

Cross-Cultural Examination of Negative Alcohol-related Consequences: Measurement  
Invariance of the Young Adult Alcohol Consequences Questionnaire in Spain, Argentina,  
and USA

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Cross-Cultural Examination of Negative Alcohol-related Consequences: Measurement  
Invariance of the Young Adult Alcohol Consequences Questionnaire in Spain, Argentina,  
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#### **Contributors**

Dr. Bravo coordinated the efforts of the research team, conceptualized the research questions, conducted the analyses and edited the introduction, method, and results sections of the first draft.

Dr. Pilatti drafted the introduction, statistical analyses, and results sections (including tables) and edited the abstract and parts of the discussion. Dr. Pearson assisted with the statistical analyses, and edited the introduction, method, results and discussion sections of the first draft. Dr. Read wrote the general discussion and edited the clinical implications section of the discussion section and the other sections of the first draft. Drs. Mezquita, Ibáñez, and Ortet drafted the abstract and parts of the 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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### Abstract

The present study examined measurement invariance of the 48-item, 8-factor, Young Adult Alcohol Consequences Questionnaire (YAACQ) across nationality in college students from U.S., Spain, and Argentina. We also compared latent mean differences and criterion-related validity (i.e., correlation with other alcohol-related outcomes) across countries. Last-month drinkers (1511) from the U.S. ( $n = 774$  [70.5% female]), Argentina ( $n = 439$  [50.6% female]) and Spain ( $n = 298$  [72.1% female]) completed an online survey measuring alcohol use, drinking motives, college alcohol beliefs and negative alcohol-related consequences. Multi-group confirmatory factor analyses supported configural and scalar invariance of a 47-item 8-factor YAACQ across countries. Overall, the correlation analysis supported criterion-related validity (i.e., strong bivariate correlations between the eight subscales and alcohol consumption, drinking motives and college alcohol beliefs) across countries. Some non-significant bivariate correlations and differences in the magnitude of the correlations across countries are discussed. Our findings expand previous work, mostly focused on U.S. samples, by supporting the YAACQ as an adequate measure to assess alcohol-related consequences in youths across countries marked by unique cultural traditions, attitudes, and policies pertaining to alcohol.

**Keywords:** alcohol-related consequences; measurement invariance; college students; cross-cultural

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### Public Significance Statement:

This study supports the notion that the Young Adult Alcohol Consequences Questionnaire is a viable tool for capturing a broad range of alcohol-related problems in college student drinkers with different cultural backgrounds. Findings revealed both commonalities and differences across cultures that have implications for the measurement and understanding of drinking problems among college students around the world.

### **Introduction**

Within many countries, alcohol use is highly prevalent among college students, with around 50% of these college students engaging in risky drinking patterns (e.g.,  $\geq 4/5$  drinks on a single occasion for women/men; Hingson, 2010; Moure-Rodríguez et al., 2014; Pilatti, Read, & Pautassi, 2017). Risky alcohol consumption represents a world-wide public health issue, given its association with a wide range of negative consequences (Hingson, 2010). For instance, college drinkers who engage in risky drinking patterns, compared to their non-risky drinking peers, endorse significantly more negative alcohol-related consequences (i.e., unsafe and unplanned sex, poor academic performance, blackouts, drunk driving; Ferreira, Martins, Coelho, & Kahler, 2014; Pilatti, Read, & Caneto, 2016), exhibit poor/impaired reaction time that could inhibit driving capabilities (Howland et al., 2010), and are at a heightened risk for the development of alcohol dependence (Hingson, 2010; Masten, Faden, Zucker, & Spear, 2009). A crucial factor for early detection and intervention targeting these at-risk students is the accurate and efficient assessment of these negative alcohol-related consequences.

### **The Young Adult Alcohol Consequences Questionnaire (YAACQ)**

There are a variety of measures that assess alcohol-related problems or problematic patterns of alcohol consumption (e.g., the Alcohol Use Disorders Identification Test; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993; the Rapid Alcohol Problems Screen, Cherpitel, 2000), but only a few have been specifically developed for use with college students. The Young Adult Alcohol Consequences Questionnaire (YAACQ; Read, Kahler, Strong, & Colder, 2006) is a comprehensive measure developed to accurately assess negative alcohol-related consequences among college students (Devos-Comby & Lange, 2008). Both the full 48-item and the brief 24-item (B-YAACQ; Kahler, Strong, &

Read, 2005) versions encompass diverse negative consequences of differing severity that fall along a continuum from mild, relatively frequent consequences (e.g., headaches) to more severe, generally infrequent consequences (e.g., withdrawal symptoms) (Ferreira et al., 2014; Kahler et al., 2005; Pilatti et al., 2016; Verster, van Herwijnen, Olivier, & Kahler, 2009).

The YAACQ, as most of the measures for the assessment of alcohol-related consequences, was developed within the U.S. (an English speaking country), but it is also available in other languages, including Spanish (Pilatti et al., 2016), Dutch (Verster et al., 2009), and Portuguese (Ferreira et al., 2014). These previous studies strongly supported the use of the YAACQ as a measure of negative alcohol-related consequences among college students with diverse cultural backgrounds. Specifically, scores on both the full (Keough, O'Connor, & Read, 2016; Pilatti et al., 2016; Read et al., 2006; Read, Merrill, Kahler, & Strong, 2007) and the brief (Ferreira et al., 2014; Kahler, Hustad, Barnett, Strong, & Borsari, 2008; Pilatti et al., 2014; Verster et al., 2009) versions have demonstrated strong psychometric properties including adequate reliability and evidence of construct (internal and convergent) and criterion-related validity.

### **Factor Structure of the YAACQ**

The 8-factor structure of the full 48-item YAACQ, which does not apply to the brief version, has been identified as one of the major advantages of this measure as the subscale information can serve to identify students who are experiencing specific types of consequences that may be targeted in intervention (Devos-Comby & Lange, 2008).

Although many studies only use the total score to assess negative consequences (Bachrach, Merrill, Bytschkow, & Read, 2012; Dvorak, Pearson, Neighbors, & Martens, 2015; Messina, Tseng, & Correia, 2015; Read & Curtin, 2007; Yurasek, Murphy, Clawson,

Dennhardt, & MacKillop, 2013), a growing number of studies examines the subscales instead of or in addition to the total score (Hustad, Barnett, Borsari, & Jackson, 2010; Lemley, Kaplan, Reed, Darden, & Jarmolowicz, 2016; Read, Beattie, Chamberlain, & Merrill, 2008; Read et al., 2007). These specific domains are: Social-Interpersonal Consequences, Academic/Occupational Consequences, Blackout Drinking, Physical Dependence, Risk Behaviors, Impaired Control, Self-Perception, and Self-Care.

Items featuring these different domains were selected and developed to represent a wide spectrum of negative alcohol-related consequences as well as addressing gender-related bias of previous measures. Specifically, women are more likely to experiment internalizing (e.g. sadness, guilt) and interpersonal (e.g., damaged relationships) consequences related to their drinking than are men. However, these negative alcohol-related consequences are mostly absent in other measures that tend to emphasize externalizing alcohol-related consequences, which are more frequently endorsed by men (Read et al., 2006). To overcome this limitation, the YAACQ was designed to measure a broad spectrum of negative consequences, including those that may be more relevant to college women. This more balanced content includes, among others, internalizing (i.e. feeling bad/guilty, not eating or sleeping properly, or being less physically/mentally active), interpersonal (i.e. drinking has created problems with a partner or a near relative) and externalizing (i.e., getting into physical fights, damaging property or doing something disruptive) negative alcohol-related consequences. The inclusion of these consequences, mostly neglected in the measures that were available at the time the YAACQ was designed, has been acknowledged as a strength of this measure as it represents the “most elaborate categorization of problems in the college drinking literature” (Devos-Comby & Lange, 2008, p.358).

### **Purpose of Present Study**

To date, we are unaware of previous work that has examined whether the YAACQ's 8 factors/domains are invariant across countries. Most psychological constructs are highly dependent of the cultural context where the tests are used; therefore, a central aspect to test development is to determine whether, across languages or groups of administration, measures operate in the same way. For instance, previous studies have found different mean number of negative alcohol-related consequences between Argentinean (Pilatti et al., 2014, 2016) and U.S. (Kahler et al., 2008; Read et al., 2006) college drinkers. Beyond possible differences in related variables (i.e., drinking patterns, age, etc.), comparisons are not valid until multi-cultural and multi-language research confirms measurement equivalence (International Test Commission, 2015). Measurement equivalence refers to the extent to which self-report items convey the same meaning, and whether responses to those items load onto the same set of factors, across languages and cultures of administration.

