Research paper

Polydrug use among nightclub patrons in a megacity: A latent class analysis

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ABSTRACT

Background: Nightclubs are places with a high prevalence of binge drinking and illicit drug use. The aim of this study was to evaluate the characteristics of polydrug use, including licit and illicit drugs, among 2420 nightclub patrons in a probabilistic sample in the city of São Paulo, Brazil,

Methods: The study was conducted in 2013. A latent class analysis (LCA) of polydrug use, accounting for binge drinking (BD) and other drug use (cannabis, cocaine, ecstasy, tobacco, ketamine, inhalants and hallucinogens) in the past 12 months was performed using Mplus. Multinomial logistic regression was used to evaluate latent class associations with sociodemographic characteristics and variables that characterise type of nightclub and frequency of attendance.

Findings: A three-class LCA model best described polydrug use patterns. We found a "no polydrug use" class (55%), a "moderate polydrug use" class (35%) and a "high level polydrug use" class (10%). Compared to "no polydrug use", patrons in the two "polydrug use classes" were more likely to be men, young adults (<34 years), have attended nightclubs three times or more per month and have attended hip-hop and rock music nightclubs. Patrons in the "high level polydrug use" class were more likely to attend electronic (aOR = 9.9, 95% CI: 5.4–8.1, $p < 0.001$) and hip-hop music nightclubs (aOR = 10.1, 95% CI: 6.2–16.5, $p < 0.001$).

Conclusion: LCA is a useful method to identify groups of polydrug users among nightclub patrons. The three groups identified represented the diversity of patrons of São Paulo nightclubs. Frequency of attendance and the nightclub's musical style were highly correlated with polydrug use.

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Introduction

São Paulo is the most populous city in Brazil and in the Southern hemisphere, with more than 11 million inhabitants (IBGE, 2014). The nightlife of São Paulo is arguably one of its greatest attractions, as observed by tourists and experts worldwide. According to a CNN (Cable News Network) survey, São Paulo offers the 4th best nightlife in the world, receiving a grade of nine out of 10 for working hours, people and experience (Manson, 2014). The night-time economy is lucrative, raising US$ 770 million (R$ 2.4 billions) annually (Muniz, Silva, & Maffezzolli, 2014) for the Brazilian economy.

In "the city that never sleeps", patrons can attend all types of nightclubs, from the regular venue with pop-dance music, to electronic music nightclubs that open at dawn and close the next afternoon. Patrons can choose nightclubs from a diverse range of musical styles, such as funk (high sexual connotation dance and lyrics), "forró" (typical Brazilian ballroom dance), electronic and flashback. Besides music preferences, venues in São Paulo are characterised by the socioeconomic class and sexual orientation of their patrons. This is often related to the neighbourhood where the club is located and the cost of entry (Silva, 2014).

Worldwide, nightclubs are generally places visited by youths and young adults who are seeking entertainment and where the use of alcohol and other drugs act as important mediators (Demant, 2013). According to Calafat et al. (2011), the recreational context of the nightclub is associated with the misuse of alcohol and other drugs, and contributes to increased risk behaviour inside these venues (Duff, 2008). Moreover, patrons of music festivals and dance events have been found to have more experience of illegal drugs use than other groups in the population (Chinet, Stéphan, Zobel, & Halfon, 2007; Winstock, Griffits, & Stewart, 2001).

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In the United Kingdom, a nightlife survey demonstrated that the vast majority of club drug users were polysubstance users, with over 70% also reporting hazardous alcohol consumption (Winstock et al., 2001). One of the major concerns about polydrug use is that the effects of the individual drugs are usually boosted, and harmful physiological effects can accumulate in the body (Quek et al., 2013) and increase the likelihood of physical and physiological damage (Smith, Farrell, Bunting, Houston, & Shevlin, 2011).

In several European countries, music preference and venue choice seem to predict illegal drug use (Calafat, Fernández, Juan, & Becoña, 2008). A Danish study that focused on drug initiation at music festivals, found a higher prevalence of first cannabis and tobacco use among attendees of rock festivals (Hesse, Tutenges, & Schliewe, 2010). The same group of researchers found that patrons who prefered hip-hop or electronic music festivals were more likely to be polydrug users, while patrons who prefered pop music were less likely to have used all illicit drugs (Hesse & Tutenges, 2012).

In Brazil, a population survey has shown that nightclubs are the location of choice for young people to practise binge drinking (Sanchez et al., 2011), however, to date no epidemiological survey has identified patterns of consumption of alcohol and drugs among patrons of these venues. All major studies about the nightlife environment have been conducted in Europe (Bellis et al., 2008), North America (Carlson, Wang, Falck, & Siegal, 2005) and Oceania (McKetin, Chalmers, Sunderland, & Bright, 2014), leaving a large gap in knowledge about this behaviour in less wealthy and more unequal countries.

