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**Article:**
Hines, S.A. orcid.org/0009-0004-0439-4411, Morin, A.J.S., Norman, P. orcid.org/0000-0002-5892-0470 et al. (2 more authors) (2024) Development and validation of the perceived approval of Risky Drinking Inventory in undergraduate students. Psychology of Addictive Behaviors, 38 (5). pp. 601-615. ISSN 0893-164X

https://doi.org/10.1037/adb0000990

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# Development and Validation of the Perceived Approval of Risky Drinking Inventory in Undergraduate Students

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**Acknowledgements**. The authors want to thank Erin Barker for her support and feedback in earlier stages of this research. This study was supported by a grant from the Social Sciences and Humanities Research Council of Canada (SSHRC # 435-2020-1329) awarded to the last author. The second author was supported by a grant from the Social Sciences and Humanities Research Council of Canada (SSHRC # 435-2018-0368) in the preparation of this paper.

**Data, materials, and codes.** Materials and analysis code for this study are available by emailing the corresponding author.

**Preregistration of studies and analysis plans.** This study was not preregistered.

**Author version of paper accepted for publication in *Psychology of Addictive Behaviors* on 19 December 2023.**

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**Abstract**

**Objective:** Undergraduates frequently engage in risky drinking (i.e., drinking alcohol in ways that may result in problems). The reasoned action approach identifies injunctive norms (i.e., perceptions that others approve of risky drinking) as central in predicting engagement in risky drinking. However, research linking injunctive norms and risky drinking is equivocal , possibly because of extensive variability in the operationalization of injunctive norms across studies. This study describes the development and validation of the Perceived Approval of Risky Drinking Inventory (PARDI), designed according to best practice guidelines in questionnaire development. **Method:** Undergraduate students ($N$=1313) participated in one of three phases of data collection, including focus group interviews for item generation ($n$=31), self-report questionnaires for scale refinement ($n$=407), and self-report questionnaires for scale validation ($n$=875). **Results:** Exploratory and confirmatory factor analyses supported a 20-item four-factor solution (Heavy Drinking, Drinking-Related Problems, Coping-Related Drinking, and Sexual-Risk Taking) across the three assessed referent groups (friends, parents, and typical students), all of which present satisfactory estimates of scale score and composite reliability. The results also provided preliminary support for the convergent validity of scores obtained on the PARDI as demonstrated through correlations with other measures of perceived norms, alcohol use, alcohol-related problems, and coping-motivated drinking. Finally, the results supported the generalizability of the PARDI factor structure by demonstrating its measurement invariance across gender and drinking status (i.e., alcohol use and problems). **Conclusions:** The PARDI represents a reliable, valid, yet nuanced measure of injunctive norms that can be used to support further theory development and intervention.

**Keywords**: Risky drinking; injunctive norms; perceived approval of risky drinking inventory (PARDI); perceived approval; alcohol use.

**Public health significance.** This study provides researchers with a reliable and valid instrument to measure injunctive drinking norms in undergraduate students. This measure is shown to be valid for use in various referent groups (friends, typical students, and parents) and across different groups of respondents (i.e., men and women, heavy and light drinkers).

## Introduction

Risky drinking (i.e., using alcohol heavily and/or in a way that can lead to negative outcomes) is widespread among university and college undergraduate students (White & Hingson, 2013). Approximately 70% of undergraduates report binge drinking in the past month (i.e., 4+/5+ drinks for females/males; Edkins et al, 2017). High-intensity drinking (i.e., 10+ drinks, or sex-specific guidelines of 8+/10+ drinks for females/males) occurs in approximately 12-18% of undergraduates every two weeks (Johnston et al., 2015; Patrick et al., 2022). Heavy drinking is associated with poorer academic performance (e.g., absenteeism, concentration difficulties, not getting assignments done), experiences of physical or sexual victimization, injury, overdose, and death (Krebs et al., 2009; Tembo et al., 2017; White & Hingson, 2013). Risky drinking in university can also presage lifelong alcohol-related problems (Sloan et al., 2011). Identifying malleable factors leading to risky drinking in young adulthood is critical to effective interventions.

The reasoned action approach (RAA; Fishbein & Ajzen, 2010) provides a framework for understanding intentional behavior and can help identify viable targets for intervention. This theory points to *intention* as the most proximal and potent determinant of behavior. Intention, in turn, is influenced by (1) evaluation of the behavior (i.e., *instrumental* and *experiential attitudes*), (2) beliefs that one is able to engage in the behavior and that it is under one's control (i.e., *capacity* and *autonomy*), and (3) perception that others also engage in, or approve of, the behavior (i.e., *descriptive* and *injunctive norms*). Each of these components (attitudes, perceived control, perceived norms) has been found to predict drinking intentions, which in turn reliably predict drinking behaviors (Cooke et al., 2016).

Perceived norms represent a potentially important malleable target of intervention. Undergraduates tend to perceive peer risky drinking and associated approval as more normative than it actually is (Neighbors et al., 2006; Perkins, 2007; Perkins & Berkowitz,

1986). Moreover, this 'over-perception' has been found to predict risky drinking (LaBrie et al., 2010; Lewis et al., 2010; Neighbors et al., 2007). Importantly, perceived norms have been shown to be modifiable with corrective feedback and reductions in perceived prevalence and approval of risky drinking (via corrective feedback) are found to predict decreased risky drinking (Mattern & Neighbors, 2004; Prince & Carey, 2010; Young & Neighbors, 2019).

Perceived norms refer to beliefs about how much others drink (*descriptive norms*) and about how much others approve of risky drinking (*injunctive norms*). There is a growing body of literature identifying descriptive norms as a strong predictor of the number of drinks individuals consume within a week (Larimer et al., 2004; Neighbors et al., 2007), but as a poor predictor of alcohol-related problems. The social norms approach to intervention (Perkins & Berkowitz, 1986) focuses on changing subjective perceptions of how much others drink (i.e., descriptive norms) through corrective feedback. While these interventions lead to reduced amount of alcohol consumed by students, the impact on decreasing alcohol-related problems is minimal (Dotson et al., 2015; Scott-Sheldon et al., 2014). Some evidence suggests that perceptions about risky drinking approval by others (i.e., injunctive norms) may be more central to prediction of alcohol-related problems (Buckner et al., 2011; LaBrie et al., 2010; Larimer et al., 2004), especially when considering proximal referents, such as friends (Dumas et al., 2019; Collins et al., 2013; Neighbors et al., 2008). However, injunctive norms are seldom used in interventions (Miller et al., 2013), possibly because the research linking injunctive norms to risky drinking is equivocal (Collins & Carey, 2007; Pearson & Hustad, 2014; Reid & Carey, 2015; Willis et al., 2020). These mixed results may, in part, be due to problems arising from the lack of a psychometrically sound measure of injunctive norms.

Research on injunctive drinking norms emerged with Baer's (1994) four items assessing perceived approval by friends of drinking enough to pass out, drinking every day, drinking every weekend, and driving a car after drinking. While Baer assessed these items

individually, many studies have since combined these four items to create a measure of injunctive norms, typically reporting low Cronbach's αs (e.g., parent norms α=.58, LaBrie et al., 2010; typical student norms α=.66, Neighbors et al., 2007, 2008; friend norms α=.68, Osberg et al., 2021). A low Cronbach's α may be the result of having only a few items in a scale. However, it may also be an indicator of poor item inter-relatedness (Tavakol & Dennick, 2011), which suggests that the items may not work well together and that the resulting aggregation incorporates a problematic amount of random measurement error.

Other studies have relied on unique sets of questions to assess injunctive norms (Collins & Spelman, 2013; LaBrie et al., 2008; Pearson & Hustad, 2014; Robinson et al., 2014; Willis et al., 2020). These idiosyncratic measures have been typically limited to one or two questions, thus failing to properly control for random measurement error and contributing to extensive variability in the operationalization of injunctive norms across studies. Further, it remains unclear whether any of these measures are appropriate to capture the injunctive norms of different referent groups (e.g., friends, typical students, and parents) and whether they yield scores that are comparable across different groups (e.g., men/women, light/heavy drinkers). The aforementioned inconsistent findings linking injunctive norms to alcohol-related problems may be anchored in poor measurement practices.

The goal of the present study was to create an empirically developed and psychometrically sound measure of injunctive drinking norms following best practice guidelines in survey development (Nunnally & Bernstein, 1994; Rattray & Jones, 2007). Phase 1 focused on item-generation and involved small focus groups of undergraduates. Phase 2 involved initial testing of items generated in phase 1 for suitability (pilot testing, part A) and relied on exploratory factor analysis (EFA) to remove unnecessary items, refine the scale, and establish a factor structure (scale refinement, part B). Phase 3 involved confirmation of the factor structure established in phase 2, while also assessing score

reliability as well as validity in relation to measures of subjective norms, alcohol use, alcohol-related problems, and drinking motives. Generalizability of psychometric properties was assessed through tests of measurement invariance across undergraduates' gender (men and women) and drinking status (high and low levels of alcohol use and related problems). This measure should allow for researchers to use a common psychometrically sound instrument in research on injunctive drinking norms with undergraduate students. Accordingly, this measure should also support cross-study comparisons, thereby providing improved understanding of the predictive influence of injunctive norms on undergraduate drinking.

## Method

### Participants

Undergraduates were recruited via posters and online announcements to take part in focus groups exploring alcohol-related beliefs (phase 1) or to participate in an online questionnaire study (phases 2 and 3). For all phases, consenting participants were first asked to complete a short online screening questionnaire to confirm eligibility (i.e., undergraduate student between 18 and 25 years old, as 18 is the legal drinking age locally). Participation in any previous phase rendered an individual ineligible for subsequent phases. See Table 1 for demographics for each study phase. Across all phases, participants reported between 0-36 drinks typically consumed in a week, with 24% reporting no alcohol consumed in the past three months. This is consistent with published data on Canadian undergraduate drinking practices (American College Health Association, 2019). Students who endorsed drinking in the past three months reported 7.76 ($SD$=8.29) alcohol-related problems in the past month, consistent with other Canadian undergraduate drinking research (Keough et al., 2018).

### Procedure

In phase 1, a graduate student and a research assistant led 90-minute audio-recorded focus group sessions with six groups of four to six participants. Participants first completed

consent procedures and background questionnaires (i.e., demographics, alcohol use), before being introduced to the concept of injunctive drinking norms. In each focus group, the moderators facilitated a discussion around potential dimensions of undergraduate drinking where perceived approval by others may be relevant to students' own drinking (e.g., reasons for drinking, problems experienced because of drinking, risky drinking behaviours). Participants were then instructed to write down specific examples related to the first identified dimension. The moderators then facilitated a discussion around that dimension and participants freely shared their specific examples of drinking behaviors or outcomes that they believed were relevant to that dimension (e.g., "getting into a car accident as a result of drinking" as a specific example provided within the *problems experienced as a result of drinking* dimension). The same procedure was followed for all other dimensions identified. Participants were given the opportunity to add any other items with an anonymous form at the end of the focus group as well as within the next two days via an optional online survey. Participants were compensated $20 or with partial course credit for their time.

Phases 2 and 3 each involved a new sample of undergraduate students. Participants completed a series of online questionnaires assessing demographic information and alcohol use behaviors. Participants were compensated $10 or provided partial course credit for their participation. The study (phases 1, 2, and 3) was approved by the research ethics committee of the first author's institution. We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study.

**Measures**

The *Perceived Approval of Risky Drinking Inventory* (PARDI, see Appendix) was developed for this study to assesses injunctive drinking norms. Across study phases 2 and 3, 64 initial items were reduced to a 20-item measure. Using a 5-point scale (*1=Strongly Disapprove* to *5=Strongly Approve*) participants indicated how much they believed each

reference group (friends, typical students at their university, and parents) approved of each risky drinking behavior.

An adapted version of the *Daily Drinking Questionnaire* (Collins et al., 1985) was used to assess alcohol use. Participants reported the typical number of drinks they consumed on each day of the week over the past three months. A sum score was derived which reflected total drinks in a typical week. This is a commonly used measure of alcohol use (Cahalan et al., 1969; Collin et al., 1985; Read & O'Connor, 2006).

The *Young Adult Alcohol Consequences Questionnaire* (YAACQ; Read et al., 2006) was used to assess alcohol-related problems. Participants responded dichotomously (*Yes/No*) to 48 items, indicating whether they had experienced each alcohol-related problem over the past month. Scores are summed with relatively higher values indicating more alcohol-related problems. The YAACQ demonstrates excellent scale score reliability (α=.96 to .98; Read et al., 2007). Cronbach's αs and McDonald's ωs (McDonald, 1970) were excellent (αs > .91 and ωs > .94) in the current samples.

