

Article

Personality and Alcohol Expectancies Discriminate Alcohol Consumption Patterns in Female College Students

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Abstract

Aims: To characterize patterns of alcohol use in a sample of Argentinean female college students according to personality traits and alcohol expectancies.

Methods: Data from 298 female college students (*M* age = 18.27 years; *SD* = 1.37 years) from the city of Córdoba, Argentina were analysed using multinomial regression.

Results: Three drinking categories were identified, abstainers, moderate drinkers and regular drinkers with heavy episodic drinking, and these were differentiated by three personality traits [extraversion, disinhibition (DIS) and experience seeking (ES)] and three alcohol expectancies dimensions (sociability, risk/aggression and negative mood). Regular drinkers with heavy episodic drinking and moderate drinkers had, compared to abstainers, higher scores in extroversion and alcohol expectancies for social facilitation, and lower scores in alcohol expectancies for risk and aggression. Regular drinkers with heavy episodic drinking exhibited, compared to moderate drinkers, higher scores in ES, DIS, extroversion, alcohol expectancies for social facilitation and negative mood alcohol expectancies; as well as lower scores in risk and aggression alcohol expectancies.

Conclusion: College women in Argentina with problematic alcohol drinking can be distinguished from those drinking moderately.

INTRODUCTION

Approximately 45% of college students in United States exhibit, according to nation-wide studies, excessive and hazardous alcohol consumption (Hingson *et al.*, 2009). This represents a central issue in public health due to its association to a wide range of negative consequences (i.e. unsafe and unplanned sex, poor academic performance and memory blackouts), including alcohol dependence (Hingson *et al.*, 2009; Masten *et al.*, 2009). Nation-wide epidemiological studies assessing prevalence of alcohol drinking are scarce in Argentina. Recent studies with non-representative samples, however, suggest an important prevalence of frequent and heavy alcohol drinking among adolescents (Pilatti *et al.*, 2013) and college Argentinean students

(Garimaldi *et al.*, 2013; Pilatti *et al.*, 2014a,b). Specifically, 85 and 56% of college students reported last month and last week alcohol drinking, respectively; and 40–45% reported heavy episodic drinking (Garimaldi *et al.*, 2013; Pilatti *et al.*, 2014b). Heavy alcohol use seems pervasive among Argentinean teens: more than 35% of high school adolescents reported to drink five or more alcohol units per drinking occasion (Pilatti *et al.*, 2013). These results highlight the importance of addressing alcohol drinking in late adolescence and youth in Argentina (SEDRONAR, 2006). College students generally belong to the age group of 18–25 years—a group that exhibits the highest prevalence of alcohol consumption and alcohol-related disorders—, and

therefore they are at risk of engaging in problematic alcohol consumption (Windle and Zucker, 2010).

Women college students who drink alcohol are at higher risk for developing alcohol-related problems than their men counterparts (Perkins, 2002; Fernandez-Sola, 2007). Women, compared to men, exhibit lower alcohol dehydrogenase activity (the enzyme responsible for the breakdown of alcohol into its first metabolite, acetaldehyde; Seitz *et al.*, 1993) and lower body weight percentage of water. This results in an increased rate of absorption of alcohol and greater production of hepatotoxic residuals, which in turn generate tissue damage (Fernandez-Sola, 2007). Moreover, even mild-to-moderate doses of alcohol have negative consequences in the women's reproductive system (e.g. alterations in the menstrual cycle; Emanuele *et al.*, 2002).