Diagnosis of the risks is the first step in the development of effective harm reduction policies for a given population, thus it is necessary to understand the São Paulo nightlife scene. In this sense, science can inform policy by identifying which groups are more exposed to risks and should be targeted by nightlife harm reduction initiatives, such as: providing free water; organising a "chill out" area with appropriate ventilation, regulation of temperature, and places to sit; staff training for a responsible drinking service and first-aid support during alcohol and drugs intoxication (Van Havere, Vanderplasschen, Lammertyn, Broekaert, & Bellis, 2011).

The study reported here, called "Balada com Ciência" (www.baladacomciencia.com.br) was designed to evaluate the prevalence of risk behaviours practised by nightclub patrons in the city of São Paulo, with an emphasis on alcohol and illicit drug use. We set out to evaluate how concurrent polydrug use is grouped among nightclub patrons by the use of latent class analysis (LCA) and to explore how these different patterns of drug use are associated with sociodemographic factors, frequency of attendance and the music style of the venue.

Methodology

Recruitment and procedures for obtaining informed consent and protecting the rights of study participants was approved by the Research Ethics Committee of the Federal University of São Paulo (Universidade Federal de São Paulo – UNIFESP) (protocol number 795276).

Sampling

We defined "nightclubs" as establishments that have controlled entry and exit of patrons, sell alcoholic beverages and have a dance floor. A portal survey (Voas et al., 2006), was conducted at nightclubs in São Paulo during the first half of 2013, and data were collected from their patrons. Cluster sampling was performed in two stages; the selection of nightclubs (first stage) consisted of a systematic sample of 40 nightclubs, with a probability of inclusion proportional to their maximum capacity. The patron selection (second stage) was a systematic sample of every third person in the entrance lines of the selected nightclubs (Voas et al., 2006).

The nightclub frame list was created by an active search of magazines, guides which specialised in leisure activities and a search of the first 10 pages from a Google search using the following key words: "São Paulo, Nightclubs and Discos" (in Portuguese). The final sampling list consisted of 150 nightclubs from which 40 nightclubs and potential replacements were drawn. The statistical model used in this study (draw and inferential process for large samples in clusters) requires at least 30 primary sample units to allow a proper performance of the statistical analyses (Levy and Lemeshow, 2008). To guarantee that we would have at least 30 nightclubs participating in the survey, we contacted the original 40 selected nightclubs and 7 replacements, resulting in an acceptance rate of 66% (31/47). The replacements had the same capacity, were located in the same neighbourhood, and were subject to the same probability of selection as the original nightclub sampled. An adjustment factor for non-response was used by weighting the 31 nightclubs in order to make them equivalent to the 40 selected nightclubs. The adjustments were estimated by a logistic regression model with agreement to participate in the study as the dependent variable and establishment size as the explanatory variable. The nightclub (clusters) weights were equal to the inverse selection probability multiplied by the non-response adjustment factor.

A target sample size of 1600 patrons was calculated considering an absolute precision of 5% and a 95% confidence interval (CI), with two-stage cluster sampling and a design effect of two (Lwanga & Lemeshow, 1991). A total of 2912 patrons were initially approached. This was to account for an estimated refusal rate of 30% and a maximum loss to follow-up from entrance to exit of 40% (Clapp et al., 2007).

More details on sample weights and study design are presented in Carlini et al. (2014).

Data collection

Data collection took place between January and July 2013 (from summer to winter, with an average temperature of 20 °C). The research team visited 31 nightclubs, each one on a different night, from time of opening (approximately 10:30 pm) until the club was closed (approximately 7:00 am). To select the day of data collection, we asked the club manager to indicate the most popular day at each of the venues. In most nightclubs, we collected data on Friday and Saturday nights (75%). The remaining (25%) data collection was spread across the other nights of the week.

The nightclubs

Most nightclubs in our sample were open from 11:00 pm to 7:00 am, which is usual for nightclubs in São Paulo, however, three closed between 9:00 am and noon.

We stratified our sample by venue capacity, to guarantee inclusion of small, medium and large nightclubs. These were located across São Paulo's five regions (North, East, South, Centre and West) and this guaranteed socioeconomic diversity.

The study nightclubs were as representative as possible of the diversity of nightclubs in the city, ranging from venues aimed at couples' ballroom dancing to indoor raves or funk festivals in slum areas. Since our intention was to collect data from different kinds of nightclubs (different regions, social classes, capacity, sexual orientations, and music style), we selected similar replacement nightclubs to account for any refusals.

