

Drinking Motives as Mediators of the Relationship between Cultural Orientation and  
Alcohol Outcomes in College Students from Seven Countries

Angelina Pilatti, PhD\*  
Facultad de Psicología  
Universidad Nacional de Córdoba, Facultad de Psicología  
Instituto de Investigaciones Psicológicas, IIPsi, CONICET. Córdoba, Argentina

Neelamberi Klein, B.A.  
Department of Psychological Sciences  
William & Mary, USA

Laura Mezquita, PhD  
Department of Basic and Clinical Psychology and Psychobiology  
Universitat Jaume I, Castelló de la Plana, Castellón, Spain

Adrian J. Bravo, PhD  
Department of Psychological Sciences  
William & Mary, USA

Matthew T. Keough, PhD  
Department of Psychology  
York University, Canada

Ricardo Marcos Pautassi  
Universidad Nacional de Córdoba. Facultad de Psicología. Córdoba, Argentina  
Instituto de Investigación Médica M. y M. Ferreyra, INIMEC-CONICET-UNC,  
Córdoba, Argentina.

Cross-Cultural Addictions Study Team\*\*

**\*Corresponding Author**

Angelina Pilatti, Ph.D. Instituto de Investigaciones Psicológicas, IIPSI, Unidad Ejecutora  
CONICET. Córdoba, Argentina. Facultad de Psicología, Universidad Nacional de  
Córdoba. Bv de la Reforma y Enfermera Gordillo s/n, Ciudad Universitaria, 5000,  
Córdoba, Argentina. [apilatti@unc.edu.ar](mailto:apilatti@unc.edu.ar)

Drinking Motives as Mediators of the Relationship between Cultural Orientation and  
Alcohol Outcomes in College Students from Seven Countries

Running title: Cultural Orientation, Drinking Motives and Alcohol Outcomes

## Abstract

**Aims.** Past research has examined the association of cultural orientation with drinking motives and drinking outcomes, mainly, at the country level or in participants from a single region. This study examined the indirect associations of features of cultural orientation (i.e., vertical individualism, vertical collectivism, horizontal individualism, horizontal collectivism; VI, VC, HI and HC, respectively) with alcohol outcomes (i.e., use and negative consequences) via drinking motives in college students from seven countries (n = 4093, 72.8% female). **Methods.** Participants completed an online survey reporting alcohol use, experienced alcohol-related problems, drinking motives and cultural orientation. **Results.** VI was significantly indirectly associated with drinking outcomes mainly via positive reinforcement motives. VC and HC were indirectly associated with drinking outcomes via conformity motives; although the association was negative for HC and positive for VC. Although most of the associations between variables were invariant across countries, a few differences emerged. **Conclusions.** Overall, our findings suggest that the vertical component of individualism and the horizontal component of collectivism might operate as risk or protective factors, respectively. The small effect sizes of some paths also suggest that other variables could be mediating the association between cultural orientation and alcohol outcomes.

**Key words:** college students, alcohol, cultural orientation, drinking motives

## **Introduction**

Broadly speaking, culture refers to a set of items (including language, norms, values, beliefs and life experiences) shared by the individuals of a given social group (Johnson, 2007). Culture influences behavior by specifying how people define themselves and their relation to others (Oyserman et al., 2002). Two primary styles of cultural orientation are individualism and collectivism. Individualistic societies, groups or individuals stimulates thinking of each individual as independent from the others and promote behaviors, beliefs and attitudes aimed at pursuing goals at the individual over the group level. The collectivistic orientation, where individuals are strongly tied to each other and seen as parts of a larger unit, gives more importance to the group (i.e., community, family) over individuals (Oyserman et al., 2002). Each of these broad categories can be additionally described as vertical (i.e., members are hierarchically different from each other) or horizontal (i.e., members are similar to each other), yielding to four dimensions: horizontal individualism (HI), vertical individualism (VI), horizontal collectivism (HC) and vertical collectivism (VC) (Bobbio & Sarrica, 2009; Chiou, 2001; Singelis et al., 1995).

Cultures, societies and individuals differ in the preponderance placed to each of these cultural patterns. Previous research has described U.S. (Foster et al., 2014; Oyserman et al., 2002; Schreier et al., 2010), U.K. or Canada (Mackinnon et al., 2017; Schreier et al., 2010) as individualistic countries while Argentina (Khosrowjerdi et al., 2020), Uruguay (Khosrowjerdi et al., 2020) and Spain (Mackinnon et al., 2017) are generally described as collectivistic countries. However, patterns of cultural orientation are not crystalized and uniformly applied to all situations and contexts and individual differences are expected (Ford & Mauss, 2015; Oyserman et al., 2002; Singelis et al., 1995). Moreover, even when a cultural orientation may be prevalent at a given time or situation, the same country, society, group or

individual might exhibit other cultural orientation at a later time or when faced with a different situation (Gouveia et al., 2003).

### **Cultural orientation and alcohol use**

Different studies have examined, at the individual level, the associations between patterns of cultural orientation and behaviors that entail risk for personal health, including substance use. Overall, results have suggested that higher individualism is associated with greater substance use while collectivism has, depending on the study, either non-significant or protective effects. For instance, higher individualism was associated with more drinking days and number of drinks per week but not with alcohol-related problems in a sample of U.S. college students (Foster et al., 2014). In a sample of Russian adolescents, higher individualism was associated with greater substance use and higher risky sexual behavior whereas collectivism was negatively associated with risky sexual behavior (Pokhrel et al., 2018). Studies conducted in China indicated that higher individualism and lower collectivism were associated, via hopelessness, with greater substance use in a sample of young adults (Du et al., 2014); while individualism was positively associated with lifetime use of non-medical use of prescription drugs in a sample of college students (Tam et al., 2018). Another study with Chinese college students showed that the traditional Western cultural orientation (i.e., an individualistic-related orientation), but not the traditional Chinese cultural orientation (i.e., a collectivistic-related orientation), increased the odds of recent alcohol consumption (Wang et al., 2016).

Using data from 74 countries, Inman et al. (2017) found that cultural value orientation was significantly associated with alcohol use. Among other results, they found that autonomy (i.e., being independent, a feature associated with individualism) and embeddedness (i.e., being part of a collective) were positively and negatively, respectively, associated with

alcohol consumption. Specifically, they found that those who placed more value on autonomy exhibited greater alcohol use while those greatly valuing embeddedness displayed lower alcohol use. Altogether, past research has suggested that specific patterns of cultural orientation or attitudes are associated with risky behaviors and substance use. Moreover, and within a given country, individual differences in these cultural patterns are associated with increased or decreased vulnerability for alcohol use outcomes. However, less is known about the association between individual cultural orientation and alcohol outcomes in samples from different countries/regions. This has been highlighted as a research gap that needs to be addressed (Inman et al., 2017).

### **Cultural orientation and Drinking Motives**

Different mechanisms may underlie the effect of cultural orientation on drinking, yet intriguing recent research pinpoint drinking motives as a likely mediator of this association. Drinking motives are proximal antecedents of alcohol use (Cooper, 1994; Cox & Klinger, 1988) that mediate the effect of distal variables on drinking behaviors (Cooper et al., 2016). Bresin and Mekawi (2021), using meta-analytic structural equation models, found that enhancement motives were the strongest predictor of alcohol use, while enhancement and coping motives showed the strongest associations with drinking problems. However, the relationship between enhancement motives and drinking problems was mainly mediated by alcohol use. Additionally, social motives related with alcohol use, while conformity motives related negatively with alcohol use and positively with drinking problems.

When cultural features are considered, it seems that some differences among countries arose. For instance, adolescents from the northern region of Europe (traditionally characterized by socially accepting infrequent occasions of excessive drinking) compared to those from the southern region (typically characterized by socially accepting the frequent

consumption of moderate amounts of alcohol) endorsed more drinking motives (Kuntsche et al., 2015). Similarly, college students from Hungary, that has been typically characterized as an individualistic country with frequent heavy consumption, reported a higher mean in social, enhancement and coping motives than their peers from Spain, that has been traditionally known as a collectivistic country with a Mediterranean drinking style (Németh et al., 2011). Although the association between drinking motives and alcohol outcomes was fairly similar across both countries, enhancement motives were associated with drinking problems only among students from Spain (Németh et al., 2011).

Mackinnon et al. (2017) compared drinking motives in samples of college students from 10 countries that were previously classified as individualistic or collectivistic. Although all college students, regardless of their country of origin, reported to engage in drinking behaviors for highly similar reasons, positive reinforcement drinking motives (i.e., social and enhancement) were more prominent in college students from countries categorized as individualistic (e.g., Canada, U.K., and U.S.) than in college students from countries described as collectivistic (e.g., Brazil, Mexico, Portugal and Spain). Altogether, these findings suggest cultural features (such as individualism or collectivism) influence drinking motives. Notably, this has been mainly examined at the country/region level and less is known about the association of individual levels of cultural orientation and drinking motives.