Evidence suggests that men and women also differ on their risky behavior while intoxicated with ethanol. Pilatti *et al.* (2014a) found that men, compared to women, were more likely to experience negative consequences such as 'taking foolish risks', 'spending too much time drinking' and 'driving a car' while under the effects of alcohol. Women, instead, were more likely than men to report experiencing negative consequences like 'having less energy or feeling tired', 'being overweight because of drinking' and 'doing impulsive things'. Notably, women with heavy alcohol consumption, but not those who were moderate drinkers, exhibit increased impulsivity after an acute dose of alcohol (Reed *et al.*, 2012). Another example of sex differences in alcohol-related behaviors is that women, but not men, reported more unprotected sex with a regular partner after heavy alcohol use (Scott-Sheldon *et al.*, 2010). Women usually display lower frequency and quantity of alcohol drinking than men (O'Malley and Johnston, 2002; Slutske, 2005; NIAAA, 2013). It is noteworthy, however, that several studies, conducted mostly in United States, indicated that the gap in alcohol consumption between men and women is shortening (Young *et al.*, 2005; Cranford *et al.*, 2006; Balodis *et al.*, 2009; Grucza *et al.*, 2009; Keyes *et al.*, 2011). Evidence also suggests that both women and men exhibit similar drinking trajectories (Patrick and Schulenberg, 2011) and similar prevalence of alcohol-related consequences (Pilatti *et al.*, 2014a).

Personality traits and alcohol expectancies have been identified as risk factors for alcohol use and abuse, and this variables can be targeted in interventions aimed at reducing alcohol drinking. Individual differences in disinhibition (DIS) are associated to different patterns of alcohol consumption. Higher impulsivity (Fu *et al.*, 2007; Cyders *et al.*, 2010; Cyders, 2011), higher extraversion (Fischer *et al.*, 2003; McAdams and Donnellan, 2009) and lower level of conscientiousness (Kuntsche *et al.*, 2008; McAdams and Donnellan, 2009) are related to greater alcohol consumption. Personality studies showed that women are more likely than men to exhibit higher scores in neuroticism (which include impulsiveness) (Costa *et al.*, 2001; McCrae and Terracciano, 2005; Cupani *et al.*, 2014) and men are more likely than women to score higher in sensation seeking (Cyders, 2011; Cupani *et al.*, 2014).

Alcohol expectancies, defined as the beliefs about the effects that drinking alcohol has on behavior, mood and emotions (Goldman *et al.*, 1991; Leigh, 1999), are also associated with alcohol drinking. Positive alcohol expectancies, the anticipation of positive effects of alcohol, are related to the initiation, maintenance and escalation of drinking (Read *et al.*, 2004; Fu *et al.*, 2007), whereas negative alcohol expectancies are related to lower levels of alcohol drinking (Oei and Lee Jardin, 2007; Tush and Wiers, 2007; Urbán *et al.*, 2008). From this perspective, alcohol intake will be increased among those who expect to obtain positive effects (e.g. facilitation of social interactions or tension reduction), and will be reduced among those who anticipate negative effects (e.g. cognitive or motor impairment, aggression or

depression). It has been observed that women and men hold different alcohol expectancies (Labbe and Maisto, 2011). Women anticipate more alcohol expectancies for social facilitation while men expect sexual arousal from alcohol drinking (Pilatti *et al.*, 2010). This information is key to design appropriate, gender-sensitive interventions to challenge alcohol expectancies, and indicates the need for further scrutiny of alcohol expectancies in women of different cultures and backgrounds.

In summary, heavy alcohol drinking is highly prevalent among Argentinian college students and this pattern of alcohol use is associated with broader health-related risks. Physiological and behavioral responses to alcohol show differences as a function of gender and, as a consequence women—particularly those exhibiting heavy alcohol use—could be at higher risk of developing alcohol use disorders and engaging in other risky behaviors. Personality traits and alcohol expectancies, both important mediators of vulnerability or resilience to alcohol use, are also sex-dependent. All together, these results indicate that, to improve the efficiency of interventions targeting heavy alcohol use in college women, we should first consider their particular cognitive-behavioral and personality profile.

A better understanding of which factors are associated to different patterns of alcohol drinking among college women should help develop interventions tailored to the different needs of each groups. Alcohol-related research focused on women is, however, still scarce. It is important, therefore, to identify which groups of women are at higher risk for developing patterns of alcohol abuse and which groups are more likely to abstain from alcohol or to maintain social patterns of alcohol drinking.