Nightclubs in São Paulo have different musical styles, ranging from those that play a variety of types of music on the same night

to those where a particular style predominates (e.g., electronic, funk, rock, pop-dance, forró, zouk and hip-hop). The impressive variety of nightclubs in the city represents the mixture of cultures, races and sexual preferences. The patronage of each nightclub varies according to the entrance fee (ticket price), that goes from R$ 10,00 (~US$ 3,00) to more than R$ 300,00 (~US$ 100,00) and the type of music played.

Instruments and data collection

Patrons were systematically selected from the entrance lines of the nightclubs. Those who agreed to participate were asked to respond to an entrance and exit questionnaire and to undergo a breathalyser test after each interview (Draguer Alcotest 7410 Plus RS). These patrons received a bracelet with a unique numeric code to identify them at the nightclub exit, allowing entry and exit data to be matched. Data were entered by seven field researchers onto Samsung Galaxy tablets, which were sent to a central database.

Initial interviews at entrance investigated sociodemographic variables, patterns of alcohol and drug use and risk behaviours in nightclubs in the year preceding the survey.

Variables

Explanatory variables included sociodemographic characteristics (gender, age, ethnicity, socioeconomic status [SES], education, occupation and religion); information on the patrons' frequency of attending nightclubs in the last 30 days; and the type of nightclub, classified by the musical style. Each respondent was asked about his or her past year's history of binge drinking (5 doses of alcohol for men and 4 doses for women, in the period of 2 h – a serving dose was defined as a 5-oz glass of wine, a 12-oz can of beer or a 1.5-oz shot of liquor and the equivalence examples) (NIAAA, 2004) and drug use (tobacco, cannabis, cocaine, ecstasy, inhalants, ketamine and hallucinogens). A binary response to each of these drugs ('yes' or 'no') served as the basis for generating the latent classes. Concurrent polydrug use was evaluated over one year, as this interval has the advantage of capturing a larger period of probable experimentation compared to use on the day of the survey, and of maintaining the statistical power to determine the classes (Quek et al., 2013). Polydrug use, i.e., using more than one drug, licit or illicit, is a general term describing a variety of patterns of multiple drug use (Smith et al., 2011). According to Martin (2008), concurrent polydrug use is defined as one person's consumption of more than one drug in a period of up to 12 months.

SES was evaluated using a standardised index known as the "Brazilian Economic Classification" (ABEP, 2012), which is based on the education level of the household head, possession of various types of consumer goods (e.g., television sets) and the number of domestic employees. This scale was used to classify participants into subgroups from "A" to "E" (where A corresponds to the highest economic stratum).

To facilitate interpretation, some low-frequency categories were grouped together (in this case SES classes "C", "D" and "E" were grouped together); age was categorised into three age groups ("18–25", "26–33" and "34 years or older"). For education, "without qualifications", "incomplete primary education" and "complete primary education" were grouped into the same category (up to elementary school), individuals with complete secondary school education were classified as having "secondary school education", and those with an undergraduate degree or completed or on-going postgraduate education were classified as "University/Postgraduate". For marital status, married and common-law marriage were grouped into a single category, and separated and widower into another.

Frequency of nightclub attendance in the past 30 days was categorised by the median of "up to 3 times a month" or "more than 3 times a month." Musical styles were categorised into eclectic (plays several musical styles on the same night), country, funk, electronic, pop-dance, rock, hip-hop and forró, according to the type of music played in the nightclub, and this was recorded by field staff during data collection.

Statistical analysis

Complex latent class models (Hagenaars and McCutcheon, 2002), from one to six classes, were estimated and the fit of one model was compared to the other five, using the MPlus program version 7 (Muthén & Muthén, 2012). Models with an increasing number of classes are specified using an iterative process. Latent class extraction ceases when there is a small gain with the inclusion of an additional class. The adjusted model is evaluated on the basis of goodness of fit statistics and considerations of parsimony. Goodness of fit statistics include: log likelihood (LL), Akaike information criterion (AIC) (Akaike, 1974); Bayesian information criterion (BIC) (Schwartz, 1978); Sample size-adjusted Bayesian information criterion (SSABIC) (Sclove, 1987); Vuong Lo Mendell Rubin test (VLMR) (Lo, Mendell, & Rubin, 2001); and an entropy measure (Ramaswamy, Desarbo, Reibstein, & Robinson, 1993). Entropy is based on a posteriori probability and indicates the accuracy of the classification; values close to one indicate clear classifications and greater precision (Carragher & McWilliams, 2011). In addition to the indices described above, the final evaluation of the model of best fit considered the solution that reflected consistency and conceptually distinct groups.