The *Injunctive Norms Questionnaire* (INQ, Baer, 1994) measures injunctive drinking norms. Participants indicated on a 7-point scale (*1=Strong Disapproval* to *7=Strong Approval)* the extent they believe their friends, typical students, and parents approve of drinking alcohol every weekend, drinking alcohol daily, driving a car after drinking alcohol, and drinking enough to pass out. A mean score was derived for each referent group. Higher scores indicate stronger perceived approval. In the current sample, Cronbach's αs and McDonald's ωs were located at the lower bound of acceptability, for friends, typical students, and parents (αs= 67, .75, and .70 and ωs=.68, .76, and .69, respectively).

The *Descriptive Norms Rating Form* (DNRF; Baer, 1991) was used to assess descriptive norms. Participants indicated the number of drinks they believe each referent group (friends, typical students, parents) had on each day of a typical week over the past three

months. Sum scores reflect perceived total drinks in a week for each reference group.

The *Modified Drinking Motives Questionnaire-Revised* (MDMQ-R; Cooper, 1994; Grant et al., 2007) was used to assess motives for drinking across five subscales: coping with anxiety, coping with depression, enhancement, social, and conformity. Participants indicated how often their drinking is motivated by each of 28 reasons on a 5-point scale (*1=Almost never/never* to *5=Almost always/always).* Mean subscale scores were derived; higher scores indicate more frequent drinking due to that motive. Scores on the MDMQ-R demonstrate adequate to excellent scale score reliability (αs from .76 to .92; Goldstein et al., 2010). Scale score reliability in the current sample was excellent (αs=.84 to .95, ωs=.85 to .95).

**Data Analytic Procedures**

Phase 1 analysis began with the transcription and coding of information generated by focus groups. The sample size for phase 1 was decided according to the process of sampling to redundancy (Bernard, 2011), whereby data collection continued until information became redundant. This was achieved after six focus groups with a total of 31 participants. Template analysis guided the analytic methods in phase 1, permitting organization and analysis of textual data using a clear, systematic, and flexible approach (Brooks et al., 2015). A template of codes identifying unique concepts was created using Dedoose (2021) software and a directed content analytic approach (Hsieh & Shannon, 2005). The template was applied to the transcripts to evaluate the codes that were more frequently endorsed. Conceptually related codes were clustered and guided creation of the set of preliminary items.

Statistical analyses in phase 2 were completed in two parts. Part A involved preliminary testing the initial items selected in phase 1. Clark and Watson (1995) recommend a sample size of 100-200 participants for initial pilot testing of items. Problematic items were identified following recommended guidelines such that those items with low endorsement variability or that were unrelated to other items (i.e., >80% of responses at an extreme or

inter-item *r*s<.3; Rattray & Jones, 2007) or that were either redundant (*r*s>.5; Clark & Watson, 1995) were identified and removed. Review of the remaining items and consultation with experts, literature, and the dominant focus group themes informed item retention decisions. Part B focused on identifying a structurally sound measure using EFA with a recommended minimum of 300 participants (Clark & Watson, 1995; part B included 181 students from part A who completed a 4-month follow-up assessment and 158 newly recruited students). To maximize the distinctiveness of the factors, we relied on a goemin rotation procedure with an epsilon value of .5 (Morin et al., 2013). Separate solutions were estimated for each reference group (friends, typical students, parents). The optimal number of factors was determined by conducting a parallel analysis (using 1000 random samples) and by considering model fit indicators (Finch, 2020). Initial solutions were estimated using the full set of items retained at the end of part B. Items with weak factor loadings or that cross-loaded at half or more of the primary factor loading (Hinkin, 1998) were removed. This led to selection of a reduced set of optimal items, as characterized by strong factor loadings (minimally higher than .40) and negligible cross-loadings (minimally lower than .30) across the three reference groups. Test-retest reliability was assessed utilizing participant scores from Phase2/Part B and from a 4-month follow-up assessment.

Phase 3 focused on confirming the factor structure with a new sample. This was done using confirmatory factor analyses (CFA; Kline, 2016) and tests of measurement invariance and convergent validity. While sample size recommendations vary, we recruited a minimum of 400 participants for phase 3 based on the recommendations of Jackson et al. (2013). The use of CFA allowed us to test the utility of incorporating *a priori* correlated uniquenesses between two pairs of adjacent items with similar content (i.e., parallel wording), as recommended by Marsh et al. (2013): (a) Items 14 (*You drinking to help you forget about your problems*) and 15 (*You drinking to forget your worries*); (b) Items 5 (*You passing out as*

*a result of drinking*…) and 6 (*You blacking out as a result of drinking*…). After testing the factor structure identified in phase 2 separately for each referent group, we then tested the measurement invariance (or equivalence; Millsap, 2011) of this factor structure across referent groups. These tests were realized using a repeated measures approach (with referent group treated as the repeated measures), while incorporating *a priori* correlated uniquenesses to account for the matching items to avoid converging on inflated estimates of correlations (Marsh, 2007). We also tested the invariance of this factor structure as a function of drinking status (use and problems) and gender. The first three steps (configural-, weak-, and strong-invariance) test for measurement biases (i.e., different construct definition), the next two steps (strict- and correlated uniquenesses-invariance) test the presence of differences in precision (i.e., reliability), and the last two steps (variance covariance- and latent means-invariance) are about theoretically relevant differences (e.g., Millsap, 2011). Convergent validity was assessed via the estimation of correlations between factors and scores on the convergent measures. Incremental validity of the PARDI in the prediction of alcohol use behaviors was also tested relative to the INQ (Baer, 1994) and weekly alcohol use.

In phase 2/part B and phase 3, analyses were conducted in Mplus 8.5 (Muthén & Muthén, 2020) using maximum likelihood estimation robust to non-normality (MLR) and full information maximum likelihood (FIML; Enders, 2010) to handle the few missing responses (phase 2/part B: 1.77% to 4.13%; *M*=2.32%; phase 3: 0.29% to 1.06%; *M*=0.70%).Given known oversensitivity of chi-square to minor misspecification, sample size, and omitted variables, we relied on sample-size independent fit indices to assess model fit (Hu & Bentler, 1999; Marsh et al., 2005). Values ≥.900 and .950 on the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI), and ≤.08 and .06 on the Root Mean Square Error of Approximation (RMSEA), indicate adequate and excellent fit. For tests of invariance, decreases in CFI and TLI ≤.010 and increases in RMSEA ≤.015 between one model and the

previous one support the most invariant model (Chen, 2007).

## Results

### Phase 1 (Item Generation)

Overall, 228 unique codes, representing conceptually distinct drinking-related behaviors, were created from 1,232 units of information. Clustering codes according to thematic similarity resulted in the creation of 54 representative items (see Section S1 of the online supplements). Codes associated with a low endorsement and no conceptual overlap with other codes were not used to generate the initial items (see Section S2 of the online supplements). It was decided to include "your friends," "typical students at your university" and "your parents" as referent groups given the well documented relevance of these groups in relation to young adult drinking (LaBrie et al., 2010; Neighbors et al., 2008). Also, these were by far the most often discussed referent groups by participants, with other potential referent groups (e.g., significant others, supervisors) rarely acknowledged.

### Phase 2 (Pilot Testing and Scale Refinement)

Figure 1 provides a summary of item removal. In part A/pilot testing, 12 items were trimmed from the initial 54 items, including six items with low endorsement variability, five items with low inter-item correlations, and one redundant item. In part B/scale refinement, ten items related to coping motivated drinking, drawn from the MDMQ-R (Cooper, 1994; Grant et al., 2007), were added to the 42 remaining items to improve coverage of this domain (these items are presented in Section S3 of the online supplements). Four of the remaining 52 items exhibited insufficient endorsement variability, one item exhibited low inter-item correlations, and seven items exhibited redundancy and were removed from further analyses. The model fit and the parallel analyses supported a four-factor solution for all three reference groups. The results revealed seven items with low factor loadings and 13 items with problematic cross-loading which were also removed from the analysis. In the final four factor

solutions, derived from the 20 remaining items, all items loaded on their respective factors with satisfactory factor loadings ($\lambda$=.415 to .905; *M*=.711) and no problematic cross-loadings. All factors (Heavy Drinking, Drinking-Related Problems, Coping-Related Drinking, and Sexual-Risk Taking) were highly reliable (ω=.811 to .955, *M*=.893; α=.848 to .957, *M*=.909). Parameter estimates are reported in Table 2 and model fit is reported in Table 3.

**Test-Retest Reliability.** Due to the cross-sectional nature of the data in phase 3 where the factor structure was confirmed, we assessed test-retest reliability using participant responses from phase 2/part B (*n* = 179) and a 4-month follow-up survey (*n* = 120; 33.5% attrition). There were no statistically significant differences on any PARDI subscales, weekly use, or alcohol problems between those who did and did not complete the follow-up assessment. Test-retest reliability ranged from *r*=.505 (sexual-risk taking subscale with typical students reference group) to .819 (heavy drinking subscale with friends reference group; all *p*s<.001), thus providing support for the PARDI's test-retest reliability.

**Phase 3 (Scale Validation)**

**Measurement Models.** The fit of the alternative CFA solutions is reported in Table 3 and revealed that all solutions had acceptable fit to the data, although solutions incorporating *a priori* correlated uniquenesses resulted in a substantially higher level of fit (ΔCFI=+.012 to +.026; ΔTLI=+.013 to +.029; ΔRMSEA=-.005 to -.011) and substantively identical parameter estimates. These models were thus retained for interpretation and further analyses. The parameter estimates from these models are reported in Table 4 and revealed factors that were well-defined in terms of factor loadings ($\lambda$=.625 to .869; *M*=.790), reliable (ω=.819 to .940, *M*=.885; α=.817 to .941, *M*=.887), and moderately to highly correlated (*r*=.287 to .883, *M*=.526), although clearly distinct. The highest correlation was systematically found between Drinking-Related Problems and Sexual-Risk Taking (*r*=.632 to .886), while the weakest was between Heavy Drinking and Sexual-Risk Taking (*r*=.287 to .399).

**Measurement Invariance.** The results from the tests of measurement invariance are reported in Table 5. Across all tests, the configural model (i.e., M1) resulted in an acceptable level of fit to the data indicating that the four-factor structure is acceptable for all referent groups (friends, parents, typical students) and groups of respondents (men and women, and those with low and high alcohol use and problems). Likewise, the weak and strong invariance (i.e., M2 and M3), of this model was supported for all comparisons consistent with the lack of measurement biases related to the definition of the constructs and propensity to provide higher or lower scores on specific items. Although the invariance of the correlated uniquenesses (i.e., M5) was also supported across all comparisons, the strict invariance of the model (i.e., M4) was not supported in three of the comparisons (Table 5, Panels A, C, and I), suggesting differences in composite reliability. For all three comparisons, examination of the parameter estimates associated with the previous model of strong invariance and of the modification indices associated with the failed models of strict invariance revealed that the lack of invariance was limited to only a subset of uniquenesses. Once equality constraints were relaxed on these specific uniquenesses, the resulting model of partial strict invariance (i.e., M4') was supported, allowing us to achieve unbiased group comparisons of variances, covariances, and means. The model of partial strict invariance revealed a higher level of reliability (i.e., lower uniquenesses) in participant ratings of parents' approval of drinking behaviors, which suggests a greater level of familiarity with views of parental approval relative to friends or typical students. Further, when groups of participants with high and low levels of alcohol-related problems were compared, the model of partial strict invariance suggests that participants with lower levels of alcohol-related problems were slightly more familiar with views of friends' approval of two types of risky sexual behaviors (i.e., using less protection, and exposure to risky sexual situations), and of parents' approval of drinking in inappropriate ways. This is consistent with empirical research findings indicating that

undergraduates who overestimate others' approval of drinking behaviours are at elevated risk for problematic drinking (LaBrie et al., 2010; Perkins, 2007) and thus those with more accurate perceptions of friend and parental approval should be at lower risk for alcohol-related problems.

The invariance of the latent-variances and covariances (i.e., M6) was supported for most comparisons, with two exceptions (Table 5, Panels A and J). The alternative model of partial invariance of the latent variances and covariances (i.e., M6') indicated that ratings of parents on all four factors displayed less inter-individual variability than ratings of friends or typical students. This is consistent with research findings indicating relatively lower variability in parental injunctive norms than typical student and friend norms (e.g., LaBrie et al., 2010). These results also revealed higher correlations between ratings of factors 2 (Drinking-Related Problems) and 4 (Sexual-Risk Taking) for parents than in relation to friends or typical students, suggesting that students experience the domains more distinctly when reflecting upon peer approval than parental approval. Further, the resulting model of partial invariance of the latent variances and covariances revealed a higher level of inter-individual variability for men, relative to women, on ratings of parents' approval of risky-sexual behaviors, which is consistent with research findings that parents communicate more protective and restrictive messaging regarding sexual activity to daughters than to sons (Kuhle et al., 2015).