### **Purpose of the present study**

The present study tested a model examining whether the relationship between vertical and horizontal individualist and collectivist attitudes on the individual level indirectly relate to college drinking (i.e., alcohol use and alcohol-related negative consequences) via drinking motives in a sample of college students from several countries/regions. Given the present study is predominantly exploratory, there were no a priori hypotheses for the associations

between features of cultural orientation and alcohol outcomes via drinking motives. However, it could be postulated that higher individualism would be positively indirectly associated with drinking outcomes via higher drinking motives (mainly positive reinforcement drinking motives).

The model put forward in the present study was tested in college students from seven countries and three continents: U.S., Canada, Spain, Uruguay, Argentina, South Africa and England. Therefore, an additional aim was to examine whether the proposed associations were culturally-universal (i.e., invariant) or culturally-specific (i.e., non-invariant) across countries or regions. These countries differ in their patterns of alcohol use (Bloomfield et al., 2003), alcohol-related consequences (Graham et al., 2011; Bravo et al., 2019) and also in other variables relevant to understand drinking behaviors such as college life, minimum legal drinking age and the role of alcohol in daily life (including the availability and price of alcoholic beverages). It is important to remark that the aim was not to compare nations against each other but instead individual reflections of cultural attitudes on drinking motives and substance use. In this, we align with a growing set of studies (e.g., Ford & Mauss, 2015; Triandis & Gelfand, 1998) that, challenging the widespread description of countries as purely individualist or collectivist, suggested that cultural orientation should be better described as individual instead of societal attitudes.

## **Method**

### **Sample and procedure**

A convenience sample of 9171 college students enrolled in 12 universities across seven countries (U.S., Canada, Spain, England, Argentina, Uruguay, and South Africa) completed an online survey assessing risk and protective factors associated with addictive



behaviors (see Anonymous, 2021 for more information about the recruitment procedure). The survey was programmed following a planned missingness design (Graham et al., 2006; Schafer, 1997), such that all participants completed a set of sociodemographic and substance use measures followed by a randomly selected set of 12 measures (out of a total of 17 measures). For the present study, we considered data from past-month drinkers who completed the individualism/collectivism measure ( $n = 4093$  [72.8% female]: U.S.,  $n = 1892$  [69.77% female]; Canada,  $n = 808$ , [71.66% female]; South Africa,  $n = 314$  [84.07% female]; Spain,  $n = 353$  [73.65% female]; Argentina,  $n = 382$  [76.96% female]; Uruguay  $n = 65$  [84.6% female]; England,  $n = 279$  [78.8% female]). Since only 65 participants from the Uruguayan sample reported alcohol use within the previous month and completed the cultural orientation measures, we combined this and the Argentinian samples and labeled them as “South America” ( $n = 447$  [78.97% female]). Uruguay and Argentina are neighboring South-American countries with a large cultural overlap (Rocha et al., 2017) in key elements of daily/college life, family organization, language and economy. Although independent t-test between Uruguay and Argentinian students revealed statistically significant mean differences for VC and three motives dimensions, these differences were not large (VC, Cohen’s  $d = 0.28$ ; social motives Cohen’s  $d = 0.20$ ; coping motives Cohen’s  $d = 0.24$ ; conformity motives Cohen’s  $d = 0.24$ ). Study procedures were approved by the institutional review boards (or the international equivalent) for each participating university.

## **Measures**

We conducted multi-group confirmatory factor analyses (MG-CFA) using a diagonally weighted least squares (WLSMV) estimator in Mplus 8.3 (Muthén & Muthén, 1998-2018) to determine the factorial invariance of the questionnaires assessing constructs in our model prior to our main analyses. Invariance testing of all measures supported at least

metric invariance (i.e., item-factor loadings similar across groups [Putnick, & Bornstein, 2016]) across countries, language, and sex. This is a necessary step when examining associations between a set of constructs across different groups (analyses available upon request). Supplemental Tables 1 to 6 present internal consistency of all psychometric measures by country.

***Alcohol Use.*** The survey assessed several indicators of last-month alcohol use but, for the purpose of the present study, we used responses to past 30-day typical quantity of alcohol use. This section included a visual guide about typical drinks (specific to each country) to orient participants with the Standard Drink Units (SDUs) concept. Participants indicated the number of standard drinks they typically consumed during each of six 4-hour blocks of time (12a-4a, 4a-8a, 8a-12p, etc.) during a “typical week” in the past 30 days. We calculated typical quantity of alcohol use by summing the total number of standard drinks consumed across time blocks during the typical week. To make accurate comparisons across countries, the total number of Standard Drink Units (SDUs) consumed (summed) were transformed into grams of alcohol, taking into account country specific SDU rates based on grams of alcohol (quantity estimates >3SDs above the mean were Winsorized).

***Alcohol-related Problems.*** We used the 24-item Brief-Young Adult Alcohol Consequences Questionnaire (B-YAACQ; Kahler et al., 2005), or its Spanish version (Pilatti et al., 2014) for measurements in Argentina, Spain, and Uruguay, to assess past 30-day alcohol-related problems. Each item was scored dichotomously and participants reported the presence/absence of the alcohol-related problem in the past month (0 = *no*, 1 = *yes*). We summed all items to create a composite score that reflects the total number of consequences experienced in that period. Reliability analyses of the total score was  $\alpha = .86$  in the total sample.

***Drinking motives.*** Drinking motives were assessed with using the Drinking Motives Questionnaire-Revised Short Form (DMQ-R SF, Kuntsche & Kuntsche, 2009) and its Spanish version (Mezquita et al., 2018). This measure encompasses 12 items (3 per dimension) that assess social, coping, enhancement, and conformity motives. Participants indicated how often (1 = *almost never/never* to 5 = *almost always/always*) they drink for each reason. Reliability analyses of the subscales' scores in the total sample were as follow: social,  $\alpha = .91$ ; coping,  $\alpha = .83$ ; enhancement,  $\alpha = .76$ ; conformity,  $\alpha = .87$ .

***Individualism and Collectivism.*** Cultural attitudes were measured using the Vertical and Horizontal Individualism and Collectivism Scale (Singelis et al., 1995) or its Spanish version (Gouveia et al., 2003) for Spanish-speaking students. The measure assesses, via Likert-like options (1 = *strongly disagree* to 9 = *strongly agree*), agreement with statements specifically aimed at each of the four facets of vertical and horizontal individualism and collectivism. The Spanish version (Gouveia et al., 2003) largely resemble the original English version, yet it features a few differences. We used a slightly modified Spanish version that fully resembles the content of the original English version. The rationale was to guarantee content correspondence between the two measures. Specifically, two items of the original English version that were absent in the Spanish adaptation were adapted from English into Spanish and three items were slightly modified to assurance content similarity. All these tasks were performed by bilingual researchers of the research team. Factor analyses and invariance testing of this measure supported a 17-item 4-factor model fit was acceptable on fit indices and metric invariant across countries, language, and sex (see Klein et al., 2021 for further details). Reliability analyses of the subscales' scores were as follow in the total sample: HI (3 items),  $\alpha = .65$ ; VI (4 items),  $\alpha = .78$ ; HC (6 items),  $\alpha = .80$ ; VC (4 items),  $\alpha = .58$ .

### ***Data analysis plan***

First, we conducted Pearson correlations to examine bivariate associations between cultural orientation, drinking motives and alcohol outcomes (i.e., typical alcohol use and alcohol-related negative consequences). Then, we examined the indirect associations between individual cultural orientation and alcohol outcomes via drinking motives. Specifically, and considering the cross-sectional nature of the data, we conducted atemporal mediation analysis (Winer et al., 2016) which provides information about the association between the predictor and the outcome variables after accounting for the shared relation among all variables in the model. We employed a fully saturated path model such that all dimensions of cultural orientation have paths estimated on alcohol-related negative consequences via each type of drinking motives and alcohol use (e.g., VI → coping → alcohol use → alcohol-related negative consequences). We examined the total, indirect, and direct effects of each distal variable on alcohol outcomes using bias-corrected bootstrapped estimates (Efron & Tibshirani, 1994), based on 10,000 bootstrapped samples. Considering the large sample size, statistical significance was determined by 99% bootstrapped confidence intervals not containing zero. Then, we conducted  $\chi^2$  difference tests to examine whether the mediation model was invariant or non-invariant across countries/cultures and across sex. Specifically, we compared a freely estimated multi-group model to a constrained multi-group model (i.e., constraining the paths of the mediation model) to determine whether constraining the paths to be equivalent across countries or sex resulted in a significantly worse fitting model. Given the  $\chi^2$  test statistics sensitivity to sample size (Brown, 2015), a more stringent alpha level was used ( $\alpha=.01$ ). We also relied on model comparison criteria of  $\Delta CFI \leq 0.01$  (Cheung & Rensvold, 2002) to determine misfit. The correlation analyses were performed with SPSS 23.0 and the path analyses were conducted with Mplus 8.3 (Muthén &

Muthén, 1998-2018).

