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DSM-5 latent classes of alcohol users in a population-based sample: Results from the São Paulo Megacity Mental Health Survey, Brazil☆

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Abstract

Background—We aimed to identify different categorical phenotypes based upon the DSM-V criteria of alcohol use disorders (AUD) among alcohol users who had at least one drink per week in the past year ($n = 948$).

Methods—Data are from the São Paulo Megacity Mental Health Survey collected in 2005–2007, as part of the World Mental Health Survey Initiative. A latent class analysis of the 11 DSM-5-AUD criteria was performed using Mplus, taking into account complex survey design

☆Supplementary material for this article can be found by accessing the online version of this paper. Please see Appendix A for more information.

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Contributors

Authors CMS, ERS, Y-PW, AGA, SSM and LHA designed the study. MCV and LHA wrote protocol, and created the databank. Authors JMC-M, CMS, GB, LHA, and SSM managed the literature searches and summaries of previous related work. JMC-M, IAM, CA-S, and SSM undertook the statistical analysis. Author JMC-M, CMS, LHA and SSM wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

Conflict of interest

None.

features. Weighted logistic regression models were used to examine demographic correlates of the DSM-5-AUD latent classes.

Results—The best latent-class model was a three-class model. We found a “non-symptomatic class” (69.7%), a “use in larger amounts class” (23.2%), defined by high probability (>70%) of the “use in larger amounts” criterion only, and a “high-moderate symptomatic class” (7.1%), defined by high-moderate probability of all the 11 AUD criteria. Compared to those in the non-symptomatic class, individuals in the “high-moderate symptomatic class” were more likely to have been married, have lower educational attainment and to be unemployed or in non-regular/informal employment. Those on the “use in larger amounts class” were more likely to have been married or never married.

Conclusion—The two symptomatic classes clearly represented the dimensionality of the new proposed AUD criteria, and could be more specifically targeted by different prevention or treatment strategies. DSM-5-AUD has the advantage of shedding light on risky drinkers included in the “use in larger amounts class”, allowing for preventive interventions, which will reach a large number of individuals.

Keywords

Alcohol use disorders (AUD); DSM-5 criteria; Latent class analysis; São Paulo; Brazil

1. Introduction

The recently released Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) brings a revised alcohol use disorder (DSM-5 AUD) diagnosis that combines DSM-IV alcohol abuse and dependence criteria, with the following notations: the exclusion of the legal problems abuse criterion (due to its low prevalence among alcohol users; Keyes and Hasin, 2008; Saha et al., 2006; Babor and Caetano, 2008) and the inclusion of the craving criterion from the ICD-10 (International Classification of Diseases – Tenth Edition; Keyes et al., 2011; Casey et al., 2012). As reported by nearly a quarter of all current alcohol users (Cherpitel et al., 2010), this totals 11 criteria (O’Brien, 2010). There is the need to explore the applicability of this new diagnosis in different populations and countries (Mewton et al., 2011; Borges et al., 2010; Shmulewitz et al., 2010), including urban populations in middle-income countries such as Brazil, the largest country in Latin America with approximately 190 million inhabitants (The World Bank, 2013).

This new unidimensional diagnosis for AUD addresses some important issues. Firstly, the idea that the abuse diagnosis would always precede the diagnosis of dependence has been disproven by a number of prospective studies (Grant et al., 2001; Schuckit et al., 2001, 2008). For instance, in a recent paper about transitions across alcohol use stages in the São Paulo Megacity Health Survey (SPMHS), without imposing the DSM-IV hierarchy of abuse and dependence, we identified three different sequences of transitions in AUD: (i) around 15% of the positive cases for both AUD had concurrent onsets of abuse and dependence when the first DSM-IV non-dependent alcohol abuse (NDAA) occurs for the first time during the same year of life as the first DSM-IV alcohol dependence problem; (ii) around 10% had dependence before abuse, when the first dependence problem predates the first

NDAA problem and (iii) around 75% had abuse before dependence, when the first NDAA problem predates the first dependence problem (Silveira et al., 2011). Secondly, the two distinct diagnostic categories in DSM-IV leave a number of individuals with severe problems related to alcohol use as “diagnostic orphans” (Hasin and Paykin, 1998; McBride et al., 2009; Caetano et al., 2011; Peer et al., 2013), because they do not meet the minimum of three criteria required to have dependence nor have any criteria of abuse (Degenhardt et al., 2002; Lynskey and Agrawal, 2007; Martin et al., 2008). This is overcome by DSM-5-AUD with the threshold for AUD diagnosis set at two or more criteria.