Next, the invariance of the latent means (i.e., M7) was supported for all except two comparisons (Table 5, Panels A and B). These results revealed that latent means differences were limited to ratings about parents, suggesting a lower level of perceived parental approval relative to friends or typical students for all types of drinking-related behaviors (-1.491 SD for Heavy Drinking; -0.834 SD for Drinking-Related Problems; -0.969 SD for Coping-Related Drinking; -0.699 SD for Sexual Risk-Taking). This is consistent with previous

research reporting lower levels of perceived parental approval in comparison to typical student or friend approval (LaBrie et al., 2010). Last, those with a low (relative to high) level of alcohol use reported a lower level of approval among friends for all types of drinking-related behaviors (-0.864 SD for Heavy Drinking; -0.361 SD for Drinking-Related Problems; -0.387 SD for Coping-Related Drinking; -0.400 SD for Sexual-Risk Taking), consistent with the reasoned action approach (Fishbein & Ajzen, 2010). In sum, the PARDI demonstrates invariance across referent group as well as undergraduate student characteristics, such as gender and high/low alcohol use and problems. The instances where only partial invariance was supported are consistent with theory and empirical research.

**Validity.** Factor correlations are presented in Table S4.1 of the online supplements. First, considering ratings of each factor across referent groups: (a) factor 1 (Heavy Drinking) ratings were statistically more similar between friends and typical students ($r$=.649), than among parents and friends ($r$=.379, $Z$=8.589, $p$<.001), or parents and typical students ($r$=.302, $Z$=11.290, $p$<.001); (b) factor 2 (Drinking-Related Problems) ratings were statistically more similar between friends and typical students ($r$=.562) than among friends and parents ($r$=.209, $Z$=9.872, $p$<.001) or among parents and typical students ($r$=.270, $Z$=8.000, $p$<.001); (c) factor 3 (Coping-Related Drinking) ratings were statistically more similar between friends and typical students ($r$=.620), than among friends and parents ($r$=.420, $Z$=6.352, $p$<.001), or parents and typical students ($r$=.304, $Z$=10.414; $p$<.001); and (d) factor 4 (Sexual-Risk Taking) ratings were statistically less similar between typical students and parents ($r$=.217), than among friends and typical students ($r$=.493, $Z$=-8.574, $p$<.001), or friends and parents ($r$=.449, $Z$=-7.388, $p$<.001). These results clearly support the complementary nature of considering all three types of referents.

Second, correlations between PARDI subscales and convergent measures are reported in Table 6. Results indicate that perceptions of friends' (but not parents') approval on all four

subscales were positively related to alcohol use and alcohol-related problems. Perceptions of typical students' approval of heavy drinking also had a weak positive correlation with alcohol use and alcohol-related problems. Most of the PARDI subscales had positive associations with participant ratings on other measures of perceived drinking norms (i.e., INQ and DNRF), with only a few exceptions. Perceptions of friends' and parents' approval of coping-related drinking was positively related with drinking for coping motives (depression). Perceptions of friend approval of coping-related drinking was also positively related with drinking for coping motives (anxiety).

Third, we tested the incremental validity of the PARDI. The results are presented in Tables S4.2 and S4.3 of the online supplements. The PARDI (friends and parents) demonstrated statistically significant improvement in the prediction of weekly alcohol use ($R^2\Delta$ =.038 and $R^2\Delta$ =.035, both $p$<.05) over and above INQ. Controlling for weekly alcohol use, the PARDI (friends) also demonstrated statistically significant improvements in the prediction of alcohol-related problems ($R^2\Delta$ =.018, $p$<.05), as well as coping- ($R^2\Delta$ =.025, $p$<.05) and enhancement- ($R^2\Delta$ =.026, $p$<. <.05) motivated drinking, both being motives that are consistently linked with risky young adult drinking (Goldstein et al., 2010). This provides preliminary support for the utility of the PARDI to predict alcohol use behaviors relative to what is predicted by the INQ and weekly use.

## Discussion

Our study objective was to develop and validate a new measure of injunctive drinking norms. Item creation was guided by focus groups with undergraduates to ensure the items included would capture aspects relevant to their subjective reality. Scale refinement resulted in a reduced set of 20 items, covering four factors, via an analysis of the items (i.e., endorsement, inter-item correlations) and EFAs. We then confirmed the four-factor structure across referent groups, its generalizability across gender and drinking status, its discriminant

validity across referent group, its convergent validity in relation to measures of alcohol use, problems, perceived norms, and drinking motives, as well as its incremental validity relative to the INQ. The resulting PARDI appears to provide a valid and reliable assessment of friends, typical students, and parents perceived approval of heavy drinking (e.g., drinking games), drinking-related problems (e.g., blackouts), coping-related drinking (e.g., to forget your worries), and sexual risk-taking (e.g., sex with someone that you would not have if you were sober) with undergraduate students.

The PARDI adds to the literature by providing a multidimensional measure of injunctive norms, allowing researchers to consider not only across different referent groups, but also across different types of drinking behaviors. Whereas previous measures of injunctive norms typically included items capturing heavy drinking and drinking-related problems treated as if they were forming a single dimension, our analyses revealed that these two facets seem to capture different, non-redundant, aspects of injunctive norms. Both factors were only moderately correlated with one another and displayed differentiated patterns of association with alcohol use and related problems across referent groups. When considering the perceived approval of heavy drinking, norms related to friends and typical students both correlated with alcohol use and related problems. However, only perceptions of friends' approval of drinking-related problems correlated with students own alcohol use and related problems. These results are consistent with research showing that friends are a source of influence on drinking behaviors (Neighbors et al., 2008). In contrast, perceived parental approval of heavy drinking and drinking-related problems did not share statistically significant associations with alcohol use or problems. This lack of association may be partially explained by the tendency of participants to rate their parents as being far less approving than their friends and typical students, and in a way that demonstrated less inter-individual variability. This range restriction, which reflects participants' perception of their

parents as less tolerant of risky drinking, could explain this lack of association.

Our results also suggest two additional distinct elements of injunctive norms: the perceived approval of coping-related drinking and of sexual risk-taking. These unique facets of injunctive norms have not previously been measured and studied on their own and appeared to be clearly distinct from the other facets of norms covered in the PARDI. For instance, participant scores on the coping-related drinking subscale were only moderately correlated with scores on the other PARDI factors (*r*s from .367 to .619), and for the more proximal referent groups (friends and parents) these scores correlated positively with one's reported tendency to drink to cope with depression. Perceptions of typical students' approval of drinking to cope were not associated with one's own alcohol use, alcohol-related problems, or drinking motives. This suggests proximity may be particularly relevant when considering the influence of perceived approval of drinking to cope. As drinking to cope is one of the best predictors of severe alcohol-related problems and alcohol use disorders (Carpenter & Hasin, 1999; Merrill et al., 2014), the perceived approval of drinking to cope may help explain the development of coping-motivated drinking. Moreover, this points to the possible value of correcting overestimations of friend and parent coping-related approval.

Perceived approval of sexual risk-taking also emerged as a distinct construct when considering friends and typical student perceived approval ($r$ = .632 to .666). However, when considering perceptions of parental approval, this dimension was more highly correlated to the drinking-related problems subscale ($r$ = .883)[1]. This suggests that participants may consider approval of these two types of problematic behaviors (e.g., passing out and sexual risk-taking) more similarly by their parents than by their peers. While only ratings of friends' approval of sexual risk-taking were associated with one's own alcohol-related problems, it is

[1]Despite this high correlation, we found no evidence that these two factors were redundant in relation to parents. Specifically, estimation of an alternative measurement model combining these two dimensions into a single factor resulted in a substantial decrease in model fit (e.g., ΔCFI=-.014, ΔTLI=-.015).

important to note that the 48-item measure of alcohol-related consequences only included two items specific to sexual consequences. This may explain part of the lack of association with parent and typical student norms. Indeed, the sexual risk-taking subscale displayed a more consistent pattern of correlations with the two negative sexual consequences items (i.e., (protection) *As a result of drinking, I have neglected to protect myself or my partner from a sexually transmitted disease (STD) or unwanted pregnancy,* and (regret) *My drinking has gotten me into sexual situations I later regretted*)[2]. Beyond this empirically demonstrated value, incorporating this facet of injunctive norms could prove useful for the development of interventions designed to help reduce unplanned or unwanted sexual experiences based on changing perceived norms.

A key strength of the PARDI comes from the demonstration that it provides scores that are directly comparable (i.e., invariant) across undergraduate men and women irrespective of their level of alcohol use or alcohol-related problems. Perhaps more importantly, PARDI ratings were also found to be directly equivalent, and comparable, across friends, typical students, and parents. This evidence of generalizability indicates that the PARDI can be used to monitor group differences in undergraduates across all three referent groups, and to monitor the efficacy of various interventions seeking to modify injunctive norms in a generic (all referent groups) or specific (one referent only) manner. Pending further studies documenting the equivalence of these ratings across different stages of young adulthood, the PARDI could easily become a key tool for studying how injunctive norms emerge, evolve, and change over the university context. Documenting this longitudinal equivalence would appear to be particularly important in relation to what we already know about drinking norms. For example, parental norms tend to have a small but unique effect on

[2]Correlations between sexual-risk taking subscale and negative sexual consequences (protection and regret): Friends: $r$=.237 and .125, respectively (both $p$<.01); Typical students $r$=.080 and .074, respectively (both $p$<.01); and (c) parents $r$=.132 ($p$<.01) for the first of those items, but only .049 for the second one ($p$=.149).

adolescent and early college drinking (Neighbors et al., 2007) but appear to become stronger predictors of drinking after leaving university (Hamilton et al., 2020). In contrast, friends' approval is consistently relevant to predicting drinking and drinking-related harm.

The ability to contrast injunctive norms across referent groups is also important, both for purposes of guiding intervention and of contributing to our understanding of the process via which injunctive norms come to influence alcohol use and related problems. For instance, research has already shown that people tend to be better estimators of their friends' approval than of more distal groups, such as typical students (Cox et al., 2019). This suggests that friends may be a less useful target for interventions delivering norm-correcting feedback. Neighbors et al. (2008) found that whereas parent and friend injunctive norms were associated positively with drinking behaviors, typical student injunctive norms were negatively associated with personal drinking. Relying on our arguably more elaborate multidimensional measure of injunctive norms, we found that perceived typical student approval of heavy drinking demonstrated significant associations with participants' own drinking and alcohol-related problems. These results indicate the presence of nuances in relation to what kinds of perceived approval by distal groups may be most relevant to one's own drinking and support the ability of the PARDI to detect such differences.

**Limitations**

Limitations of the present study must be acknowledged to help direct future research. First, women were over-represented in all study phases. Research indicates that gender predicts differential patterns of alcohol use and associated behaviors, such as men being more approving of alcohol-related problems (DeMartini et al., 2011), and non-binary and transgender students endorsing more frequent binge drinking episodes (Ruppert et al., 2021). Future studies should include more men and participants with non-binary genders to assess whether unique, gender-specific aspects of injunctive norms in predicting risky drinking may

be missing. However, phase 3 included sufficient men to test the invariance of the measure across men and women. Our findings indicate equivalence of PARDI scores across men and women, while showing that men tend to display more inter-individual variability than women in their ratings of parental approval of risky sex behaviors.

A second limitation is the length of this measure in comparison to other measures of injunctive norms. However, the PARDI demonstrates good incremental validity in predicting drinking behaviours beyond what is predicted by the shorter INQ. Furthermore, researchers may elect to assess only those referent groups relevant to their analyses thereby reducing participant burden by limiting the number of repetitions of the items. Future research should also endeavor to develop a shorter version of the PARDI.

## Conclusion

In this study, we developed and validated a measure of injunctive norms designed to help improve theory testing and norms-based interventions. The PARDI specifically assesses perceived approval of heavy drinking, drinking-related problems, coping-related drinking, and sexual risk-taking by friends, typical students, and parents. This multi-dimensional questionnaire was found to yield directly comparable results across each of the referent groups and across subgroups of undergraduate men and women displaying different levels of drinking. The PARDI is thus a potentially useful tool that will inform theory development and interventions focused on injunctive norms. The widespread use of the PARDI in research should help achieve a clearer integration and comparison of results across studies, referents, and groups of participants through the reliance on a more consistent operationalization and measurement than has been previously used in this area of research. Ultimately, more nuanced investigations exploring distinct facets of injunctive norms with a psychometrically-sound measure and the ability to compare results across studies and samples, should help shed light on the relevance of injunctive norms in prevention and intervention.