## Results

Bivariate correlations and descriptive statistics of all study variables among the total sample are shown in Table 1 (for country specific statistics, see Supplemental Tables 1-6). The total, total indirect, specific indirect, and direct effects of the mediation model are summarized in Table 2 and Figure 1 (see also Supplemental Table 7 for the direct associations between cultural features and drinking motives). The results of the atemporal mediation model are described below as a function of each dimension of drinking motives.

### *Mediation Results by Drinking Motives Dimension*

***Social Motives.*** Social motives significantly mediated the association of VI and VC with alcohol outcomes (alcohol use and negative consequences). That is, greater VI and greater VC were associated with more alcohol use and greater number of alcohol-related problems via the endorsement of more social motives. Additionally, the double mediated paths from VI/VC to alcohol-related problems via social motives and alcohol use was statistically significant (i.e., VI/VC → social motives → typical week alcohol consumption → alcohol-related negative consequences).

***Coping Motives.*** All dimensions of cultural orientation but HC were positively associated with greater alcohol use and alcohol problems via a greater motivation to use alcohol to alleviate negative mood (i.e., HI/VI/VC → coping motives → alcohol-related negative consequences). Moreover, the double mediated paths for HI, VI and VC were statistically significant such that each of these cultural orientations was related to alcohol-related problems via drinking to cope and alcohol use. HC, in turn, was negatively associated with alcohol use and number of problems via coping motives. The double mediated path from HC to alcohol-related problems via drinking to cope and alcohol use (i.e., HC → coping

motives → typical week alcohol consumption → alcohol-related negative consequences) was statistically significant. That is, greater HC was associated with lower motivation to use alcohol to cope with negative mood which, in turn, lead to lower use of alcohol which was subsequently associated with fewer alcohol-related problems.

***Enhancement Motives.*** Drinking motivated to increase positive mood significantly mediated the association between VI and alcohol outcomes (e.g., VI → enhancement motives → alcohol-related negative consequences). The paths from VI to alcohol problems via enhancement motives and alcohol use were significant. This doubled mediated path suggest that those exhibiting greater level of VI were more motivated to drink to increase positive mood which was associated with greater alcohol use which was associated with more alcohol-related negative consequences.

***Conformity Motives.*** Conformity motives significantly mediated the associations linking the four patterns of cultural orientation and alcohol outcomes. VI and VC were negatively associated with alcohol use but positively associated with alcohol-related problems via conformity motives. That is, higher level of VI and VC was associated with lower alcohol use but more negative drinking consequences. HC and HI were positively associated with alcohol use but negatively associated with alcohol problems via conformity motives. Additionally, the double mediated paths from VI, HC, HI and VC to alcohol-related problems via conformity motives and alcohol use were statistically significant.

Even when accounting for all other predictors in the model, HI and VI had significant direct effects on alcohol use. Specifically, lower HI and higher VI were significantly associated with alcohol use. None of the cultural orientation dimensions had significant direct effects on alcohol-related negative consequences, once accounting for all other predictors.

***Structural invariance testing across countries and gender***

The comparison of the freely estimated multi-group model to the constrained multi-group model indicated that the model was invariant across sex ( $[\chi^2_{(33)} = 51.80, p = 0.02]$ ; CFI = 0.998 [ $\Delta$ CFI = 0.002]; TLI = 0.996; RMSEA = 0.013 [90% CI (0.005, 0.020)]) but was not invariant across countries ( $[\chi^2_{(165)} = 394.189, p < .001]$ ; CFI = 0.977 [ $\Delta$ CFI = 0.023]; TLI = 0.968; RMSEA = 0.036 [90% CI (0.032, 0.041)]). We identified those paths with the greatest contribution to reducing model fit within the fully constrained model to detect where the lack of invariance was located. In the final multi-group model ( $[\chi^2_{(140)} = 231.636, p < .001]$ ; CFI = 0.991 [ $\Delta$ CFI = 0.009]; TLI = 0.985; RMSEA = 0.025 [90% CI (0.019, 0.030)]), all the associations were constrained across countries with the exception of five paths: alcohol use  $\rightarrow$  alcohol-related negative consequences; enhancement motives  $\rightarrow$  alcohol-related negative consequences; enhancement motives  $\rightarrow$  alcohol use; VI  $\rightarrow$  conformity motives; HC  $\rightarrow$  conformity motives.

More in detail, the association between alcohol use and negative consequences was significant across all countries. However, this association was lower in Spain ( $\beta = .263$  [.145, .380]) and South-America ( $\beta = .287$  [.240, .371]) compared to U.S. ( $\beta = .329$  [.274, .384]), Canada ( $\beta = .360$  [.283, .438]), South-Africa ( $\beta = .388$  [.271, .504]) and England ( $\beta = .394$  [.267, .521]). Similarly, the association between enhancement motives and negative consequences was significant in all countries but the magnitude of the association was lower in U.S. ( $\beta = .091$  [.039, .143]) and Canada ( $\beta = .095$  [.026, .164]) compared to Spain ( $\beta = .160$  [.047, .272]), South-America ( $\beta = .218$  [.139, .296]), South-Africa ( $\beta = .148$  [.050, .246]) and England ( $\beta = .217$  [.115, .319]). The association between enhancement motives and alcohol use was also significant in all countries but these associations were larger in U.S. ( $\beta = .281$  [.229, .334]), England ( $\beta = .333$  [.228, .437]) and Canada ( $\beta = .275$  [.201, .349]) compared to Spain ( $\beta = .182$  [.058, .307]), South-America ( $\beta = .136$  [.042, .230]), and South-

Africa ( $\beta = .150$  [.043, .257]). Additionally, two paths involving cultural orientation and conformity motives were differently associated across countries. Specifically, the association between VI and conformity motives was significant in U.S. ( $\beta = .113$  [.057, .170]), Canada ( $\beta = .164$  [.084, .244]), South-Africa ( $\beta = .186$  [.044, .328]) and England ( $\beta = .224$  [.104, .344]) but non-significant in Spain ( $\beta = .081$  [-.036, .198]) and South-America ( $\beta = .079$  [-.036, .194]). Finally, the association between HC and conformity motives was non-significant in Canada ( $\beta = -.051$  [-.135, .032]) and South-America ( $\beta = -.010$  [-.135, .115]) but significant in U.S. ( $\beta = -.145$  [-.20.6, -.085]), Spain ( $\beta = -.199$  [-.308, -.090]), South-Africa ( $\beta = -.159$  [-.278, -.039]) and England ( $\beta = -.175$  [-.314, -.036]).

### **Discussion**

Our findings suggest that certain individual cultural features are positively (suggesting a risk factor) or negatively (suggesting a protective factor) linked with alcohol outcomes (i.e., use and negative consequences) via drinking motives. Notably, most of these associations remained invariant across countries/regions, supporting that these features of cultural orientation are not homogeneously distributed within each country but, instead, these patterns seem to influence drinking behaviors mainly at the individual level. Despite this overall similar pattern of associations across countries, a few differences emerged. It should also be noted that some of the direct and indirect associations between cultural orientation and drinking outcomes were small and the percentage of explained variance for drinking motives was low. This most likely suggests that other variables, different to drinking motives, may better explain the link between cultural orientation and alcohol outcomes. We further discuss all these findings and their implications keeping in mind these constraints and the cross-sectional nature of the study.



Focusing on drinking motives as the most proximal variables of alcohol outcomes, and similarly to recent findings presented in a meta-analytical study (Bresin & Mekawi, 2021), we found that the four drinking motives dimensions had significant direct associations with alcohol use and negative consequences. The positive association between alcohol use and enhancement motives was the strongest while the negative association with conformity motives was the weakest. Also similar to the meta-analysis, the positive association between enhancement and drinking problems was largely explained by increased alcohol use, whereas the positive relation between coping motives and drinking problems was only partially explained by increased alcohol use (Bresin & Mekawi, 2021).

In line with previous research (Foster et al., 2014; Inman et al., 2017; Pokhrel et al., 2018), VI was associated with greater alcohol use and, indirectly, with more alcohol-related problems. As VI stresses competition with others (Albarracin et al., 2018; Shavitt, & Cho, 2016), the present findings suggest that students higher in individualism, particularly those who prioritize distinguish from others via competition, might be at increased risk for excessive alcohol use and more alcohol-related problems. Results also expands previous work by suggesting that this association is mainly indirect via positive reinforcement motives (social and enhancement) and to a lesser extent through coping and conformity motives. Furthermore, our results suggest that the associations of individualism with drinking outcomes through positive reinforcement motives (Németh et al., 2011; Mackinnon et al., 2017) and coping motives (Németh et al., 2011) found in previous studies, may be mainly rooted in the vertical, rather than the horizontal, component of individualism.

Patrick et al. (2011) found social motives to negatively relate to use of protective strategies, such as choosing not to drink, pacing drinks, or avoiding drinking games. Social motives have previously been associated with increased risk of problematic drinking, and the

greater number of social motive items reported, the greater the risk of all problematic drinking indicators, as measured by the Alcohol Use Disorders Identification Test (Van Damme et al., 2013). Altogether, this information suggests that a hierarchy focused cultural orientation (mainly VI but, to a lesser extent, also VC) combined with social motives may be indicative of an individual's reaction to social pressures or expectations, especially from others who may be perceived to have more social power. This may manifest in a feeling of obligation to either participate or compete with others in the context of alcohol consumption, potentially leading to increased alcohol consumption as well as alcohol related consequences.