Notwithstanding recent research (Mewton et al., 2011; Borges et al., 2010; Shmulewitz et al., 2010; Hagman and Cohn, 2011) reinforcing the unidimensional model, there is also strong evidence of the existence of different classes of alcohol dependents (Moss et al., 2007; Delucchi et al., 2004; Hedden et al., 2010) or alcohol users (Ko et al., 2010; McBride et al., 2011). These studies explored the endorsement of DSM-IV alcohol use disorder criteria (Moss et al., 2007; Ko et al., 2010; McBride et al., 2011), longitudinal drinking patterns (Delucchi et al., 2004), and problems associated with different classes of individuals with AUD (Hedden et al., 2010). In addition, substance use disorders are well-known clinically heterogeneous syndromes (Kendler et al., 2013), as described by studies using latent class analysis (LCA), a statistical method that generates categorical phenotypes within a single unidimensional diagnostic construct (Muthén and Asparouhov, 2006). However, none of these studies used the DSM-5 AUD criteria, with the inclusion of craving criterion and exclusion of legal problems criterion, therefore, it is important to further extend this line of research by examining DSM-5 AUD criteria via LCA in other populations of alcohol users.

The current report presents results of this type of analysis using data from the Sao Paulo Megacity Health Survey (SPMHS), the Brazilian counterpart of the World Mental Health Survey Initiative (WMHS). Different from other WMHS countries, the SPMHS data were collected in an ungated approach, i.e., individuals did not need to meet the criteria for alcohol abuse to be asked about dependence symptoms (Degenhardt et al., 2008; Silveira et al., 2011). This provided a unique opportunity of investigating all DSM-5 AUD criteria in this setting. We aimed to explore latent classes among alcohol users who had at least 1 drink per week in the past year in the Brazilian general adult population. As secondary aims, we explored the sociodemographic characteristics associated with identified categorical phenotypes within the new diagnosis for AUD and the distribution of these phenotypes within DSM-5 alcohol use disorders.

2. Methods

2.1. Ethics committee approval

The procedures for recruitment, obtaining informed consent, and protection of human subjects involved during field procedures of São Paulo Megacity Health Survey were approved by the Research and Ethics Committee of the University of São Paulo Medical School (Project number 792/03).

2.2. Sample

The São Paulo Megacity Mental Health Survey (SPMHS) is a cross-sectional population-based study, designed to evaluate psychiatric morbidity in a representative sample in the general population, aged 18 years or more, living in the São Paulo Metropolitan Area (SPMA) (Andrade et al., 2012; Viana and Andrade, 2012). Respondents were selected through a multistage probabilistic process covering the 39 municipalities of SPMA, without replacement. Respondents were assessed using the World Mental Health Study (World Mental Health Survey) Composite International Diagnostic Interview (WMH-CIDI) of the World Health Organization, which was translated and adapted to Brazilian Portuguese (Viana et al., 2009). Data collection occurred between May 2005 and April 2007, by trained interviewers. The final sample assessed was composed of 5037 individuals, with a response rate of 81.3%. The current analyses were restricted to 948 subjects who endorsed drinking at least 1 drink per week in the past year. This sub-sample was chosen because of the low drinking levels in South America (Rehm et al., 2003) and the usual criteria for selecting a past-year drinking sample was too restrictive for this survey sample.

The WMH-CIDI is composed of clinical and non-clinical sections, arranged in two parts, generating diagnoses according to DSM-IV and ICD-10. All respondents received the assessment modules of mood, anxiety, and impulse control disorders, along with substance abuse and suicidal behavior, considered nuclear disorders, as well as a sociodemographic module. Blind clinical re-appraisal using the Structured Clinical Interview for DSM-IV Axis I disorder (SCID-I) for last 12-month DSM-IV Disorders in a probabilistic subsample of WMH respondents found generally good agreement between WMH-CIDI diagnoses and SCID diagnoses (Haro et al., 2006). Preliminary results of the clinical reappraisal study in the SPMHS with a probability subsample of 775 respondents, not included in the previous validation study, showed good total classification accuracy (range: 76–99%) and an area under the Receiver Operating Characteristics curve around 0.7 for any disorder (data available from the authors).