Once the number of classes had been determined and the patrons grouped into the classes created, a multinomial logistic regression model (Hosmer, Lemeshow, & Sturdivant, 2013) was performed in Stata/SE 13. The logistic regression model was constructed in two blocks – Block 1 with sociodemographic variables and Block 2 with variables relating to frequency and nightclub style.

The results are presented as weighted percentages (wt%), crude odds ratios (cOR), adjusted odds ratios (aOR), 95% CI and p-values.

Findings

A total of 3063 patrons were approached at the 31 nightclubs, resulting in 2422 interviews (79.1% acceptance rate at the time of entrance). There was no significant gender difference between those who consented or did not consent to participate in the interview at nightclub entrance (p = 0.945).

Two interviews had missing data in all of the variables required for the construction of latent classes, so the final sample size was 2420 interviews.

Table 1 presents the sociodemographic characteristics of the nightclub patrons. This shows that most of the patrons were male (60.8%), came from the middle socioeconomic class (53.7%), were white (69.5%), were single (90.3%) and were below the age of 33 (88%).

The latent classes were created from the variables of consumption of licit and illicit drugs in the last year. A total of six latent class models (classes 1–6) were examined (Table 2). The solution with one class exhibited the worst fit with the data when compared to other fits. The 3-class model presented a lower BIC value; however, the lowest SSABIC value was detected in the 4-class model. The LL and AIC values decreased as the number of classes increased. The VLMR test p-value of the two-class model was not significant. The highest entropy value was obtained in the two-class model. Considering the BIC value as the most reliable measure (Nylund, Asparouhov, & Muthén, 2007), the 3-class model

Table 1
Sociodemographic characteristics of nightclub patrons (N = 2420) in the city of São Paulo in 2013.

Variables	N	wt%	95% CI
Sociodemographics			
Gender			
Male	1476	60.8	[48.3; 72.0]
Female	944	39.2	[28.0; 51.7]
Age group (years)			
18–25	1356	62.9	[51.9; 72.6]
26–33	684	24.9	[18.8; 32.1]
≥34	380	12.3	[7.5; 19.5]
Ethnicity			
White	1701	69.5	[63.1; 75.4]
Mixed race	429	19.8	[14.4; 26.6]
Black	184	7.6	[5.6; 10.0]
Others	79	3.1	[2.1; 4.5]
Socioeconomic status			
A	638	25.8	[19.0; 63.8]
B	1361	53.7	[50.5; 56.9]
C/D/E	421	20.5	[14.9; 27.5]
Education			
Up to elementary school	138	7.5	[4.5; 12.3]
Secondary school	1335	59.6	[53.0; 65.8]
University/postgraduate	920	32.9	[24.8; 42.3]
Marital status			
Married/cohabitating	183	6.8	[3.9; 11.7]
Single	2123	90.3	[84.2; 94.2]
Separated/widowed	99	2.9	[1.8; 4.6]
Occupation			
Just working	1211	47.6	[40.6; 54.7]
Working and studying	724	32.3	[28.2; 36.6]
Just studying	314	13.4	[8.8; 19.9]
Neither working nor studying	149	6.7	[5.0; 8.9]
Religion			
None	817	30.5	[25.5; 35.9]
Non-practising	878	39.3	[36.4; 42.4]
Practising	707	30.2	[26.1; 34.6]
Nightclubs			
Monthly frequency			
Up to 3 times	1288	54.2	[47.3; 61.0]
More than 3 times	1127	45.8	[39.0; 52.7]
Music			
Eclectic	536	25.1	[10.8; 48.1]
Country	218	17.0	[3.5; 53.5]
Funk	151	9.5	[2.2; 33.2]
Electronic	663	28.2	[11.3; 54.7]
Pop-dance	261	7.4	[1.8; 26.1]
Rock	240	2.8	[0.7; 10.1]
Hip-hop	164	5.0	[0.8; 24.8]
Forró/zouk	187	5.1	[1.1; 20.8]

was selected as the most parsimonious, as it had acceptable values in the other goodness of fit statistics and interpretability from the point of view of the event.