To inform a better understanding of how college student drinkers embedded in particular cultural contexts experience negative alcohol-related consequences, the present study aimed at examining the measurement invariance of the 48-item 8-factor YAACQ across college student drinkers in three countries (the U.S., Spain and Argentina). Specifically, the aims of the present study were: 1) to examine whether the 48-item 8-factor YAACQ operates in the same way (i.e., measurement equivalence) across countries (U.S., Spain, and Argentina); 2) examine how individuals from different countries/cultures (controlling for sex differences) compare on the number of negative alcohol-related consequences experienced (i.e., latent mean differences across factors); and 3) examine how the eight domains of negative alcohol-related consequences within the 48-item YAACQ relate to drinking behaviors, drinking motives, and college alcohol beliefs (i.e.,



beliefs regarding the degree to which alcohol use is considered an integral part of the college experience) across different countries/cultures (i.e., comparing criterion-related validity).

## **Method**

### **Participants and Procedures**

Participants were recruited from universities across the U.S. (two universities; one located in the southeast and the other in the southwest), Argentina (one university located in the Central region), and Spain (one university located in the autonomous community of Valencia) to participate in an online survey regarding personal mental health, personality traits, and alcohol use behaviors. For the U.S. southeastern site, students were recruited from a Psychology Department pool. For the U.S. southwestern site, all current students who identified as Hispanic/Latino received an email invitation to participate in the study (email list of Hispanic/Latino students provided by the registrar). In Argentina, an invitation to participate in the study was disseminated through online social networks and e-mail listings of college students. The invitation, which asked for college students enrolled in National University of Córdoba, was disseminated in academic-related groups. In Spain, students were invited to participate in the study by professors in teaching sessions of different psychology courses from the four academic courses of the degree. The Spanish psychology students were also invited to contact a student of the “opposite” gender from other departments (i.e., different degrees) to equalize the number of males and females.

Although 1,864 students were recruited across sites (see Author, 2018 for more information on the larger sample), for the present study only data from last-month drinkers (i.e., students who reported consuming alcohol at least one day in the previous month;  $n = 1,511$ ) were included in the final analysis from each sample (U.S. sites combined,  $n = 774$ ;

Argentina,  $n = 439$ , Spain,  $n = 298$ ). See Table 1 for demographic breakdown across countries. At the southeastern U.S. site, participants received research credit for completing the study which may be applied as extra credit for courses at the participating university. At the southwestern U.S. site, participants completed the survey voluntarily and did not receive any compensation for their participation. In Argentina, participants received neither a monetary compensation nor research/course credit for participating in the study. However, four cash prizes (each of  $\approx$ US\$ 36) and other items were raffled among the participants who completed the survey. In Spain, three checks of 100 euros to be used in office materials (i.e., photocopies, pens, folders) were raffled among the participants. Across all sites, students completed the same battery of measures via a computerized questionnaire using *Qualtrics* software. Study procedures were approved by the institutional review boards (or their international equivalent) at the participating universities.

### Measures

Descriptive statistics and reliability coefficients for all non-YAACQ constructs across countries are shown in Table 1. It is important to highlight that the only large mean difference (Cohen, 1992) on study variables was for college alcohol beliefs (higher endorsement among U.S. compared to Spain and Argentina).

PLEASE, INSERT TABLE 1 AROUND HERE

**Negative alcohol-related consequences.** Negative alcohol-related consequences were assessed using the 48-item YAACQ (Read et al., 2006) at the U.S. sites and the 48-item Spanish version (S-YAACQ, Pilatti et al., 2016) at the Argentina site. In the case of Spain, the Pilatti et al. (2016) version was used, although some items were reworded to Castilian Spanish. Each item was scored dichotomously to reflect presence/absence of the

alcohol-related problem in the past month (0 = *no*, 1 = *yes*). Because of the dichotomous scoring structure, the total score reflects the total number of consequences that the individual has experienced in that period. Previous psychometric studies, based on both Item Response Theory and Classical Test Theory, indicated the validity of YAACQ's scores to capture negative alcohol consequences among Spanish-speaking (Pilatti et al., 2016) and English-speaking (Read et al., 2006) students.

**Alcohol consumption.** Several dimensions of alcohol consumption were assessed via self-report questionnaires. Before completing these questionnaires, participants were first presented with a visual guide about typical drinks (specific to each country), in order to help orient them to Standard Drink Units (SDUs). Alcohol consumption was measured with the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985). Participants indicated how much they drink during a typical week in the past 30 days using a 7-day grid from Monday to Sunday. To assess the total amount of alcohol consumed during a typical week, the total number of Standard Drink Units (SDUs) consumed (summed) were transformed into grams of alcohol taking into account that in U.S and Argentina one SDU is equivalent to 14 grams of alcohol [International Alliance for Responsible Drinking (IARD), 2016; NIAAA, 2015], while in Spain it is equivalent to 10 grams (IARD, 2016; Rodríguez-Martos, Gual, & Llopis, 1999). Alcohol consumption was broken down into several indicators that were measured across all sites including two frequency measures (i.e., past 30-day frequency of alcohol use, past 30-day frequency of getting drunk), two indicators of quantity [i.e., number of SDUs consumed during a typical/heaviest week], and an indicator of binge drinking frequency (past 30-day frequency of drinking 4+/5+ SDUs in U.S. and Argentina and 5.5+/7+ in Spain for women/men in a period of two hours or less). These, or similar drinking indicators, have been successfully used to measure a variety of

drinking behaviors in previous studies with college students from U.S. (Prince, Pearson, Bravo, & Montes, 2018), Spain (Mezquita, Ibáñez, Moya, Villa, & Ortet, 2014) or Argentina (Pilatti et al., 2017).

**College alcohol beliefs.** College alcohol beliefs were assessed using the 12-item version of the College Life Alcohol Salience Scale (CLASS; Osberg et al., 2010). Although the original CLASS is a 15-item measure, previous work translating the CLASS into Spanish (some items were reworded to Castilian Spanish; Author et al., 2017) found a shortened, 12-item, version to be invariant across sex and drinker status. This shortened version was also found to be metric invariant across countries (i.e., the U.S., Spain and Argentina) with its scores showing adequate reliability coefficients across countries (alpha values ranged between .83 and .88). Therefore, the 12-item version was employed in the present study. Participants were requested to indicate their level of agreement with each statement using a 5-point response scale (1 = *Strongly Disagree*, 5 = *Strongly Agree*). We averaged items to create a total score with higher scores indicating higher college alcohol beliefs. Both construct and predictive validity have been established for the CLASS scores among college students in the U.S. (Osberg, Billingsley, Eggert, & Insana, 2012; Osberg, Insana, Eggert, & Billingsley, 2011) and Spain/Argentina (Author et al., 2018).

**Drinking motives.** Drinking motives were assessed using the 12-item Drinking Motives Questionnaire-Revised, Short Form (DMQ-R SF; Kuntsche & Kuntsche, 2009) at the U.S. sites and the 12-item Spanish version (Spanish DMQ-R SF; Mezquita et al., 2018) at the sites in Spain (some items were worded in Castilian Spanish) and Argentina. The measure assesses reasons for drinking within four domains (3 items each): social (“because it helps you enjoy a party”), conformity (“to be liked”), enhancement (“because you like the feeling”), and coping (“to cheer up when you’re in a bad mood”). We averaged items for

each subscale with higher scores indicating higher endorsement of that specific drinking motive. Previous studies with U.S. (Harbke, Laurent, & Catanzaro, 2017), Spanish (Mezquita et al., 2018) and Argentinean (Caneto, Cupani, & Pilatti, 2016) youths provided evidence of the validity and reliability of DMQ scores for measuring drinking motives.

### **Statistical Analysis**

To examine the internal structure of the 8-factor YAACQ across countries and in the total sample, we conducted confirmatory factor analyses (CFA) using a diagonally weighted least squares (WLSMV) estimator in *Mplus* 7.4 (Muthén & Muthén, 1998-2015). To evaluate overall model fit, we used model fit criteria suggested by Marsh et al. (2004) including the Comparative Fit Index (CFI)  $>.90$  (acceptable)  $>.95$  (optimal), Tucker-Lewis Index (TLI)  $>.90$  (acceptable)  $>.95$  (optimal), Root Mean Square Error of Approximation (RMSEA)  $<.06$ . Within the total sample and across sites, we estimated Cronbach's alpha from test scores using tetrachoric correlations, a procedure that is better suitable for dichotomously-scored measures (Ledesma, Macbeth, & Valero-Mora, 2011).

