



Impulsivity-related traits, college alcohol beliefs, and alcohol outcomes: Examination of a prospective multiple mediation model among college students in Spain, Argentina, and USA



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HIGHLIGHTS

- Tested a mediation model among college drinkers in Argentina, Spain and US.
- College alcohol beliefs prospectively predicted increased alcohol use/consequences.
- Impulsivity-like traits relate to alcohol outcomes via college alcohol beliefs.
- Model was invariant across countries/sex, suggesting a culturally-universal model.

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ABSTRACT

Objectives: The present study examined (both cross-sectionally and prospectively) the mediational role of college alcohol beliefs in the relationship between impulsivity-related traits and alcohol outcomes (i.e., alcohol use and negative consequences) among college student drinkers from the United States (U.S.), Spain, and Argentina.

Method: A sample of 1429 (U.S. = 733, Spain = 292, Argentina = 404) drinkers (at least one drinking episode within the previous month) completed the baseline survey, and 242 drinkers completed the follow-up. To test study aims, a cross-sectional model was first employed to examine whether the proposed double-mediated paths (i.e., each dimension of impulsivity → college alcohol beliefs → alcohol use → negative alcohol-related consequences) extends across samples with different cultural backgrounds (i.e., structural invariance testing). A longitudinal model was then conducted to assess if college alcohol beliefs prospectively mediate the associations between trait impulsivity and alcohol outcomes.

Results: College alcohol beliefs were concurrently and prospectively associated with both greater alcohol use and increased number of negative alcohol-related consequences. These internalized beliefs about college student drinking culture significantly mediated the effects of several distinct impulsivity-related traits on alcohol-related outcomes including urgency (positive and negative), sensation seeking, and perseverance. These findings were invariant across gender and across three countries (Argentina, Spain, and the U.S.).

Conclusions: Our findings highlight the modulatory role of cognitive factors on problematic alcohol use among college students with different cultural backgrounds. Our results suggest that, despite the cultural differences exhibited by these three countries, the unique and mediational effects of college alcohol beliefs appear relatively universal.

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1. Introduction

Decades of research has identified the college student drinking culture as a barrier toward effective prevention efforts (Borsari, Murphy, & Barnett, 2007; Moffatt, 1991; National Advisory Council on Alcohol Abuse and Alcoholism, 2002; Wolburg, 2016). More recent research has formally operationalized the internalization of college student drinking culture, or beliefs regarding the degree to which alcohol use is considered an integral part of the college experience using the College Life Alcohol Salience Scale (CLASS; Osberg et al., 2010). Among U.S. college students, research has found these perceptions to be robustly associated with elevated levels of alcohol use ($r_s = 0.31$ to 0.71) and negative consequences ($r_s = 0.35$ to 0.52 ; Bravo, Prince, & Pearson, 2017; LaBrie, Kenney, Napper, & Miller, 2014; Osberg & Boyer, 2016; Osberg, Billingsley, Eggert, & Insana, 2012; Ward, Galante, Trivedi, & Kahrs, 2015), including prospective associations among first year college students (Osberg, Insana, Eggert, & Billingsley, 2011).

Beyond direct associations with alcohol outcomes and in line with various theoretical models linking personality traits to substance use behaviors via their influence on individual beliefs or perceptions (e.g., Acquired Preparedness Model, Smith & Anderson, 2001; Theory of Planned Behavior, Ajzen, 2011; Health Belief Model, Rosenstock, 1974), two cross-sectional studies have demonstrated that internal college alcohol beliefs partially mediate the associations between personality traits (i.e., impulsivity and sensation seeking) and alcohol-related outcomes among college students (Hustad, Pearson, Neighbors, & Borsari, 2014; Pearson & Hustad, 2014). These results indicate that personality-tailored interventions targeting the degree to which alcohol use is considered an integral part of the college experience may be appropriate (Conrod, Castellanos-Ryan, & Mackie, 2011). However, these studies were limited by their cross-sectional study design, and thus lacked the ability to examine these associations prospectively to demonstrate temporal precedence (i.e., one requisite for making causal inferences). In addition, these studies utilized a unidimensional assessment of impulsivity, and research suggests that impulsivity is multifaceted (Cyders et al., 2007; Whiteside & Lynam, 2001) with different facets exhibiting differential relations with alcohol outcomes (Kaiser, Bonsu, Charnigo, Milich, & Lynam, 2016; LaBrie et al., 2014). Finally, the data were collected in a single cultural milieu (i.e., a large northeastern university in the United States) and it is not clear how generalizable these findings are to college students across various cultures and countries.

Recent cross-cultural research by our research team has found that internal college alcohol beliefs is significantly and positively associated with various alcohol outcomes (e.g., typical quantity, binge drinking frequency, negative consequences) among college students in three countries (U.S., Argentina, and Spain) and these associations are fairly similar across countries and gender (Bravo, Pearson, et al., 2017). However, a cross-cultural examination of the mediation effects found in previous studies (Hustad et al., 2014; Pearson & Hustad, 2014) could help further guide the development of effective, contextually-tailored interventions targeting internalized college alcohol beliefs. Specifically, a better understanding of how personality traits (i.e., impulsivity) impact internalized college alcohol beliefs and alcohol outcomes should help tailor intervention efforts to the different needs of college students with different cultural backgrounds.