2.3. Measures

The 948 subjects who endorsed drinking at least one drink per week in the past year were asked a series of questions derived from DSM-IV/ICD-10 alcohol abuse/dependence criteria embedded in the WMH-CIDI (see supplementary materials for question details[2]). Twelve individuals did not answer these questions and were excluded from the statistical analysis (n = 936). These questions were combined to generate 11 dichotomous variables matching the DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, 2013) criteria (see supplementary materials for the 11 criteria[3]). The abbreviation of the names of the variables was based on previously published studies (Hasin and Beseler, 2009; Shmulewitz et al., 2010). Positive cases of DSM-5 AUD had to endorse at least 2 of the following 11 criteria at any point in their lifetime: Tolerance, Withdrawal, Larger/Longer, Quit/Control, Time Spent, Activities Given Up, Physical/Psychological, Neglect Roles, Social/Interpersonal,

[2]Supplementary material can be found by accessing the online version of this paper at http://dx.doi.org/10.1016/j.drugalcdep.2013.12.012 and by entering.
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Hazardous Use and Craving. In addition, DSM-5 AUD cases were classified according to three levels of severity based on the number of criteria endorsed: mild (2 or 3 criteria); moderate (4 or 5 criteria); or severe (6 or more criteria).

The following sociodemographic correlates were considered: gender (female and male), age (categorized as 18–34, 35–54 and ≥55); education (0–8, 9–11, ≥12); marital status (married/cohabiting, previously married (separated/divorced/widowed), never married); employment status (working/student, homemaker, retired, unemployed/other: non-regular or informal employment.); and household income, defined in categories (low = up to 3918 US dollars/year, low-average = from 3919 to 7050 US dollars/year, high-average = from 7051 to 14,826 US dollars/year, high = more than 14,826 US dollars/year) based on the respondent's household income per family member divided by the median income-per-family member in the entire sample.

2.4. Statistical analysis

All analyses were performed with Mplus version 6 (Muthén and Muthén, 1998–2010), using sampling weights and complex survey design measures. Descriptive statistics were used to describe the sample. Specifically, counts and percentages were used to describe categorical variables.

Latent class analysis (LCA) was conducted with Mplus version 6.0, using maximum likelihood ratio estimation. The random option in Mplus was applied to ensure convergence for the most successful LCA models. Specifically, 500 sets of random starting values were used in the initial phase, and 10 optimizations were used in the final stage of convergence. This process ensured that the best log-likelihood (LL) value for each model was replicated several times. Several statistical indices were used to assess model fit, including LL, Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC) and sample-size-adjusted BIC (SSABIC). A value of LL together with smaller amounts in AIC, BIC and SSABIC may reflect a parsimonious model (Muthén, 2006). However, the BIC value has been shown to be more reliable than other information (Nylund et al., 2007).

Once the number of classes was determined, we used polytomous logistic regression models (e.g., Ko et al., 2010) in Mplus (pseudo-class draw method) to investigate the association between latent classes and demographic characteristics. The Mplus auxiliary option was used to identify the DSM-5 variables (DSM-5 AUD, Mild DSM-5 AUD, Moderate DSM-5 AUD, and Severe DSM-5 AUD) for which the equality of means across latent classes was tested using pseudo-class-based multiple imputations (Asparouhov, 2007).

3. Results

Table 1 presents the prevalence of DSM-5 AUD criteria endorsement and the distribution of sociodemographic variables in the sample. Similar to a previous study investigating lifetime alcohol use (Silveira et al., 2011), there was a remarkably higher prevalence of men among past-year alcohol users compared to the total SPMHS sample. Other significant differences were found in age, household income, employment status and education.

Table 2 presents the comparison between fit statistics according to the number of latent classes based upon the DSM-5 AUD criteria among past-year alcohol users who drank alcohol at least once a week. The three-class model had the lowest BIC value. However, the lowest value of SSABIC was found in the five-class model. The AIC and LL values were better as the number of factors increased but the opposite was true for the *p*-value of Vuong–Mendel–Rubin and degrees of freedom. The higher entropy values were found in the two-class and four-class models, but all the models had an acceptable value (>0.8). Considering the value of BIC as the most reliable measure (over SSABIC), and the opposite trend of the other variables (AIC/LL versus *p*/df), we selected the three-class model as the most parsimonious one for the DSM-5 AUD. In addition, the three-class model had acceptable values in all other statistical indices.

