common psychiatric disorder (31%).⁵⁴ The higher prevalence of anxiety disorders among cocaine dependent subjects encompasses different dysfunctions such as general anxiety, phobic, panic, and obsessive-compulsive disorders.⁵⁵ Although the physiological and psychoactive effects of cocaine are similar regardless of its hydrochloride or crack form, evidence indicates a greater abuse liability and propensity for dependence, as well as more severe consequences, when cocaine is smoked or injected intravenously in comparison with intranasal use.⁵⁶ In Brazil, a significant tendency to change routes of administration and patterns of cocaine use has been documented by several studies in the last decade.^{1,44,57-60}

Contrarily to the results of the HAM-A, the STAI failed to demonstrate a significant difference between the two groups of substance users. There are conceptual differences between the two scales used to evaluate anxiety in this sample. The HAM-A measures state anxiety, which is a symptomatic expression, while the STAI also captures trait anxiety, which is related to characterological issues.⁴⁵ The differences between “state” and “trait” anxiety reflect the conceptual distinction between existing anxiety as a transitory state and the anxiety as a relatively stable personality characteristic.^{61,62} STAI scores may suffer from being influenced by different illness variables, such as severity, chronicity, and comorbidity of symptoms.⁶³ Although variations in ratings have been reported with the HAM-A as well,^{64,65} the STAI was unable to distinguish between anxiety and depression in a mixed group of patients with both conditions, from which the authors concluded that the STAI does have clinical utility for measuring emotional distress.⁶³ In the present study, only the trait subset of the STAI was used. The results of this study suggest therefore that trait anxiety is not significantly affected by crack and inhalant use, and that only measures of state anxiety should be used for the assessment of anxiety related to cocaine and inhalant use.

Considering the contrasting results produced by different scales used to measure anxiety, there is an increased need to investigate possible differences in the symptomatic

measurement among patients with anxiety.⁶³ Although psychometric measures have been produced extensively in psychiatry, sometimes via a single assessment tool, it has been advocated that anxiety and depression may be similar elements of a general psychological distress experience of difficult differentiation.⁶⁶ Likewise, depression is a disorder with important clinical significance among crack cocaine users. A previous study detected a lifetime prevalence of 17.8% for depression among crack cocaine users.⁶⁷ Prevalence of depression among crack users is believed to be higher than what has been previously reported.⁶⁸ Furthermore, studies that investigated depressive disorders among crack users have detected additional psychiatric comorbidities, including anxiety, bipolar disorder, and attention-deficit/hyperactivity disorder, with eventual fatal outcomes.^{52,53}

Regarding psychiatric morbidity, the scores generated by the SRQ revealed that crack and inhalants users had significant degrees of morbidity. The SRQ has been previously used as general screening tool for mental disorders in the context of substance abuse.⁶⁹⁻⁷² Furthermore, in a community-based study conducted in southern Brazil, in which 126 adolescents were screened for mental problems, the prevalence of depressive symptoms, suicidal ideation, and hopelessness were higher among those who were detected as SRQ-positive according to a cut-off score of ≥ 8 ,⁷³ the same threshold used in the present study.

The results of Pearson correlation analyses also revealed a significant correlation among anxiety symptoms and general psychopathology, which attest to a congruent measurement of the constructs investigated in this study. Furthermore, the results of the bivariate linear regression analyses also revealed that the scores of the two anxiety rating scales used in this study can predict, with significant accuracy, the scores of general psychopathology of crack and inhalant users.

Previous evidence, based on regression analyses of data from a national survey in the United States, revealed that inhalant users had greater odds of intravenous drug use than users who had not used inhalants.³⁴ The results presented here reveal a direct and predictive association between depressive symptoms and general mental disorder among crack and inhalant users. Although additional studies are required to further substantiate these findings, these results may recommend more rigorous and extensive screening efforts to detect and treat depressive symptoms among crack and inhalant users.

This study may present some limitations, especially in relation to the nature of the sample investigated. Some of these discrepancies were revealed in the analyses of demographic data. Firstly, regarding age range, inhalant users presented a lower mean age in comparison with crack users. The reasons for the early age of inhalant use are based on the fact that many organic solvents are present in wide array of chemical compounds publicly commercialized for a broad variety of household purposes, which facilitate children's access. In fact, inhalant use has been characterized as preferentially prevalent among children and juveniles in both developed and developing economies.⁷⁴⁻⁷⁹ In Brazil, as well as in other developing countries, inhalants tend to be the preferred drug used among the street children, who are who

live and wander unsupervised on the streets of major urban centers.⁸⁰

Secondly, male participants predominated significantly in both groups. Evidence based on a series of surveys conducted with Brazilian secondary school students demonstrated an increased use of illicit psychotropic drugs by males, while women prefer to use drugs in the form of pills, such as anxiolytics and amphetamines.⁸¹

Thirdly, the psychometric tools used in this study were not specifically designed to evaluate adolescents. Although the mean age in the overall sample was 20.1 years, the mean age of inhalant users was 17.3 years. Nevertheless, most of the instruments used in this study have been tested previously as screening tools among adolescents in southern Brazil.⁷³ Furthermore, the unavailability of versions validated in Portuguese of instruments developed specifically for assessing adolescents' mental health prevented, at this stage, the use of a more suitable methodology for this sample. This limitation highlights the need for validation studies of psychometric instruments among adolescents in Brazil.

Despite the above-mentioned limitations, the sample investigated in this study was recruited in public health facilities, where members of all socio-economic strata of the Brazilian society have prompt access to health care. This advantage is particularly relevant in the case of a study conducted in a developing economy, where inequalities of care are known to produce significant health differentials.⁸²

Conclusion

A significant difference regarding anxiety symptomatology, especially state anxiety, was observed among inhalant and crack users. Anxiety and overall mental psychopathology were significantly correlated in this sample. The results indicate that screening initiatives to detect anxiety and additional psychiatric comorbidities among crack and inhalant users are feasible and relevant. Considering that drug abuse, especially of inhalants, affect youth preferentially, and that adolescence is a vulnerable life cycle phase, the present findings justify more rigorous and extensive screening efforts to detect and treat anxiety disorders among crack cocaine and inhalant users.

Conflicts of interest

The authors declare no conflicts of interest.

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