The present study sought to cross-culturally replicate and extend previous findings by examining three distinct research questions: a) to what extent are the mediational effects found in previous research (Hustad et al., 2014; Pearson & Hustad, 2014) replicable when examining impulsivity multidimensionally (i.e., positive urgency, negative urgency, premeditation, perseverance, and sensation-seeking), b) to what extent does the proposed double mediation model (i.e., impulsivity-related traits → college alcohol beliefs → alcohol use → negative consequences) replicate when examining these associations

prospectively (e.g., baseline sensation seeking → baseline college alcohol beliefs → follow-up alcohol use → follow-up negative consequences), and c) are these models invariant across distinct cultural contexts (i.e., across different countries) and gender (men vs women)? Based on findings from previous cross-sectional research (Hustad et al., 2014; Pearson & Hustad, 2014) and prospective research (Osberg et al., 2011), we expected that college alcohol beliefs would prospectively predict alcohol outcomes and mediate (both cross-sectionally and prospectively) the associations between impulsivity-related traits and alcohol outcomes.

2. Method

2.1. Participants & procedures

College students from four universities ($n = 1864$) across three countries (U.S. [two universities; one located in the southeast and the other in the southwest], Argentina, and Spain) participated in the baseline online survey study regarding personality traits, alcohol beliefs, and alcohol use behaviors (for more information on recruitment procedures, see Bravo et al., 2018). Three of the four sites also participated in a follow-up assessment approximately three months later (the southeastern U.S. site did not participate in this follow-up). Of the 884 students eligible for the follow-up (i.e., students who consumed alcohol at least once in the previous month during baseline), 271 completed the same survey from the baseline roughly three months later and were entered in raffles for cash prizes at their respective institutions. To test our proposed cross-sectional mediational model, we used baseline data from students who consumed alcohol at least once in the previous month ($n = 1429$; [U.S. sites combined, $n = 733$, 72.3% women; Argentina, $n = 404$, 70.5% women; Spain, $n = 292$, 52.2% women]). To test our proposed prospective mediation model, we used data from students who participated in the follow-up and consumed alcohol in the previous month during the follow-up assessment ($n = 242$; [U.S., $n = 30$, 66.7% women; Argentina, $n = 120$, 66.7% women; Spain, $n = 92$, 80.4% women]). These studies were approved by the institutional review boards (or their international equivalent) at the participating universities.

2.2. Measures

2.2.1. Impulsivity-related traits

At the U.S. sites, we used the UPPS-P Impulsive Behavior Scale (Lynam, Smith, Whiteside, & Cyders, 2006). The UPPS-P is a 59-item scale devised to assess positive urgency, negative urgency, premeditation, perseverance, and sensation-seeking. Items are assessed on a 4-point response scale (1 = *Disagree Strongly*, 4 = *Agree Strongly*). In Spain and Argentina, we administered the Spanish version of the scale (Pilatti, Lozano, & Cyders, 2015; Verdejo-García, Lozano, Moya, Alcázar, & Pérez-García, 2010).

2.2.2. College alcohol beliefs

The College Life Alcohol Salience Scale (CLASS; Osberg et al., 2010) was used to assess alcohol beliefs of college students. Items are measured on a 5-point response scale (1 = *Strongly Disagree*, 5 = *Strongly Agree*). In Spain and Argentina, we employed the Spanish version of the CLASS (see translating and adaptation procedures in Bravo, Pearson, et al., 2017). Although originally examined as a 15-item measure, Bravo et al. revealed that a 12-item version was scalar invariant across gender and drinker status, and metric invariant across countries (thus we used the 12-item version for the present study).

2.2.3. Alcohol consumption

The Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985) was used to measure alcohol consumption. Participants indicated the total amount of Standard Drink Units (SDUs) taken during a typical

Table 1
Structural invariance testing results of the cross-sectional mediational model across countries and gender.

Models	Overall fit indices						Model comparison fit indices				
	χ^2	<i>df</i>	CFI	TLI	RMSEA	SRMR	$\Delta\chi^2$	Δdf	ΔCFI	ΔTLI	$\Delta RMSEA$
<i>Mediation model across countries</i>											
Unconstrained	2776.60	812	0.907	0.897	0.071 (0.068, 0.074)	0.067	69.42***	36	−0.001	0.003	−0.001
Constrained	2846.02	848	0.906	0.900	0.070 (0.067, 0.073)	0.073					
<i>Mediation model across gender</i>											
Unconstrained	1767.23	530	0.939	0.931	0.057 (0.054, 0.060)	0.054	21.61	18	0.000	0.002	−0.001
Constrained	1788.84	548	0.939	0.933	0.056 (0.054, 0.059)	0.057					

Note. We used comparison criteria of $\Delta RMSEA \leq 0.015$ (increase indicates worse fit; Chen, 2007) and $\Delta CFI/\Delta TFI \leq 0.01$ (decrease indicates worse fit; Cheung & Rensvold, 2002) to test for invariance. To ensure model convergence for the mediational model across gender, we constrained the variance of alcohol consumption to be under 10 by dividing by a constant as recommended by Muthén & Muthén (1998–2015).

*** $p < .001$.

week. In order to help orient students to SDUs, they were first presented with a visual guide about typical drinks (specific to each country). The total number of SDUs consumed (summed) were transformed into grams of alcohol. In U.S. and Argentina, one SDU is equivalent to 14 g of alcohol (International Alliance for Responsible Drinking [IARD], 2016; National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2015). In Spain, one SDU is equivalent to 10 g of alcohol (IARD, 2016; Rodríguez-Martos, Gual, & Llopis, 1999).