The great majority of studies assessing the association between personality/cognitive (i.e. alcohol expectancies) factors and alcohol use in college students has been conducted with US samples. (e.g. Read *et al.*, 2004; McAdams and Donnellan, 2009; Corbin *et al.*, 2011). The importance of progressing in the study of psychological variables in more diverse cultural groups has been recently highlighted (Henrich *et al.*, 2010). Indeed, US populations have been the subjects in a vast majority of studies on the effects of personality and expectancies on alcohol consumption. It is yet unknown if the facilitatory effect of factors like extroversion, inhibition or positive alcohol expectancies on alcohol intake generalizes to the alcohol drinking pattern of persons from different national contexts. Moreover, women have been a group traditionally neglected in alcohol research, and it has been suggested that researchers should try to provide more information on sex effects across epidemiological, clinical and even pre-clinical alcohol research (Clayton and Collins 2014).

To our knowledge, no previous Argentinian study addressed the link between personality traits and alcohol expectancies in a sample of college student women. The current study used multinomial regression analysis to determine personality and alcohol expectancies that differentiate between groups of women with different drinking patterns. We first identified patterns of alcohol use in first year-college women via latent class analysis (LCA). Multinomial regression was subsequently performed to assess prediction of membership in each of the resulting drinking classes obtained through LCA on the basis of personality traits and alcohol expectancies dimensions.

Specifically, the multinomial regression analysis assessed the utility of each personality and alcohol expectancy dimension in the prediction of each alcohol drinking pattern. The main aim was to find the best predictors of membership to the different drinking patterns. All the predictors (i.e. personality traits, alcohol expectancies) were simultaneously evaluated. Our hypotheses were that groups exhibiting higher alcohol consumption would show greater DIS and extroversion

and more positive expectancies about the effects of alcohol, than groups exhibiting relatively low alcohol consumption.

METHOD

Participants

The sample was composed of 298 female first year-college students (M age = 18.27 years; $DT = 1.37$), who were enrolled in different courses at the Psychology Department of the National University of Cordoba (Argentina). Courses were selected based on accessibility. The confidentiality of the participants and the voluntary nature of participation were emphasized.

Measures

Alcohol use

Alcohol use was defined as drinking one glass or more of any alcoholic beverage. Participants were asked about last 3 months, last month and last 2 weeks alcohol use. Three other questions assessed (a) the type of alcoholic beverage usually consumed (i.e. beer, wine, vermouth, *fernet*, vodka/rum and cider), (b) frequency (I do not drink alcohol, 1–4 times per year, 5–10 times per year, once a month, 2–3 times per month, once a week, 2–3 times per week) and (c) quantity (1–2 glasses, 3–4 glasses, 5–6 glasses, 7–8 glasses, 9–11 glasses, 12 or more glasses) of usual drinking during the past year. *Fernet* is a type of Italian amaro that contains up to 43% alcohol by volume and is very popular among drinkers in Argentina. One question inquired about lifetime occurrence of drunkenness episodes. For the LCA, frequency answers were recoded as follows: no drinking = 0, drinking up to once a month = 1, drinking twice a month or more = 2. Answers to questions 1 and 3 served to calculate grams of alcohol consumed per drinking occasion. One standard drink was defined as containing 12.5 g of alcohol (Dawson, 2003). For LCA, the number of drinks consumed per drinking occasion was recoded as follows: none = 0, between 1 to 3.99 drinks = 1, four or more drinks = 2. For LCA, participants who reported at least one drunkenness episode in their lifetime were coded as 1 and the others were coded as 0. The rationale for the recoding was to reduce inter-individual variability and, hence, allow the creation of groups that differed the most among them, yet exhibited significant internal similarity. Moreover, the recoding helped capture a sub-group of women exhibiting risky drinking, defined as heavy episodic drinking (i.e., four or more drinks) and drunkenness episodes.