Table 3 shows the weighted probabilities of Binge drinking (BD) and polydrug use in the previous year for each latent class of the model of best fit (3 latent classes). The classes were called "No polydrug use" corresponding to 55% of the patrons (95% CI = 45.5%; 64.1%), "Moderate polydrug use" (35%, 95% CI = 29.2%; 40.3%) and "high level polydrug use" (10%, 95% CI = 5.3%; 19.6%). Patrons in the "no polydrug use" class had an average likelihood of BD (49.6%), a low probability of smoking (5.4%) and a negligible probability of using other drugs (<5%). Patrons in the "moderate polydrug use" class had high probabilities of BD (92.7%) and smoking (73.5%), a moderate probability of cannabis use (55.0%) and a low probability of use of other drugs (<15%). Patrons in the "high level polydrug use" class had high risk levels for BD, cannabis use and ecstasy use (>80%) and a moderate probability of the use of other drugs (between 40 and 70%). Fig. 1 shows the probability of each of the variables used to construct the latent classes in each class of the adopted model.

Table 4 displays the results of the multinomial logistic regression model (univariate and multivariate) with "no polydrug use" class as the reference category. Compared to those in the "no-polydrug use" class, individuals in the "moderate polydrug use" were more likely to be in the 18–25 and 26–33 year age groups (aOR = 2.5, 95% CI = 1.7–3.6 and aOR = 2.4, 95% CI = 1.5–4.0, respectively), have attended nightclubs more than 3 times a month (aOR = 1.8, 95% CI = 1.5–2.2), along with those who attended rock nightclubs (aOR = 1.9, 95% CI = 1.4–2.8) and hip-hop nightclubs (aOR = 1.9, 95% CI = 1.4–2.7). Those frequenting country music and forró/zouk nightclubs were, 57% and 64%, respectively, less likely to belong to the "moderate polydrug use" class than to the "no polydrug use" class ($p < 0.001$). Those on the "high level polydrug use" class were more likely to be male (aOR = 1.4, 95% CI = 1.0–2.1), have attended nightclubs more than 3 times a month (aOR = 3.5, 95% CI = 2.0–6.2), along with those who attended electronic music nightclubs (aOR = 9.9, 95% CI = 5.4–18.1), rock nightclubs (aOR = 2.3, 95% CI = 1.3–4.0) and hip-hop nightclubs (aOR = 10.1, 95% CI = 6.2–16.5). However, those frequenting country music and forró/zouk nightclubs were, 94% and 75%, respectively, less likely to belong to the "high level polydrug use" class than the "no-polydrug use" class ($p < 0.001$ and $p = 0.013$, respectively).

Discussion

LCA was used to classify nightclub patrons of the city of São Paulo according to their drug consumption patterns over the preceding year. A 3-class model ("no polydrug use", "moderate polydrug use" and "high level polydrug use") provided the best explanation of polydrug use patterns. "Moderate" or "high level polydrug use" were found in approximately half of the patrons.

Other studies have used LCA to evaluate drug consumption patterns in specific populations and usually their best model was also a 3-class model, both in a sample of ecstasy users in Ohio, USA (Carlson et al., 2005) and among nightclub drug users in New York (Ramo, Grov, Delucchi, Kelly, & Parsons, 2010).

Table 2
Goodness of fit statistics according to the number of latent classes for polydrug use in the preceding year among nightclub patrons (N = 2420) in the city of São Paulo, 2013.

Polydrug use						
Model	Goodness of fit statistics					
	LL	AIC	BIC	SSABIC	p-Vuong	Entropy
1 class	−8187.570	16,391.14	16,437.47	16,412.05	N.A.	N.A.
2 classes	−7104.308	14,242.62	14,341.07	14,287.06	0.202	0.827
3 classes	−6919.892	13,891.78	14,042.36	13,959.76	0.136	0.695
4 classes	−6885.635	13,841.27	14,043.97	13,932.77	0.429	0.677
5 classes	−6867.901	13,823.80	14,078.63	13,938.83	0.538	0.674
6 classes	−6852.533	13,811.06	14,118.02	13,949.62	0.575	0.709

Note: Goodness of fit statistics represent: LL, log likelihood; AIC, Akaike information criterion; BIC, Bayesian information criterion; SSABIC, Sample size adjusted Bayesian information criterion; p-Vuong, p-value associated with Vuong Lo Mendell Rubin test (VLMR).

Table 3
Conditional prevalence rates of *binge drinking* (BD) and polydrug use in the previous year for each latent class among nightclub patrons in the city of São Paulo in the year 2013 (*N* = 2420).