2.2.4. Negative alcohol-related consequences

The 48-item Young Adult Alcohol Consequences Questionnaire (YAACQ; Read, Kahler, Strong, & Colder, 2006) was administered to college students to assess negative alcohol-related consequences. Each item was scored dichotomously to reflect presence/absence of the alcohol-related problem in the past month (0 = no, 1 = yes). The Spanish version (S-YAACQ, Pilatti, Read, & Caneto, 2016) was used at the Argentina/Spain sites, although some items were reworded to Castilian Spanish in Spain.

2.3. Statistical analysis

To test the proposed models, structural equation modeling (cross-sectional data) and path analysis (prospective data) using Mplus 7.4 (Muthén & Muthén, 1998–2015) were conducted. In the cross-sectional model, a double-mediated path was examined for each impulsivity-related trait (e.g., sensation seeking → college alcohol beliefs → alcohol use → negative consequences). In the prospective model, the structural model was the same with the exception that impulsivity-related traits and college alcohol beliefs at baseline were entered as predictors of alcohol outcomes at follow-up (controlling for baseline alcohol use and negative consequences). To evaluate overall model fit in the cross-sectional model (prospective model was fully saturated), we used model fit criteria suggested by Hu and Bentler (1999) including the Comparative Fit Index (CFI) > 0.90 (acceptable) > 0.95 (optimal), Tucker-Lewis Index (TLI) > 0.90 (acceptable) > 0.95 (optimal), Root Mean Square Error of Approximation (RMSEA) < 0.06, and Standardized Root Mean Square Residual (SRMR) < 0.08. To reduce the complexity of the models, we followed the item-to-construct balance approach described by Little, Cunningham, Shahar, and Widaman (2002) by creating parcels for all latent study variables (exception was alcohol use).

In order to test whether our cross-sectional model was culturally-specific or culturally-universal, we conducted χ^2 difference tests comparing a freely estimated multi-group model to a constrained multi-group model (i.e., constraining the paths of the SEM) to determine whether constraining the paths to be equivalent across countries resulted in a worst fitting model (i.e., test of structural invariance). Given that the χ^2 test statistic is sensitive to sample size (Brown, 2015), we also relied on model comparison criteria of $\Delta RMSEA \leq 0.015$ (Chen, 2007) and $\Delta CFI/\Delta TFI \leq 0.01$ (Cheung & Rensvold, 2002).

For both models, we examined the total, direct, and indirect effects of each predictor variable on alcohol outcomes using bias-corrected bootstrapped estimates (Efron & Tibshirani, 1993) based on 10,000 bootstrapped samples, which provides a powerful test of mediation (Fritz & MacKinnon, 2007) and is robust to small departures from normality (Erceg-Hurn & Mirosevich, 2008). Given our large sample size in the cross-sectional model, we adopted a more conservative criterion for establishing statistical significance. Specifically, 99% bias-corrected bootstrapped confidence intervals that do not contain zero were applied to the cross-sectional model. We used 95% confidence intervals for the prospective model.

3. Results

Within the cross-sectional model, the multi-group model (including constrained models) provided acceptable fit based on fit criteria suggested by Hu and Bentler and the minimal changes in CFI/TLI and RMSEA indicated model invariance across countries and gender (see Table 1). Based on these results, we present results of all our models within the total sample.

3.1. Cross-sectional mediation model

Bivariate correlations, descriptive statistics, and reliability coefficients of all study variables for the cross-sectional model are presented in Table 2. The model provided an acceptable fit to the data based on most fit indices, CFI = 0.944, TLI = 0.932, RMSEA = 0.057 (90% CI [0.054, 0.060]), SRMR = 0.050. The significant Model χ^2 ($\chi^2[248] = 1401.91, p < .001$) would suggest poor model fit; however, the Model χ^2 is highly sensitive to sample size (Jöreskog & Sörbom, 1993; Kline, 1998). The total, total indirect, and specific indirect effects of the cross-sectional mediation model are summarized in Table 3 and direct effects are depicted in Fig. 1. Four of the five traits were significantly associated with college alcohol beliefs (non-significant association for premeditation). Specifically, perseverance was associated with lower college alcohol beliefs, whereas sensation seeking and positive urgency were associated with higher college alcohol beliefs. Compared to its positive bivariate correlation ($r = 0.16$, see Table 2), negative urgency presented an inverse association with college alcohol beliefs ($\beta = -0.10$) once controlling for the other impulsivity-related traits. These contradictory results may reflect a multicollinearity problem and/or statistical suppressor situation (see Paulhus, Robins, Trzesniewski, & Tracy, 2004) as opposed to negative urgency having a protective role on college alcohol beliefs. College alcohol beliefs were associated with both higher alcohol use ($\beta = 0.23$) and negative consequences ($\beta = 0.17$) and alcohol use significantly mediated the association between college alcohol beliefs and negative consequences (indirect $\beta = 0.09$), accounting for 35.10% of the total effect.

Table 2
Bivariate correlations among study variables in total cross-sectional sample.