Table 3 presents the weighted probability of DSM-5 AUD criteria per latent class of best model fit for the DSM-5 (three-class model). The three classes were labeled as: “non-symptomatic class” (corresponding to 69.7% of the respondents); “use in larger amounts class” (23.2%); and “high-moderate symptomatic class” (7.1%). Respondents in the “non-symptomatic class” had a very low probability of endorsing all considered criteria. Those in the “use in larger amounts class” had low probability (<30%) of having all DSM-5 AUD criteria, with the exception of a high probability of endorsing the Larger/Longer criterion (85.4%) and a moderate probability of endorsing the Hazardous Use criterion (40.8%). The “high-symptomatic class” included individuals with moderate to high probabilities (60.5–100.0%) of endorsing all DSM-5 AUD criteria. Among all past-year weekly alcohol users, the Larger/Longer criterion had the highest prevalence of endorsement (35.53%), followed by Hazardous Use (16.99%), Neglect Roles (14.10%) and Craving (14.06%) criteria. Fig. 1 displays the probability of endorsement of the eleven DSM-5 AUD criteria per each latent class in the three-class model.

Table 4 shows the covariate estimates model with the “non-symptomatic class” as the reference category. Those in the “high-moderate symptomatic class” were more likely to have been previously married (aOR = 2.45, 95%CI = 1.10–5.44, $p = 0.027$), have lower educational attainment (aOR = 14.35, 95%CI = 2.73–75.41, $p = 0.002$, aOR = 10.81, 95%CI = 2.01–58.13, $p = 0.006$, and aOR = 8.51, 95%CI = 2.24–32.34, $p = 0.002$) and to be unemployed/other (aOR = 8.84, 95%CI = 1.38–56.80, $p = 0.021$). Those in the “use in larger amounts class” were more likely to have been previously married (aOR = 1.99, 95%CI = 1.17–3.40, $p = 0.011$) or never married (aOR = 2.26, 95%CI = 1.19–4.30, $p = 0.012$), and less likely to be in the high-average income category (aOR = 0.39, 95%CI = 0.17–0.87, $p = 0.028$).

Table 5 presents the proportion of DSM-5 AUD estimated in each of the classes. The majority of the past-year alcohol users who drank at least once a week was within the “non-symptomatic class” and did not meet criteria for DSM-5 AUD. The vast majority of the respondents in the 2 problematic latent classes (92.5% and 100%) met AUD diagnosis. Most of the individuals from the “use in larger amounts class” were diagnosed with Mild (54.8%) or Moderate (28.3%) DSM-5 AUD, while almost all individuals from the “high-moderate symptomatic class” were diagnosed as having Severe DSM-5 AUD (96.7%).

4. Discussion

This is the first LCA study in past-year alcohol users who drank at least once a week from a representative sample of the general population using DSM-5 AUD criteria. Our findings indicate that within the new proposed DSM-5 AUD there are three different latent classes of past-year alcohol users who drank at least one a week (the best LCA solution): the vast majority of these alcohol users were within the “non-symptomatic class” (nearly 70%) with less than 1% of respondents in this class receiving a DSM-5 AUD diagnosis. In contrast, the two symptomatic classes well represented the dimensionality of the new proposed AUD criteria. The “use in larger amounts class” reflected the less severe level of this disorder, with more than 90% being captured by DSM-5 AUD (representing Mild and Moderate DSM-5 AUD). At the upper end of the spectrum is the “high-moderate symptomatic class”, representing Severe DSM-5 AUD. The difference between these two classes was regarding the probability (low versus moderate/high, respectively) of endorsement of all criteria other than Larger/Longer (high in both classes).

The similarities among our latent classes obtained with DSM-5 criteria, and the latent classes obtained using DSM-IV criteria from previous studies (Ko et al., 2010; McBride et al., 2011), support the existence of three or four latent classes of alcohol users: a non-symptomatic class, a high-moderate symptomatic class, and an intermediate class or classes with high probability of endorsing Larger/Longer criterion. One recent study that investigated DSM-IV abuse and dependence criteria together in a representative sample of individuals who drank on ≥3 days a week and/or have usually consumed ≥3 drinks on the days they were drinking during lifetime of the population of Australia (McBride et al., 2011), found the model with three phenotypic classes was the most parsimonious: (1) a non-symptomatic class (68.1%), (2) a moderate-high symptomatic class (4.8%) and (3) a class (27.1%) with a high probability of endorsing Larger/Longer criterion, and with a moderate probability of endorsing the Hazardous Use criterion, which resembled a lot this study’s findings.