The discrepancies of past research concerning the association between collectivism and substance use, with some suggesting non-significant associations (Pokhrel et al., 2018) and others suggesting a protective effect (Inman et al., 2017), could have emerged because each type of collectivism (vertical or horizontal) seems to be differently related to drinking outcomes. Moreover, although both types of collectivism were related to negative reinforcement motives (i.e., coping and conformity) the direction of the associations was negative for HC and positive for VC. HC values the interest of the group and the equality of its members and aims for the pursuit of outcomes that are equally beneficial for both the self and the other persons (Moon et al., 2018). Our data suggests that this cultural orientation feature may have a protective effect by lowering engaging in alcohol use or experiencing alcohol-related problems for coping motives. That is, students who place value to the interests of the group and see each member as an equal and interdependent partner may be less prone to engage in alcohol use as a way to alleviate negative affect. As Sivadas et al. (2008) have noted, VC centers around duty and sacrifice for the group and individuals high on this orientation feature may feel obligated to participate in certain activities, which can explain the positive association of VC with conformity motives. Additionally, these situations may

generate negative emotions, which could motivate the use of alcohol to regulate affect.

It is important to note that we found a paradoxical effect in the case of the indirect associations via conformity motives, as HC was indirectly related to higher alcohol use and lower drinking problems through conformity motives, and VC was related to lower drinking and higher problems. This paradoxical effect is due to the negative and positive association of conformity motives with alcohol use and drinking problems, respectively, a result that has been found in previous studies (Bresin & Mekawi, 2021). Previous research has argued that these two pathways may work against one another such as they did not find a net effect of conformity motives on drinking problems (Bresin & Mekawi, 2021). Similarly, the total indirect effect of horizontal and vertical collectivism on drinking was non-significant, suggesting a compensatory effect of drinking motives on alcohol use, while the protective role of horizontal collectivism and the increase risk of vertical collectivism on alcohol-related negative consequences through negative reinforcement motives was significant.

### **Cross-cultural differences**

The associations between variables evidenced a few differences across countries/regions. Although alcohol use and negative consequences were significantly associated across all countries/regions, the magnitude of this association was lower in Spain and South-America compared to the remaining countries. Spain, Argentina and Uruguay are countries where alcohol use with family members or in family settings are common behaviors and where frequent alcohol consumption of moderate quantities has been socially accepted. In that sense, it is possible that some level of alcohol use could generate less problems in these countries. Supporting this, previous work found that some alcohol-related problems (e.g., interpersonal problems) were low in Argentina, Uruguay and Spain (Graham et al. 2011). Additionally, the stronger association between alcohol use and problems could be

reflecting differences in alcohol use, particularly in binge drinking involvement, across countries. Binge drinking is a pattern commonly associated with alcohol-related problems (Krieger et al., 2018). Notably, in the present study, the samples from Spain and South America exhibited the lowest mean in past-month frequency of binge drinking (U.S. = 2.45, Canada = 2.00, South Africa = 2.45, Spain = 1.44, South America = 1.38 and England = 4.40 days/month).

Differences in alcohol use, particularly in heavy episodic drinking, could be also involved in the findings concerning the associations between enhancement motives and both drinking outcomes. The associations involving enhancement motives and alcohol use were significant in all countries but larger in U.S., England and Canada than in Spain, South-America and South-Africa. Enhancement motives have been consistently associated with greater alcohol use (Bresin & Mekawi, 2021; Cooper et al., 2016; Merrill et al., 2014) and, therefore, it is possible that the stronger association is reflecting a higher motivation to engage in heavy drinking sessions. On the contrary, the association between enhancement motives and negative consequences was significant in all countries but lower in U.S. and Canada than in the other countries. This is fairly similar to past research showing that enhancement motives were significantly associated with alcohol problems among college students from Spain but not among those from Hungary (Németh et al., 2011). As in the study by Németh et al., this could be associated with variations in the frequency of heavy drinking.

The association between VI and conformity motives was significant in U.S, Canada, South-Africa and England, but not in Spain and South-America. This association may reflect, among those who perceive society as a hierarchical pyramid and attempt to achieve special status, a broader tendency to avoid rejection and interpersonal conflict with figures of power or considered influential for the purposes of upward social mobility. Notably, Canada, U.S.

and the England (but not South Africa) exhibit greater levels of the latter construct than Spain and, particularly, Argentina. In addition, the association between HC and conformity motives was significant in U.S., Spain, South-Africa and England; but not in Canada or South-America. Future work is needed to ascertain the mechanisms underlying these intriguing country- or region-specific associations.

### **Limitations and future research**

These findings should be interpreted considering some limitations. We used a large and diverse sample of college students from seven countries; however, the use of a convenience sample limits generalization to other college students. Additionally, the study cross-sectional nature of the study design hinders the evaluation of temporal effects between distal, proximal and dependent variables. Considering the small effect sizes of some paths and the low percentage of the explained variance for drinking motives, future research would benefit from using a longitudinal design to temporally examine the mediation role of drinking motives or other possible mediators on the association between cultural orientation and alcohol outcomes.

### **Conclusions**

The present study, albeit preliminary, suggests there are significant associations between components of cultural orientation (i.e., horizontal and vertical collectivism and individualism) and drinking outcomes. The study moves forward from traditional approaches by exploring these associations at the individual level, instead of assuming that individuals within one country are homogeneously culturally oriented. Moreover, this study sampled participants from seven countries, which contrasts from most studies on cultural orientation and problem behavior, which have been conducted in the U.S. or in Southeast Asia.

The present study suggests a potential mechanism through which these features may

modulate drinking quantity and alcohol-related consequences. Specifically, these features seem to be associated indirectly with drinking outcomes, and differently mediated by drinking motives. Within this sample of participants, the results suggest that vertical individualism and horizontal collectivism connect, respectively, to greater or lower alcohol involvement (or to the report of alcohol-related negative consequences) mainly via increased positive reinforcement or decreased negative reinforcement drinking motives. These associations need to be confirmed in future studies that will also benefit from including other potential mediators.

### References

- Albarracín, D., Jones, C. R., Hepler, J., & Li, H. (2018). Liking for Action and the Vertical/Horizontal Dimension of Culture in Nineteen Nations: Valuing Equality over Hierarchy Promotes Positivity Towards Action. *Revista Interamericana de Psicología = Interamerican Journal of Psychology*, *51*, 335–343.
- Bloomfield, K., Stockwell, T., Gmel, G., & Rehn, N. (2003). International comparisons of alcohol consumption. *Alcohol Research & Health*, *27*(1), 95–109.
- Bobbio, A., & Sarrica, M. (2009). Horizontal and vertical individualism and collectivism: an Italian adaptation of Singelis et al.'s scale and its relations with conflict management and leadership styles. *Testing, Psychometrics, Methodology in Applied Psychology*, *16*, 209-226.
- Anonymous (2021). Young adult concurrent use and simultaneous use of alcohol and marijuana: A cross-national examination among college students in seven countries. *Addictive Behaviors Reports*, *100373*. <https://doi.org/10.1016/j.abrep.2021.100373>
- Bravo, A. J., Pilatti, A., Pearson, M. R., Read, J. P., Mezquita, L., Ibáñez, M. I., & Ortet, G.

- (2019). Cross-cultural examination of negative alcohol-related consequences: Measurement invariance of the Young Adult Alcohol Consequences Questionnaire in Spain, Argentina, and USA. *Psychological Assessment, 31*(5), 631–642. <https://doi.org/10.1037/pas0000689>
- Bresin, K., & Mekawi, Y. (2021). The “Why” of Drinking Matters: A Meta-Analysis of the Association Between Drinking Motives and Drinking Outcomes. *Alcoholism: Clinical and Experimental Research, 45*, 38–50. <https://doi.org/10.1111/acer.14518>
- Brown, T. A. (2015). *Confirmatory factor analysis for applied research* (2nd ed.). New York: Guilford Press.
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9*, 233–255. [http://dx.doi.org/10.1207/S15328007SEM0902\\_5](http://dx.doi.org/10.1207/S15328007SEM0902_5).
- Chiou J. S. (2001). Horizontal and vertical individualism and collectivism among college students in the United States, Taiwan, and Argentina. *The Journal of Social Psychology, 141*, 667–678. <https://doi.org/10.1080/00224540109600580>
- Cooper, M. L., Kuntsche, E., Levitt, A., Barber, L. L., & Wolf, S. (2016). Motivational models of substance use: A review of theory and research on motives for using alcohol, marijuana, and tobacco. In K. J. Sher (Ed.), *The Oxford handbook of substance use and substance use disorders* (pp. 375–421). Oxford University Press.
- Cooper, M. L. (1994). Motivations for alcohol use among adolescents: Development and validation of a four-factor model. *Psychological Assessment, 6*, 117–128. <https://doi.org/10.1037/1040-3590.6.2.117>
- Cox, W. M., & Klinger, E. (1988). A motivational model of alcohol use. *Journal of Abnormal Psychology, 97*(2), 168–180. <https://doi.org/10.1037//0021-843x.97.2.168>