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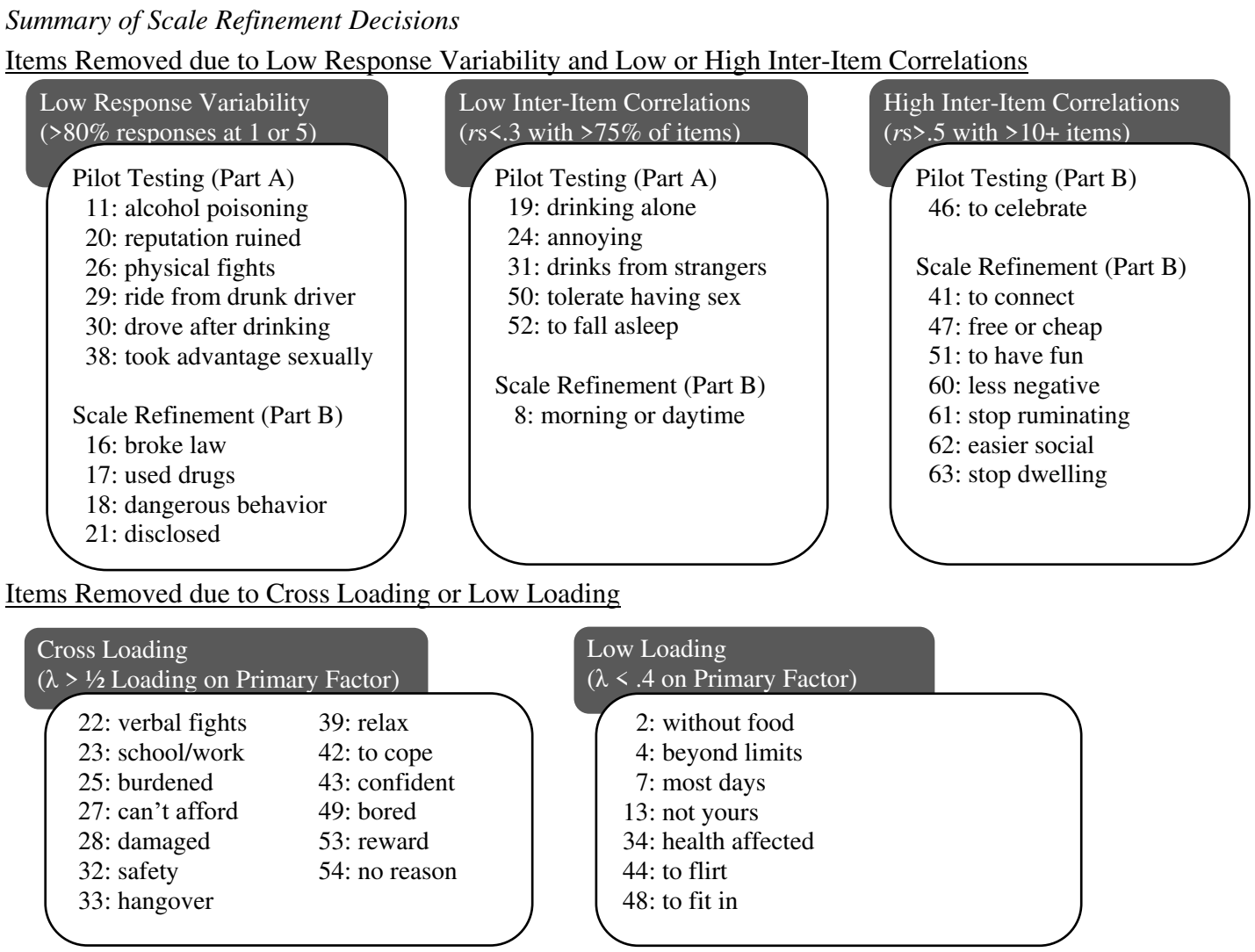
**Figure 1.**

*Summary of Scale Refinement Decisions*




*Note.* Item numbers correspond to item lists in S1 and S3 of online supplements.

**Table 1**
*Participant Characteristics*

| | Phase 1 | Phase 2 | | Phase 3 |
|---|---|---|---|---|
| | | Part A | Part B | |
| *N* | 31 | 249 | 338[1] | 875 |
| Age: Mean (*SD*) | 21.30 (1.49) | 20.76 (1.59) | 20.04 (1.79) | 20.77 (1.845) |
| Gender (% women) | 82% | 81%[2] | 66.3%[3] | 82.9%[4] |
| Ethnicity | | | | |
| East Asian, South-East Asian, Pacific Islander | 3.2% | 16.1% | 18.0% | 11.0% |
| Middle Eastern, North African, Central Asian | 6.4% | 10.8% | 4.7% | 6.5% |
| Hispanic or Latino | 3.2% | 3.2% | 2.1% | 4.3% |
| Caucasian or White | 61.3% | 58.2% | 58.3% | 61.0% |
| Black | 9.7% | 3.2% | 6.5% | 4.2% |
| Aboriginal | 0.0% | 0.0% | 0.3% | 0.6% |
| South Asian | 6.4% | 3.6% | 3.0% | 4.0% |
| Other | 6.4% | 4.8% | 7.1% | 8.4% |
| Weekly Drinks: Mean (*SD*) | 5.24 (4.73) | 5.78 (7.61) | 6.13 (7.25) | 5.13 (6.50) |

*Note:* [1]includes 181 follow-up assessments from participants in part A, with 158 new participants. [2]1.6% of sample identified as non-binary (i.e., any option other than "man/male" or "woman/female"); [3]0.9% of sample identified as non-binary; [4]1.0% of sample identified as non-binary.

**Table 2**

*Standardized Factor Loadings (λ), Uniquenesses (δ), Correlations (r) and Reliability from the Exploratory Factor Analyses*

| | Friends | | | | | Students | | | | | Parents | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | F1 λ | F2 λ | F3 λ | F4 λ | δ | F1 λ | F2 λ | F3 λ | F4 λ | δ | F1 λ | F2 λ | F3 λ | F4 λ | δ |
| 1. Binge drinking | **.704** | .124 | -.033 | .096 | .411 | **.774** | .122 | .011 | .009 | .324 | **.475** | .290 | .088 | .169 | .382 |
| 2. Drinking games | **.847** | .003 | .040 | -.026 | .270 | **.905** | -.039 | .042 | .015 | .170 | **.815** | .100 | .005 | -.039 | .290 |
| 3. Mixing drinks | **.543** | .160 | .065 | .155 | .524 | **.637** | .202 | .030 | .090 | .420 | **.608** | .162 | .150 | .069 | .362 |
| 4. Pre-drinking | **.825** | .039 | -.004 | -.066 | .316 | **.796** | .075 | .048 | -.003 | .300 | **.855** | -.035 | .061 | .065 | .199 |
| 5. Passing out | -.054 | **.719** | .015 | .155 | .370 | .026 | **.765** | .017 | .098 | .312 | .055 | **.741** | .006 | .207 | .185 |
| 6. Blacking out | .047 | **.856** | -.011 | .017 | .233 | .068 | **.762** | -.008 | .086 | .319 | .047 | **.722** | .029 | .193 | .223 |
| 7. Vomit | .082 | **.575** | .084 | .131 | .500 | .005 | **.667** | .146 | .147 | .345 | .118 | **.622** | .087 | .151 | .334 |
| 8. Inappropriate | .091 | **.519** | .018 | .218 | .526 | .046 | **.586** | .023 | .238 | .432 | .080 | **.674** | .137 | .153 | .229 |
| 9. Can't limit | .092 | **.415** | .126 | .230 | .581 | .100 | **.566** | .073 | .187 | .453 | .059 | **.611** | .121 | .217 | .284 |
| 10. Sex | .118 | .172 | .010 | **.691** | .324 | .076 | .071 | .058 | **.755** | .310 | .094 | .115 | .053 | **.784** | .157 |
| 11. Less protection | -.041 | .036 | .041 | **.862** | .217 | -.015 | .104 | -.017 | **.852** | .193 | .006 | .095 | .022 | **.895** | .066 |
| 12. Risky situation | -.024 | .058 | -.039 | **.823** | .296 | -.024 | .056 | .005 | **.869** | .200 | .027 | .102 | .040 | **.867** | .081 |
| 13. To get drunk | **.663** | .072 | .130 | .135 | .400 | **.650** | .052 | .170 | .112 | .396 | **.683** | .017 | .081 | .153 | .366 |
| 14. To forget problems | .143 | .121 | **.667** | .062 | .382 | .282 | .070 | **.592** | .116 | .346 | .208 | .097 | **.624** | .160 | .234 |
| 15. To forget worries | .137 | .107 | **.769** | .021 | .259 | .142 | .095 | **.758** | .026 | .260 | .111 | .173 | **.732** | .062 | .178 |
| 16. Depressed | -.058 | .050 | **.863** | .132 | .172 | .010 | .078 | **.773** | .164 | .235 | .015 | .190 | **.732** | .172 | .130 |
| 17. Nervous | .201 | .131 | **.696** | -.008 | .325 | .194 | .091 | **.732** | .049 | .244 | .250 | -.028 | **.704** | .100 | .226 |
| 18. Hopeless | -.037 | .064 | **.825** | .132 | .221 | -.045 | .095 | **.767** | .183 | .247 | .039 | .162 | **.655** | .234 | .199 |
| 19. Reduce anxiety | .134 | .073 | **.721** | .026 | .361 | .092 | .093 | **.785** | .024 | .255 | .203 | .047 | **.707** | .083 | .228 |
| 20. Physical tension | .052 | .107 | **.473** | .242 | .573 | .073 | .107 | **.511** | .193 | .537 | .136 | .178 | **.583** | .107 | .346 |
| Correlations | F1 | F2 | F3 | F4 | | F1 | F2 | F3 | F4 | | F1 | F2 | F3 | F4 | |
| F1 | | | | | | | | | | | | | | | |
| F2 | .291* | | | | | .278* | | | | | .341* | | | | |
| F3 | .243* | .293* | | | | .323* | .301* | | | | .437* | .403* | | | |
| F4 | .155* | .468* | .251* | | | .165* | .477* | .313* | | | .319* | .589* | .415* | | |
| Reliability | | | | | | | | | | | | | | | |
| α | .878 | .848 | .925 | .876 | | .907 | .889 | .938 | .903 | | .898 | .932 | .957 | .955 | |
| ω | .870 | .811 | .916 | .871 | | .898 | .857 | .919 | .897 | | .881 | .900 | .936 | .955 | |

*Note.* * $p < .001$; F1 = Heavy drinking; F2 = Drinking-related problems; F3 = Coping-related drinking; F4 = Sexual-risk taking; Main factor loadings are marked in bold; α = Cronbach alpha coefficient of scale score reliability; ω = McDonald omega coefficient of composite reliability.

**Table 3**

*Model Fit of the Alternative Measurement Models*

| Description | $\chi^2$ (*df*) | CFI | TLI | RMSEA | 90% CI |
|---|---|---|---|---|---|
| *Phase 2 Part B: Main Models* | | | | | |
| Friends: Exploratory Factor Analysis | 257.738 (116)* | .957 | .929 | .060 | [.050; .070] |
| Students: Exploratory Factor Analysis | 194.290 (116)* | .978 | .973 | .045 | [.034; .056] |
| Parents: Exploratory Factor Analysis | 214.383 (116)* | .967 | .946 | .050 | [.040; .061] |
| *Part 3: Main Models* | | | | | |
| Friends: Confirmatory Factor Analysis | 816.600 (164)* | .921 | .909 | .067 | [.063; .072] |
| Students: Confirmatory Factor Analysis | 702.447 (164)* | .943 | .934 | .061 | [.057; .066] |
| Parents: Confirmatory Factor Analysis | 530.640 (164)* | .921 | .909 | .051 | [.046; .056] |
| *Part 3: Main Models with A Priori Correlated Uniquenesses* | | | | | |
| Friends: Confirmatory Factor Analysis | 601.813(162)* | .947 | .938 | .056 | [.051; .060] |
| Students: Confirmatory Factor Analysis | 592.339(162)* | .955 | .947 | .055 | [.051; .060] |
| Parents: Confirmatory Factor Analysis | 460.542(162)* | .936 | .925 | .046 | [.041; .051] |

*Note.* * $p < .01$; $\chi^2$: Scaled chi-square test of exact fit; *df*: Degrees of freedom; CFI: Comparative fit index; TLI: Tucker-Lewis index; RMSEA: Root mean square error of approximation; 90% CI: 90% confidence interval.