It is important to discuss some previous problematic issues (Martin et al., 2008) with the criterion Larger/Longer criterion, as this criterion was very important for the definition of latent classes in the present study with DSM-5 criteria, and in the previous LCA studies with DSM-IV criteria (Ko et al., 2010; McBride et al., 2011). Moss et al. (2007) state that Larger/Longer criterion assignments could be false among those who do not report a compulsive pattern of substance use. Future LCA studies that take into account the Moss et al. (2007) suggestions of defining whether using more or longer durations of alcohol due to compulsive use and not merely due to social reasons, could possibly generate different latent classes, which could represent better the different phenotypes of alcohol users. Item response theory (IRT) analysis could also generate interesting findings to further advance our knowledge on the severity and discrimination of Larger/Longer and the other DSM-5 AUD criteria (McBride et al., 2011).

Only one LCA study conducted in U.S. (Ko et al., 2010) investigated sociodemographic aspects of different latent classes in a representative sample of past-year alcohol users. Despite similarities regarding the latent classes found in Ko et al.’ study and this study, the

sociodemographic correlates were quite different. The only significant sociodemographic differences in Ko et al.'s study (2010) were: moderate symptomatic and high symptomatic classes tended to be comprised of younger individuals and those with lower income as compared to the other two classes. Adults in Brazil and United States have enormous differences regarding levels of educational attainment (Maia and Sakamoto, 2012), which possibly explains the differences between findings regarding educational attainment in our study and in Ko et al.'s (2010) study. Only 19.1% of adult population in Brazil aged 16 and older have entered college compared to 62.0% in the U.S. (Maia and Sakamoto, 2012).

Lower educational attainment and unemployment status were associated with the "high-moderate symptomatic class", which seems to be in line with recent investigations in Brazilian samples (Silveira et al., 2011; Castro et al., 2012). A previous report from our research group using the same sample (Silveira et al., 2011), shows that the three lowest levels of education (up to a maximum of 11 years of formal education) predicted the transition from regular alcohol use to abuse. Another study in Brazil (Castro et al., 2012) found similar results: individuals with lower education levels were twice more likely to engage in binge drinking than those at the higher level of education. These associations suggest that in our country there is an association between lower educational attainment with problematic alcohol use (i.e., alcohol abuse, binge drinking and Severe DSM-5 AUD). The association between unemployment and problematic drinking behaviors has been described in different cultures (Caetano et al., 2012; Backhans et al., 2012; Popovici and French, 2013) Despite the fact that there are no specific studies with Brazilian samples, this association seems to be especially important for Latin American male immigrants living in U.S. (Caetano et al., 2012). Our finding that individuals with high-average household income are less likely to be in the "use in larger amounts class" as compared to individuals with higher household income is in line with previous studies in Brazil showing that higher income has a protective effect for heavy drinking, and alcohol abuse or dependence (Moreira et al., 1996; de Lima et al., 2003; Costa et al., 2004; Silveira et al., 2007).

Previously married respondents were more likely to be in both problematic classes ("use in larger amounts" and "high-moderate symptomatic") than those currently married. This is not surprising since prior studies from different countries (Leonard and Eiden, 2007; Silveira et al., 2007; Dawson et al., 2008; Scott et al., 2009; Boden et al., 2013), a well established two-way relationship has been described, in which drinking in larger amounts affects marital quality and stability, as well as marriage disruption increases alcohol consumption, heavy drinking and related problems.

Remarkably, we did not find any association between gender and the two problematic alcohol classes. Gender effects were expected since male gender has been extensively associated with all patterns of alcohol misuse in Brazil (Silveira et al., 2011, 2012; Castro et al., 2012). Perhaps these differences could be explained by the fact that none of these previous studies investigated gender differences in DSM-5 AUD criteria. In the specific case of gender, the absence of differences may be due to a recent trend of increased alcohol-related problems in women worldwide and in Brazil (Bloomfield et al., 2006; White et al., 2011; Silveira et al., 2012). According to the GENACIS (Gender, Alcohol and Culture: An International Study) project, as women's position in society has moved toward higher gender

equality, differences in consequences of alcohol use between women and men have decreased (Bloomfield et al., 2006).