- Du, H., Li, X., Lin, D., & Tam, C. C. (2014). Hopelessness, individualism, collectivism, and substance use among young rural-to-urban migrants in China. *Health Psychology and Behavioral Medicine*, 2(1), 211–220. <https://doi.org/10.1080/21642850.2014.888656>
- Efron, B., & Tibshirani, R. J. An introduction to the bootstrap. CRC press. 1994.
- Ford, B. Q., & Mauss, I. B. (2015). Culture and emotion regulation. *Current Opinion in Psychology*, 3, 1–5. <https://doi.org/10.1016/j.copsyc.2014.12.004>
- Foster, D. W., Yeung, N., & Quist, M. C. (2014). The influence of individualism and drinking identity on alcohol problems. *International Journal of Mental Health and Addiction*, 12(6), 747–758. <https://doi.org/10.1007/s11469-014-9505-2>
- Gouveia, V. V., Clemente, M., & Espinosa, P. (2003). The horizontal and vertical attributes of individualism and collectivism in a Spanish population. *The Journal of Social Psychology*, 143(1), 43–63. <https://doi.org/10.1080/00224540309598430>
- Graham, J. W., Taylor, B. J., Olchowski, A. E., & Cumsille, P. E. (2006). Planned missing data designs in psychological research. *Psychological Methods*, 11(4), 323-343. <https://doi.org/10.1037/1082-989X.11.4.323>
- Graham, K., Bernards, S., Knibbe, R., Kairouz, S., Kuntsche, S., Wilsnack, S. C., Greenfield, T. K., Dietze, P., Obot, I., & Gmel, G. (2011). Alcohol-related negative consequences among drinkers around the world. *Addiction*, 106, 1391–1405. <https://doi.org/10.1111/j.1360-0443.2011.03425.x>
- Inman, R. A., da Silva, S., Bayoumi, R. R., & Hanel, P. (2017). Cultural Value Orientations and Alcohol Consumption in 74 Countries: A Societal-Level Analysis. *Frontiers in Psychology*, 8, 1963. <https://doi.org/10.3389/fpsyg.2017.01963>
- Johnson T. P. (2007). Cultural-level influences on substance use & misuse. *Substance Use & Misuse*, 42(2-3), 305–316. <https://doi.org/10.1080/10826080601142022>



- Kahler, C. W., Strong, D. R., & Read, J. P. (2005). Toward efficient and comprehensive measurement of the alcohol problems continuum in college students: the brief young adult alcohol consequences questionnaire. *Alcoholism, Clinical and Experimental Research, 29*(7), 1180–1189. <https://doi.org/10.1097/01.alc.0000171940.95813.a5>
- Khosrowjerdi, M., Sundqvist, A. & Byström, K. (2020). Cultural Patterns of Information Source Use: A Global Study of 47 Countries. *Journal of the Association for Information Science and Technology, 71*, 711–724. <https://doi.org/10.1002/asi.24292>
- Klein, N. D., Bravo, A. J., Conway, C. C., Keough, M. T., Pilatti, A., Mezquita, L., & Cross-Cultural Addictions Study Team. (2021). Individualism, collectivism, and emotion regulation: A cross-cultural examination among young adults from seven countries. *Manuscript submitted for review.*
- Krieger, H., Young, C. M., Anthenien, A. M., & Neighbors, C. (2018). The Epidemiology of Binge Drinking Among College-Age Individuals in the United States. *Alcohol Research: Current Reviews, 39*(1), 23–30.
- Kuntsche, E., & Kuntsche, S. (2009). Development and validation of the Drinking Motive Questionnaire Revised Short Form (DMQ-R SF). *Journal of Clinical Child and Adolescent Psychology, 38*, 899–908. <https://doi.org/10.1080/15374410903258967>
- Kuntsche, E., Wicki, M., Windlin, B., Roberts, C., Gabhainn, S. N., van der Sluijs, W., Aasvee, K., Gaspar de Matos, M., Dankulinová, Z., Hublet, A., Tynjälä, J., Välimaa, R., Bendtsen, P., Vieno, A., Mazur, J., Farkas, J., & Demetrovics, Z. (2015). Drinking motives mediate cultural differences but not gender differences in adolescent alcohol use. *The Journal of Adolescent Health, 56*(3), 323–329. <https://doi.org/10.1016/j.jadohealth.2014.10.267>
- Mackinnon, S. P., Couture, M. E., Cooper, M. L., Kuntsche, E., O'Connor, R. M., Stewart,

- S. H., & DRINC Team (2017). Cross-cultural comparisons of drinking motives in 10 countries: Data from the DRINC project. *Drug and Alcohol Review, 36*(6), 721–730. <https://doi.org/10.1111/dar.12464>
- Merrill, J. E., Wardell, J. D., & Read, J. P. (2014). Drinking motives in the prospective prediction of unique alcohol-related consequences in college students. *Journal of Studies on Alcohol and Drugs, 75*(1), 93–102. <https://doi.org/10.15288/jsad.2014.75.93>
- Mezquita, L., Ibáñez, M. I., Moya-Higueras, J., Villa, H., Arias, B., Fañanás, L., & Ortet, G. (2018). Psychometric properties of Drinking Motives Questionnaire-Revised (DMQ-R) in Spanish adolescents. *European Journal of Psychological Assessment, 34*, 145–153. <https://doi.org/10.1027/1015-5759/a000319>
- Moon, C., Travaglino, G. A., & Uskul, A. K. (2018). Social Value Orientation and Endorsement of Horizontal and Vertical Individualism and Collectivism: An Exploratory Study Comparing Individuals from North America and South Korea. *Frontiers in Psychology, 9*, 2262. <https://doi.org/10.3389/fpsyg.2018.02262>
- Muthén, L. K., & Muthén, B. O. (1998-2018). Mplus user's guide (seventh ed.). Los Angeles, CA: Muthén & Muthén.
- Németh, Z., Urbán, R., Kuntsche, E., San Pedro, E. M., Roales Nieto, J. G., Farkas, J., Futaki, L., Kun, B., Mervó, B., Oláh, A., & Demetrovics, Z. (2011). Drinking motives among Spanish and Hungarian young adults: a cross-national study. *Alcohol and Alcoholism, 46*(3), 261–269. <https://doi.org/10.1093/alcalc/agr019>
- Oyserman, D., Coon, H. M., & Kemmelmeier, M. (2002). Rethinking individualism and collectivism: evaluation of theoretical assumptions and meta-analyses. *Psychological Bulletin, 128*(1), 3–72.

- Patrick, M. E., Lee, C. M., & Larimer, M. E. (2011). Drinking motives, protective behavioral strategies, and experienced consequences: Identifying students at risk. *Addictive Behaviors, 36*(3), 270–273. <https://doi.org/10.1016/j.addbeh.2010.11.007>
- Pilatti, A., Read, J. P., Vera, B., Caneto, F., Garimaldi, J. A., & Kahler, C. W. (2014). The Spanish version of the Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ): a Rasch model analysis. *Addictive Behaviors, 39*(5), 842–847. <https://doi.org/10.1016/j.addbeh.2014.01.026>
- Pokhrel, P., Bennett, B. L., Regmi, S., Idrisov, B., Galimov, A., Akhmadeeva, L., & Sussman, S. (2018). Individualism-Collectivism, Social Self-Control and Adolescent Substance Use and Risky Sexual Behavior. *Substance Use & Misuse, 53*(7), 1057–1067.
- Putnick, D. L., & Bornstein, M.H. (2016). Measurement invariance conventions and reporting: The state of the art and future directions for psychological research. *Developmental Review, 41*, 71-90. <https://doi.org/10.1016/j.dr.2016.06.004>.
- Rocha, V., Ladas, E. J., Lin, M., Cacciavillano, W., Ginn, E., Kelly, K. M., Chantada, G., & Castillo, L. (2017). Beliefs and Determinants of Use of Traditional Complementary/Alternative Medicine in Pediatric Patients Who Undergo Treatment for Cancer in South America. *Journal of Global Oncology, 3*(6), 701–710. <https://doi.org/10.1200/JGO.2016.006809>
- Schafer, J. L. (1997). Analysis of incomplete multivariate data. New York: Chapman Hall.
- Schreier, S. S., Heinrichs, N., Alden, L., Rapee, R. M., Hofmann, S. G., Chen, J., Oh, K. J., & Bögels, S. (2010). Social anxiety and social norms in individualistic and collectivistic countries. *Depression and Anxiety, 27*(12), 1128–1134. <https://doi.org/10.1002/da.20746>