Table 4

*Standardized Factor Loadings (λ), Uniquenesses (δ), Correlations (r) and Reliability from the Confirmatory Factor Analyses*

| | Friends | | | | | Students | | | | | Parents | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | F1 λ | F2 λ | F3 λ | F4 λ | δ | F1 λ | F2 λ | F3 λ | F4 λ | δ | F1 λ | F2 λ | F3 λ | F4 λ | δ |
| 1. Binge drinking | **.769** | | | | .408 | **.780** | | | | .391 | **.625** | | | | .610 |
| 2. Drinking games | **.855** | | | | .269 | **.862** | | | | .257 | **.790** | | | | .377 |
| 3. Mixing drinks | **.715** | | | | .489 | **.775** | | | | .399 | **.682** | | | | .535 |
| 4. Pre-drinking | **.859** | | | | .262 | **.863** | | | | .255 | **.799** | | | | .362 |
| 5. Passing out | | **.712** | | | .493 | | **.780** | | | .392 | | **.813** | | | .339 |
| 6. Blacking out | | **.757** | | | .428 | | **.803** | | | .355 | | **.843** | | | .289 |
| 7. Vomit | | **.728** | | | .469 | | **.784** | | | .386 | | **.768** | | | .410 |
| 8. Inappropriate | | **.669** | | | .553 | | **.714** | | | .491 | | **.774** | | | .402 |
| 9. Can't limit | | **.710** | | | .496 | | **.739** | | | .454 | | **.731** | | | .466 |
| 10. Sex | | | | **.806** | .350 | | | | **.811** | .343 | | | | **.822** | .324 |
| 11. Less protection | | | | **.774** | .401 | | | | **.869** | .245 | | | | **.839** | .297 |
| 12. Risky situation | | | | **.746** | .444 | | | | **.807** | .348 | | | | **.858** | .263 |
| 13. To get drunk | **.800** | | | | .360 | **.770** | | | | .407 | **.733** | | | | .463 |
| 14. To forget problems | | | **.776** | | .398 | | | **.807** | | .348 | | | **.776** | | .398 |
| 15. To forget worries | | | **.834** | | .304 | | | **.865** | | .252 | | | **.840** | | .295 |
| 16. Depressed | | | **.826** | | .317 | | | **.858** | | .264 | | | **.820** | | .327 |
| 17. Nervous | | | **.856** | | .267 | | | **.857** | | .266 | | | **.823** | | .323 |
| 18. Hopeless | | | **.794** | | .370 | | | **.827** | | .317 | | | **.839** | | .297 |
| 19. Reduce anxiety | | | **.840** | | .294 | | | **.861** | | .259 | | | **.814** | | .337 |
| 20. Physical tension | | | **.703** | | .506 | | | **.746** | | .444 | | | **.730** | | .468 |
| Correlations | F1 | F2 | F3 | F4 | | F1 | F2 | F3 | F4 | | F1 | F2 | F3 | F4 | |
| F1 | | | | | | | | | | | | | | | |
| F2 | .465* | | | | | .530* | | | | | .471* | | | | |
| F3 | .486* | .494* | | | | .574* | .586* | | | | .542* | .619* | | | |
| F4 | .287* | .632* | .367* | | | .399* | .666* | .544* | | | .343* | .883* | .572* | | |
| Reliability | | | | | | | | | | | | | | | |
| α | .898 | .850 | .930 | .817 | | .903 | .882 | .941 | .886 | | .845 | .887 | .926 | .877 | |
| ω | .899 | .840 | .928 | .819 | | .906 | .875 | .940 | .869 | | .849 | .890 | .929 | .878 | |

*Note.* * $p < .001$; F1 = Heavy drinking; F2 = Drinking-related problems; F3 = Coping-related drinking; F4 = Sexual-risk taking; Main factor loadings are marked in bold; α = Cronbach alpha coefficient of scale score reliability; ω = McDonald omega coefficient of composite reliability.

Table 5

*Tests of Measurement Invariance*

| Description | $\chi^2$ (*df*) | CFI | TLI | RMSEA | 90% CI | CM | $\Delta\chi^2$ (*df*) | ΔCFI | ΔTLI | ΔRMSEA |
|---|---|---|---|---|---|---|---|---|---|---|
| *Panel A - Invariance Across Referent Group* | | | | | | | | | | |
| M1. Configural invariance | 3112.034(1578)* | .951 | .946 | .033 | [.032; .035] | - | - | - | - | - |
| M2. Weak invariance | 3342.597(1610)* | .945 | .940 | .035 | [.033; .037] | M1 | 193.334 (32)* | -.006 | -.006 | +.002 |
| M3. Strong invariance | 3628.443(1642)* | .937 | .932 | .037 | [.036; .039] | M2 | 307.937 (32)* | -.008 | -.008 | +.002 |
| M4. Strict invariance | 6315.835(1682)* | .853 | .846 | .056 | [.055; .058] | M3 | 1094.567 (40)* | -.084 | -.086 | +.019 |
| M4' Partial strict invariance | 3786.031(1668)* | .933 | .929 | .038 | [.036; .040] | M4 | 141.656 (26)* | -.004 | +.003 | +.001 |
| M5. Correl. uniq. invariance | 3862.929(1672)* | .931 | .927 | .039 | [.037; .040] | M4' | 34.161 (4)* | -.002 | -.002 | +.001 |
| M6. Variance-covariance invariance | 4816.279(1692)* | .901 | .896 | .046 | [.044; .047] | M5 | 520.895 (20)* | -.030 | -.031 | +.007 |
| M6' Partial var.-covar. invariance | 4008.010(1686)* | .926 | .923 | .040 | [.038; .041] | M6 | 125.027 (14)* | +.025 | +.027 | -.006 |
| M7. Latent means invariance | 4996.632(1694)* | .895 | .891 | .047 | [.046; .049] | M6' | 1151.434 (8)* | -.031 | -.032 | +.007 |
| *Panel B - Friends: Invariance Alcohol Use* | | | | | | | | | | |
| M1. Configural invariance | 809.244(324)* | .939 | .929 | .059 | [.053; .064] | - | - | - | - | - |
| M2. Weak invariance | 825.744(340)* | .939 | .932 | .057 | [.052; .062] | M1 | 15.633 (16) | .000 | +.003 | -.002 |
| M3. Strong invariance | 859.341(356)* | .937 | .933 | .057 | [.052; .062] | M2 | 32.814 (16)* | -.002 | +.001 | .000 |
| M4. Strict invariance | 944.818(376)* | .929 | .928 | .059 | [.054; .063] | M3 | 74.587 (20)* | -.008 | -.005 | +.002 |
| M5. Correl. uniq. invariance | 946.425(378)* | .929 | .928 | .059 | [.054; .063] | M4 | 3.509 (2) | .000 | .000 | .000 |
| M6. Variance-covariance invariance | 1015.915(388)* | .921 | .923 | .061 | [.056; .065] | M5 | 60.864 (10)* | -.008 | -.005 | +.002 |
| M7. Latent means invariance | 1129.965(392)* | .908 | .910 | .066 | [.061; .070] | M6 | 137.095 (4)* | -.013 | -.013 | +.005 |
| *Panel C - Friends: Invariance Alcohol-Related Problems* | | | | | | | | | | |
| M1. Configural invariance | 791.834(324)* | .941 | .931 | .057 | [.052; .063] | - | - | - | - | - |
| M2. Weak invariance | 822.741(340)* | .939 | .932 | .057 | [.052; .062] | M1 | 30.346 (16) | -.002 | +.001 | .000 |
| M3. Strong invariance | 866.650(356)* | .936 | .931 | .057 | [.052; .062] | M2 | 44.729 (16)* | -.003 | -.001 | .000 |
| M4. Strict invariance | 1022.122(376)* | .919 | .918 | .063 | [.058; .067] | M3 | 121.631 (20)* | -.017 | -.013 | +.006 |
| M4' Partial strict invariance | 943.840(373)* | .928 | .927 | .059 | [.054; .074] | M4 | 68.003 (17)* | -.009 | -.005 | +.002 |
| M5. Correl. uniq. invariance | 960.392(375)* | .926 | .925 | .060 | [.055; .064] | M4' | 10.162 (2)* | -.002 | -.002 | +.001 |
| M6. Variance-covariance invariance | 1009.527(385)* | .922 | .923 | .061 | [.056; .065] | M5 | 43.927 (10)* | -.004 | -.002 | +.001 |
| M7. Latent means invariance | 1068.289(389)* | .915 | .917 | .063 | [.059; .068] | M6 | 141.240 (4)* | -.007 | -.006 | +.002 |
| *Panel D - Friends: Invariance Gender* | | | | | | | | | | |
| M1. Configural invariance | 776.514(324)* | .947 | .938 | .057 | [.052; .062] | - | - | - | - | - |
| M2. Weak invariance | 803.491(340)* | .946 | .939 | .056 | [.051; .061] | M1 | 23.868 (16) | -.001 | +.001 | -.001 |
| M3. Strong invariance | 846.038(356)* | .943 | .939 | .056 | [.052; .061] | M2 | 43.203 (16)* | -.003 | .000 | .000 |
| M4. Strict invariance | 911.316(376)* | .937 | .937 | .057 | [.053; .062] | M3 | 60.890 (20)* | -.006 | -.002 | +.001 |
| M5. Correl. uniq. invariance | 907.956(378)* | .938 | .938 | .057 | [.052; .062] | M4 | .016 (2) | +.001 | +.001 | .000 |
| M6. Variance-covariance invariance | 926.992(388)* | .937 | .938 | .057 | [.052; .061] | M5 | 18.944 (10) | -.001 | .000 | .000 |
| M7. Latent means invariance | 976.328(392)* | .931 | .934 | .059 | [.054; .063] | M6 | 53.106 (4)* | -.006 | -.004 | +.002 |
| *Panel E - Students: Invariance Alcohol Use* | | | | | | | | | | |
| M1. Configural invariance | 765.310(324)* | .954 | .946 | .056 | [.051; .061] | - | - | - | - | - |
| M2. Weak invariance | 786.283(340)* | .954 | .948 | .055 | [.050; .060] | M1 | 14.450 (16) | .000 | +.002 | -.001 |
| M3. Strong invariance | 811.979(356)* | .953 | .949 | .054 | [.049; .059] | M2 | 23.436 (16) | -.001 | +.001 | -.001 |
| M4. Strict invariance | 875.388(376)* | .948 | .948 | .055 | [.050; .060] | M3 | 58.651 (20)* | -.005 | -.001 | +.001 |
| M5. Correl. uniq. invariance | 878.736(378)* | .948 | .948 | .055 | [.050; .060] | M4 | 4.074 (2) | .000 | .000 | .000 |
| M6. Variance-covariance invariance | 1000.551(380)* | .947 | .948 | .055 | [.050; .060] | M5 | 19.542 (10) | -.001 | .000 | .000 |
| M7. Latent means invariance | 938.530(392)* | .943 | .945 | .057 | [.052; .061] | M6 | 47.345 (4)* | -.004 | -.003 | +.002 |