The identified latent classes and their sociodemographic correlates could guide public policy and clarify the patterns of alcohol use in our country. Considering that the “use in larger amounts” class is the largest problematic class in terms of number of individuals, and that recent Brazilian studies have shown that among alcohol drinkers, a large proportion drink in a heavy pattern (Lima et al., 2007; Guimarães et al., 2010; Laranjeira et al., 2010), the use of alcohol in larger amounts calls for special attention in our country. Prevention strategies for these individuals with low distress related to alcohol use must be the most effective approach to modify this drinking culture in Brazil. In a recent review, Strang et al. (2012) suggest brief interventions to selected individuals at higher risk for drug problems, which seems to fit well for this latent class. On the other hand, individuals in the “high-moderate symptomatic class” deserve specialized treatment in addiction care units with a multidisciplinary team, in view of their high clinically significant impairment caused by alcohol use, with several behavioral and physical symptoms. In these individuals, major areas of life functioning are likely to be impaired (work or school, interpersonal relationships, communication, and health).

This study is not without limitations. The sample is restricted to residents of a large urban area, which precludes the generalization of our findings to the general population who live in rural settings. In addition, lay interviewers may not have the ability to make a refined assessment of alcohol related problems, although they received a five-day standardized training. Furthermore, possible recall bias may have occurred. Another limitation refers to the number (eleven) of disaggregated individual criterion items (which could have occurred in different time-points in a respondents lifetime), which were considered in the latent class model (as analyses with numerous variables increase random error and provide less parsimonious and unreliable latent variables). Finally, the cross-sectional design cannot establish a cause-effect relationship for the observed data.

In summary, this study demonstrates that within the new diagnosis of AUD proposed for DSM-5, LCA distinguishes three distinct categorical phenotypes of Brazilian past-year weekly alcohol users. This new criteria has the advantage of shedding light on risky drinkers included in the “use in larger amounts class,” allowing for preventive and brief interventions, which will reach a large number of individuals. In the light of some problematic issues with Larger/Longer, future LCA studies with alcohol users may distinguish compulsive patterns of this criterion. IRT studies should also further investigate the performance of this and the other ten criteria.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.drugalcdep.2013.12.012.

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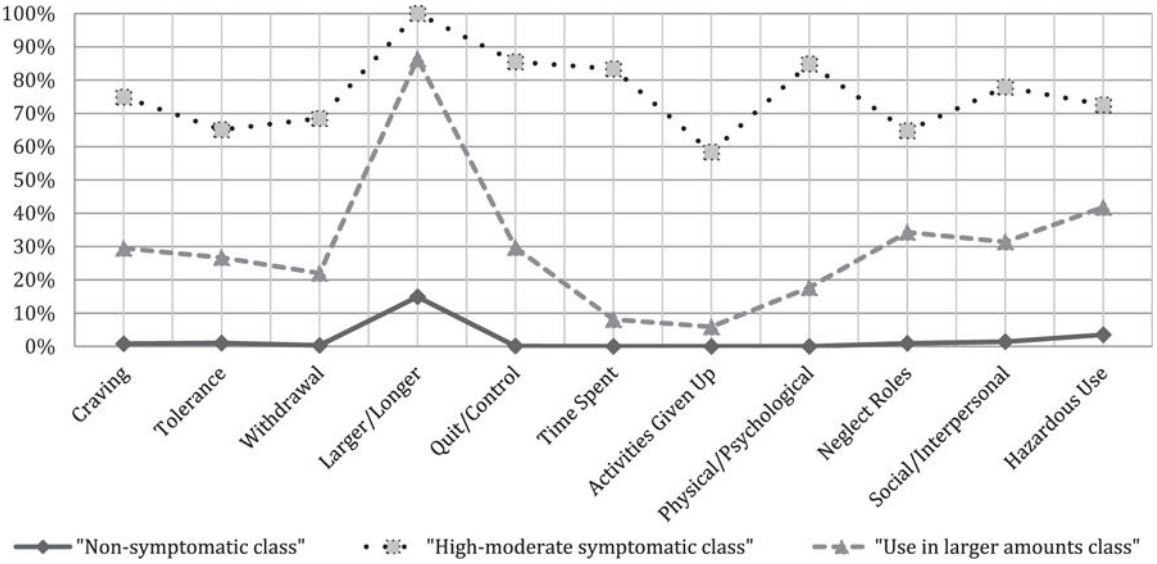

Fig. 1.