Criteria[a]	Latent classes											
	No polydrug use (*N* = 1253)			Moderate polydrug use (*N* = 925)			High level polydrug use (*N* = 242)			Total (*N* = 2420)		
	N	wt%	95% CI	*N*	wt%	95% CI	*N*	wt%	95% CI	*N*	wt%	95% CI
BD	606	49.6	[45.0; 54.3]	847	92.7	[90.5; 94.5]	189	80.3	[76.2; 83.8]	1642	67.8	[63.4; 71.9]
Cannabis	42	2.4	[1.1; 5.0]	523	55.0	[45.6; 64.1]	205	86.1	[81.5; 89.7]	770	29.3	[20.6; 39.9]
Cocaine	2	0.1	[0.0; 0.7]	72	6.0	[4.0; 9.2]	121	57.2	[40.3; 72.6]	195	8.2	[4.2; 15.3]
Ecstasy	21	2.2	[0.8; 5.6]	57	7.8	[4.7; 12.5]	213	87.4	[82.4; 91.1]	291	13.0	[7.0; 23.0]
Tobacco	74	5.4	[4.2; 7.0]	683	73.5	[68.4; 78.0]	160	67.0	[60.3; 73.1]	917	35.5	[29.9; 41.5]
Inhalant	0	0.0	–	126	14.7	[9.4; 22.2]	152	63.6	[56.4; 70.2]	278	11.7	[7.1; 18.8]
Ketamine	1	0.1	[0.0; 0.3]	0	0.0	–	79	43.0	[17.7; 72.6]	80	4.5	[1.3; 15.0]
Hallucinogens	0	0.0	–	105	9.5	[6.0; 14.7]	139	53.3	[43.0; 63.2]	244	8.9	[5.2; 14.8]

[a] Consumption in previous 12 months, BD – binge drinking.

However, LCA has also been used to identify polydrug use profiles in general population samples. Smith et al. (2011) described polydrug use patterns over a year for nine illicit substances among adults living in private households in Great Britain and the 3-class model best explained illicit drug use patterns for this population.

It is noteworthy that our study differs from the others because it evaluates polydrug use among nightclub patrons, i.e., a population of young adults frequenting nightclubs and thus at greater risk of exposure to any drug consumption, as the misuse of alcohol and other drugs is directly related to the recreational context of nightclubs (Calafat et al., 2011).

Although the present study addresses a probabilistic sample of nightclub patrons in the city of São Paulo (including drug users and non-users), the "no polydrug use" class showed 50% of nightclub patrons engaged in BD in the past-year. Therefore, we recruited a different population from that presented by Smith et al. (2011).

In the present study, there were differences between the two classes characterised by polydrug use in their associations with the evaluated factors. Being under 34 years of age was associated with a higher probability of belonging to the "moderate" compared to the "no" polydrug use class. Those who frequented nightclubs with rock and hip-hop music more than three times a month showed an increased chance of belonging to both the "moderate" and the "high level" polydrug use classes. In contrast, those who attended nightclubs with country music or forró/zouk were less likely to belong to the "moderate" and "high level" polydrug use classes. Those frequenting nightclubs with electronic music were more

likely to belong to the "high level" rather than the "no" polydrug use class.

Characteristics associated with the "high level polydrug use" class compared to the "no polydrug use" class support the findings of Ramo et al. (2010), Smith et al. (2011), Carter et al. (2013) and Quek et al. (2013) in terms of the association with male gender. However, our study, like Carlson et al. (2005), did not find a gender association for the "moderate" polydrug use class. Analysis of these findings suggests that gender differences in polydrug use can vary according to both the type of drug examined and the population under study. However, our study points to the fact that men are more exposed to "high level" polydrug use.

With regard to age, our study revealed an association only with the "moderate" class compared to the "no" polydrug use class. This was also observed by Smith et al. (2011), who found that as age increased the chances of belonging to the polydrug use class decreased. This suggests that older age groups are more protected against polydrug use.

The findings of our study suggest that choice of nightclub type and frequency of attendance were more important to an association with polydrug use than the effects of any variables relating to sociodemographic profile. These findings concur with Calafat, Gomez, Juan, and Becona (2007), who showed that variables relating to recreational lifestyle were better predictors of establishing drug consumption patterns than the sociodemographic variables of students in 9 European cities: the higher the frequency of night recreational events, the greater the variety of drug consumption. This relationship may suggest that the longer
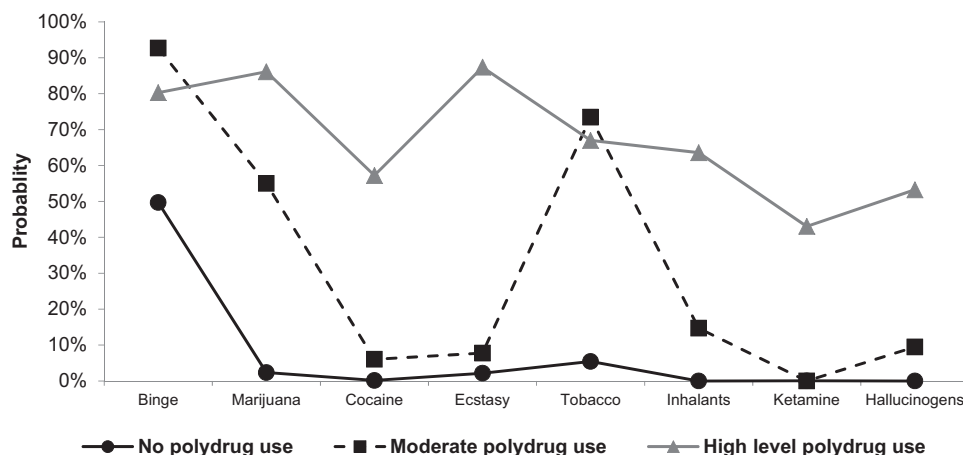