| Description | $\chi^2$ (*df*) | CFI | TLI | RMSEA | 90% CI | CM | $\Delta\chi^2$ (*df*) | ΔCFI | ΔTLI | ΔRMSEA |
|---|---|---|---|---|---|---|---|---|---|---|
| *Panel F - Students: Invariance Alcohol-Related Problems* | | | | | | | | | | |
| M1. Configural invariance | 820.350(324)* | .949 | .940 | .059 | [.054; .064] | - | - | - | - | - |
| M2. Weak invariance | 839.791(340)* | .948 | .942 | .058 | [.053; .063] | M1 | 11.200 (16) | -.001 | +.002 | -.001 |
| M3. Strong invariance | 867.554(356)* | .947 | .944 | .057 | [.053; .062] | M2 | 25.495 (16) | -.001 | +.002 | -.001 |
| M4. Strict invariance | 963.262(376)* | .939 | .939 | .060 | [.055; .065] | M3 | 82.352 (20)* | -.008 | -.005 | +.003 |
| M5. Correl. uniq. invariance | 971.234(378)* | .939 | .938 | .060 | [.055; .065] | M4 | 6.430 (2) | .000 | -.001 | .000 |
| M6. Variance-covariance invariance | 994.893(388)* | .937 | .939 | .060 | [.055; .065] | M5 | 23.634 (10)* | -.002 | +.001 | .000 |
| M7. Latent means invariance | 1027.576(392)* | .934 | .936 | .061 | [.057; .066] | M6 | 37.560 (4)* | -.003 | -.003 | +.001 |
| *Panel G - Students: Invariance Gender* | | | | | | | | | | |
| M1. Configural invariance | 750.574(324)* | .956 | .949 | .055 | [.050; .061] | - | - | - | - | - |
| M2. Weak invariance | 772.194(340)* | .956 | .950 | .054 | [.049; .059] | M1 | 14.624 (16) | .000 | +.001 | -.001 |
| M3. Strong invariance | 823.941(356)* | .952 | .949 | .055 | [.050; .060] | M2 | 55.221 (16)* | -.004 | -.001 | +.001 |
| M4. Strict invariance | 834.951(376)* | .953 | .952 | .053 | [.048; .058] | M3 | 19.220 (20) | -.001 | +.003 | -.002 |
| M5. Correl. uniq. invariance | 832.177(378)* | .953 | .953 | .053 | [.048; .058] | M4 | 1.242 (2) | .000 | +.001 | .000 |
| M6. Variance-covariance invariance | 850.881(388)* | .953 | .954 | .053 | [.048; .058] | M5 | 18.100 (10) | .000 | +.001 | .000 |
| M7. Latent means invariance | 867.214(392)* | .951 | .953 | .053 | [.048; .058] | M6 | 17.405 (4)* | -.002 | -.001 | .000 |
| *Panel H - Parents: Invariance Alcohol Use* | | | | | | | | | | |
| M1. Configural invariance | 670.499(324)* | .930 | .917 | .050 | [.044; .055] | - | - | - | - | - |
| M2. Weak invariance | 688.903(340)* | .929 | .921 | .049 | [.043; .054] | M1 | 23.975 (16) | -.001 | +.004 | -.001 |
| M3. Strong invariance | 720.288(356)* | .926 | .921 | .048 | [.043; .054] | M2 | 30.189 (16) | -.003 | .000 | -.001 |
| M4. Strict invariance | 741.289(376)* | .926 | .925 | .047 | [.042; .052] | M3 | 32.622 (20) | .000 | +.004 | -.001 |
| M5. Correl. uniq. invariance | 735.502(378)* | .927 | .927 | .047 | [.042; .052] | M4 | 1.262 (2) | +.001 | +.002 | .000 |
| M6. Variance-covariance invariance | 753.185(388)* | .926 | .927 | .046 | [.042; .051] | M5 | 18.243 (10) | -.001 | .000 | -.001 |
| M7. Latent means invariance | 777.187(392)* | .922 | .924 | .048 | [.043; .052] | M6 | 45.261 (4)* | -.004 | -.003 | +.002 |
| *Panel I - Parents: Invariance Alcohol-Related Problems* | | | | | | | | | | |
| M1. Configural invariance | 696.625(324)* | .926 | .913 | .051 | [.046; .057] | - | - | - | - | - |
| M2. Weak invariance | 703.916(340)* | .928 | .919 | .050 | [.044; .055] | M1 | 16.907 (16) | +.002 | +.006 | -.001 |
| M3. Strong invariance | 735.603(356)* | .924 | .919 | .049 | [.044; .055] | M2 | 7.517(16) | -.004 | .000 | -.001 |
| M4. Strict invariance | 834.637(376)* | .909 | .908 | .053 | [.048; .058] | M3 | 110.180 (20)* | -.015 | -.011 | +.004 |
| M4’ Partial strict invariance | 776.834(375)* | .920 | .919 | .050 | [.045; .055] | M4 | 70.266 (19)* | -.004 | .000 | +.001 |
| M5. Correl. uniq. invariance | 781.907(377)* | .919 | .919 | .050 | [.045; .055] | M4’ | 4.400 (2) | -.001 | .000 | .000 |
| M6. Variance-covariance invariance | 783.272(387)* | .921 | .923 | .048 | [.044; .053] | M5 | 10.313 (10) | +.002 | +.004 | -.002 |
| M7. Latent means invariance | 802.682(391)* | .918 | .920 | .049 | [.044; .054] | M6 | 35.810 (4)* | -.003 | -.003 | +.001 |
| *Panel J - Parents: Invariance Gender* | | | | | | | | | | |
| M1. Configural invariance | 732.104(324)* | .924 | .911 | .054 | [.049; .059] | - | - | - | - | - |
| M2. Weak invariance | 752.098(340)* | .923 | .914 | .053 | [.048; .058] | M1 | 21.475 (16) | -.001 | +.003 | -.001 |
| M3. Strong invariance | 785.777(356)* | .920 | .915 | .053 | [.048; .058] | M2 | 32.209 (16)* | -.003 | +.001 | .000 |
| M4. Strict invariance | 831.325(376)* | .915 | .914 | .053 | [.048; .058] | M3 | 44.723 (20)* | -.005 | -.001 | .000 |
| M5. Correl. uniq. invariance | 831.128(378)* | .916 | .915 | .053 | [.048; .058] | M4 | 2.741 (2) | +.001 | +.001 | .000 |
| M6. Variance-covariance invariance | 902.192(388)* | .904 | .906 | .056 | [.051; .060] | M5 | 61.628 (10)* | -.012 | -.009 | +.003 |
| M6’ Partial var.-covar. invariance | 856.893(387)* | .912 | .914 | .053 | [.048; .058] | M6 | 25.911 (9)* | -.004 | -.001 | .000 |
| M7. Latent means invariance | 872.285(391)* | .910 | .913 | .054 | [.049; .058] | M6’ | 22.620 (4)* | -.002 | -.001 | +.001 |

*Note.* * $p < .01$; M: Invariance model; M’: Partial invariance model; $\chi^2$: Scaled chi-square test of exact fit; *df*: Degrees of freedom; CFI: Comparative fit index; TLI: Tucker-Lewis index; RMSEA: Root mean square error of approximation; 90% CI: 90% confidence interval; CM: Comparison model; and Δ: Change in fit relative to the CM.

Table 6
*Convergent Validity*

| PARDI Subscale | AU | YAACQ | INQ | DNRF | DMQ (Anx) | DMQ (Dep) | DMQ (Enh) | DMQ (Soc) | DMQ (Con) |
|---|---|---|---|---|---|---|---|---|---|
| Heavy Drinking | | | | | | | | | |
| Friends | .153** | .172** | .288** | .269** | .174** | .049 | .221** | .227** | .012 |
| Students | .088** | .083* | .097 | .210* | .049 | -.049 | .087* | .082* | -.066 |
| Parents | .052 | .066 | .203* | .160 | .048 | .011 | .072* | .047 | -.006 |
| Drinking-Related Problems | | | | | | | | | |
| Friends | .114** | .164** | .472** | .463** | .135** | .107** | .196** | .152** | .104** |
| Students | .064 | .035 | .424** | .376** | .060 | .007 | .013 | .009 | .015 |
| Parents | .039 | .019 | .426** | .521** | .015 | -.005 | .038 | .042 | -.030 |
| Coping-Related Drinking | | | | | | | | | |
| Friends | .080* | .134** | .377** | .317** | .173** | .167** | .141** | .122** | .069* |
| Students | .031 | .031 | .085 | .160 | .056 | .037 | .032 | .032 | .044 |
| Parents | .065 | .034 | .414** | .371** | .056 | .080* | .001 | .000 | .003 |
| Sexual-Risk Taking | | | | | | | | | |
| Friends | .235** | .267** | .489** | .318** | .156** | .147** | .245** | .227** | .160** |
| Students | .061 | .037 | .449** | .216** | -.031 | -.077* | .049 | .006 | -.064 |
| Parents | .051 | .047 | .370** | .364** | .033 | .060 | .001 | .014 | .038 |

*Note.* * $p < .05$; ** $p < .01$. AU = weekly alcohol use. YAACQ = Young Adult Alcohol Consequences Questionnaire (alcohol related problems). INQ = Injunctive Norms Questionnaire (injunctive norms). DNRF = Drinking Norms Rating Form (descriptive norms). DMQ = Modified Drinking Motives Questionnaire – Revised (drinking motives): Anx = Coping-anxiety; Dep = Coping-depression; Enh = Enhancement; Soc = Social; Con = Conformity. INQ and DNRF correlations with PARDI subscales use scores from the corresponding referent group.

## Appendix

### Perceived Approval of Risky Drinking Inventory (PARDI)

Please use the scale below to indicate how much you believe each specified group (your friends, your parents, and typical students at your university) would approve of each of the following behaviors.

1 = Strongly Disapprove
2 = Somewhat Disapprove
3 = Neutral or Indifferent
4 = Somewhat Approve
5 = Strongly Approve

1. You drinking a large amount of alcohol quickly (e.g., chugging instead of sipping, drinking shots, binge drinking).
2. You playing drinking games (i.e., social games that encourage or require drinking alcohol).
3. You drinking various types of alcohol (e.g., beer, wine, liquor) over a single drinking occasion.
4. You drinking alcohol prior to going out (e.g., to a bar or party) to get intoxicated beforehand (i.e., pre-drinking, pre-gaming).
5. You passing out as a result of drinking (i.e., drinking so much that you lose consciousness).
6. You blacking out as a result of drinking (i.e., not having a memory of what occurred during a drinking occasion).
7. You vomiting as a result of drinking too much.
8. You drinking in ways that were inappropriate to the context (e.g., chugging at dinner while others are sipping).
9. You being unable to limit the amount you drink once you start (i.e., you were unable to stop or drank more than you intended to).
10. You having sex with someone while intoxicated that you would not have if you were sober.
11. You having sex using less protection than you normally use (e.g., not using condoms) because you are intoxicated.
12. You being in a risky sexual situation while intoxicated (e.g., going home with a stranger, flirting when you didn't want it to go further).
13. You drinking with the intention of getting drunk.
14. You drinking to help you forget about your problems.
15. You drinking to forget your worries.
16. You drinking because it helps you when you are feeling depressed.
17. You drinking to stop you from feeling so hopeless about the future.

18. You drinking to reduce your anxiety.
19. You drinking because it makes it easier to be social when you are feeling nervous.
20. You drinking to reduce physical tension (e.g., sweating, racing heart).

**Online Supplements for:**

# Development and Validation of the Perceived Approval of Risky Drinking Inventory in Undergraduate Students

**Section S1**

***Code Endorsement and Item Generation of for Phase 1 (54 Item Survey)***

| Item | Code | Code Description | Endorsement |
|---|---|---|---|
| *1. You drank a large amount of alcohol quickly (e.g., chugging instead of sipping, drinking shots, binge drinking).* | | | |
| | Large quantity | Drinking a large amount of alcohol in a given period of time | 14 |
| | Small quantity | Drinking a small or normative amount (e.g., a glass of wine) | 1 |
| | Fast consumption | Consuming alcohol in a quick manner (e.g., chugging) | 14 |
| | Drinking shots | Drinking shots of hard liquor | 4 |
| | Binge drinking | Drinking large quantities in short periods of time | 3 |
| | From the bottle | Drinking "from the bottle" in situations in which it is inappropriate to do so (e.g., wine bottles, hard liquor) | 1 |
| | Higher content | Intentionally drinking alcohol with a higher alcohol content | 5 |
| | Dangerous administration | Administration of alcohol in ways that may be dangerous (e.g., rectally, vaginally) | 1 |
| *2. You drank alcohol without consuming food (i.e., drinking on an empty stomach).* | | | |
| | During a meal | Drinking alcohol as part of a meal | 5 |
| | Not during meal | Drinking when it is not within the context of a meal | 3 |
| | Drinking without eating | Drinking without eating / on an empty stomach | 2 |
| *3. You played drinking games (i.e., social games that encourage or require drinking alcohol).* | | | |
| | Drinking games | Playing games whereby individuals are encouraged to drink when they win/lose | 13 |
| | Competitive drinking | Drinking in competitive ways (e.g., "shot for shot" type drinking) | 4 |
| *4. You drank beyond your personal limits or past the point of intoxication.* | | | |
| | Beyond limits | Drinking beyond what you can personally handle | 7 |
| | Drinking beyond intoxication | Drinking beyond the point of intoxication | 6 |
| | Uncharacteristic drinking | Drinking in heavy/risky ways not characteristic of the person | 2 |
| | More than usual | Drinking more than you usually would | 1 |
| *5. You drank various types of alcohol (e.g., beer, wine, liquor) over a single drinking occasion.* | | | |
| | Mixing types | Drinking various types of alcohol (beer, wine, hard liquor, etc.) | 6 |

| Item | Code | Code Description | Endorsement |
|---|---|---|---|
| *6. You drank alcohol prior to going out (e.g., to a bar or party) to get intoxicated beforehand (i.e., pre-drinking, pre-gaming).* | | | |
| | Pre-drinking | Drinking prior to going out | 4 |
| | Bringing alcohol | Bringing alcohol with you (e.g., in a flask) | 1 |
| *7. You drank alcohol on most days and not just on weekends.* | | | |
| | Daily drinking | Drinking every or most days | 8 |
| | Habitual drinking | Developing a habit or routine out of drinking | 5 |
| | Weekday drinking | Drinking heavily during the week | 3 |
| *8. You drank alcohol in the morning or during the daytime.* | | | |
| | Morning drinking | Drinking in the morning | 4 |
| | Daytime drinking | Drinking during the daytime | 4 |
| *9. You passed out as a result of drinking (i.e., drinking so much that you lose consciousness).* | | | |
| | Passing out | Drinking until you pass out from alcohol | 9 |
| *10. You blacked out as a result of drinking (i.e., you did not have a memory of what occurred during a drinking occasion).* | | | |
| | Black out | Drinking to the point where you do not remember, the following day, what occurred whilst intoxicated | 7 |
| *11. You suffered from alcohol poisoning as a result of drinking.* | | | |
| | Alcohol poisoning | Alcohol poisoning; getting stomach pumped | 6 |
| | Choking on vomit | Choking on one's vomit as a result of drinking | 1 |
| *12. You vomited as a result of drinking too much.* | | | |
| | Vomiting | Drinking to the point of throwing up | 5 |
| | Recurring vomiting | Vomiting due to drinking with a regular occurrence | 1 |
| *13. You drank alcohol that was not yours (e.g., taking someone else's drink or drinks that were left behind by others).* | | | |
| | Drinking others' drinks | Drinking alcohol that does not belong to you | 5 |
| *14. You were drinking in ways that were inappropriate to the context (e.g., chugging at dinner while others are sipping).* | | | |
| | Inappropriate to situation | Drinking in a way in which is inappropriate to the context (e.g., chugging a drink during a meal) | 7 |
| | Family observed drunkenness | Getting drunk in front of your family | 1 |
| | Heavier than friends | Drinking heavier/more than those who you are out drinking with (e.g., friends) | 3 |
| | Drinking at school | Drinking at, or being intoxicated at, school | 11 |
| *15. You were unable to limit the amount you drank once you started (i.e., you were unable to stop or drank more than you intended to).* | | | |
| | Heavily every time | Every time a person drinks, they drink very heavily (i.e., never drinks mildly or moderately) | 3 |