DSM-5 alcohol use disorder criteria in a three-class model. Weighted probability of endorsing DSM-5 AUD criteria given latent class among alcohol users who had at least 1 drink/week in the past year in São Paulo, 2005–2007.

Table 1

Prevalence of socio-demographic variables of individuals who had at least 1 drink/week in the past-year (n = 936) and from the total representative sample (n = 5037) of the São Paulo metropolitan area, 2005–2007.

	Past-year weekly alcohol users			Total sample				
Variables	***n*[a]**	**%**	**SE**	***n*[a]**	**%**	**SE**	**λ**	***p***
Age (years)								
18–34	390	41.69	1.75	2252	44.70	0.73	14.4	<0.01
35–54	414	44.28	2.01	1916	38.03	0.90		
≥55	131	14.03	1.54	869	17.26	0.63		
Gender								
Female	235	25.13	1.55	2669	52.99	0.97	246.0	<0.01
Male	701	74.86	1.55	2368	47.00	0.97		
Household income[b]								
Low	176	18.78	2.18	1132	22.47	0.63	15.4	<0.01
Low-average	237	25.31	1.21	1388	27.56	0.53		
High-average	230	24.57	1.68	1225	24.32	0.75		
High	293	31.34	1.91	1292	25.64	0.71		
Employment status								
Homemaker	44	4.66	0.97	668	13.27	0.44	64.1	<0.01
Working/student	674	71.97	1.90	3274	64.99	0.84		
Retired	60	6.37	0.83	412	8.19	0.39		
Unemployment/other[c]	159	17.00	1.74	682	13.54	0.73		
Education (years)								
Low (≤4)	181	19.29	1.64	1111	22.05	0.73	9.4	0.02
Low-average (5–8)	250	26.69	1.60	1189	23.61	0.68		
High-average (9–11)	324	34.70	2.51	1874	37.20	0.94		
High (≥12)	181	19.32	1.95	863	17.13	0.74		
Marital status								
Married/cohabiting	568	60.72	1.45	2971	58.97	1.00	1.5	0.45
Previously married	147	15.71	1.63	780	15.49	0.57		
Never married	221	23.56	1.73	1286	25.53	0.99		

[a] Estimated value of *n* since after de imputation of weights/clusters/strata it is not possible to calculate the exact value of *n*.

[b] Household income: low = up to 3918 US dollars/year; low-average = from 3919 to 7050 US dollars/year; high-average = from 7051 to 14,826 US dollars/year; high = more than 14,826 US dollars/year.

[c] Other = non-regular/informal employment.

Table 2

Comparison between fit statistics according to the number of LCA with the DSM-5 AUD criteria among alcohol users who had at least 1 drink/week in the last year in São Paulo, 2005–2007.

DSM-5 (AUD – alcohol use disorder) criteria							
Model	**LL**	**AIC**	**BIC**	**SSABIC**	***p*-Vuong**	**Entropy**	**df**
One-class	−3942.706	7907.411	7960.669	7925.734	N.A.	N.A.	1968
Two-class	−2943.857	5933.714	6045.071	5972.025	0.000	0.913	2015
Three-class	−2795.417	5660.834	5830.290	5719.133	0.358	0.896	2003
Four-class	−2765.747	5625.495	5853.051	5703.783	1.000	0.914	1991
Five-class	−2735.091	5588.182	5873.838	5686.458	1.000	0.877	1979
Six-class	−2717.583	5577.165	5920.920	5695.430	1.000	0.867	1967

LL = log-likelihood; AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; SSABIC = sample size adjusted BIC; *p*-Vuong = *p* value of Vuong–Mendel–Rubin; df = degrees of freedom.

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Table 3

Conditional prevalence DSM-5 AUD criteria endorsement per each latent class, among alcohol users who had at least 1 drinks/week in the past year in São Paulo, 2005–2007.