	1	2	3	4	5	6	7	8	M	SD
1. Premeditation	<u>0.81</u>								3.02	0.48
2. Perseverance	0.48	<u>0.82</u>							3.02	1.44
3. Sensation seeking	-0.04	0.11	<u>0.85</u>						2.69	1.56
4. Positive urgency	-0.21	-0.30	0.29	<u>0.90</u>					1.94	1.58
5. Negative urgency	-0.22	-0.34	0.16	0.64	<u>0.82</u>				2.35	1.50
6. College alcohol beliefs	-0.16	-0.18	0.27	0.25	0.16	<u>0.86</u>			2.46	0.98
7. Alcohol use in grams	-0.13	-0.08	0.21	0.18	0.09	0.29	-		89.73	106.51
8. Negative alcohol-related consequences	-0.22	-0.20	0.12	0.32	0.33	0.30	0.45	<u>0.93</u>	8.31	8.35

Note. Significant correlations ($p < .01$) are bolded for emphasis. Cronbach's alphas are underlined and shown on the diagonals.

In predicting alcohol use, college alcohol beliefs accounted for: 1) 87.00% of the total effect of perseverance on alcohol use (indirect $\beta = -0.05$); 2) 34.50% of the total effect of sensation seeking on alcohol use (indirect $\beta = 0.07$); 3) 26.90% of the total effect of positive urgency on alcohol use (indirect $\beta = 0.03$); and 4) 32.54% of the total effect of negative urgency on alcohol use (indirect $\beta = -0.02$). In predicting negative consequences, college alcohol beliefs accounted for 12.03% of the total effect of positive urgency on negative consequences

(indirect $\beta = 0.02$). All other effects were “fully” mediated in that the direct effects of perseverance, sensation seeking, and negative urgency were of the opposite sign of the total effect (see Table 3).

In examining alcohol use as a mediator of impulsivity-related traits, alcohol use only uniquely mediated the effects of sensation seeking on negative consequences (positive indirect effect and a non-significant negative association between sensation seeking and negative consequences). Finally, four double-mediated associations were significant

Table 3
Summary of total, indirect, and direct effects of the cross-sectional mediation model.

Outcome variables:	College alcohol beliefs		Alcohol use		Negative alcohol-related consequences	
	β	99% CI	β	99% CI	β	99% CI
Predictor variable: <i>Premeditation</i>						
Total	-0.066	-0.15, 0.05	-0.081	-0.16, 0.03	-0.131	-0.23, -0.0.03
Total indirect ^a	-	-	-0.015	-0.05, 0.01	-0.042	-0.08, 0.01
College alcohol beliefs	-	-	-0.015	-0.05, 0.01	-0.011	-0.04, 0.01
Alcohol use	-	-	-	-	-0.025	-0.06, 0.02
College alcohol beliefs → alcohol use	-	-	-	-	-0.006	-0.02, 0.004
Direct effect	-0.066	-0.15, 0.05	-0.065	-0.17, 0.04	-0.089	-0.18, 0.002
Predictor variable: <i>Perseverance</i>						
Total	-0.194	-0.32, -0.07	-0.052	-0.18, 0.07	-0.045	-0.16, 0.07
Total indirect ^a	-	-	-0.045	-0.08, -0.02	-0.053	-0.12, 0.01
College alcohol beliefs	-	-	-0.045	-0.08, -0.02	-0.032	-0.06, -0.01
Alcohol use	-	-	-	-	-0.003	-0.06, 0.04
College alcohol beliefs → alcohol use	-	-	-	-	-0.018	-0.03, -0.01
Direct effect	-0.194	-0.32, -0.07	-0.007	-0.14, 0.12	0.007	-0.07, 0.10
Predictor variable: <i>Sensation seeking</i>						
Total	0.290	0.20, 0.38	0.196	0.12, 0.27	0.051	-0.03, 0.13
Total indirect ^a	-	-	0.068	0.04, 0.10	0.124	0.08, 0.17
College alcohol beliefs	-	-	0.068	0.04, 0.10	0.048	0.02, 0.08
Alcohol use	-	-	-	-	0.050	0.02, 0.08
College alcohol beliefs → alcohol use	-	-	-	-	0.026	0.02, 0.04
Direct effect	0.290	0.20, 0.38	0.129	0.05, 0.21	-0.074	-0.15, 0.000
Predictor variable: <i>Positive urgency</i>						
Total	0.145	0.04, 0.25	0.126	0.03, 0.22	0.199	0.10, 0.29
Total indirect ^a	-	-	0.034	0.01, 0.06	0.073	0.03, 0.12
College alcohol beliefs	-	-	0.034	0.01, 0.06	0.024	0.01, 0.055
Alcohol use	-	-	-	-	0.035	-0.003, 0.08
College alcohol beliefs → alcohol use	-	-	-	-	0.013	0.004, 0.03
Direct effect	0.145	0.04, 0.25	0.092	-0.001, 0.19	0.126	0.03, 0.22
Predictor variable: <i>Negative urgency</i>						
Total	-0.095	-0.18, -0.01	-0.068	-0.15, 0.02	0.146	0.06, 0.23
Total indirect ^a	-	-	-0.022	-0.05, -0.002	-0.042	-0.08, -0.003
College alcohol beliefs	-	-	-0.022	-0.05, -0.002	-0.016	-0.04, -0.002
Alcohol use	-	-	-	-	-0.018	-0.05, 0.02
College alcohol beliefs → alcohol use	-	-	-	-	-0.009	-0.02, -0.001
Direct effect	-0.095	0.30, 0.51	-0.046	-0.13, 0.04	0.188	0.11, 0.26
Predictor variable: <i>College alcohol beliefs</i>						
Total	-	-	0.233	0.15, 0.31	0.257	0.18, 0.33
Indirect via alcohol use	-	-	-	-	0.090	0.06, 0.13
Direct	-	-	0.233	0.15, 0.31	0.167	0.09, 0.24

Note. Significant associations are in bold typeface for emphasis and were determined by a 99% bias-corrected standardized bootstrapped confidence interval (based on 10,000 bootstrapped samples) that does not contain zero.