To determine the factorial invariance of the questionnaire across countries (i.e., U.S., Argentina, and Spain), we conducted multi-group confirmatory factor analyses (MG-CFA) using *Mplus* 7.4 with a robust weighted least squares estimator (i.e., WLSMV). Specifically, we tested two levels of measurement invariance: configural (i.e., whether all items load on the proposed factor) and scalar (i.e., whether the unstandardized item thresholds are similar across groups). It should be noted that based on the binary nature of the items, it is not possible to examine metric invariance (Schroeders & Wilhelm, 2011). Since the  $\chi^2$  test statistic is sensitive to sample size (Brown, 2015), we used model comparison criteria of  $\Delta\text{CFI}/\Delta\text{TFI} \geq .01$  (Cheung & Rensvold, 2002) and  $\Delta\text{RMSEA} \geq .015$  (Chen, 2007) to indicate significant decrement in fit when testing for measurement

invariance. If findings support both configural and scalar invariance of the models, then YAACQ factor mean scores could be compared across groups.

Finally, evidence of criterion-related validity (i.e., the relationship between the test's scores with other theoretically relevant constructs), was assessed using correlation analyses among the 8 factors of the YAACQ and drinking motives (social, coping, enhancement, and conformity), alcohol use indicators (past 30-day frequency of alcohol use, past 30-day frequency of getting drunk, typical quantity, and binge drinking frequency), and college alcohol beliefs.

## Results

### CFAs and Measurement Invariance

CFA findings largely supported the 48-item, 8- inter-correlated factor model structure of the YAACQ in the total sample and across subsamples (analyses available upon request). However, item 16 ("I have felt like I needed a drink after I'd gotten up [that is, before breakfast]") caused a greater than one correlation between its latent factor (i.e., physiological dependence) and the latent factor academic/occupational consequences within the Spanish subsample (i.e., Heywood case). To make accurate estimates of measurement invariance and comparisons across countries, we report on a 47-item version of the YAACQ (i.e., dropping item 16). As with the 48-item version, CFA findings supported the 47-item, 8- inter-correlated factor model structure of the YAACQ across all subsamples and total sample. Specifically, CFA results showed adequate to excellent fit to the data on most indices for the total sample: Model  $\chi^2$  [ $\chi^2(1006) = 2431.37, p < .001$ ], CFI = .955 TLI = .952, RMSEA = .031 (90% CI [.029, .032]); Argentinean subsample: Model  $\chi^2$  [ $\chi^2(1006) = 1278.28, p < .001$ ], CFI = .970, TLI = .968, RMSEA = .025 (90% CI [.020, .029]); Spanish subsample: Model  $\chi^2$  [ $\chi^2(1006) = 1156.24, p < .001$ ], CFI = .967, TLI =

.964, RMSEA = .022 (90% CI [.015, .028]); and U.S. subsample: Model  $\chi^2$  [ $\chi^2(1006) = 1652.67, p < .001$ ], CFI = .963, TLI = .960, RMSEA = .029 (90% CI [.026, .031]). The significant Model  $\chi^2$ 's would suggest poor model fit; however, the Model  $\chi^2$  is highly sensitive to sample size (Jöreskog & Sörbom, 1993; Kline, 1998). Furthermore, exploratory analyses revealed that the 8-factor solution fit the data better (based on most fit indices) than a one factor solution model and a higher order one-factor plus eight factor model in the total sample and subsamples (based on the 47-item version; see Supplemental Table 1).

The standardized loadings (available from the authors upon request) of the indicator variables on their hypothesized factors were all salient (i.e.  $\geq .30$ ; Brown, 2015). Reliability coefficients for the scores on all eight dimensions (48-version) ranged between .83-.92 for the total sample, and ranged between .88-.94, .74-.91, and .76-.90 for the U.S., Argentinean and Spanish samples, respectively. Based on the findings reported above, measurement invariance testing was conducted and the 47-item 8-factor YAACQ was found to be invariant across the three countries<sup>1</sup> (i.e., configural and scalar invariance was met; see Table 2). Reliability coefficients for the scores on all eight dimensions (47-version) ranged between .80-.92 for the total sample, and ranged between .85-.94, .65-.91, and .64-.90 for the U.S., Argentinean and Spanish samples, respectively.

PLEASE, INSERT TABLE 2 AROUND HERE

### **Latent Mean Comparisons**

Based on the results of our measurement invariance analyses, we conducted latent mean comparisons to test for latent score mean differences by country (controlling for sex differences). We used dummy-coded indicators for country and sex (0= male, 1 = female)

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<sup>1</sup> The 48-item 8-factor YAACQ was found to be invariant across Argentina and United States (see Table 2).

as predictors of the eight subscales (i.e., latent factors) of the YAACQ. A statistically significant result indicates a significant mean difference in the latent factor between the reference group and the predictor group. To corroborate findings, we also ran ANOVAs (not controlling for sex) to compare composite means across countries (findings were largely similar to findings reported below for latent mean differences; see Table 3).

Using Argentina as the reference group and controlling for sex, we found that college students from Spain reported lower number of alcohol-related consequences on Academic/Occupational ( $b = -.222, p < .05$ ), on Risky Behaviors ( $b = -.129, p < .05$ ), and on Control ( $b = -.189, p < .01$ ) domains than Argentinean participants but did not significantly differ on Social/Interpersonal ( $b = -.069, p = .320$ ), on Self-Perception ( $b = -.059, p = .510$ ), on Blackout ( $b = .117, p = .087$ ), on Physiological Dependence ( $b = -.037, p = .714$ ), and on Self-Care ( $b = .076, p = .259$ ) domains.

Compared to college student drinkers from Argentina, U.S. student drinkers reported lower number of alcohol-related consequences on Social/Interpersonal ( $b = -.139, p < .05$ ), on Self-Perception ( $b = -.271, p < .001$ ), on Control ( $b = -.344, p < .001$ ) and on Self-Care ( $b = -.356, p < .001$ ) domains but did not significantly differ on Academic/Occupational ( $b = -.076, p = .312$ ), on Risky Behaviors ( $b = .017, p = .743$ ), on Blackout ( $b = -.093, p = .103$ ), and on Physiological Dependence ( $b = -.162, p = .052$ ) domains.

Compared to college student drinkers from Spain, we found that U.S. college students reported significantly lower scores on Self-Perception ( $b = -.214, p < .01$ ), on Blackout ( $b = -.208, p < .001$ ), on Control ( $b = -.156, p < .05$ ), and on Self-Care ( $b = -.435, p < .001$ ); significantly higher scores on Risky Behaviors ( $b = .128, p < .05$ ); but did not significantly differ on Social/Interpersonal ( $b = -.072, p = .258$ ), on Academic/Occupational



( $b = .137, p = .124$ ) and on Physiological Dependence ( $b = -.177, p = .062$ ) domains.

PLEASE, INSERT TABLE 3 AROUND HERE

### **Criterion-related validity**

Bivariate correlations were conducted between each of the eight YAACQ's subscales and drinking-related measures of drinking motives, alcohol consumption, and college alcohol beliefs. These analyses were conducted by country and results are summarized in Table 4. Overall, YAACQ scores were significantly positively associated with most outcome variables ( $p < .05$ ) supporting criterion-related validity of the YAACQ scores across different countries. Precisely, all the associations were significantly positive for the U.S. sample. For the Argentina sample, there was one non-significant association between the Academic/Occupational factor and conformity motives. For the Spain sample, there were ten non-significant associations involving the Diminished Self-Perception, Social/Interpersonal, Academic/Occupational, Risky Behaviors, Blackout Drinking, Physiological Dependence and Poor Self-care factors and drinking motives or alcohol consumption indicators (see Table 4).

PLEASE, INSERT TABLE 4 AROUND HERE

We also examined differences in correlation coefficients across countries (see Table 5) to determine if certain variables were differentially related to distinct facets of negative alcohol-related consequences. Given that statistical tests of these differences may be over-sensitive to small differences including differences in sample sizes across countries, we focused on the magnitude of these differences. Across 240 possible comparisons, we found that the average difference in correlations was .09 ( $SD = .08$ ). We considered differences  $< 1$  SD to be small, between 1 SD and 2 SD were considered medium (*italicized* in Table 5), between 2 SD and 3 SD were considered large (bolded in Table 5), and difference greater

than 3 SD were considered substantial (bolded and underlined in Table 5). Overall, we found 4 substantial differences, which were all on associations with the Academic/Occupational and Physiological Dependence factors. The largest difference observed was between conformity motives and the Academic/Occupational factor, showing a medium-sized positive correlation in the United States ( $r = .31$ ), a non-significant positive correlation in Argentina ( $r = .10$ ), and a medium-sized negative correlation in Spain ( $r = -.24$ ). The other substantial differences across countries was the association between social motives and the Physiological Dependence factor, which was modest in the United States ( $r = .25$ ), but strong in both Spain ( $r = .57$ ) and Argentina ( $r = .73$ ).