Criteria	"Non-symptomatic class"			"Use in larger amounts class"			"High-moderate symptomatic class"			Total	
	n[a]	%	SE	*n*[a]	%	SE	*n*[a]	%	SE	*n*[a]	%
Craving	5	0.7	0.01	64	29.3	0.05	44	67.1	0.12	121	12.9
Tolerance	6	0.9	0.01	54	25.0	0.03	41	63.3	0.10	110	11.7
Withdrawal	2	0.3	0.01	45	20.7	0.05	42	63.8	0.08	96	10.3
Larger/Longer	94	14.4	0.02	185	85.4	0.03	66	100.0	0.00	358	38.2
Quit/Control	1	0.1	0.01	63	29.1	0.05	51	77.4	0.12	124	13.3
Time Spent	0	0.0	0.00	12	5.4	0.02	53	80.2	0.13	74	7.9
Activities Given Up	1	0.1	0.01	7	3.4	0.02	38	57.3	0.12	52	5.6
Physical/Psychological	0	0.0	0.00	36	16.4	0.05	51	78.0	0.11	96	10.3
Neglect Roles	5	0.8	0.01	73	33.8	0.05	40	60.5	0.09	126	13.5
Social/Interpersonal	9	1.4	0.01	61	28.1	0.06	52	79.2	0.06	131	14.1
Hazardous Use	22	3.4	0.01	89	40.8	0.05	46	69.5	0.08	165	17.7
Total	652	69.7	0.02	217	23.2	0.01	66	7.1	0.01	936	100.0

[a]Estimated value of *n* since after de imputation of weights/clusters/strata it is not possible to calculate the exact value of *n*.

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Table 4

Logisitic regression models results of sociodemographic correlates within latent classes among individuals who had at least 1 drink/week in the past-year in São Paulo, 2005–2007.

Variable	"Use in larger amounts class"*			"High-moderate symptomatic class"*		
	aOR	95%CI	p	aOR	95%CI	p
Gender						
Female	1.00			1.00		
Male	1.29	0.69–2.40	0.423	1.81	0.65–5.06	0.255
Household income **						
Low	0.99	0.43–2.29	0.995	1.79	0.56–5.66	0.318
Low-average	0.92	0.45–1.85	0.776	1.58	0.56–4.41	0.382
High-average	**0.39**	**0.17–0.87**	**0.028**	0.77	0.20–2.94	0.703
High	1.00			1.00		
Employment status						
Homemaker	1.00			1.00		
Working/student	1.56	0.34–7.13	0.564	2.12	0.34–12.96	0.413
Retired	0.39	0.04–3.67	0.411	1.28	0.04–41.77	0.886
Unemployed/other	1.24	0.25–6.15	0.792	**8.84**	**1.38–56.60**	**0.021**
Education (in years)						
Low (0–4)	2.38	0.93–6.08	0.068	**14.35**	**2.73–75.41**	**0.002**
Low-average (5–8)	2.25	0.97–5.24	0.059	**10.81**	**2.01–58.13**	**0.006**
High-average (9–11)	1.55	0.77–3.10	0.214	**8.51**	**2.24–32.34**	**0.002**
High (>11)	1.00			1.00		
Marital status						
Married/cohabiting	1.00			1.00		
Previously married	**1.99**	**1.17–3.40**	**0.011**	**2.45**	**1.10–5.44**	**0.027**
Never married	**2.26**	**1.19–4.30**	**0.012**	0.74	0.20–2.74	0.654
Age (in years)						
18–34	0.93	0.38–2.29	0.881	1.20	0.20–7.02	0.838
35–54	1.47	0.59–3.69	0.405	0.90	0.17–4.63	0.900
>54	1.00			1.00		

* Non-symptomatic class was the reference category for other latent classes.

** Household income: low = up to 3918 dollars/year; low-average = from 3919 to 7050 dollars/year; high-average = from 7051 to 14,826 dollars/year; high = more than 14,826 dollars/year. Bold values are significant.

Table 5

Prevalence DSM-5 diagnosis per four latent classes of alcohol users who had at least 1 drink/week in the past year in São Paulo, 2005–2007.

Latent class	Sample %(SE)	DSM-5 AUD %(SE)	Mild DSM-5 AUD %(SE)	Moderate DSM-5 AUD %(SE)	Severe DSM-5 AUD %(SE)
"Non-symptomatic class"	69.7 (0.02)	1.1 (0.01)	1.1 (0.01)	0.0 (0.00)	0.0 (0.00)
"Use in larger amounts class"	23.2 (0.01)	92.5 (0.02)	54.8 (0.03)	28.3 (0.03)	9.4 (0.02)
"High-moderate symptomatic class"	7.1 (0.01)	100.0 (0.00)	0.0 (0.01)	3.3 (0.03)	96.7 (0.03)

SE = linearized standard error.