^a Reflects the combined indirect associations within the model.

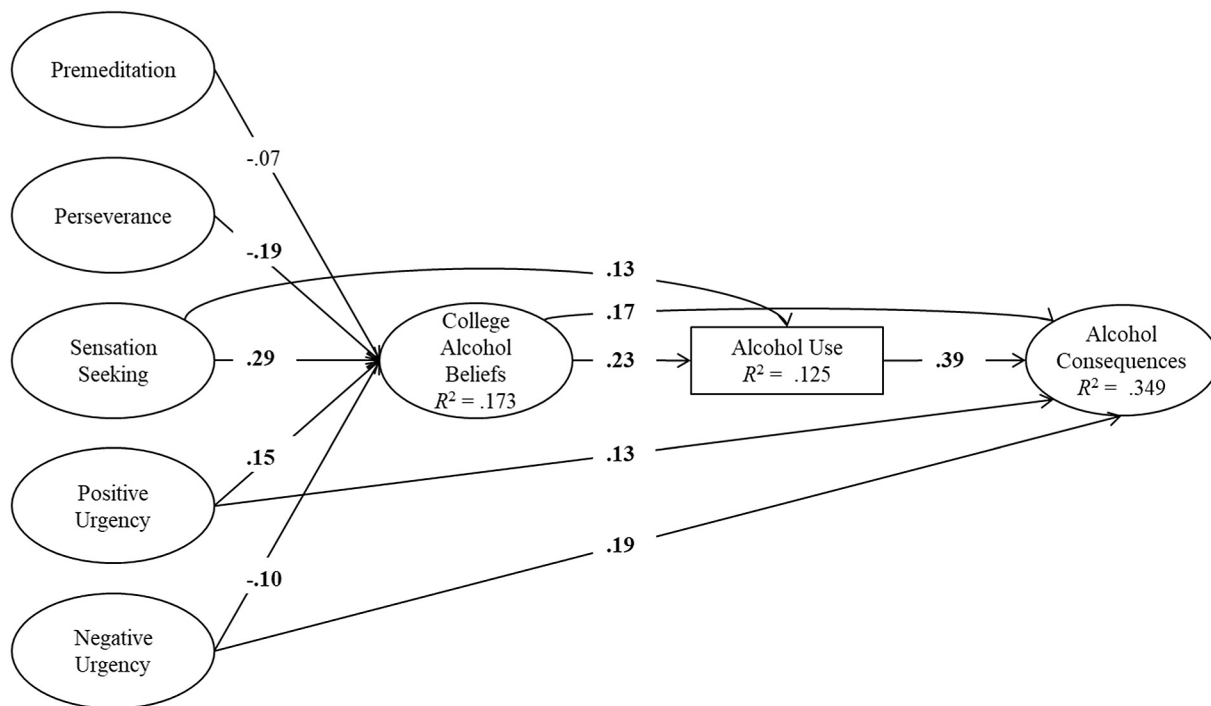


Fig. 1. Depicts the standardized effects of the cross-sectional mediation structural equation model ($n = 1429$). Significant associations are in bold typeface for emphasis and were determined by a 99% bias-corrected unstandardized bootstrapped confidence interval (based on 10,000 bootstrapped samples) that does not contain zero. Factor loadings to parcels and non-significant path coefficients between impulsivity-related traits and alcohol outcomes are not shown in the figure for reasons of parsimony.

(i.e., perseverance/sensation seeking/positive urgency/negative urgency → college alcohol beliefs → alcohol use → negative consequences). With positive urgency as a predictor, the dual mediation path accounted for an additional 6.50% of the total effect of positive urgency on negative consequences (indirect $\beta = 0.01$). All other double mediated effects were ‘fully’ mediated in that the direct effect was of the opposite sign of the total effect (see Table 3).

3.2. Prospective mediation model

Bivariate correlations, descriptive statistics, and reliability coefficients of all study variables for the longitudinal model are presented in Table 4. The total, total indirect, specific indirect, and direct effects of the prospective mediation model are summarized in Table 5 and direct effects are depicted in Fig. 2. Within this model, only perseverance ($\beta = -0.22$) and sensation seeking ($\beta = 0.24$) were significantly associated with college alcohol beliefs. Controlling for baseline alcohol use and negative consequences, higher college alcohol beliefs was associated with increased alcohol use at follow-up ($\beta = 0.15$) and alcohol use significantly mediated the association between baseline college alcohol beliefs and follow-up negative consequences (indirect

$\beta = 0.03$), accounting for 66.06% of the total effect. Consistent with these direct effects, there were two significant single mediation effects: 1) college alcohol beliefs accounted for 59.32% of the total effect between baseline perseverance and follow-up alcohol use (indirect $\beta = -0.03$), and 2) college alcohol beliefs accounted for 73.27% of the total effect between baseline sensation seeking and follow-up alcohol use (indirect $\beta = 0.04$). Further, there were two significant double-mediation effects: 1) baseline perseverance → baseline college alcohol beliefs → follow-up alcohol use → follow-up negative consequences (indirect $\beta = -0.01$), which accounted for an additional 22.67% of the total effect of baseline perseverance on follow-up negative consequences; and 2) baseline sensation seeking → baseline college alcohol beliefs → follow-up alcohol use → follow-up negative consequences, indirect $\beta = 0.01$ (positive indirect effect and a non-significant negative association between baseline sensation seeking and follow-up negative consequences).