Big five questionnaire for children (BFQ-C)

The Spanish version of the BFC-Q (Barbaranelli *et al.*, 2003), adapted to the local population (Cupani and Ruarte, 2008), was used to measure the five personality factors: extraversion, agreeableness, conscientiousness, neuroticism and openness/intellect. The BFC-Q is composed by 65 items, 13 items for each personality factor, which are answered using a 5-point scale (ranging from 1 to 5). Subjects are asked to indicate the occurrence of each behavior. Greater scores are thought to reflect greater levels of that specific personality trait. The original (Barbaranelli *et al.*, 2003) and the adapted (Cupani and Ruarte, 2008) version exhibit adequate reliability and validity. In the present study, all the scales showed acceptable internal consistency [$\alpha = 0.70$ (extraversion), $\alpha = 0.73$ (agreeableness), $\alpha = 0.73$ (conscientiousness), $\alpha = 0.78$ (neuroticism), $\alpha = 0.71$ (openness/intellect)]. The justification for using a children questionnaire on freshman college students is that the instrument has been adapted in Argentinian adolescents aged 15 years (Cupani and Ruarte, 2008) and subsequently used to measure personality traits in late adolescence (Pilatti *et al.*, 2013).

Alcohol Expectancy Scale for Argentinean Adolescents (AES-AA; Pilatti *et al.*, 2010). This 45-items scale was used to assess positive (i.e. sociability, relaxation and sexuality) and negative (i.e. risk and aggression, negative mood and cognitive and behavioral impairment) alcohol expectancies. Participants were asked to respond on a 5-point Likert type scale (from 1 to 5) how frequently they expected a given outcome of alcohol drinking. Greater scores are thought to reflect greater expectancies for that specific dimension. The scale exhibits adequate reliability indices ($\alpha = 0.77$ to 0.89; Pilatti *et al.*, 2010). In the present study all the scales showed adequate reliability [$\alpha = 0.73$ (relaxation), 0.93 (sociability), 0.84 (sexuality), 0.85 (impairment), 0.91 (risk and aggression), 0.88 (negative mood)].

Sensation seeking scale-form V (Zuckerman *et al.*, 1978)

The Spanish version of the Sensation Seeking Scale-Form V (SSS-V; Schmidt *et al.*, 2004) was used. This adapted version has 24 forced-choice items measuring four subscales: thrill and adventure seeking (TAS: which expresses a desire to engage in sports or other physical activities involving speed or danger), experience seeking (ES: which measures the pursuing of experience through the mind and senses, the liking for traveling and a nonconformist life-style), disinhibition (DIS: measures the tendency to look for social and sexual disinhibited situations, expressed by social drinking, partying and diversity in sexual partners), risk and novelty seeking (RNS: measures the preference for a variety of activities that are unplanned, exciting, unpredictable and novel). Reliability alpha coefficients for the Spanish adaptation range between 0.60 and 0.80 (Schmidt *et al.*, 2004), which is fairly similar to the reliability indices reported with English-speaking samples (Zuckerman, 2007). In the present study one scale showed acceptable values of internal consistency [TAS ($\alpha = 0.71$)], and three scales showed low reliability values [ES ($\alpha = 0.68$), DIS ($\alpha = 0.42$), RNS ($\alpha = 0.58$)]. Taking this into account, the reliability of the factorial scores (Mislevy and Bock, 1990) was calculated using the software Factor 9.3. This analysis yielded reliability values between 0.73 and 0.86. We decided to use the factorial scores (TAS = 0.73, ES = 0.86, DIS = 0.73 and RNS = 0.81) for the regression analyses.

Procedure

Data gathering took place during the regular term. The survey was taken collectively during the course of a regular school day. The researcher and four trained senior Psychology students explained the aim of the study and provided detailed instructions on how to complete the survey. The confidentiality of the participants and the voluntary nature of the participation were emphasized. Researchers answered any question regarding test completion and stayed through the course of the evaluation session until all participants had completed the survey. They also periodically asked the participants if they had any questions. Verbal informed consent was obtained before scale administration. Participants did not receive monetary compensation or credits for their participation. They were assured about confidentiality of data handling. No identifiable information was collected. Survey administration took ~40 min. All study procedures were approved by the University Internal Review Board.