- Shavitt, S., & Cho, H. (2016). Culture and Consumer Behavior: The Role of Horizontal and Vertical Cultural Factors. *Current Opinion in Psychology*, 8, 149–154. <https://doi.org/10.1016/j.copsyc.2015.11.007>
- Singelis, T. M., Triandis, H. C., Bhawuk, D. P. S., & Gelfand, M. J. (1995). Horizontal and vertical dimensions of individualism and collectivism: A theoretical and measurement refinement. *Cross-Cultural Research*, 29(3), 240–275. <https://doi.org/10.1177/106939719502900302>
- Sivadas, E., Bruvold, N., & Nelson, M. (2008). A reduced version of the horizontal and vertical individualism and collectivism scale: A four-country assessment. *Journal of Business Research* 61, 201-210. <https://doi.org/10.1016/j.jbusres.2007.06.016>
- Tam, C. C., Benotsch, E. G., Wang, X., Lin, D., Du, H., & Chi, P. (2018). Non-medical use of prescription drugs and cultural orientation among college students in China. *Drug and Alcohol Dependence*, 192, 271–276. <https://doi.org/10.1016/j.drugalcdep.2018.08.012>
- Triandis, H. C., & Gelfand, M. J. (1998). Converging measurement of horizontal and vertical individualism and collectivism. *Journal of Personality and Social Psychology*, 74(1), 118–128. <https://doi-org/10.1037/0022-3514.74.1.118>
- Van Damme, J., Maes, L., Clays, E., Rosiers, J. F., Van Hal, G., & Hublet, A. (2013). Social motives for drinking in students should not be neglected in efforts to decrease problematic drinking. *Health Education Research*, 28(4), 640–650. <https://doi.org/10.1093/her/cyt036>
- Wang, S., Newman, I. M., & Shell, D. F. (2016). Cultural Orientation and Its Associations with Alcohol Use by University Students in China. *PloS One*, 11(11), e0165858. <https://doi.org/10.1371/journal.pone.0165858>

Winer, E. S., Cervone, D., Bryant, J., McKinney, C., Liu, R. T., & Nadorff, M. R. (2016). Distinguishing mediational models and analyses in clinical psychology: Atemporal associations do not imply causation. *Journal of Clinical Psychology, 72*(9), 947–955. <https://doi.org/10.1002/jclp.22298>

**Figure caption**

Figure 1. Depiction of the significant standardized effects of the fully saturated mediation model. Significant associations were determined by a 99% bias-corrected standardized bootstrapped confidence interval (based on 10,000 bootstrapped samples) that does not contain zero. Non-significant path coefficients are not shown in the figure for reasons of parsimony.

**Table 1.**

Bivariate correlations and descriptive statistics among study variables in total sample

	1	2	3	4	5	6	7	8	9	10	M	SD
1. Horizontal Individualism	<b>.12</b>	<b>.13</b>	.02	.02	<b>.05</b>	.02	<b>-.04</b>	<b>-.04</b>	.01		6.51	1.50
2. Vertical Individualism			-.01	<b>.19</b>	<b>.19</b>	<b>.11</b>	<b>.14</b>	<b>.18</b>	<b>.10</b>	<b>.09</b>	4.39	1.79
3. Horizontal collectivism				<b>.31</b>	.01	<b>-.12</b>	-.00	<b>-.10</b>	-.02	<b>-.06</b>	6.79	1.34
4. Vertical Collectivism					<b>.10</b>	<b>.08</b>	.03	<b>.13</b>	-.00	.02	5.17	1.50
5. Social Motives						<b>.30</b>	<b>.70</b>	<b>.39</b>	<b>.27</b>	<b>.39</b>	3.16	1.23
6. Coping Motives							<b>.37</b>	<b>.36</b>	<b>.17</b>	<b>.37</b>	1.82	.94
7. Enhancement Motives								<b>.29</b>	<b>.34</b>	<b>.42</b>	2.74	1.08
8. Conformity Motives									<b>.08</b>	<b>.27</b>	1.59	.90
9. Alcohol Typical Quantity										<b>.44</b>	124.42	115.55
10. Negative Consequences											4.73	4.36

Note. Significant correlations ( $p < .05$ ) are in bold typeface for emphasis.

**Table 2.***Summary of total, indirect, and direct effects of comprehensive mediation path model*

Alcohol Outcome Variables:		<i>Alcohol Use</i>		<i>Negative Consequences</i>	
Predictor Variable: <i>Horizontal Individualism</i>	$\beta$	99% CI	$\beta$	99% CI	
Total	<b>-.049</b>	<b>-.096, -.003</b>	.008	-.033, .050	
Total indirect <sup>a</sup>	.007	-.008, .023	-.008	-.033, .018	
Social Motives	-.001	-.005, .003	-.001	-.006, .004	
Coping Motives	<b>.005</b>	<b>.001, .009</b>	<b>.012</b>	<b>.004, .021</b>	
Enhancement Motives	.000	-.011, .011	.000	-.006, .006	
Conformity Motives	<b>.003</b>	<b>.000, .006</b>	<b>-.004</b>	<b>-.007, -.000</b>	
Alcohol Typical Quantity	---		<b>-.018</b>	<b>-.032, -.004</b>	
Social Motives - Alcohol Typical Quantity	---		.000	-.001, .001	
Coping Motives - Alcohol Typical Quantity	---		<b>.002</b>	<b>.000, .003</b>	
Enhancement Motives - Alcohol Typical Quantity	---		.000	-.004, .004	
Conformity Motives - Alcohol Typical Quantity	---		<b>.001</b>	<b>.000, .002</b>	
Direct	<b>-.056</b>	<b>-.100, -.012</b>	.016	-.019, .051	
Predictor Variable: <i>Vertical Individualism</i>					
Total	<b>.098</b>	<b>.051, .145</b>	<b>.085</b>	<b>.045, .126</b>	
Total indirect <sup>a</sup>	<b>.048</b>	<b>.032, .063</b>	<b>.100</b>	<b>.075, .126</b>	
Social Motives	<b>.016</b>	<b>.007, .026</b>	<b>.022</b>	<b>.013, .031</b>	
Coping Motives	<b>.006</b>	<b>.001, .010</b>	<b>.015</b>	<b>.006, .023</b>	
Enhancement Motives	<b>.037</b>	<b>.025, .050</b>	<b>.018</b>	<b>.010, .026</b>	
Conformity Motives	<b>-.011</b>	<b>-.018, -.005</b>	<b>.014</b>	<b>.007, .021</b>	
Alcohol Typical Quantity	---		<b>.016</b>	<b>.001, .031</b>	
Social Motives - Alcohol Typical Quantity	---		<b>.005</b>	<b>.002, .008</b>	
Coping Motives - Alcohol Typical Quantity	---		<b>.002</b>	<b>.000, .003</b>	
Enhancement Motives - Alcohol Typical Quantity	---		<b>.012</b>	<b>.008, .016</b>	
Conformity Motives - Alcohol Typical Quantity	---		<b>-.004</b>	<b>-.006, -.001</b>	
Direct	<b>.050</b>	<b>.005, .096</b>	-.015	-.049, .019	
Predictor Variable: <i>Horizontal collectivism</i>					
Total	-.012	-.061, .036	<b>-.065</b>	<b>-.110, -.019</b>	
Total indirect <sup>a</sup>	-.003	-.020, .013	<b>-.046</b>	<b>-.072, -.020</b>	
Social Motives	-.001	-.005, .003	-.001	-.006, .004	
Coping Motives	<b>-.012</b>	<b>-.019, -.005</b>	<b>-.030</b>	<b>-.040, -.020</b>	
Enhancement Motives	.000	-.011, .011	.000	-.006, .006	
Conformity Motives	<b>.009</b>	<b>.003, .015</b>	<b>-.011</b>	<b>-.017, -.005</b>	
Alcohol Typical Quantity	---		-.003	-.018, .012	
Social Motives - Alcohol Typical Quantity	---		.000	-.001, .001	
Coping Motives - Alcohol Typical Quantity	---		<b>-.004</b>	<b>-.006, -.001</b>	
Enhancement Motives - Alcohol Typical Quantity	---		.000	-.004, .004	
Conformity Motives - Alcohol Typical Quantity	---		<b>.003</b>	<b>.001, .005</b>	
Direct	-.009	-.056, .038	-.018	-.057, .020	
Predictor Variable: <i>Vertical Collectivism</i>					
Total	-.024	-.072, .025	.025	-.019, .068	
Total indirect <sup>a</sup>	.005	-.011, .021	<b>.033</b>	<b>.007, .059</b>	
Social Motives	<b>.006</b>	<b>.001, .011</b>	<b>.008</b>	<b>.002, .014</b>	
Coping Motives	<b>.008</b>	<b>.003, .013</b>	<b>.020</b>	<b>.011, .029</b>	
Enhancement Motives	.001	-.011, .012	.000	-.005, .006	
Conformity Motives	<b>-.010</b>	<b>-.016, -.003</b>	<b>.012</b>	<b>.006, .018</b>	
Alcohol Typical Quantity	---		-.009	-.024, .006	
Social Motives - Alcohol Typical Quantity	---		<b>.002</b>	<b>.000, .004</b>	
Coping Motives - Alcohol Typical Quantity	---		<b>.003</b>	<b>.001, .004</b>	
Enhancement Motives - Alcohol Typical Quantity	---		.000	-.004, .004	



Conformity Motives - Alcohol Typical Quantity	---		<b>-.003</b>	<b>-.005, -.001</b>
Direct	-.029	-.076, .018	-.008	-.044, .028

*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. <sup>a</sup>Reflects the combined indirect associations within the model.