4. Discussion

Overall, our results extend previous research in several ways. First, consistent with limited previous research (Osberg et al., 2011), we

Table 4
Bivariate correlations among study variables in total prospective sample.

	1	2	3	4	5	6	7	8	9	10	M	SD
1. Premeditation T1	<u>0.80</u>										2.98	0.44
2. Perseverance T1	0.35	<u>0.81</u>									3.03	0.47
3. Sensation seeking T1	-0.02	0.09	<u>0.84</u>								2.52	0.60
4. Positive urgency T1	-0.10	-0.24	0.24	<u>0.86</u>							1.83	0.49
5. Negative urgency T1	-0.28	-0.30	0.07	0.61	<u>0.77</u>						2.30	0.50
6. College alcohol beliefs T1	-0.01	-0.22	0.30	0.29	0.19	<u>0.85</u>					2.28	0.71
7. Alcohol use in grams T1	-0.01	-0.07	0.19	0.25	0.10	0.30	-				78.38	74.72
8. Alcohol use in grams T2	-0.07	-0.12	0.16	0.21	0.11	0.33	0.62	-			71.33	71.09
9. Negative alcohol-related consequences T1	-0.10	-0.13	0.24	0.45	0.40	0.35	0.44	0.27	<u>0.91</u>		8.48	7.56
10. Negative alcohol-related consequences T2	-0.06	-0.12	0.17	0.36	0.29	0.30	0.39	0.35	0.69	<u>0.91</u>	6.73	6.83

Note. T1 = Baseline; T2 = Follow-up. Significant correlations ($p < .05$) are bolded for emphasis. Cronbach's alphas are underlined and shown on the diagonals.

Table 5
Summary of total, indirect, and direct effects of prospective mediation model.

Outcome variables:	<i>College alcohol beliefs T1</i>		<i>Alcohol use T2</i>		<i>Negative alcohol-related consequences T2</i>	
	β	95% CI	β	95% CI	β	95% CI
Predictor variable: Premeditation T1						
Total	0.094	−0.03, 0.22	−0.042	−0.15, 0.07	0.015	−0.08, 0.11
Total indirect ^a	–	–	0.014	−0.001, 0.05	−0.006	−0.03, 0.02
College alcohol beliefs T1	–	–	0.014	−0.001, 0.05	0.001	−0.01, 0.02
Alcohol use T2	–	–	–	–	−0.010	−0.04, 0.004
College alcohol beliefs T1 → alcohol use T2	–	–	–	–	0.002	0.000, 0.01
Direct effect	0.094	−0.03, 0.22	−0.056	−0.16, 0.05	0.021	−0.07, 0.11
Predictor variable: Perseverance T1						
Total	−0.222	−0.34, −0.10	−0.057	−0.16, 0.05	−0.026	−0.15, 0.09
Total indirect ^a	–	–	−0.034	−0.08, −0.01	−0.013	−0.05, 0.01
College alcohol beliefs T1	–	–	−0.034	−0.08, −0.01	−0.003	−0.03, 0.02
Alcohol use T2	–	–	–	–	−0.004	−0.03, 0.02
College alcohol beliefs T1 → alcohol use T2	–	–	–	–	−0.006	−0.02, −0.001
Direct effect	−0.222	−0.34, −0.10	−0.023	−0.13, 0.09	−0.013	−0.14, 0.11
Predictor variable: Sensation seeking T1						
Total	0.239	0.12, 0.36	0.050	−0.03, 0.14	−0.009	−0.10, 0.08
Total indirect ^a	–	–	0.036	0.01, 0.09	0.012	−0.01, 0.05
College alcohol beliefs T1	–	–	0.036	0.01, 0.09	0.003	−0.02, 0.03
Alcohol use T2	–	–	–	–	0.002	−0.02, 0.02
College alcohol beliefs T1 → alcohol use T2	–	–	–	–	0.006	0.001, 0.02
Direct effect	0.239	0.12, 0.36	0.013	−0.08, 0.11	−0.021	−0.12, 0.07
Predictor variable: Positive urgency T1						
Total	0.078	−0.08, 0.23	0.041	−0.09, 0.17	0.043	−0.10, 0.19
Total indirect ^a	–	–	0.012	−0.01, 0.05	0.008	−0.01, 0.05
College alcohol beliefs T1	–	–	0.012	−0.01, 0.05	0.001	−0.01, 0.02
Alcohol use T2	–	–	–	–	0.005	−0.02, 0.04
College alcohol beliefs T1 → alcohol use T2	–	–	–	–	0.002	−0.001, 0.01
Direct effect	0.078	−0.08, 0.23	0.029	−0.10, 0.16	0.035	−0.11, 0.18
Predictor variable: Negative urgency T1						
Total	0.005	−0.15, 0.17	0.015	−0.12, 0.16	0.004	−0.13, 0.14
Total indirect ^a	–	–	0.001	−0.02, 0.03	0.003	−0.02, 0.05
College alcohol beliefs T1	–	–	0.001	−0.02, 0.03	0.000	−0.01, 0.01
Alcohol use T2	–	–	–	–	0.002	−0.02, 0.05
College alcohol beliefs T1 → alcohol use T2	–	–	–	–	0.001	−0.004, 0.01
Direct effect	0.005	−0.15, 0.17	0.014	−0.12, 0.16	0.209	−0.13, 0.14
Predictor variable: College alcohol beliefs T1						
Total	–	–	0.152	0.03, 0.28	0.040	−0.07, 0.15
Indirect via alcohol use T2	–	–	–	–	0.026	0.001, 0.08
Direct	–	–	0.152	0.03, 0.28	0.014	−0.08, 0.12