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### **Discussion**

Despite evidence that problematic drinking occurs across cultures and around the world (Mason-Jones & Cabieses, 2015; Pilatti et al., 2017; White & Hingson, 2013), much of the literature on this phenomenon has been focused on the United States. The present study sought to address this limitation of the literature by examining negative alcohol-related consequences as they occur in college students outside of the U.S. We did this by examining measurement characteristics of YAACQ scores among college students in the U.S., Spain, and Argentina. We also aimed to broaden the scope of investigation in order to understand how college student drinkers experience negative alcohol-related consequences in these countries that are marked by unique cultural traditions, attitudes, and policies pertaining to alcohol. Findings revealed both commonalities and differences across cultures that have implications for the measurement and understanding of problem drinking among college students around the world.

### **Cross-Cultural Measurement of Alcohol Consequences**

Though the factor structure of the YAACQ has been tested previously in Canadian (Keough et al., 2016) and Argentinean (Pilatti et al. 2016) samples, this is the first study to examine the equivalence of YAACQ scores across countries and cultures. We found strong support for consistency of the 8-factor structure of the YAACQ across our three samples. Specifically, the 48-item 8-factor structure was invariant across the U.S. and Argentinean samples. However, one of the items (“I have felt like I needed a drink after I'd gotten up [that is, before breakfast]”) from the Physiological Dependence scale didn't work well for Spanish participants. Although different alternatives may underlie this inadequate behavior (e.g., errors when adapting the items to Castilian or a different meaning of the item for individuals from the different cultures represented in the present study), this is probably related to the fact that students in the Spanish sample did not endorse this item as frequently as students from U.S. or Argentina (i.e., sampling issues). Indeed, only one student endorsed this item in Spain while 13 did in Argentina and 40 did in the U.S. This lower endorsement is, most likely, related to the smaller sample size of the Spanish sample that limited the occurrence of consequences, such as the one reflected by this item, that are both highly infrequent (i.e., prevalence usually around 1%) and very severe (Ferreira et al., 2014; Pilatti et al. 2014; Pilatti et al., 2016; Verster et al., 2009).

Therefore, and for the sake of providing accurate estimates of measurement invariance, we dropped that item and examined measurement invariance for the 47-item 8-factor version. Findings supported the measurement equivalence of this 47-item 8-factor structure across the three countries/cultures. That is, regardless of dropping item 16, the 8-factor solution structure was still best in each country/culture. Support for the proposed structure adds to a growing literature demonstrating the utility of the YAACQ for the assessment of drinking consequences in college populations (Ferreira et al., 2014; Verster

et al., 2009) different from where the YAACQ was initially developed (Read et al., 2006; Read et al., 2008). The YAACQ is a multidimensional measure designed to capture a wide range of alcohol-related consequences in college students. Although YAACQ dimensions load on a single, higher order factor (Pilatti et al., 2016; Read et al., 2006), its underlying structure of eight unique -interrelated sub-components (represented by subscales), is one of the strengths of this measure, as these sub-components can shed light about the specific nature of the consequences that a student may be experiencing (Devos-Comby & Lange, 2008; Read et al., 2006) and have been shown to be associated with unique etiological correlates and outcomes (Lemley et al., 2016; Merrill et al., 2014; Read et al., 2007). Replication of this 8-factor structure in our European (Spain) and Latin American (Argentina) samples suggests that the underlying structure of alcohol problems is consistent, even in these diverse regions and college contexts.

Other indications of the YAACQ's psychometric robustness across cultures were observed. Specifically, the YAACQ demonstrated configural and scalar invariance across countries, suggesting that YAACQ scores capture the consequence construct equally well, regardless of country. Support for criterion-related validity also was generally strong. The great majority ( $\geq 95\%$ ) of bivariate correlations supported criterion-related validity across countries. Additionally, we did not find many substantial differences in the associations between distinct factors of alcohol consequences and other alcohol-related variables. However, we found a few large differences that deserve some attention. Specifically, findings were less robust within the Spanish sample where, in particular, less consistent associations with drinking variables were observed. This inconsistency was most evident for the conformity drinking motives which were moderately and positively correlated with the YAACQ's Self-Perception scale, but also showed other less strong positive

correlations, even negative or non-significant, with other YAACQ subscales. Similar inconsistencies have been observed in bivariate associations involving conformity motives in previous studies with Spanish youths (Németh et al., 2011; Mezquita, Ibáñez, Ortet, 2011; Mezquita et al., 2018; Mota et al., 2010). This suggests that drinking to fit in with others is not as strongly linked to harmful alcohol-related outcomes among Spanish youth.

Differences in the bivariate associations between the YAACQ scores and external drinking-related variables, particularly those involving conformity motives, might be also related to variations in cultural orientation. College students from individualistic cultures (such as those from U.S.), compared to those from more collectivistic cultures (such as those from Spain and Argentina), exhibited significant differences in their endorsement of drinking motives (Mackinnon et al., 2017). Additionally, the smaller sample size for our Spanish site may also have reduced our ability to detect differences with inferential tests, due to less power and/or less variability across specific variables (e.g., conformity motives). More research, examining the specific association between conformity motives and particular alcohol-related consequences among Spanish youth, is needed.

We found significant differences in latent mean consequences across countries. Overall, mean number of negative alcohol-related consequences were greater among Spanish-speaking students than among U.S. students. This pattern was particularly conspicuous for self-care and self-perception subscales which measure mostly chronic (as opposed to acute) alcohol-related problems. Cultural differences, such as those related to wet/dry or individualistic/collectivistic cultures or even those related to idiosyncratic components of nightlife or other socialization patterns, might underlie these findings. Previous work suggested that persons with greater level of individualism might be more prone to avoid alcohol-related problems that interfere with personal pursuits (Foster,

Neighbors, & Young, 2014). Additionally, Kuendig et al. (2008) found that drinkers from dry cultures (such as those from U.S.), compared to those from wet cultures (such as those from Argentina and Spain), were more likely to attribute the occurrence of acute, but not chronic, alcohol-related consequences to their alcohol drinking patterns. Some differences in the characteristics of nightlife in Argentina and Spain, compared to nightlife in U.S., are worth noting. In Argentina and Spain, social activities – including those involving alcohol – often begin very late at night (e.g., it is not until 3 am that discotheques or clubs are in full function), possibly affecting (i.e., exacerbating) the occurrence of the kinds of alcohol-related consequences measured by the self-care subscale.

### **Limitations**

With this study, we examined alcohol consequences across Latin, European, and American college students. Thus, this examination spanned three different cultures, including those traditionally identified as “wet” or “dry” cultures and “collectivistic” or “individualistic” cultures. However, there is substantial cultural variability across Latin America and Europe, and as such, findings here cannot be assumed to be generalizable to other countries from similar regions. Moreover, there were certain sociodemographic information that was not collected (e.g., socioeconomic status, on-campus living status, etc.) that could have impacted study results.

Further, though we were able to offer evidence of concurrent criterion validity for the YAACQ’s scores in our three samples, the cross-sectional nature of our data preclude any conclusions about how the predictive validity of this measure may be similar or different in these populations. Though the predictive validity of the YAACQ’s scores has been demonstrated in U.S. samples (Read et al., 2007), whether it might be a similarly

useful tool for the identification of later problem alcohol involvement in other countries, including those examined here, remains unknown.

When ignoring gender, we found measurement invariance across the three countries. However, one limitation is that we were unable to examine the potential interaction of gender and culture on measurement invariance. Expectedly, several items that are reflective of a greater level of severity (Pilatti et al., 2016; Read et al., 2006) had rather low endorsement rates within our sample. When attempting to test for measurement invariance across gender subsamples within particular countries (i.e., 6 subgroups), low endorsement rates led to estimation problems based on empty/sparse cell counts. Specifically, if no one in a particular subsample endorsed a particular item, then covariances with that item cannot be estimated, which was this case within our study. The intersection between gender and culture is an important one. Though prior work has found the YAACQ generally to be robust to gender differences (e.g., Read et al., 2006; Keough et al., 2016) the question of whether the YAACQ performs differently by gender across wet and dry cultures such as those that were the focus this study remains an unanswered one. Additional studies should be conducted with larger samples and/or higher severity samples to be able to better examine the interplay between gender and country on the experience of alcohol-related problems.