**Supplementary Table 1.**

Bivariate correlations and descriptive statistics among study variables in the U.S. sample

	1	2	3	4	5	6	7	8	9	10	M	SD
1. Horizontal Individualism	<u>.71</u>	<b>.18</b>	<b>.16</b>	<b>.07</b>	.02	<b>.06</b>	.01	-.04	<b>-.07</b>	.02	6.46	1.56
2. Vertical Individualism		<u>.77</u>	<b>.08</b>	<b>.14</b>	<b>.14</b>	<b>.08</b>	<b>.08</b>	<b>.11</b>	<b>.08</b>	<b>.07</b>	4.66	1.71
3. Horizontal collectivism			<u>.82</u>	<b>.38</b>	.03	<b>-.10</b>	.02	<b>-.10</b>	-.03	<b>-.06</b>	6.67	1.38
4. Vertical Collectivism				<u>.57</u>	.04	.03	-.03	<b>.05</b>	-.03	.01	5.22	1.43
5. Social Motives					<u>.91</u>	<b>.29</b>	<b>.67</b>	<b>.36</b>	<b>.27</b>	<b>.37</b>	3.21	1.21
6. Coping Motives						<u>.85</u>	<b>.38</b>	<b>.39</b>	<b>.16</b>	<b>.35</b>	1.87	0.99
7. Enhancement Motives							<u>.75</u>	<b>.28</b>	<b>.35</b>	<b>.39</b>	2.90	1.08
8. Conformity Motives								<u>.87</u>	<b>.06</b>	<b>.28</b>	1.61	0.91
9. Alcohol Typical Quantity									--	<b>.43</b>	138.74	126.74
10. Negative Consequences										<u>.88</u>	4.76	4.58

Note. Cronbach's alphas are underlined and shown on the diagonals. Significant correlations ( $p < .05$ ) are in bold typeface for emphasis.

**Supplementary Table 2.**

Bivariate correlations and descriptive statistics among study variables in the Canada sample

	1	2	3	4	5	6	7	8	9	10	M	SD
1. Horizontal Individualism	<u>.64</u>	<b>.08</b>	<b>.10</b>	.06	.02	.07	.03	.02	.00	.03	6.57	1.41
2. Vertical Individualism		<u>.75</u>	.02	<b>.13</b>	<b>.15</b>	<b>.06</b>	<b>.17</b>	<b>.18</b>	<b>.08</b>	<b>.10</b>	4.82	1.69
3. Horizontal collectivism			<u>.80</u>	<b>.38</b>	-.00	<b>-.11</b>	-.00	-.03	-.01	-.07	6.77	1.32
4. Vertical Collectivism				<u>.58</u>	<b>.09</b>	<b>.09</b>	.03	<b>.19</b>	-.03	.01	5.44	1.50
5. Social Motives					<u>.92</u>	<b>.26</b>	<b>.70</b>	<b>.39</b>	<b>.32</b>	<b>.39</b>	3.42	1.23
6. Coping Motives						<u>.83</u>	<b>.33</b>	<b>.31</b>	<b>.17</b>	<b>.40</b>	1.93	1.03
7. Enhancement Motives							<u>.73</u>	<b>.33</b>	<b>.35</b>	<b>.44</b>	2.74	1.06
8. Conformity Motives								<u>.86</u>	<b>.10</b>	<b>.27</b>	1.81	1.03
9. Alcohol Typical Quantity									--	.50	128.40	114.95
10. Negative Consequences										<u>.86</u>	4.18	4.07

Note. Cronbach's alphas are underlined and shown on the diagonals. Significant correlations ( $p < .05$ ) are in bold typeface for emphasis.

**Supplementary Table 3.**

Bivariate correlations and descriptive statistics among study variables in the South African sample

	1	2	3	4	5	6	7	8	9	10	M	SD
1. Horizontal Individualism	<u>.57</u>	<b>.18</b>	-.03	-.07	.04	<b>.14</b>	.07	.00	.04	.01	6.62	1.36
2. Vertical Individualism		<u>.76</u>	.04	.09	<b>.13</b>	.07	<b>.11</b>	<b>.19</b>	.11	<b>.11</b>	4.11	1.70
3. Horizontal collectivism			<u>.82</u>	<b>.34</b>	-.03	.01	.00	<b>-.12</b>	-.01	-.10	6.94	1.32
4. Vertical Collectivism				<u>.53</u>	-.04	.11	-.02	-.03	-.06	-.06	5.27	1.42
5. Social Motives					<u>.90</u>	<b>.29</b>	<b>.68</b>	<b>.33</b>	<b>.26</b>	<b>.43</b>	3.21	1.18
6. Coping Motives						<u>.78</u>	<b>.42</b>	<b>.21</b>	<b>.23</b>	<b>.44</b>	1.84	0.89
7. Enhancement Motives							<u>.76</u>	<b>.18</b>	<b>.27</b>	<b>.42</b>	2.77	1.05
8. Conformity Motives								<u>.80</u>	.07	<b>.30</b>	1.51	0.78
9. Alcohol Typical Quantity									--	<b>.49</b>	90.58	84.78
10. Negative Consequences										<u>.85</u>	5.59	4.47

Note. Cronbach's alphas are underlined and shown on the diagonals. Significant correlations ( $p < .05$ ) are in bold typeface for emphasis.

**Supplementary Table 4.**

Bivariate correlations and descriptive statistics among study variables in the Spain sample

	1	2	3	4	5	6	7	8	9	10	M	SD
1. Horizontal Individualism	<u>.61</u>	.09	<b>.25</b>	.02	<b>.11</b>	.02	.10	-.02	.10	.02	6.63	1.40
2. Vertical Individualism		<u>.79</u>	-.03	<b>.26</b>	<b>.19</b>	<b>.16</b>	<b>.13</b>	<b>.13</b>	-.01	<b>.23</b>	3.82	1.77
3. Horizontal collectivism			<u>.83</u>	<b>.24</b>	.06	<b>-.16</b>	.01	<b>-.18</b>	.10	-.06	6.99	1.38
4. Vertical Collectivism				<u>.60</u>	<b>.11</b>	.00	.06	.07	.00	.07	5.05	1.51
5. Social Motives					<u>.87</u>	<b>.24</b>	<b>.73</b>	<b>.30</b>	<b>.24</b>	<b>.39</b>	2.87	1.16
6. Coping Motives						<u>.81</u>	<b>.32</b>	<b>.32</b>	<b>.12</b>	<b>.30</b>	1.51	0.69
7. Enhancement Motives							<u>.79</u>	<b>.26</b>	<b>.28</b>	<b>.41</b>	2.42	1.04
8. Conformity Motives								<u>.85</u>	.02	<b>.23</b>	1.31	0.63
9. Alcohol Typical Quantity									--	<b>.36</b>	105.09	94.78
10. Negative Consequences										<u>.83</u>	4.36	3.83

Note. Cronbach's alphas are underlined and shown on the diagonals. Significant correlations ( $p < .05$ ) are in bold typeface for emphasis.

**Supplementary Table 5.**

Bivariate correlations and descriptive statistics among study variables in the South-American sample

	1	2	3	4	5	6	7	8	9	10	M	SD
1. Horizontal Individualism	<u>.63</u>	.07	<b>.10</b>	-.05	<b>.11</b>	.07	<b>.13</b>	.01	.09	<b>.11</b>	6.71	1.61
2. Vertical Individualism		<u>.77</u>	<b>-.17</b>	<b>.16</b>	<b>.15</b>	.07	<b>.09</b>	<b>.10</b>	-.01	<b>.11</b>	3.16	1.79
3. Horizontal collectivism			<u>.68</u>	<b>.16</b>	<b>-.10</b>	<b>-.20</b>	<b>-.11</b>	-.03	-.06	<b>-.10</b>	6.97	1.20
4. Vertical Collectivism				<u>.58</u>	.07	.05	.05	<b>.10</b>	-.00	<b>.11</b>	4.40	1.69
5. Social Motives					<u>.88</u>	<b>.30</b>	<b>.71</b>	<b>.31</b>	<b>.21</b>	<b>.44</b>	2.51	1.14
6. Coping Motives						<u>.74</u>	<b>.35</b>	<b>.23</b>	<b>.18</b>	<b>.44</b>	1.61	0.76
7. Enhancement Motives							<u>.76</u>	<b>.20</b>	<b>.22</b>	<b>.46</b>	2.26	1.00
8. Conformity Motives								<u>.82</u>	-.03	<b>.18</b>	1.23	0.55
9. Alcohol Typical Quantity									--	<b>.39</b>	107.62	106.22
10. Negative Consequences										<u>.82</u>	4.23	3.75

Note. Cronbach's alphas are underlined and shown on the diagonals. Significant correlations ( $p < .05$ ) are in bold typeface for emphasis.