| Item | Code | Code Description | Endorsement |
|---|---|---|---|
| | Incapable of stopping | Being incapable of stopping drinking once you've started | 3 |
| | Addiction | Suffering from addiction | 11 |
| | Withdrawal | Feeling (physically or psychologically) like you need a drink | 3 |
| | Tolerance | Alcohol having less of an effect | 1 |
| | Refusing to stop | Refusing to stop drinking despite concern from others | 2 |
| *16. You broke the law (e.g., trespassing, vandalism, theft) while intoxicated.* | | | |
| | Getting arrested | Getting arrested due to behaviour while drunk | 6 |
| | Illegal acts | Engaging in acts (e.g., vandalism) that are against the law | 4 |
| | Unlawful behaviour | Engaging in unlawful behaviour (e.g., breaking into places) due to intoxication | 8 |
| | Underage drinking | Drinking when you're not legally allowed to | 1 |
| | Drinking in public | Drinking alcohol in public places (when you aren't supposed to do so) | 2 |
| *17. You have used drugs that you otherwise would not have because you were intoxicated.* | | | |
| | Using drugs | Using other substances because you're intoxicated | 8 |
| | Smoking | Smoking cigarettes while drinking | 1 |
| *18. You engaged in dangerous behaviours that could result in injury (e.g., climbing, swimming, biking) while intoxicated.* | | | |
| | Being irresponsible | Doing irresponsible things whilst drunk | 2 |
| | Dangerous behaviour | Dangerous behaviour, such as climbing things | 12 |
| | Injury | Injuring oneself due to intoxication | 7 |
| | Disinhibition | Being disinhibited and more likely to engage in risky behaviours | 6 |
| | Riding a bike | Riding a bike while intoxicated | 1 |
| | In the cold | Drinking outdoors in the cold | 2 |
| | Injury to others | Other people becoming injured due to one's drinking (e.g., stopping a fight that the intoxicated individual is in) | 8 |
| *19. You were drinking alone.* | | | |
| | Drinking alone | Drinking without anyone else present | 5 |
| | Drunk alone | Being drunk and alone, due to risk of injury (e.g., choking on vomit) | 1 |
| *20. Your reputation was ruined (among peers, family, or coworkers) due to your drinking.* | | | |
| | Saying inappropriate things | Saying things (such as making jokes) while drunk that are inappropriate or offensive | 2 |
| | Poor role model | Being a poor role model for others (e.g., siblings) | 2 |
| | Stigmatization | Being stigmatized, having others think less of you because of drinking | 8 |

| Item | Code | Code Description | Endorsement |
|---|---|---|---|
| | Social media | The usage of social media in potentially damaging ways whilst intoxicated | 5 |
| | Interpersonal consequences | Suffering interpersonal consequences (e.g., loss of friendships) due to drinking | 15 |
| | Cancelling plans | Cancelling plans | 1 |
| | Lying to parents | Lying to your parents about your drinking | 4 |
| | Lying to friends | Lying to your friends about your drinking | 2 |
| | Loss of children | Losing your children (i.e., to child protective services) due to drinking habits | 1 |
| | Isolation | Becoming socially isolated due to drinking | 3 |
| | Losing friendships | Losing friends as a result of drinking behaviours | 1 |
| | Regret | Saying or doing things that you later regret | 2 |
| *21. You shared information that you were not supposed to (e.g., told others' or your own secrets) because you were intoxicated.* | | | |
| | Divulging information | Sharing secrets or personal information while drunk that you otherwise would not have | 8 |
| *22. You got into arguments or verbal fights while you were drinking.* | | | |
| | Fighting (verbal) | Verbally fighting with others | 7 |
| | Fights with family | Having fights with family due to your drinking | 1 |
| | Fights with partner | Fighting with a significant other due to drinking | 2 |
| | Emotional abuse | Engaging in emotional abuse due to drinking | 2 |
| | Bullying | Bullying others whilst intoxicated | 2 |
| *23. You were not doing well in school or your work was negatively affected due to your drinking (e.g., missed class, late to work).* | | | |
| | Missing school | Missing school/class due to alcohol use | 2 |
| | Priorities | Changes in priorities due to alcohol use | 4 |
| | Being unproductive | Wasting time due to drinking or hangover | 6 |
| | Academic consequences | Doing poorly in school or not finishing one's degree due to drinking behaviours | 10 |
| | Occupational consequences | Experiencing problems at work or losing your job because of your drinking | 4 |
| | Drinking at work | Drinking alcohol while at work | 2 |
| | During exam period | Drinking during one's school exam period | 2 |
| | Neglecting responsibilities | Neglecting responsibilities due to intoxication or hangover | 1 |
| *24. You were annoying or obnoxious while drinking.* | | | |
| | Being obnoxious | Doing obnoxious or annoying things while drinking | 3 |
| | Annoying others | Being annoying, bothering others | 3 |
| *25. Others were burdened as a result of your drinking (e.g., others needing to take care of you because you're too drunk to take care of yourself).* | | | |

| Item | Code | Code Description | Endorsement |
|---|---|---|---|
| | Burdening others | Drinking to the point where others need to take care of you | 8 |
| *26. You got into physical fights with others while drinking.* | | | |
| | Fighting (physical) | Getting in fights, fighting with others | 12 |
| *27. You spent more money than you had intended to or could afford on alcohol.* | | | |
| | Wasting money | Money is wasted on alcohol | 4 |
| | Spending money | Spending money (e.g., buying others drinks, shopping) while drunk | 3 |
| *28. Your belongings were damaged or lost as a result of your drinking.* | | | |
| | Leaving things unattended | Leaving personal items unattended because you're intoxicated | 1 |
| | Losing belongings | Losing your personal belongings (e.g., wallet, phone) because you're drunk | 1 |
| | Damaging belongings | Damaging one's belongings (e.g., clothing) because of drinking | 5 |
| *29. You accepted a ride from a driver that you knew was drunk while you were intoxicated.* | | | |
| | Ride from drunk driver | Making the decision to receive a ride from a person who is too intoxicated to drive, because you are drunk | 3 |
| *30. You drove a car after drinking alcohol.* | | | |
| | Drunk driving | Driving after having consumed alcohol | 11 |
| | Car accident | Getting into a car accident due to drinking | 5 |
| | DUI | Getting charged with a DUI due to drinking and driving | 5 |
| *31. You accepted drinks from strangers or left your drinks unattended.* | | | |
| | Leaving drinks unattended | Leaving drinks unattended | 4 |
| | Drinks from strangers | Accepting drinks from strangers | 4 |
| *32. You were generally less conscious of safety because of intoxication.* | | | |
| | Walking home alone | Walking home alone in a situation in which it is dangerous to do so, because a person is intoxicated | 1 |
| | Ride from stranger | Taking a ride home from a stranger | 3 |
| | Less aware (safety) | Becoming less aware of safety due to intoxication | 9 |
| | Trusting others | Indiscriminately trusting others due to intoxication | 3 |
| | Physical assault | Getting physically assaulted while drinking | 4 |
| | Getting attacked | Getting targeted or attacked due to your inebriation | 2 |
| | Clumsiness | Becoming clumsy (and increasing risk of injury) due to intoxication | 2 |
| | Getting lost | Getting lost due to being intoxicated | 3 |

| Item | Code | Code Description | Endorsement |
|---|---|---|---|
| | Leaving friends | Leaving friends in unsafe situations because of drinking | 2 |
| | Getting stranded | Getting stranded because you miss your ride, for instance | 1 |
| | Loss of common sense | Loss of common sense while drinking | 2 |
| | Poor decisions | Making poorer decisions in general | 1 |
| *33. You had a hangover as a result of your drinking.* | | | |
| | Hangover | Having a hangover due to drinking | 3 |
| *34. Your physical or mental health (e.g., weight or mood) were negatively affected by your drinking.* | | | |
| | Neglect hygiene | Neglect to take care of their hygiene | 1 |
| | Mental illness | Drinking contributing to the development or maintenance of a mental illness | 4 |
| | Physical illness | Developing or maintaining a physical illness due to drinking | 3 |
| | Weight issues | Gaining or losing weight due to drinking behaviours | 1 |
| | Appearance issues | Appearance issues (e.g., breaking out) due to drinking behaviours | 1 |
| | Health effects | Negative health effects (e.g., brain damage) as a result of drinking | 6 |
| | Reduced self-esteem | Negative effects on one's self-esteem due to habitual problematic drinking | 1 |
| | Suicidal behaviour | Engaging in suicidal behaviour while intoxicated | 2 |
| | Drinking while taking medication | Consuming alcohol while on a medication that is contraindicated | 2 |
| | Losing interest | Loss of interest in activities you used to enjoy | 2 |
| | Normalizing illness | Getting used to the feelings of illness and pain associated with drinking, so it becomes your new normal | 1 |
| | Death | Dying because of drinking | 2 |
| | Cognitive Impairment | Experiencing cognitive impairment | 1 |
| | Denial | Being in denial, or being unwilling to acknowledge, one's drinking problems | 3 |
| *35. You had sex with someone while intoxicated that you would not have if you were sober.* | | | |
| | Poor sexual decisions | Going home with / having sex with anyone that the person otherwise would not have wanted to have sex with | 13 |
| | Infidelity | Cheating on a romantic partner due to intoxication | 2 |

| Item | Code | Code Description | Endorsement |
|---|---|---|---|
| *36. You had sex using less protection than you normally would have (e.g., not using condoms) because you were intoxicated.* | | | |
| | STI | Getting a sexually transmitted infection due to behaviour while intoxicated | 4 |
| | Unintended pregnancy | Becoming pregnant due to behaviour while intoxicated | 4 |
| | Unprotected sex | Drinking to the point where you unintentionally have unprotected sex | 4 |
| *37. You were in a risky sexual situation while intoxicated (e.g., going home with a stranger, flirting when you didn't want it to go further).* | | | |
| | Sexual assault | Getting physically assaulted while drinking | 14 |
| | Leaving with strangers | Leaving an event with a stranger, going home with strangers | 2 |
| | Sex with strangers | Having sex with strangers, those unfamiliar to you | 2 |
| | Sex in public | Sex in inappropriate public places | 3 |
| | Trading for sex | Trading alcohol for sex | 1 |
| *38. You took advantage of someone else sexually while you were drunk.* | | | |
| | Taking advantage | Taking advantage of someone who is too intoxicated to consent (sexually) | 5 |
| | Sexual advances | Making unwanted sexual advances due to alcohol consumption | 1 |
| *39. You drank alcohol to relax or unwind.* | | | |
| | To relax | Drinking to unwind or relax after school or work | 8 |
| | To calm down | Drinking to calm down | 1 |
| | To blow off steam | To "blow off steam" or to "let loose" or getting rid of pent-up energy or strong emotions | 1 |
| *40. You drank alcohol with the intention of getting drunk.* | | | |
| | To get drunk | Drinking with the intention of getting intoxicated | 8 |
| | Drinking to intoxication | Drinking to the point of inebriation or intoxication | 1 |
| *41. You drank alcohol in order to connect with others and to socialize.* | | | |
| | To socialize | Drinking to socialize / social drinking | 8 |
| | To connect | To connect or bond socially with others | 7 |
| | To meet people | To meet new people | 2 |
| *42. You drank alcohol in order to cope with a negative mood or take the edge off.* | | | |
| | Because you're upset | Drinking in order to reduce the feeling of being upset | 1 |
| | Because of bad day | Drinking because you had a bad day | 2 |
| | Because of a breakup | Drinking to feel better after a break-up with a romantic partner | 4 |