Note. T1 = Baseline; T2 = Follow-up. Significant associations are in bold typeface for emphasis and were determined by a 95% bias-corrected standardized bootstrapped confidence interval (based on 10,000 bootstrapped samples) that does not contain zero. Alcohol use at T2 was significantly positively associated with higher negative alcohol-related consequences at T2, $\beta = 0.17$, 95% CI [0.02, 0.38]. Effects of covariates (i.e., alcohol use and negative consequences at T1) are available from the authors upon request.

^a Reflects the combined indirect associations within the model.

showed that the internalization of college student drinking culture concurrently and prospectively predicted increased alcohol use and negative consequences. Second, we found internalized college alcohol beliefs to be a plausible mediator of the effects of several distinct domains of impulsivity-related traits (i.e., urgency [positive and negative], sensation seeking, and perseverance) on alcohol-related outcomes (Hustad et al., 2014; Pearson & Hustad, 2014). Third, we found that these mediated effects were consistent across gender and consistent across distinct cultural contexts in the United States, Spain, and Argentina.

Although premeditation was the only impulsivity-related trait that did not contribute to a mediated pathway to alcohol outcomes across the cross-sectional and prospective models, we must note that the indirect effects of perseverance and sensation seeking on alcohol outcomes through the internalization of college student drinking culture were significant in both of these models. This provides additional support that these alcohol beliefs are a promising intervention target for individuals low in perseverance or high in sensation seeking. Further, we found that some impulsivity-related traits had direct effects on alcohol-related outcomes even when controlling for the internalization of

college student drinking culture, implying that additional factors need to be explored to fully account for how these facets of impulsivity-related traits transmit their effects on alcohol-related outcomes (e.g., protective behavioral strategies, Bravo, Prince, & Pearson, 2016; Pearson, Kite, & Henson, 2012).

These findings have several implications for cross-cultural research. Cross-cultural studies are critical to understand whether risk factors that have been identified in the U.S. population apply to patterns of alcohol use in college students from different cultures. Our results suggest that the doubled-mediated pathway involving impulsivity, college alcohol beliefs and alcohol outcomes may be universal rather than culturally specific. Spain and Argentina are two Spanish-speaking countries that exhibit a number of important cultural differences with the U.S., including the role of alcohol on daily life (e.g., wet vs. dry cultures), idiosyncratic features of college life (e.g., strong vs. weak identification with the university) and cultural patterns of interactions (e.g., individualistic vs. collectivistic). Despite these differences, our findings indicate that these risk factors are influencing alcohol drinking outcomes in a similar way across these cultural contexts.

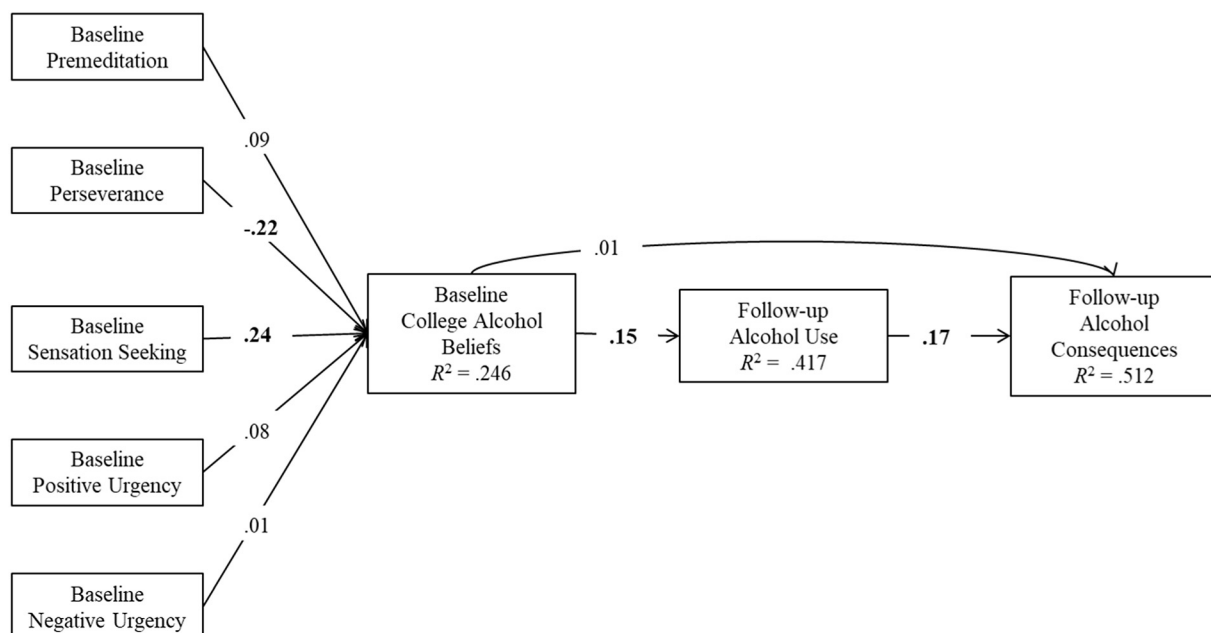


Fig. 2. Depicts the standardized effects of the prospective mediation path analysis model ($n = 242$). Significant associations are in bold typeface for emphasis and were determined by a 95% bias-corrected unstandardized bootstrapped confidence interval (based on 10,000 bootstrapped samples) that does not contain zero. Non-significant path coefficients between impulsivity-related traits and alcohol outcomes are not shown in the figure for reasons of parsimony. Effects of covariates (i.e., alcohol use and negative consequences at baseline) are available from the authors upon request.