**Supplementary Table 6.**

Bivariate correlations and descriptive statistics among study variables in the England sample

	1	2	3	4	5	6	7	8	9	10	M	SD
1. Horizontal Individualism	<u>.62</u>	.10	-.01	-.11	.01	.06	-.03	-.01	-.11	-.08	6.08	1.35
2. Vertical Individualism		<u>.75</u>	-.10	<b>.18</b>	.10	.07	-.02	<b>.24</b>	.02	.06	4.31	1.57
3. Horizontal collectivism			<u>.80</u>	<b>.23</b>	<b>.18</b>	<b>-.19</b>	<b>.16</b>	<b>-.16</b>	.11	-.02	6.97	1.22
4. Vertical Collectivism				<u>.53</u>	<b>.17</b>	<b>.13</b>	.01	<b>.22</b>	.02	-.02	5.23	1.33
5. Social Motives					<u>.89</u>	<b>.25</b>	<b>.64</b>	<b>.37</b>	<b>.30</b>	<b>.45</b>	3.84	1.01
6. Coping Motives						<u>.79</u>	<b>.30</b>	<b>.42</b>	<b>.10</b>	<b>.30</b>	1.97	0.92
7. Enhancement Motives							<u>.71</u>	<b>.20</b>	<b>.40</b>	<b>.52</b>	3.10	1.00
8. Conformity Motives								<u>.89</u>	.06	<b>.23</b>	2.13	1.14
9. Alcohol Typical Quantity									--	<b>.54</b>	131.48	105.84
10. Negative Consequences										<u>.86</u>	6.56	4.64

Note. Cronbach's alphas are underlined and shown on the diagonals. Significant correlations ( $p < .05$ ) are in bold typeface for emphasis.

**Supplemental Table 7.**

Summary of direct effects of cultural orientation features on drinking motives.

Cultural orientation features	<i>Drinking Motives</i>							
	<i>Social</i>		<i>Coping</i>		<i>Enhancement</i>		<i>Conformity</i>	
	$\beta$	99% CI	$\beta$	99% CI	$\beta$	99% CI	$\beta$	99% CI
Horizontal Individualism	-.006	-.048, .036	<b>.063</b>	<b>.023, .103</b>	.000	-.042, .043	<b>-.041</b>	<b>-.080, -.002</b>
Vertical Individualism	<b>.178</b>	<b>.137, .220</b>	<b>.074</b>	<b>.034, .115</b>	<b>.141</b>	<b>.100, .182</b>	<b>.157</b>	<b>.118, .196</b>
Horizontal collectivism	-.007	-.050, .036	<b>-.155</b>	<b>-.197, -.112</b>	.000	-.043, .043	<b>-.128</b>	<b>-.170, -.086</b>
Vertical Collectivism	<b>.065</b>	<b>.022, .109</b>	<b>.104</b>	<b>.061, .147</b>	.002	-.042, .047	<b>.132</b>	<b>.091, .173</b>

*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.

**Supplemental Table 2.**

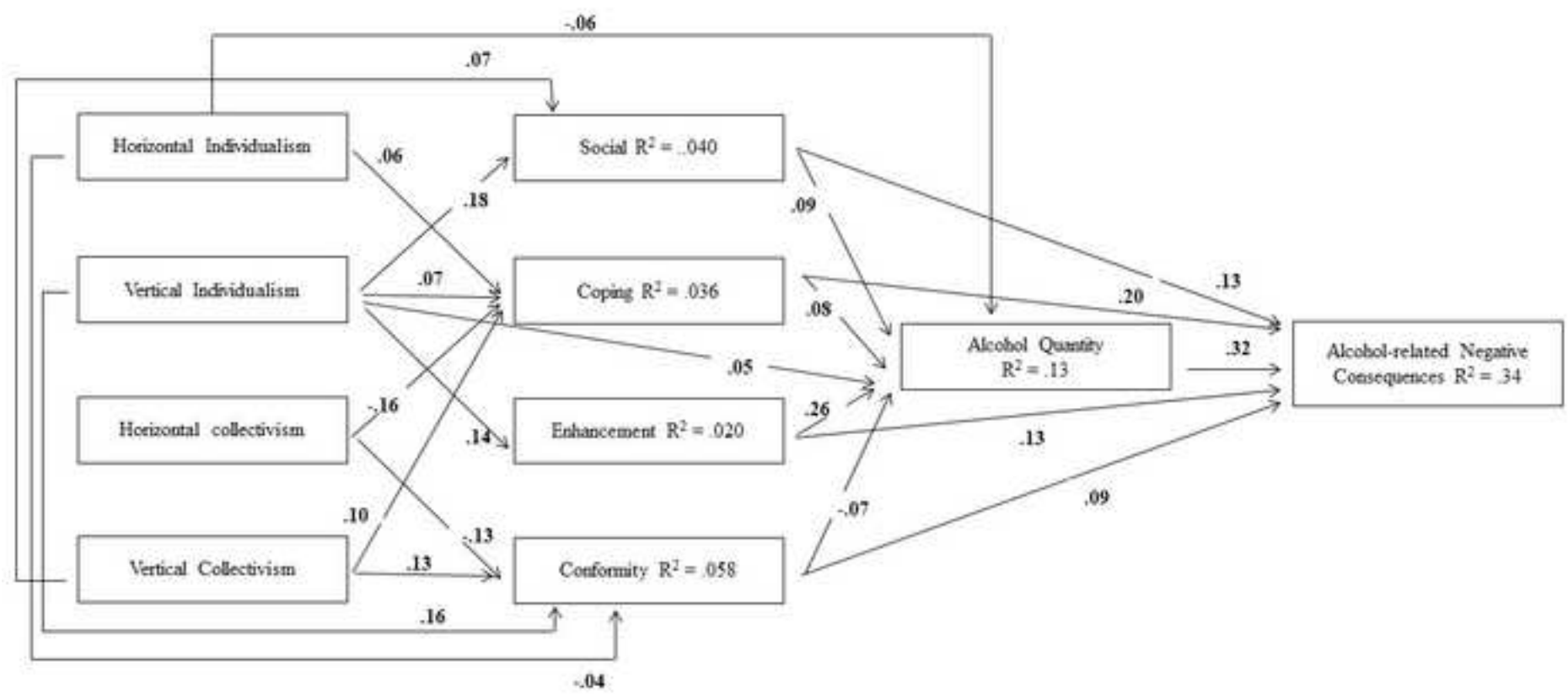
Summary of direct effects of cultural orientation features on drinking motives.

Drinking Motives	<i>Alcohol outcomes</i>			
	<i>Alcohol Use</i>		<i>Negative Consequences</i>	
	$\beta$	99% CI	$\beta$	99% CI
Social	<b>.092</b>	<b>.045, .139</b>	<b>.125</b>	<b>.085, .165</b>
Coping	<b>.075</b>	<b>.036, .114</b>	<b>.195</b>	<b>.161, .229</b>
Enhancement	<b>.263</b>	<b>.216, .310</b>	<b>.129</b>	<b>.089, .169</b>
Conformity	<b>-.072</b>	<b>-.111, -.033</b>	<b>.089</b>	<b>.053, .125</b>

*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.



Figure



### **Role of Funding Sources**

Dr. Bravo was supported by a training grant (T32-AA018108) from the National Institute on Alcohol Abuse and Alcoholism (NIAAA) in the United States during the duration of data collection for this project. Data collection was supported, in part, by grant T32-AA018108. NIAAA had no role in the study design, collection, analysis or interpretation of the data, writing the manuscript, or the decision to submit the paper for publication. Data collection in Spain was also supported by grants UJI-A2019-08 from the Universitat Jaume I and RTI2018-099800-B-I00 from the Spanish Ministry of Science, Innovation and Universities (MCIU). Data collection in Argentina was also supported by grants from the National Secretary of Science and Technology (FONCYT, grant number PICT 2018-03170) and by grants from the Secretary of Science and Technology- National University of Córdoba (SECyT-UNC).

### **Corresponding Author**

Angelina Pilatti, Ph.D. Instituto de Investigaciones Psicológicas, IIPSI, Unidad Ejecutora CONICET. Córdoba, Argentina. Facultad de Psicología, Universidad Nacional de Córdoba. Bv de la Reforma y Enfermera Gordillo s/n, Ciudad Universitaria, 5000, Córdoba, Argentina. [apilatti@unc.edu.ar](mailto:apilatti@unc.edu.ar)

### **Conflict of interest**

All authors declare that they have no conflicts of interest.

### **Ethics**

Study procedures were approved by the institutional review boards (or the international equivalent) for each participating university. The study was conducted in accordance with the declaration of Helsinki and it followed the ethical guidelines of the American Psychological Association (2016).

**Informed consent.** All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all participants for being included in the study.

### **Acknowledgments**

The authors would like to thank all the participants that took part of the study.