DATA ANALYSIS

Latent class analysis

Latent class analysis was applied to examine the structure underlying three co-occurring drinking behaviors: usual frequency of alcohol consumption, number of standard drinks consumed per drinking occasion and lifetime occurrence of drunkenness episodes. LCA, which

was conducted using Latent Gold 4.0 software, is a statistical technique that has been used to identify classes of drinkers based on their similarities on a combining set of drinking behaviors (Percy and Iwaniec, 2007; Reboussin *et al.*, 2008; Pilatti *et al.*, 2013). The selection of the number of latent classes that best described the data was determined using Bayesian Information Criteria (BIC) and Akaike Information Criteria (AIC). BIC and AIC are descriptive fit indices, in which smaller values indicate better model fit. Additionally, each model was assessed for its interpretability to determine whether the classes actually represented different categories (Muthén, 2006). The LCA model yields two types of estimated parameters: (a) class membership probabilities, reflecting the relative size or prevalence of each class, and (b) class-specific endorsement probabilities, reflecting the likelihood of endorsement of a given indicator for individuals in a particular class (Uebersax, 1994). Different solutions were explored, beginning with the most parsimonious model (one class) and increasing the number of latent classes by one to determine the model that featured the best data fit.

Multinomial regression

The multinomial regression was performed using SPSS 20.0. The aim was to assess prediction of membership in one of the three outcome categories on the basis of the five personality traits (extraversion, agreeableness, conscientiousness, neuroticism and openness/intellect), the six alcohol expectancies dimensions [three positive (sociability, relaxation and sexuality) and three negative (risk and aggression, negative mood and cognitive and behavioral impairment)] and the four sensation seeking subscales (TAS, ES, DIS and RNS). Multinomial logistic regression compares multiple groups through binary logistic regressions and does not make any assumptions of normality, linearity and homogeneity of variance for the independent variables (Tabachnick and Fidell, 2011). A stepwise procedure, in which the final model is assembled one-step at the time, was used. The odds ratios (ORs) and 95% confidence intervals (CI) were estimated.

RESULTS

Descriptive statistics

The majority of the students had consumed alcohol in the last 3 months (88.9%, $n = 265$) and in the last month (80.2%, $n = 239$). Around 60% of the students reported to drink alcohol in the last 2 weeks (59.7%, $n = 178$). More than half of the sample (56.4%) reported to drink between 1.00 to 3.99 units of alcohol per drinking session, while close to 38% indicated to drink four or more units of alcohol. The majority of the young women of the sample (67.9%) reported to drink alcohol between 2–3 per month (29.4%) and one or more times per week (38.5%). Only 6.4 indicated none alcohol use and the rest of the women reported drinking alcohol between once per month (8.8%) and sometimes per year (16.9%).

Latent class analysis

Table 1 presents goodness-of-fit indices for the different LCA models. A three-class LCA solution provided the most parsimonious and stable model, based on AIC, BIC and AIC3 values, and fulfilled the assumption of local independence (Magidson and Vermunt, 2002). All of the drinking indicators were useful in distinguishing the drinking classes of the model (all $P < 0.001$). The R^2 associated with each indicator was 0.68, 0.56 and 0.71, for frequency of alcohol drinking, quantity of alcohol drinking and drunkenness episodes, respectively.

Class 1 comprised 52.3% of the sample ($n = 156$). Women in this class showed a high probability (97%) of drinking alcohol 2–3 times per month or more. Sixty-five percent of these women had an estimated probability of drinking ≥ 4.00 units in one drinking setting, and most of the women in this class (89%) had an estimated probability of lifetime drunkenness episode. This class was denominated *regular drinkers with heavy episodic drinking*. Class 2 comprised 41.3% ($n = 123$) of the sample. Women in this class were characterized by a high probability of drinking between one and 3.99 units per drinking occasion (93%) and had an estimated probability of drinking alcohol up to once a month (60%) and non-drunkenness episodes (95%). This group was named *moderate drinkers*. Class 3 was comprised by the remaining 6.4% ($n = 19$) of the sample. Women in this class had an estimated probability of no drinking alcohol (from 97 to 99%). This class was named *abstainers*.

For each person, the Latent Gold software estimated what drinking class the person belonged to (i.e. what type of drinker the woman was). Therefore, for each case, the program estimated the probability that the person belonged to the first, second or third drinking class. It was found that the probability of belonging to the assigned class was 91% or higher for all cases. This high probability means that it is very likely that the person belonged to the assigned class. The obtained model was also evaluated based on the classification error, which indicates how well the cases (i.e. women) were assigned to a specific drinking class. The closer the classification error is to zero the better the classification of each case on each latent class. As shown in Table 1, the classification error associated to the selected model of three latent classes was small.