### **Clinical Implications & Conclusions**

These findings suggest that, despite differences in cultural context, alcohol consequences are fairly similar among young adults from “wet” and “dry” cultures. Moreover, the YAACQ appears to offer a culturally valid way of measuring these constructs across these cultural settings. It is also important to discuss our findings in the context of the recent American Psychiatric Association’s suggestion that dimensional, as

opposed to global, measures have greater sensitivity to detect treatment changes (American Psychiatric Association, 2013). The information provided by each sub-scale can help to better identify, and more properly target, college students with particular alcohol-related problems. In this sense, the YAACQ is a useful alternative to capture not only a broad range of alcohol-related problems, but also to examine the effectiveness of treatment programs in college students with different cultural backgrounds. The availability of this measure in different languages could also help explore cultural differences or treatment changes in countries with both English and Spanish speakers, like the U.S. Overall, the present research adds evidence about the construct (i.e., measurement invariance) and criterion validity of YAACQ's scores. This instrument provides an adequate measure to assess alcohol-related consequences in youths across countries, and also to assess the effectiveness of prevention/treatment programs in these populations.



### References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.
- Bachrach, R. L., Merrill, J. E., Bytschkow, K. M., & Read, J. P. (2012). Development and initial validation of a measure of motives for pregameing in college students. *Addictive Behaviors*, 37, 1038-1045. doi: 10.1016/j.addbeh.2012.04.013
- Brown, T. A. (2015). *Confirmatory factor analysis for applied research* (2nd ed.). New York: Guilford Press.
- Caneto, F., Cupani, M., & Pilatti, A. (2014). Propiedades psicométricas de Cuestionario de Motivos de Consumo de Alcohol en Argentina. *Revista de Psicología*, 24, 21-32. doi: 10.5354/0719-0581.2014.32871.
- Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling*, 14, 464-504. doi: 10.1080/10705510701301834
- Cherpitel, C. J. (2000). A brief screening instrument for alcohol dependence in the emergency room: the RAPS 4. *Journal of Studies on Alcohol*, 61, 447-449.
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, 9, 233-255. doi: 10.1207/S15328007SEM0902\_5
- Collins, R. L., Parks, G. A., & Marlatt, G. A. (1985). Social determinants of alcohol consumption: The effects of social interaction and model status on the self-administration of alcohol. *Journal of Consulting and Clinical Psychology*, 53, 189-200. doi: 10.1037//0022-006X.53.2.189
- Devos-Comby, L., & Lange, J. E. (2008). Standardized measures of alcohol-related

- problems: A review of their use among college students. *Psychology of Addictive Behaviors*, 22, 349-361. 10.1037/0893-164X.22.3.349
- Dvorak, R. D., Pearson, M. R., Neighbors, C., & Martens, M. P. (2015). Fitting in and standing out: increasing the use of alcohol protective behavioral strategies with a deviance regulation intervention. *Journal of Consulting and Clinical Psychology*, 83, 482-493. doi: 10.1037/a0038902
- Ferreira, J. A., Martins, J. S., Coelho, M. S., & Kahler, C. W. (2014). Validation of brief young adult alcohol consequences questionnaire (B-YAACQ): portuguese version. *The Spanish Journal of Psychology*, 17, E17. doi: 10.1017/sjp.2014.74
- Foster, D. W., Neighbors, C., & Young, C. M. (2014). Drink refusal self-efficacy and implicit drinking identity: An evaluation of moderators of the relationship between self-awareness and drinking behavior. *Addictive Behaviors*, 39, 196-204. Doi: 10.1016/j.addbeh.2013.09.024
- Harbke, C. R., Laurent, J., & Catanzaro, S. J. (2017). Comparison of the Original and Short Form Drinking Motives Questionnaire-Revised with high school and underage college student drinkers. *Assessment*. doi: 10.1177/1073191117731812.
- Hingson, R. W. (2010). Magnitude and prevention of college drinking and related problems. *Alcohol Research & Health*, 33, 45-54.
- Howland, J., Rohsenow, D. J., Littlefield, C. A., Almeida, A., Heeren, T., Winter, M., ... & Hermos, J. (2010). The effects of binge drinking on college students' next- day academic test- taking performance and mood state. *Addiction*, 105, 655-665. doi: 10.1111/j.1360-0443.2009.02880.x
- Hustad, J. T., Barnett, N. P., Borsari, B., & Jackson, K. M. (2010). Web-based alcohol prevention for incoming college students: A randomized controlled trial. *Addictive*

- Behaviors*, 35, 183-189. doi: 10.1016/j.addbeh.2009.10.012
- International Alliance for Responsible Drinking. (2016). *Drinking guidelines: General population. NIAAA Newsletter*. Retrieved from <http://www.iard.org/policy-tables/drinking-guidelines-general-population>
- International Test Commission. (2015). *Guidelines for practitioner use of test revisions, obsolete tests, and test disposal*. Retrieved from: [https://www.intestcom.org/files/guideline\\_test\\_disposal.pdf](https://www.intestcom.org/files/guideline_test_disposal.pdf)
- Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: User's guide*. Chicago: Scientific Software.
- Kahler, C. W., Hustad, J., Barnett, N. P., Strong, D. R., & Borsari, B. (2008). Validation of the 30-day version of the Brief Young Adult Alcohol Consequences Questionnaire for use in longitudinal studies. *Journal of Studies on Alcohol and Drugs*, 69, 611-615. doi: 10.15288/jsad.2008.69.611
- 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 Experimental Research*, 29, 1180-1189. doi: 10.1097/01.ALC.0000171940.95813.A5
- Keough, M. T., O'Connor, R. M., & Read, J. P. (2016). Replication and validation of the Young Adult Alcohol Consequences Questionnaire in a large sample of Canadian undergraduates. *Alcoholism: Clinical and Experimental Research*, 40, 1093-1099. doi: 10.1111/acer.13039
- Kuendig, H., Plant, M. A., Plant, M. L., Miller, P., Kuntsche, S., & Gmel, G. (2008). Alcohol-related adverse consequences: cross-cultural variations in attribution process among young adults. *European journal of public health*, 18, 386-391. doi:

10.1093/eurpub/ckn007

Kline, R. B. (1998). *Principles and practice of structural equation modeling*. New York, NY: Guilford Press.

Kuntsche, E., & Kuntsche, S. (2009). Development and validation of the drinking motive questionnaire revised short form (DMQ–R SF). *Journal of Clinical Child & Adolescent Psychology*, 38, 899-908. 10.1080/15374410903258967

Ledesma, R. D., Macbeth, G., & Valero-Mora, P. (2011). Software for computing the tetrachoric correlation coefficient. *Revista Latinoamericana de Psicología*, 43, 181-189. doi: 10.14349/rlp.v43i1.459

Lemley, S. M., Kaplan, B. A., Reed, D. D., Darden, A. C., & Jarmolowicz, D. P. (2016). Reinforcer pathologies: Predicting alcohol related problems in college drinking men and women. *Drug and Alcohol Dependence*, 167, 57-66. doi: 10.1016/j.drugalcdep.2016.07.025

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, 721-730. doi: 10.1111/dar.12464.