4.1. Limitations

Our results must be contextualized given the present study's strengths and limitations. Although we obtained a relatively large sample of college students from three different countries, the subsample of individuals with longitudinal data was modest. Therefore, our prospective mediation models had limited power to detect small direct and indirect effects. Moreover, attrition analyses revealed that the follow-up sample had a larger proportion of women ($d = 0.2451$) and lower levels of positive urgency ($d = 0.2925$), negative urgency ($d = 0.2528$), sensation seeking ($d = 0.3273$), and college alcohol beliefs ($d = 0.1955$) than those eligible who did not complete the follow-up and these differences may have led to differences in results between our models. Future longitudinal research with better attrition rates (30.66% in the present study) are needed to test the robustness of our findings. Though mediational models tested here were based and supported by previous work (Hustad et al., 2014; Pearson & Hustad, 2014), with only two time points, we were unable to examine a fully lagged model depicting mediational processes as they would be expected to play out over time. In our prior work, (Bravo, Pearson, et al., 2017) we found that the CLASS measure did not have strict invariance across these countries. Thus, though we found that our structural model of associations was robust across countries, we were unable to examine latent mean differences in the internalization of college student drinking culture across these countries. As such, our findings document similar associations between the CLASS and other constructs across these countries, but these findings do not imply that the overall degree to which individuals internalize these beliefs about drinking in college are the same across these countries. Finally, we must acknowledge the limitations of obtaining convenience samples. Without obtaining random, nationally representative samples, it is difficult to determine the extent to which our findings will generalize to the populations in these countries.

4.2. Clinical implications & conclusions

Perceptions about alcohol's role in the college experience have been promulgated through media depictions and other means for decades. It is only recently that these perceptions have been the subject of

empirical inquiry. This study adds to the growing literature showing college alcohol beliefs to be linked with harmful alcohol outcomes, and suggests the utility of focusing not only on these beliefs themselves, but on how these beliefs may play out in the context of other individual characteristics (LaBrie et al., 2014). Our study also builds on this literature by extending the examination of beliefs about the college drinking culture to other countries outside of the United States. Our findings point to several next steps for intervention. First, given their mechanistic role in alcohol outcomes, it appears that correcting or in other ways addressing these beliefs may be the key to reducing their impact. Social norms-based interventions that seek to alter student perceptions about the drinking of others in their social milieu have been shown to be effective in reducing drinking risk (Larimer et al., 2007; Larimer & Cronce, 2002; Neighbors et al., 2010). Such interventions could be modified to address and correct misperceptions regarding college students' attitudes toward the role of alcohol in college life. Also, a discussion of these beliefs could be incorporated into an individual-based intervention such as motivational enhancement (Borsari & Carey, 2000; Carey, Scott-Sheldon, Carey, & DeMartini, 2007; Walters & Neighbors, 2005). In this context, some of the perceived benefits and problems with a view on college life that over-values heavy drinking could be discussed in the context of a student's goals, desires, and current concerns. Further, our mediation findings showed that higher levels of traits pertaining to impulsive action were associated with the development of college alcohol beliefs, and in turn, problem alcohol outcomes. This suggests that those higher on these characteristics may benefit from early intervention in an effort to prevent these beliefs from developing even before the student begins college. Finally, our finding that college alcohol beliefs represent a risk factor for deleterious outcomes across cultures suggests that the notion of a college drinking culture is not unique to the U.S. As such, preventive interventions are warranted even in countries with "wet" cultures, where drinking is more widely integrated into other aspects of daily life. More investigation is needed to facilitate the development of culturally-informed interventions that are tailored appropriately to those beliefs that are most relevant for a given culture.

In summary, efforts to address widely held beliefs about the role of alcohol in college life can help to prevent alcohol-related harms in the

U.S. and around the world. Such efforts may also help to shift broader perceptions about the college experience away from drinking, and instead toward the myriad other rewarding and meaningful campus-based activities that constitute college life for the majority of students around the world.

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Contributors

Dr. Bravo coordinated the efforts of the research team, conceptualized the research questions, conducted the analyses, drafted the introduction, statistical analyses, and results sections (including tables). Dr. Pearson assisted with the statistical analyses, drafted parts of the discussion section, and edited the introduction, method, and results sections of the first draft. Dr. Pilatti wrote the abstract and part of the discussion section. Dr. Read wrote the clinical implications section of the discussion section and edited the other sections of the first draft. Drs. Mezquita, Ibáñez, and Ortet drafted the method section and parts of the introduction and discussion section and edited the other sections of the first draft. The entire team selected the measures in the assessment battery and collected all data. All authors contributed to and approved of the final manuscript.

Conflict of interest

No conflict declared.

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