Multinomial regression analysis

A multinomial regression analysis identified personality and alcohol expectancies profiles among the three LCA classes (regular drinkers with heavy episodic drinking, moderate drinkers and abstainers). Missing data for item nonresponse ranged from 0.3% (alcohol expectancies for relaxation) to 5.7% (negative mood alcohol expectancies). A Little's MCAR test (Chi-Square = 423,677, $df = 411$, $P = 0.322$) indicated that missing data were completely at random. Multiple imputations were used to create five complete data sets. There were no significant differences between these imputed bases and, therefore, we decided to report the results obtained with a single, randomly chosen, dataset.

Table 1. Goodness of fit indices for the different models

	LL	BIC (LL)	AIC (LL)	AIC3(LL)	N par	Classification error
1-Class	–700.739	1429.963	1411.477	1416.477	5	0
2-Class	–588.806	1228.886	1195.612	1204.612	9	0.0515
3-Class	–534.807	1143.676	1095.614	1108.614	13	0.0466
4-Class	–534.439	1165.728	1102.878	1119.878	17	0.1467

LL, Log Likelihood; BIC, Bayesian Information Criteria; AIC, Akaike Information Criteria; N par, Number of parameters.

Bold print indicates the best fit statistic across the models.

Table 2. Multinomial logistic regression analyses evaluating personality traits, alcohol expectancies and sensation seeking associated with alcohol use grouping

	Regular drinkers with heavy drinking versus abstainers			Moderate drinkers versus abstainers			Regular drinkers with heavy drinking versus moderate drinkers		
	OR	95% CI		OR	95% CI		OR	95% CI	
		Lower bound	Upper bound		Lower bound	Upper bound		Lower bound	Upper bound
ES	4.22	0.96	18.53	1.69	0.39	7.31	2.50**	1.67	3.76
Extraversion	1.20**	1.08	1.34	1.14**	1.03	1.27	1.05*	1.00	1.11
Expectancy for negative mood	1.01	0.89	1.14	0.93	0.83	1.05	1.08**	1.02	1.14
Expectancy for risk and aggression	0.81**	0.70	0.92	0.90**	0.79	1.02	0.90**	0.84	0.96
Expectancy for social facilitation	1.18**	1.09	1.28	1.11**	1.04	1.19	1.06**	1.02	1.10
DIS	2.36	0.68	8.21	1.09	0.32	3.73	2.17**	1.45	3.24

* $P < 0.05$ ** $P < 0.001$.

There was a good model fit (discrimination among groups) on the basis of six variables, $\chi^2 (582, N = 298) = 353.828, P = 1.00$, using a deviance criterion. Likelihood ratio tests (critical value for each test was 0.05) showed six of the predictors to be significant (three personality traits: extraversion, DIS and ES; and three alcohol expectancies dimensions: sociability, risk/aggression and negative mood). Correct classification rates using these six variables were 79% for regular drinkers with heavy episodic drinking, 69% for moderate drinkers and 37% for abstainers; the overall correct classification rate was 72%. Table 2 reports ORs and 95% CIs for the final Step 6 model. Statistically significant ORs are denoted by an asterisk in the table, using pseudo-class Wald Chi-square tests. Variables significantly associated with the class of regular drinkers with heavy drinking versus the class of abstainers included higher scores in extraversion (OR = 1.20) and alcohol expectancies for social facilitation (OR = 1.18), and lower scores in alcohol expectancies for risk and aggression (OR = 0.81). Higher scores in extraversion (OR = 1.14) and in alcohol expectancies for social facilitation (OR = 1.11), and lower scores in expectancies for risk and aggression (OR = 0.90) were also associated with the class of moderate drinkers versus the class of abstainers. Finally, the combination of higher scores in ES (OR = 2.50), extraversion (OR = 1.05), DIS (OR = 2.17), alcohol expectancies for negative mood (OR = 1.08) and alcohol expectancies for social facilitation (OR = 1.06) and lower scores in alcohol expectancies for risk and aggression scores (OR = 0.90) were significantly related to the class of regular drinkers with heavy drinking, compared to the class of moderate drinkers.