Marsh, H. W., Hau, K.-T., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling*, 11, 320-341. doi: 10.1207/s15328007sem1103\_2

Mason-Jones, A. J., & Cabieses, B. (2015). Alcohol, binge drinking and associated mental health problems in young urban Chileans. *PLoS one*, 10, e0121116. doi: 10.1371/journal.pone.0121116

- Masten, A. S., Faden, V. B., Zucker, R. A., & Spear, L. P. (2009). A developmental perspective on underage alcohol use. *Alcohol Research & Health*, 32(1), 3-15.
- 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, 93-102. doi: 10.15288/jsad.2014.75.93
- Messina, B. G., Tseng, A., & Correia, C. J. (2015). Measuring alcohol-related consequences and motives among students attending Historically Black Colleges and Universities. *Addictive Behaviors*, 46, 5-9. doi: 10.1016/j.addbeh.2015.02.004
- 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. doi: 10.1027/1015-5759/a000319
- Mezquita, L., Ibáñez, M. I., Moya, J., Villa, H., & Ortet, G. (2014). A longitudinal examination of different etiological pathways to alcohol use and misuse. *Alcoholism, Clinical and Experimental Research*, 38, 1770–1779. doi: 10.1111/acer.12419
- Mezquita, L., Ibáñez, M. I., & Ortet, G. (2011). *Maltreatment, personality and drinking motives in alcohol consumption*. Saarbrücken: Editorial Académica Española.
- Moure-Rodríguez, L., Caamaño-Isorna, F., Doallo, S., Juan-Salvadores, P., Corral, M., Rodríguez-Holguín, S., & Cadaveira, F. (2014). Heavy drinking and alcohol-related injuries in college students. *Gaceta Sanitaria*, 28, 376-380. doi: 10.1016/j.gaceta.2014.02.017
- Mota, N., Alvarez-Gil, R., Corral, M., Rodríguez Holguín, S., Parada, M., Crego, A., Caamaño-Isorna, F., & Cadaveira, F. (2010). Risky alcohol use and heavy episodic

- drinking among Spanish University students: A two-year follow-up. *Gaceta Sanitaria*, 24, 372-7. doi: 10.1016/j.gaceta.2010.02.013.
- Muthén, L.K. and Muthén, B.O. (1998-2015). *Mplus user's guide. Seventh Edition*. Los Angeles, CA: Muthén & Muthén.
- National Institute of Alcohol Abuse and Alcoholism. (2015). *College Drinking*. Retrieved from <http://pubs.niaaa.nih.gov/publications/CollegeFactSheet/CollegeFactSheet.pdf>
- 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, 261-269. doi: 10.1093/alcalc/agr019.
- Osberg, T. M., Atkins, L., Buchholz, L., Shirshova, V., Swiantek, A., Whitley, J., ... & Oquendo, N. (2010). Development and validation of the College Life Alcohol Salience Scale: A measure of beliefs about the role of alcohol in college life. *Psychology of Addictive Behaviors*, 24, 1-12. doi: 10.1037/a0018197.
- Osberg, T. M., Billingsley, K., Eggert, M., & Insana, M. (2012). From animal house to old school: A multiple mediation analysis of the association between college drinking movie exposure and freshman drinking and its consequences. *Addictive Behaviors*, 37, 922–930. doi: 10.1016/j.addbeh.2012.03.030.
- Osberg, T. M., Insana, M., Eggert, M., & Billingsley, K. (2011). Incremental validity of college alcohol beliefs in the prediction of freshman drinking and its consequences: A prospective study. *Addictive Behaviors*, 36, 333-340. doi: 10.1016/j.addbeh.2010.12.004
- Pilatti, A., Read, J. P., & Caneto, F. (2016). Validation of the Spanish Version of the Young Adult Alcohol Consequences Questionnaire (S-YAACQ). *Psychological*

- Assessment*, 28, e49-e61. doi: 10.1037/pas0000140
- Pilatti, A., Read, J. P., & Pautassi, R. M. (2017). ELSA 2016 cohort: alcohol, tobacco, and marijuana use and their association with age of drug use onset, risk perception, and social norms in Argentinean college freshmen. *Frontiers in Psychology*, 8, 1452. doi: 10.3389/fpsyg.2017.01452
- 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.
- Pilatti, A., Read, J. P., Vera, B. D. V., 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, 842-847. doi: 10.1016/j.addbeh.2014.01.026
- Prince, M. A., Pearson, M. R., Bravo, A. J., & Montes, K. S. (2018). A quantification of the alcohol use-consequences association in college student and clinical populations: A large, multi-sample study. *The American Journal on Addictions*, 27, 116-123. doi: 10.1111/ajad.12686
- Read, J. P., Beattie, M., Chamberlain, R., & Merrill, J. E. (2008). Beyond the “Binge” threshold: heavy drinking patterns and their association with alcohol involvement indices in college students. *Addictive Behaviors*, 33, 225-234. doi: 10.1016/j.addbeh.2007.09.001
- Read, J. P., & Curtin, J. J. (2007). Contextual influences on alcohol expectancy processes. *Journal of Studies on Alcohol and Drugs*, 68, 759-770. doi: 10.15288/jsad.2007.68.759

- Read, J. P., Kahler, C. W., Strong, D. R., & Colder, C. R. (2006). Development and preliminary validation of the young adult alcohol consequences questionnaire. *Journal of Studies on Alcohol*, 67, 169-177. doi: 10.15288/jsa.2006.67.169
- Read, J. P., Merrill, J. E., Kahler, C. W., & Strong, D. R. (2007). Predicting functional outcomes among college drinkers: Reliability and predictive validity of the Young Adult Alcohol Consequences Questionnaire. *Addictive Behaviors*, 32, 2597-2610. doi: 10.1016/j.addbeh.2007.06.021
- Rodríguez-Martos, D. A., Gual, S. A., & Llopis, L. J. (1999). The "standard drink unit" as a simplified record of alcoholic drink consumption and its measurement in Spain. *Medicina Clinica*, 112, 446-450.
- Saunders, J. B., Aasland, O. G., Babor, T. F., De la Fuente, J. R., & Grant, M. (1993). Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption- II. *Addiction*, 88, 791-804. doi: 10.1111/j.1360-0443.1993.tb02093.x
- Schroeders, U., & Wilhelm, O. (2011). Equivalence of reading and listening comprehension across test media. *Educational and Psychological Measurement*, 71, 849-869. doi: 10.1177/0013164410391468
- Verster, J. C., van Herwijnen, J., Olivier, B., & Kahler, C. W. (2009). Validation of the Dutch version of the brief young adult alcohol consequences questionnaire (B-YAACQ). *Addictive Behaviors*, 34, 411-414. doi: 10.1016/j.addbeh.2007.09.013
- White, A., & Hingson, R. (2013). The burden of alcohol use: excessive alcohol consumption and related consequences among college students. *Alcohol Research: Current Reviews*, 35, 201-218.



Yurasek, A. M., Murphy, J. G., Clawson, A. H., Dennhardt, A. A., & MacKillop, J. (2013).

Smokers report greater demand for alcohol on a behavioral economic purchase

task. *Journal of Studies on Alcohol and Drugs*, 74, 626-634. doi:

10.15288/jsad.2013.74.626

Table 1

*Demographics and descriptive statistics of non- YAACQ study constructs across countries*

	United States <sup>a</sup> (n=774)	Argentina <sup>b</sup> (n=439)	Spain <sup>c</sup> (n=298)	a-b	a-c	b-c
Sex	n (%)	n (%)	n (%)	Cramer's Phi		
Men	221 (28.6)	217 (49.4)	83 (27.9)	.206	.010	.216
Women	546 (70.5)	222 (50.6)	215 (72.1)			
Missing	7 (0.9)	0 (0.0)	0 (0.0)			
Education*				Cramer's Phi		
First Year (Freshman)	198 (25.6)	103 (23.5)	52 (17.4)	-----	----	.276
Second Year (Sophomore)	126 (16.28)	99 (22.6)	162 (54.4)			
Third Year (Junior)	190 (24.6)	69 (15.7)	28 (9.4)			
Four Year (Senior)	258 (34.7)	64 (14.6)	49 (16.4)			
Fifth Year	-----	67 (15.3)	2 (0.7)			
Finished Studies (Graduating)	-----	37 (8.4)	5 (1.7)			
Graduate Student	2 (0.3)	-----	-----			
Cohen's D of Mean Differences						
Age <i>M (SD)</i>	22.05 (5.60)	22.48 (4.13)	20.93 (3.98)	-0.08	0.22	0.38
Non-YAACQ Study Constructs	<i>M (SD) [α]</i>	<i>M (SD) [α]</i>	<i>M (SD) [α]</i>			
Coping Motives	2.01 (1.06) [α=.86]	1.82 (0.93) [α=.76]	1.54 (0.72) [α=.77]	0.18	0.48	0.33
Social Motives	3.08 (1.20) [α=.90]	2.92 (1.25) [α=.88]	2.97 (1.17) [α=.85]	0.13	0.09	-0.04
Enhancement Motives	2.81 (1.11) [α=.79]	2.52 (1.08) [α=.76]	2.55 (1.05) [α=.77]	0.26	0.26	-0.02
Conformity Motives	1.61 (0.93) [α=.87]	1.33 (0.62) [α=.81]	1.25 (0.54) [α=.79]	0.38	0.43	0.14
Frequency of Alcohol Use	6.01 (5.60) [---]	6.06 (5.13) [---]	6.50 (5.39) [---]	-0.01	-0.09	-0.08
Frequency of Getting Drunk	2.82 (3.71) [---]	1.49 (2.59) [---]	2.50 (3.08) [---]	0.45	0.09	-0.36
Binge Drinking Frequency	1.99 (3.23) [---]	1.71 (2.74) [---]	2.15 (3.30) [---]	0.09	-0.05	-0.15
Typical Week Quantity in Grams	87.99 (106.83) [---]	100.18 (119.15) [---]	81.07 (85.68) [---]	-0.11	0.07	0.18
Heavy Week Quantity in Grams	140.10 (152.97) [---]	157.56 (160.80) [---]	183.86 (186.23) [---]	-0.11	-0.27	-0.15
College Alcohol Beliefs	4.67 (2.62) [α=.86]	2.29 (0.71) [α=.84]	2.34 (0.72) [α=.87]	<b>1.11</b>	<b>1.03</b>	-0.07

*Note.* Cohen's *d* values of .20, .50 (*italicized*), and .80 (**bolded**) correspond to small, medium and large effect sizes, respectively (Cohen, 1992). Sex was coded (0= male, 1 = female). \*Please note that response options for education differed between the United States and Argentina/Spain.