Fig. 1. Weighted probability of polydrug use in the past 12 months given the latent class among nightclub patrons (*N* = 2420) in the city of São Paulo, 2013.

Table 4
Characteristics of past-year polydrug use classes identified through LCA in a sample of the nightclub population (N = 2420); São Paulo, 2013.

	Polydrug use			Univariate analysis						Multivariate analysis					
	No	Moderate	High level	Moderate polydrug use vs. no polydrug use			High level polydrug use vs. no polydrug use			Moderate polydrug use vs. no polydrug use			High level polydrug use vs. no polydrug use		
	wt%	wt%	wt%	cOR	95% CI	p	cOR	95% CI	p	aOR	95% CI	p	aOR	95% CI	p
Block 1															
Gender						0.013			0.001			0.114			0.046
Female	45.0	35.4	21.6	1.00			1.00			1.00			1.00		
Male	55.0	64.6	78.5	1.49	1.09–2.05		2.97	1.54–5.74		1.26	0.95–1.68		1.44	1.01–2.06	
Age (years)						<0.001			0.882						
18–25	60.7	68.5	55.3	2.41	1.69–3.43		1.20	0.50–2.92		2.50	1.75–3.57	<0.001	1.00	0.64–1.55	0.989
26–33	23.7	24.2	33.0	2.18	1.46–3.25		1.84	0.91–3.71		2.42	1.46–4.00	0.001	1.38	0.78–2.46	0.271
≥34	15.6	7.3	11.7	1.00			1.00			1.00			1.00		
Ethnicity						0.305			0.924						
White	67.9	72.5	68.8	1.00			1.00								
Mixed race	21.3	17.7	18.8	0.78	0.47–1.27		0.87	0.45–1.68							
Black	7.8	6.5	9.4	0.78	0.52–1.18		1.18	0.66–2.13							
Others	3.0	3.3	3.0	1.04	0.60–1.80		0.99	0.48–2.02							
Education						0.988			0.726						
Up to elementary school	7.8	7.5	5.9	0.97	0.53–1.75		0.73	0.26–2.03							
Secondary school	59.2	60.0	60.1	1.03	0.66–1.60		0.98	0.57–1.69							
Undergraduate/postgraduate	33.0	32.5	34.0	1.00			1.00								
Marital status						0.812			0.843						
Married/cohabiting	7.6	5.7	6.6	1.00			1.00								
Single	88.7	92.3	91.3	1.39	0.95–2.03		1.18	0.51–2.73							
Separated/widowed	3.7	2.0	2.1	0.73	0.45–1.16		0.65	0.16–2.58							
Occupation						0.006			0.634						
Just working	49.7	43.5	49.9	1.00			1.00								
Working and studying	32.4	32.5	30.7	1.15	0.85–1.55		0.95	0.66–1.36							
Just studying	11.9	16.4	11.3	1.57	1.00–2.46		0.94	0.41–2.15							
Neither working nor studying	6.0	7.6	8.1	1.47	0.96–2.26		1.36	0.80–2.31							
Economic status						0.179			0.828						
A	24.6	27.0	28.1	1.44	0.90–2.30		1.07	0.49–2.36							
B	53.3	56.1	48.4	1.38	1.01–1.89		0.86	0.54–1.36							
C/D/E	22.1	16.9	23.5	1.00			1.00								
Religion						0.023			0.079						
Practising	34.2	25.7	24.3	1.00			1.00								
Non-practising	40.2	36.3	44.2	1.20	0.88–1.65		1.54	0.83–2.86							
None	25.6	38.0	31.5	1.98	1.08–3.61		1.73	0.95–3.16							
Block 2															
Attendance frequency						<0.001			<0.001			<0.001			<0.001
Up to 3×/mth	63.0	47.7	30.1	1.00			1.00			1.00			1.00		
More than 3×/mth	37.0	52.3	69.9	1.87	1.44–2.43		1.79	1.47–2.18		1.79	1.47–2.18		3.50	1.96–6.25	
Music type						0.676			0.089						
Eclectic	25.9	29.3	7.8	1.00			1.00			1.00			1.00		
Country	24.2	10.5	0.4	0.39	0.27–0.56		0.06	0.01–0.60		0.43	0.30–0.61	<0.001	0.06	0.01–0.57	0.015
Funk	9.1	10.1	9.1	0.98	0.58–1.64		3.29	0.83–13.04		0.76	0.39–1.48	0.422	2.65	0.60–11.77	0.201
Electronic	19.3	29.6	70.0	1.36	0.90–2.06		12.12	6.80–21.60		1.31	0.89–1.94	0.171	9.86	5.36–18.12	<0.001
Pop-dance	9.2	6.6	0.5	0.64	0.38–1.05		0.18	0.02–1.78		0.96	0.62–1.48	0.855	0.17	0.02–1.58	0.120
Rock	2.1	4.1	1.5	1.70	1.09–2.64		2.35	1.26–4.37		1.94	1.36–2.77	<0.001	2.29	1.30–4.04	0.004
Hip-hop	2.9	6.9	10.0	2.10	1.52–2.89		11.51	7.36–17.99		1.93	1.38–2.70	<0.001	10.13	6.23–16.45	<0.001
Forró/zouk	7.3	2.9	0.7	0.35	0.26–0.47		0.34	0.11–1.09		0.36	0.26–0.50	<0.001	0.25	0.08–0.75	0.013