DISCUSSION

The present study aimed at identifying personality traits and alcohol expectancies that significantly predict different drinking patterns in Argentinean college women. An empirically based method (i.e. LCA) was used to characterize alcohol drinking in a sample of first year-college women. A multinomial regression analysis subsequently determined which personality traits and alcohol expectancies differentiate among the different drinking classes yielded by LCA.

Three co-occurring alcohol measures were simultaneously analyzed to obtain a comprehensive measure of alcohol drinking patterns, which represents an obvious advantage over employing only one drinking indicator (i.e. drinking quantity or drinking frequency) (Reboussin *et al.*, 2008). Three distinct classes were derived from

LCA: regular drinkers with heavy drinking, moderate drinkers and abstainers. An important finding was that, similar to what has been found in other western countries (Zamboanga and Ham, 2008; Balodis *et al.*, 2009), about half of the sample exhibited heavy episodic drinking. Only 6.4% of the total sample reported to abstain from drinking alcohol during the last year. This result is consistent with previous results from local studies (Pilatti *et al.*, 2013, 2014b).

We employed multinomial regression analysis to determine which features were more relevant to distinguish among the three drinking classes. Personality traits of extraversion, DIS and ES, alongside with positive (sociability) and negative (risk and aggression and negative mood) alcohol expectancies distinguished between the different drinking classes. These six cognitive and personality features were differently distributed among women in each drinking class. Regular drinkers with heavy episodic drinking and moderate drinkers differentiate themselves from abstainers based on a similar set of cognitive and personality variables. Both groups had, when compared to abstainers, higher scores in extroversion and alcohol expectancies for social facilitation, and lower scores in risk and aggression alcohol expectancies. In turn, regular drinkers with heavy episodic drinking exhibited, when compared to moderate drinkers, higher scores in extroversion and alcohol expectancies for social facilitation, and lower scores in risk and aggression alcohol expectancies; as well as higher scores in ES, DIS and negative mood alcohol expectancies.

The results suggest that extroverted and disinhibited women with a combination of more positive beliefs about the effects of alcohol on social facilitation and less negative expectancies for the effects of the drug on risk and aggression could be at higher risk for high alcohol drinking. Notably, one element that distinguishes between women in the class with the greatest level of alcohol consumption and those in the class with moderate engagement in alcohol use was that regular drinkers with heavy episodic drinking have higher scores in negative mood alcohol expectancies. This may seem paradoxical, since it would be expected an inverse relationship between negative alcohol expectancies and alcohol drinking (Engels *et al.*, 2005; Tush and Wiers, 2007; Urbán *et al.*, 2008). Yet it should be noted that the scale for these negative alcohol expectancies measures more distal effects of alcohol (i.e. feeling guilty or ashamed), which are more likely to emerge once the heavy episode of alcohol drinking has finished.

The present study supports previous work that emphasized the role of positive and negative alcohol expectancies in alcohol seeking and

intake (Jones *et al.*, 2001; Darkes *et al.*, 2004), especially at distinguishing high and low, respectively, drinking patterns in women (Stappenbeck *et al.*, 2013). Several studies indicate that alcohol expectancies play a mediational role between social (Martino *et al.*, 2006; Lau-Barraco *et al.*, 2012) and biological-genetic (McCarthy *et al.*, 2001; Smith and Anderson, 2001) variables and alcohol use. Thus, early learning experiences (Martino *et al.*, 2006), in conjunction with personality factors (Smith and Anderson, 2001), constitute early influences on subsequent behaviors. For instance, Lau-Barraco *et al.* (2012) found alcohol expectancies to significantly mediate the influence of peer drinking on alcohol use, heavy drinking and alcohol-related problems, and McCarthy *et al.* (2001) found that DIS influenced drinking mostly through its effect on positive alcohol expectancies. The Acquired Preparedness model (Smith and Anderson, 2001) integrates personality and cognitive factors to explain why some adolescents are at higher risk for developing problematic alcohol drinking. This model emphasizes the facilitative role of individual differences in DIS and in the anticipation of positive social outcomes from alcohol drinking in early and greater alcohol consumption. Extroverted adolescents and youth seem to be more prone to learn about the positive outcomes of alcohol, especially those related with social improvement (McCarthy *et al.*, 2001; Fu *et al.*, 2007).