Table 2

*Model fit and measurement invariance testing results of the 8-factor YAACQ across countries and sex*

<i>Measurement Invariance Across Countries for the 47-item version</i>											
Overall Fit Indices						Comparative Fit Indices					
	$\chi^2$	$df$	CFI	TLI	RMSEA	Model Comparison	$\Delta\chi^2$	$\Delta df$	$\Delta CFI$	$\Delta TLI$	$\Delta RMSEA$
1. Configural	3945.66	3018	.971	.969	.025 (.022, .027)						
2. Scalar	4103.83	3080	.968	.967	.026 (.024, .028)	1 vs 2	230.06*	62	-.003	-.002	.001
<i>Measurement Invariance Across Argentina and United States for the 48-item version</i>											
Overall Fit Indices						Comparative Fit Indices					
	$\chi^2$	$df$	CFI	TLI	RMSEA	Model Comparison	$\Delta\chi^2$	$\Delta df$	$\Delta CFI$	$\Delta TFI$	$\Delta RMSEA$
1. Configural	2956.67	2104	.969	.967	.026 (.024, .028)						
2. Scalar	3065.25	2136	.966	.964	.027 (.025, .029)	1 vs 2	154.20*	32	-.003	-.003	.001

*Note.* We used comparison criteria of  $\Delta RMSEA \leq .015$  (increase indicates worse fit; Chen, 2007) and  $\Delta CFI/\Delta TFI \leq .01$  (decrease indicates worse fit; Cheung & Rensvold, 2002) to test for measurement invariance. \*  $p < .001$ .

Table 3

*Descriptive statistics and mean comparisons of composite scores of 47-item YAACQ subscales across countries*

	United States ( <i>n</i> =774)	Argentina ( <i>n</i> =439)	Spain ( <i>n</i> =298)	
YAACQ Constructs	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>Significant Mean Differences</i>
YAACQ Total Score	7.45 (8.58)	9.60 (8.25)	9.02 (7.64)	U.S. < Argentina, Spain
Self-Perception	0.55 (1.05)	0.81 (1.23)	0.75 (1.17)	U.S. < Argentina, Spain
Social/Interpersonal	1.20 (1.45)	1.45 (1.61)	1.32 (1.50)	U.S. < Argentina
Academic/Occupational	0.39 (0.93)	0.46 (0.92)	0.30 (0.73)	None
Risky Behaviors	1.02 (1.58)	1.06 (1.53)	0.76 (1.19)	Spain < U.S., Argentina
Blackout Drinking	1.71 (1.94)	1.82 (1.80)	2.06 (1.82)	U.S. < Spain
Impaired Control	1.21 (1.52)	1.79 (1.67)	1.44 (1.49)	Argentina > U.S., Spain
Physiological Dependence	0.31 (0.61)	0.42 (0.58)	0.41 (0.55)	U.S. < Argentina, Spain
Self-care	1.05 (1.80)	1.80 (2.08)	1.98 (2.05)	U.S. < Argentina, Spain

*Note.* Significant mean differences were determined via post-hoc comparisons using a Bonferroni correction within an ANOVA framework.

Table 4

*Correlations between the eight latent YAACQ factors and composite scores of study variables across countries*

	Self-Perception			Social/Interpersonal			Academic/Occupational			Risky Behaviors		
	U.S.	Arg	Sp	U.S.	Arg	Sp	U.S.	Arg	Sp	U.S.	Arg	Sp
Coping Motives	<b>.39</b>	<b>.29</b>	<b>.32</b>	<b>.32</b>	<b>.31</b>	<b>.32</b>	<b>.34</b>	<b>.33</b>	<b>.29</b>	<b>.32</b>	<b>.33</b>	<b>.25</b>
Social Motives	<b>.20</b>	<b>.24</b>	<b>.22</b>	<b>.35</b>	<b>.42</b>	<b>.44</b>	<b>.29</b>	<b>.32</b>	.17	<b>.31</b>	<b>.50</b>	<b>.32</b>
Enhancement Motives	<b>.23</b>	<b>.20</b>	<b>.20</b>	<b>.34</b>	<b>.40</b>	<b>.38</b>	<b>.29</b>	<b>.31</b>	.17	<b>.31</b>	<b>.50</b>	<b>.28</b>
Conformity Motives	<b>.34</b>	<b>.14</b>	<b>.27</b>	<b>.29</b>	<b>.16</b>	.11	<b>.31</b>	.10	<b>-.24</b>	<b>.31</b>	<b>.18</b>	.08
Frequency of Alcohol Use	<b>.31</b>	<b>.12</b>	.10	<b>.29</b>	<b>.16</b>	<b>.29</b>	<b>.38</b>	<b>.23</b>	.15	<b>.30</b>	<b>.22</b>	<b>.28</b>
Frequency of Getting Drunk	<b>.36</b>	<b>.18</b>	<b>.19</b>	<b>.42</b>	<b>.34</b>	<b>.44</b>	<b>.49</b>	<b>.29</b>	<b>.19</b>	<b>.45</b>	<b>.39</b>	<b>.34</b>
Binge Drinking Frequency	<b>.30</b>	<b>.19</b>	<b>.15</b>	<b>.35</b>	<b>.30</b>	<b>.37</b>	<b>.40</b>	<b>.30</b>	<b>.23</b>	<b>.40</b>	<b>.39</b>	<b>.27</b>
Typical Week Quantity in Grams	<b>.29</b>	<b>.20</b>	<b>.22</b>	<b>.35</b>	<b>.25</b>	<b>.42</b>	<b>.41</b>	<b>.25</b>	<b>.29</b>	<b>.36</b>	<b>.36</b>	<b>.35</b>
Heavy Week Quantity in Grams	<b>.26</b>	<b>.20</b>	<b>.21</b>	<b>.33</b>	<b>.31</b>	<b>.34</b>	<b>.38</b>	<b>.27</b>	.10	<b>.33</b>	<b>.38</b>	<b>.25</b>
College Alcohol Beliefs	<b>.15</b>	<b>.15</b>	<b>.24</b>	<b>.32</b>	<b>.31</b>	<b>.41</b>	<b>.33</b>	<b>.26</b>	<b>.37</b>	<b>.33</b>	<b>.44</b>	<b>.38</b>
	Blackout Drinking			Impaired Control			Physiological Dependence			Self-care		
	U.S.	Arg	Sp	U.S.	Arg	Sp	U.S.	Arg	Sp	U.S.	Arg	Sp
Coping Motives	<b>.27</b>	<b>.26</b>	<b>.21</b>	<b>.37</b>	<b>.32</b>	<b>.33</b>	<b>.42</b>	<b>.50</b>	<b>.41</b>	<b>.35</b>	<b>.30</b>	<b>.34</b>
Social Motives	<b>.40</b>	<b>.51</b>	<b>.43</b>	<b>.36</b>	<b>.33</b>	<b>.45</b>	<b>.25</b>	<b>.73</b>	<b>.57</b>	<b>.27</b>	<b>.32</b>	<b>.42</b>
Enhancement Motives	<b>.38</b>	<b>.51</b>	<b>.42</b>	<b>.33</b>	<b>.29</b>	<b>.43</b>	<b>.35</b>	<b>.63</b>	<b>.61</b>	<b>.31</b>	<b>.33</b>	<b>.40</b>
Conformity Motives	<b>.27</b>	<b>.14</b>	.05	<b>.28</b>	<b>.11</b>	<b>.19</b>	<b>.27</b>	<b>.28</b>	.18	<b>.29</b>	<b>.12</b>	.05
Frequency of Alcohol Use	<b>.29</b>	<b>.23</b>	<b>.32</b>	<b>.38</b>	<b>.32</b>	<b>.47</b>	<b>.39</b>	<b>.23</b>	<b>.27</b>	<b>.39</b>	<b>.26</b>	<b>.28</b>
Frequency of Getting Drunk	<b>.46</b>	<b>.51</b>	<b>.56</b>	<b>.49</b>	<b>.39</b>	<b>.50</b>	<b>.41</b>	<b>.32</b>	<b>.54</b>	<b>.42</b>	<b>.33</b>	<b>.42</b>
Binge Drinking Frequency	<b>.43</b>	<b>.46</b>	<b>.44</b>	<b>.44</b>	<b>.40</b>	<b>.50</b>	<b>.42</b>	<b>.44</b>	<b>.52</b>	<b>.35</b>	<b>.36</b>	<b>.32</b>
Typical Week Quantity in Grams	<b>.40</b>	<b>.35</b>	<b>.45</b>	<b>.45</b>	<b>.47</b>	<b>.48</b>	<b>.41</b>	<b>.42</b>	<b>.44</b>	<b>.37</b>	<b>.41</b>	<b>.41</b>
Heavy Week Quantity in Grams	<b>.39</b>	<b>.43</b>	<b>.46</b>	<b>.43</b>	<b>.39</b>	<b>.53</b>	<b>.39</b>	<b>.49</b>	<b>.43</b>	<b>.35</b>	<b>.35</b>	<b>.37</b>
College Alcohol Beliefs	<b>.37</b>	<b>.38</b>	<b>.41</b>	<b>.33</b>	<b>.28</b>	<b>.42</b>	<b>.28</b>	<b>.38</b>	<b>.53</b>	<b>.26</b>	<b>.34</b>	<b>.46</b>