cOR, crude odds ratio; aOR, adjusted odds ratio.

the subject is exposed to the nightclub environment, the more chance he/she has of consuming different drugs because there is often free access to different types of drugs in these establishments.

It is important to note that São Paulo nightclubs are generally characterised by the style of music played in the establishment, and the patrons' profile differs according to the musical style of the nightclub. Thus, as expected, the present study revealed an association between music and different consumption profiles: those frequenting nightclubs that played electronic and hip-hop music were more likely to belong to polydrug use classes.

In studies conducted elsewhere, for example in Belgium, it appears that the nightclubs at highest risk of polydrug use amongst patrons are not electronic and hip-hop but pop-dance nightclubs (Van Havere et al., 2011). The great difficulty in such cultural comparisons, however, is the fact that the musical styles found in each country's nightclubs are different, which limits a valid comparison. In addition, some studies have attempted to define the profile of drugs consumed by musical style and have evaluated consumption individually without emphasis on polydrug use (Moore & Miles, 2004).

It is also important to note that public policy in each country can facilitate or impede harm reduction interventions among nightclub patrons. Public policy control on drinking and driving can reduce this behaviour while a responsible drinking service can reduce alcohol intoxication (Babor et al., 2010). As a high prevalence of binge drinking was found in the three LCA groups in our study, free water, warnings alerting patrons to the risks of drinking and driving and the implementation of public policy to control alcohol sales to those who are intoxicated, could be implemented in all São Paulo nightclubs to improve patrons' health and safety.

The main limitation of this study lies in the fact that it used polydrug use frequency in the last 12 months, to increase the number of cases; therefore, this information may be limited by the possible memory bias of patrons, who may have underestimated their consumption. Another limitation is the acceptance rate among the sampled nightclubs (66%), which may have compromised the inclusion of certain types of club. Despite these limitations, the study has several strengths. It is the first epidemiological study of a probabilistic sample of nightclub patrons in a developing country and that uses LCA to identify polydrug use profiles. The participation rate of patrons at the nightclubs' entrances (80%) in one of the largest cities in the world, and the largest city in the Southern hemisphere, is another strong point.

Conclusion

Our study shows that individual level factors and nightclub music style can be associated with different patterns of polydrug use among patrons in São Paulo. Illicit drug users are not equally distributed among the venues, since polydrug users are more likely to be found in a certain type of nightclub, such as electronic, hip-hop, pop-dance and rock. However, binge drinking is a highly prevalent behaviour among the three identified groups and alcohol harm reduction is an important need in São Paulo nightclubs. Free water, food sales, a responsible drinking service and minimum pricing would be possible harm reduction interventions for all three groups, while the installation of chill out areas and advice on intoxication for polydrug users would be most important in electronic and hip-hop venues.

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Contributors

Sanudo was responsible for data analysis and the writing of the first version of the manuscript. Andreoni was responsible for sampling, dataset weighting, data analysis supervision and the revision of the manuscript. Sanchez designed the study, wrote the grant protocol and corrected the manuscript to create the final version. All authors have read and approved the final version of the manuscript and have revised it critically for important intellectual content.

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Conflict of interest
The authors declare that there are no conflicts of interest.

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