Abstainer women had the highest scores in negative alcohol expectancies for risk and aggression, highlighting the role of this type of expected drinking outcomes in drinking behavior. Different studies supported the role of alcohol expectancies for social facilitation on greater alcohol use (Oullette *et al.*, 1999; Read *et al.*, 2004; Fu *et al.*, 2007), especially in cultural groups where alcohol use is strongly related to social activities (Kuntsche *et al.*, 2006). Other studies, however, stressed the role of negative alcohol expectancies (Leigh and Stacy, 2004; Oei and Lee Jardim, 2007; Tush and Wiers, 2007; Urbán *et al.*, 2008).

The personality differences found (i.e. more ES, DIS and extroversion in women with heavy alcohol consumption) may reflect alcohol-induced neurocognitive alterations. Alcohol alters the normal development of neurotransmitter systems (Crews *et al.*, 2000; Pascual *et al.*, 2009) and exerts neurotoxic effects in brain areas associated with the planning and regulation of behavior, such as the prefrontal cortex (García-Moreno *et al.*, 2008). These alterations, in turn, can facilitate the maintenance and escalation of drinking. Therefore, one possibility is that the profile found in females with high alcohol use is the result of alcohol-induced alterations in normal neurodevelopment. This hypothesis, however, requires further testing. The transversal design used in the present study does not allow establishing causal relationships between variables.

The present study has some other limitations. Women were first year-college students enrolled only in psychology courses, which significantly limits the generalizability of the results. Moreover, women who agreed to participate may have differed from those women who did not. There was no record of those women who did not agree to participate, although the majority of women in the courses was willing to participate. Another limitation is the low reliability found in some scales measuring sensation seeking. Previous work with the original English version indicated these subscales were only marginally reliable (between 0.48 and 0.69) in samples of college women attending psychology courses (Ridgeway and Russell, 1980), and other studies reported that some of the items did not show adequate psychometric properties (Haynes *et al.*, 2000; Gray and Wilson, 2007). However, and considering this low reliability, we calculated the reliability of the factorial scores (Mislevy and Bock, 1990), and used the factorial scores for the regression analyses. Notably, the adapted version we

employed in the present study was validated with a sample of adolescents. Future studies should contemplate the possibility of employing different measures to assess sensation seeking previously adapted to a sample of college students. Another limitation refers to the small group size for abstainers compared to the other two groups of drinking women. This uneven distribution of group size may have had an impact on the present results. It should be noted, however, that these results are consistent with the existing literature (see, for example, McAdams and Donnellan, 2009; Pilatti *et al.*, 2013). Additionally, the study did not measure other important risk factors for heavy alcohol use, such as early onset of drinking (Pilatti *et al.*, 2014b), family history of alcohol problems (LaBrie *et al.*, 2010) and social norms for alcohol drinking (Borsari and Carey, 2001; Wood *et al.*, 2004).

Despite these limitations, the most important results of the present study were the high prevalence of heavy alcohol use in college women and the identification of distinct patterns of alcohol use that were associated with different personality and alcohol expectancies profiles. A key goal in the addiction field is to determine which subjects will progress to heavy alcohol use and which will maintain social drinking patterns even after repeated exposure to alcohol use (Pautassi *et al.*, 2009). The present study provides important new information on a number of features that seem to be relevant to differentiate those women with problematic alcohol drinking from those with regular, yet social, alcohol intake. This is, to our knowledge, the first study that analyzed the relevance of personality traits and alcohol expectancies in Argentinean, female College students. The study confirms previous studies conducted in US samples and suggests that interventions tailored to the needs of the more extroverted and disinhibited women will be the most cost-effective.

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CONFLICT OF INTEREST STATEMENT

None declared.

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