*Note.* U.S.=United States ( $n = 774$ ); Arg=Argentina ( $n = 439$ ), Sp=Spain ( $n = 298$ ). Significant correlations ( $p < .05$ ) are in bold typeface for emphasis.

Table 5

*Correlation differences across countries between the eight latent YAACQ factors and composite scores of study variables*

	Self-Perception			Social/Interpersonal			Academic/Occupational			Risky Behaviors		
	U.S.- Arg	U.S.- Sp	Arg- Sp	U.S.- Arg	U.S.- Sp	Arg- Sp	U.S.- Arg	U.S.- Sp	Arg- Sp	U.S.- Arg	U.S.- Sp	Arg- Sp
Coping Motives	.10	.07	.03	.01	.00	.01	.01	.05	.04	.01	.07	.08
Social Motives	.04	.02	.02	.07	.09	.02	.03	.12	.15	.19	.01	.18
Enhancement Motives	.03	.03	.00	.06	.04	.02	.02	.12	.14	.19	.03	.22
Conformity Motives	.20	.07	.13	.13	.18	.05	.21	<b>.55</b>	<b>.34</b>	.13	.23	.10
Frequency of Alcohol Use	.19	.21	.02	.13	.00	.13	.15	.23	.08	.08	.02	.06
Frequency of Getting Drunk	.18	.17	.01	.08	.02	.10	.20	<b>.30</b>	.10	.06	.11	.05
Binge Drinking Frequency	.11	.15	.04	.05	.02	.07	.10	.17	.07	.01	.13	.12
Typical Week Quantity in Grams	.09	.07	.02	.10	.07	.17	.16	.12	.04	.00	.01	.01
Heavy Week Quantity in Grams	.06	.05	.01	.02	.01	.03	.11	<b>.28</b>	.17	.05	.08	.13
College Alcohol Beliefs	.00	.09	.09	.01	.09	.10	.07	.04	.11	.11	.05	.06
	Blackout Drinking			Impaired Control			Physiological Dependence			Self-care		
	U.S.- Arg	U.S.- Sp	Arg- Sp	U.S.- Arg	U.S.- Sp	Arg- Sp	U.S.- Arg	U.S.- Sp	Arg- Sp	U.S.- Arg	U.S.- Sp	Arg- Sp
Coping Motives	.01	.06	.05	.05	.04	.01	.08	.01	.09	.05	.01	.04
Social Motives	.11	.03	.08	.03	.09	.12	<b>.48</b>	<b>.32</b>	.16	.05	.15	.10
Enhancement Motives	.13	.04	.09	.04	.10	.14	<b>.28</b>	<b>.26</b>	.02	.02	.09	.07
Conformity Motives	.13	.22	.09	.17	.09	.08	.01	.09	.10	.17	<b>.24</b>	.07
Frequency of Alcohol Use	.06	.03	.09	.06	.09	.15	.16	.12	.04	.13	.11	.02
Frequency of Getting Drunk	.05	.10	.05	.10	.01	.11	.09	.13	<b>.22</b>	.09	.00	.09
Binge Drinking Frequency	.03	.01	.02	.04	.06	.10	.02	.10	.08	.01	.03	.04
Typical Week Quantity in Grams	.05	.05	.10	.02	.03	.01	.01	.03	.02	.04	.04	.00
Heavy Week Quantity in Grams	.04	.07	.03	.04	.10	.14	.10	.04	.06	.00	.02	.02
College Alcohol Beliefs	.01	.04	.03	.05	.09	.14	.10	<b>.25</b>	.15	.08	.20	.12

*Note.* U.S.=United States ( $n = 774$ ); Arg=Argentina ( $n = 439$ ), Sp=Spain ( $n = 298$ ). Medium correlation differences are italicized ( $.17 < r_{\text{diff}} < .24$ ), large differences are bolded ( $.24 < r_{\text{diff}} < .32$ ), and substantial difference are bolded and underlined ( $r_{\text{diff}} \geq .32$ ).

Supplemental Table 1

*Model fit comparisons of a 47-item 1-factor and 1 higher order factor plus eight-factors YAACQ vs the 47-item 8-factor YAACQ across countries*

<i>Argentina</i>									
Overall Fit Indices						Comparative Fit Indices			
	$\chi^2$	<i>df</i>	CFI	TLI	RMSEA	Model Comparison	$\Delta$ CFI	$\Delta$ TLI	$\Delta$ RMSEA
1. 1-factor	1969.65	1034	.898	.894	.045 (.042, .048)	1 vs 3	-.072	-.074	.020
2. 1 higher order factor	1441.71	1026	.955	.952	.030 (.027, .034)	2 vs 3	-.015	-.016	.005
3. 8-factor	1278.28	1006	.970	.968	.025 (.020, .029)				
<i>Spain</i>									
Overall Fit Indices						Comparative Fit Indices			
	$\chi^2$	<i>df</i>	CFI	TLI	RMSEA	Model Comparison	$\Delta$ CFI	$\Delta$ TLI	$\Delta$ RMSEA
1. 1-factor	1443.05	1034	.910	.906	.036 (.032, .041)	1 vs 3	-.057	-.058	.014
2. 1 higher order factor	1219.04	1026	.958	.955	.025 (.019, .031)	2 vs 3	-.009	-.009	.003
3. 8-factor	1156.24	1006	.967	.964	.022 (.015, .028)				
<i>United States</i>									
Overall Fit Indices						Comparative Fit Indices			
	$\chi^2$	<i>df</i>	CFI	TLI	RMSEA	Model Comparison	$\Delta$ CFI	$\Delta$ TLI	$\Delta$ RMSEA
1. 1-factor	2350.44	1034	.924	.921	.041 (.038, .043)	1 vs 3	-.039	-.039	.012
2. 1 higher order factor	1839.14	1026	.953	.951	.032 (.030, .034)	2 vs 3	-.010	-.009	.003
3. 8-factor	1652.67	1006	.963	.960	.029 (.026, .031)				
<i>Total Sample</i>									
Overall Fit Indices						Comparative Fit Indices			
	$\chi^2$	<i>df</i>	CFI	TLI	RMSEA	Model Comparison	$\Delta$ CFI	$\Delta$ TLI	$\Delta$ RMSEA
1. 1-factor	4581.16	1034	.888	.883	.048 (.046, .049)	1 vs 3	-.067	-.069	.017
2. 1 higher order factor	2893.01	1026	.941	.938	.035 (.033, .036)	2 vs 3	-.014	-.014	.004
3. 8-factor	2431.37	1006	.955	.952	.031 (.029, .032)				

*Note.* We relied on the model comparison criteria of  $\Delta$ RMSEA  $\leq$ .015 (increase indicates worse fit; Chen, 2007) and  $\Delta$ CFI/ $\Delta$ TLI  $\leq$ .01 (decrease indicates worse fit; Cheung & Rensvold, 2002) to compare competing models.