| Item | Code | Code Description | Endorsement |
|---|---|---|---|
| | Relieve negative mood | Drinking to alleviate negative affective states | 1 |
| | To relieve anxiety | Drinking to relieve or reduce anxiety | 1 |
| | Because of stress | Drinking because you are feeling stressed | 1 |
| | To reduce stress | Drinking to reduce one's stress | 3 |
| | To tolerate abuse | Drinking to tolerate the pain associated with physical abuse | 2 |
| | To be happy | Drinking in order to be happy | 1 |
| | Take edge off | To take the edge off, or to be able to tolerate an event or setting | 2 |
| | To cope | To cope with negative emotions | 12 |
| | To tolerate pain | To be able to tolerate (or to relieve) physical pain | 1 |
| | For catharsis | Drinking (particularly with others) for cathartic reasons (e.g., to relieve shared tensions about a problem or subject) | 1 |
| | To tolerate living situation | To tolerate a living situation (e.g., a roommate) that is unpleasant | 1 |
| *43. You drank alcohol in order to feel more confident.* | | | |
| | To be more confident | Drinking in order to be more confident (e.g., to talk to your "crush") | 1 |
| | To be confident | Needing to drink in order to be confident | 6 |
| *44. You drank alcohol in order to flirt, have sex, or increase the likelihood of hooking up with someone.* | | | |
| | Making out | Kissing people at the bar, etc. | 2 |
| | To meet people | Going to the bar to drink so you can meet people, pick people up (romantically) | 2 |
| | To explore sexuality | Drinking to explore your sexuality (e.g., same-sex interactions) | 1 |
| | To have sex | Drinking in order to have sex | 4 |
| *45. You drank alcohol in order to forget about your problems.* | | | |
| | To avoid responsibilities | Drinking to avoid other responsibilities (e.g., studying for an exam) | 2 |
| | To avoid problems | Drinking to avoid one's problems | 6 |
| | To forget | Drinking to forget (e.g., about one's troubles, problems) | 7 |
| | Because of hopelessness | Drinking because one is hopeless about the future, generally despondent | 1 |
| *46. You drank alcohol to celebrate an occasion.* | | | |
| | To celebrate | Drinking to celebrate (e.g., birthday, vacation) | 14 |
| | After exams | Drinking after completion of exams | 2 |
| | On vacation | Drinking because you're on vacation | 1 |
| *47. You drank because it was free, cheap, or available.* | | | |

| Item | Code | Code Description | Endorsement |
|---|---|---|---|
| | Because it's free | Drinking because you're provided alcohol for free, or because its cheap / inexpensive | 9 |
| | Because it's available | Drinking simply because you have access to alcohol and its available | 5 |
| *48. You drank in order to fit in, impress others, or to appear cool.* | | | |
| | Because of peer pressure | Drinking because others expect or encourage you to do so; to avoid social censure | 9 |
| | To be cool | Drinking to appear cool | 6 |
| | To fit in | Drinking to fit in with others | 6 |
| | To impress | Drinking to impress others | 1 |
| | Being hazed | Drinking because you're being hazed and being forced to | 1 |
| | At drinking event | Drinking because you're at a drinking event | 4 |
| | Because its normative | Drinking because it’s the normal thing to do | 2 |
| | Because of media | Drinking because of media influences (music videos, cooking shows) | 2 |
| | To be polite | Drinking because refusing a drink would be impolite | 2 |
| | To get attention | Drinking in order to get attention from others | 1 |
| *49. You drank because you were bored.* | | | |
| | Because you're bored | Drinking to reduce or tolerate boredom | 2 |
| | Curiosity | Drinking out of curiosity of the effects | 2 |
| *50. You drank in order to tolerate having sex when you didn’t really want to.* | | | |
| | To tolerate sex | Drinking in order to tolerate having sex in any situation in which you'd rather not have sex | 2 |
| *51. You drank to have fun.* | | | |
| | To have fun | Drinking to have fun / to have a good time | 4 |
| | Because you're happy | Drinking because you're in a good mood | 1 |
| *52. You drank in order to be able to fall asleep.* | | | |
| | To sleep | Drinking to fall asleep | 3 |
| *53. You drank to reward or motivate yourself.* | | | |
| | For reward | Drinking to reward oneself | 3 |
| | For motivation | Drinking to motivate oneself, or to help in beginning getting work done | 1 |
| | To work | Drinking in order to get work done (e.g., write a paper) | 1 |
| *54. You drank for no apparent reason.* | | | |
| | No reason | Drinking for no apparent reason | 2 |

**Section S2**

***Codes and Code Descriptions for Items Not Included in Initial Survey Questions***

| Code | Code Description | Endorsement |
|---|---|---|
| Repetition | Given to items that are mere verbal repetitions by the moderator or others | 417 |
| Example | Moderator provided example items | 20 |
| Family history | Drinking when you have a family history of alcoholism | 3 |
| Against culture or religion | Drinking when it is not approved of by your culture or religion | 3 |
| Explicit approval | Explicitly approving of heavy or risky drinking | 1 |
| Texting while drunk | Texting others (e.g., exes) while drunk | 1 |
| Babysitting while drunk | Taking care of siblings or children while intoxicated | 1 |
| Weekend drinking | Drinking exclusively on the weekends | 2 |
| Staying out late | Staying out late while drinking | 1 |
| Diminished moral judgement | Having your moral judgement impaired due to drinking | 1 |
| Soiling oneself | Drinking to the point of soiling (urinating, defecating) oneself | 1 |
| Uncharacteristic behaviour | Acting in ways that are uncharacteristic of a person due to intoxication | 1 |
| Poor sexual performance | Not being able to perform well sexually due to intoxication | 1 |
| Drunk next day | Still being drunk the following day after a night of drinking | 1 |
| Homelessness | Drinking resulting in homelessness | 1 |
| Enjoy the taste | Drinking because you enjoy the taste | 1 |
| Health benefits | Drinking (moderately) to receive possible health benefits | 2 |
| Drinking with strangers | Drinking with strangers or people you don't know very well | 1 |
| Unfamiliar place | Drinking in unfamiliar / foreign places | 2 |
| Frosh | Drinking because it's frosh / university initiation | 2 |
| Because you can | Drinking because you are now able to (e.g., came of age, moved out of parental home) | 2 |
| Making excuses | Finding any excuse to drink | 1 |
| Encouraging others' drinking | Encouraging others to drink because you want to drink | 1 |
| Not getting help | Not being able or willing to reach out to others to get help when needed | 2 |
| To rebel | To rebel against parents | 1 |

| | | |
|---|---|---|
| Rationalizing | Rationalizing your drinking habits as okay because its not impacting particular areas of your life | 2 |
| Pressuring others | Pressuring others to drink | 1 |
| Getting kicked out | Getting kicked out of an establishment (or refused entry) due to being intoxicated | 2 |
| Become emotional | Becoming overly emotional (e.g., crying) because of intoxication | 1 |
| Alcoholic energy drinks | Mixing alcohol and energy drinks | 1 |
| Hiding your drinking | Drinking in secret | 1 |
| Robbed | Getting robbed while intoxicated | 1 |

## Section S3

### *Coping-Motivated Drinking Items Added in Phase 2 Part B*

55. You drank to forget your worries.
56. You drank because it helps you when you are feeling depressed.
57. You drank because it helps you when you feel nervous.
58. You drank to stop you from feeling so hopeless about the future.
59. You drank to reduce your anxiety.
60. You drank to help you feel less negative about things in your life.
61. You drank to help you stop from ruminating on things that make you sad.
62. You drank because it makes it easier to be social when you are feeling nervous.
63. You drank to help you stop from dwelling on things that make you worried.
64. You drank to reduce physical tension (e.g., sweating, racing heart).

## Section S4

Table S4.1
Factor correlations, Means and Standard Deviations

| Subscale | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Heavy Fr | | | | | | | | | | | | |
| 2. Heavy St | .649** | | | | | | | | | | | |
| 3. Heavy Pa | .379** | .302** | | | | | | | | | | |
| 4. Problems Fr | .431** | .237** | .234** | | | | | | | | | |
| 5. Problems St | .261** | .484** | .134** | .562** | | | | | | | | |
| 6. Problems Pa | -.007 | -.007 | .429** | .209** | .270** | | | | | | | |
| 7. Coping Fr | .464** | .310** | .207** | .451** | .314** | .189** | | | | | | |
| 8. Coping St | .261** | .547** | .106** | .232** | .532** | .075* | .620** | | | | | |
| 9. Coping Pa | .114** | .095** | .502** | .288** | .185** | .551** | .420** | .304** | | | | |
| 10. Sex Risk Fr | .272** | .122** | .237** | .511** | .269** | .387** | .326** | .105** | .312** | | | |
| 11. Sex Risk St | .189** | .382** | .156** | .266** | .575** | .224** | .265** | .498** | .247** | .493** | | |
| 12. Sex Risk Pa | -.036 | -.06 | .298** | .315** | .199** | .698** | .160** | .083* | .492** | .449** | .271** | |
| Mean | 3.385 | 3.480 | 1.788 | 1.738 | 2.076 | 1.150 | 2.320 | 2.694 | 1.415 | 1.548 | 1.984 | 1.107 |
| *SD* | 1.152 | 1.115 | 0.796 | 0.759 | 0.907 | 0.361 | 1.023 | 1.065 | 0.624 | 0.739 | 0.950 | 0.337 |

*Note.* *Significant at $p < .05$. **Significant at $p < .01$. Heavy = Heavy drinking PARDI subscale; Problems = Drinking-related problems PARDI subscale; Coping = Coping-related drinking PARDI subscale; Sex Risk = Sexual-risk taking PARDI subscale. Fr = Friends referent group; St = Typical Students referent group; Pa = Parents referent group.

Table S4.2
Incremental Validity, Predicting Weekly Use

| | $R^2$ | $R^2\Delta$ | $F\Delta$ | *df* | *p* |
|---|---|---|---|---|---|
| Weekly Alcohol Use | | | | | |
| Friends | | | | | |
| INQ | .186 | .186 | 32.945 | 1, 144 | <.001 |
| PARDI | .224 | .038 | 6.970 | 1, 143 | .009 |
| Typical Students | | | | | |
| INQ | .021 | .021 | 3.045 | 1, 144 | .083 |
| PARDI | .031 | .010 | 1.457 | 1, 143 | .229 |
| Parents | | | | | |
| INQ | .163 | .163 | 28.106 | 1, 144 | <.001 |
| PARDI | .199 | .035 | 6.312 | 1, 143 | .013 |

*Note.* INQ = Injunctive Norms Questionnaire (Baer, 1994); PARDI = all Perceived Approval of Risky Drinking Inventory subscales (heavy drinking, drinking-related problems, coping-related drinking, sexual-risk taking) within the indicated referent group.

Table S4.3
Incremental Validity Relative to INQ, Controlling for Weekly Use

| | $R^2$ | $R^2\Delta$ | $F\Delta$ | *df* | *p* |
|---|---|---|---|---|---|
| Alcohol-Related Problems | | | | | |
| Friends | | | | | |
| Weekly Use | .414 | .414 | 101.807 | 1, 144 | <.001 |
| INQ | .415 | .001 | 0.192 | 1, 143 | .662 |
| PARDI | .433 | .018 | 4.432 | 1, 142 | .037 |
| Typical Students | | | | | |
| Weekly Use | .444 | .444 | 115.196 | 1, 144 | <.001 |
| INQ | .445 | .001 | 0.129 | 1, 143 | .720 |
| PARDI | .445 | .000 | .010 | 1, 142 | .920 |
| Parents | | | | | |
| Weekly Use | .444 | .444 | 115.196 | 1, 144 | <.001 |
| INQ | .446 | .002 | 0.406 | 1, 143 | .525 |
| PARDI | .448 | .002 | 0.435 | 1, 142 | .511 |
| Coping Motives | | | | | |
| Friends | | | | | |
| Weekly Use | .257 | .257 | 49.703 | 1, 144 | <.001 |
| INQ | .259 | .002 | 0.433 | 1, 143 | .511 |
| PARDI | .283 | .025 | 4.878 | 1, 142 | .029 |
| Typical Students | | | | | |
| Weekly Use | .257 | .257 | 49.703 | 1, 144 | <.001 |
| INQ | .261 | .004 | 0.847 | 1, 143 | .359 |
| PARDI | .269 | .008 | 1.527 | 1, 142 | .219 |
| Parents | | | | | |
| Weekly Use | .257 | .257 | 49.703 | 1, 144 | <.001 |
| INQ | .257 | .001 | 0.132 | 1, 143 | .717 |
| PARDI | .262 | .005 | 0.897 | 1, 142 | .345 |
| Enhancement Motives | | | | | |
| Friends | | | | | |
| Weekly Use | .261 | .261 | 50.901 | 1, 144 | <.001 |
| INQ | .276 | .015 | 2.930 | 1, 143 | .089 |
| PARDI | .302 | .026 | 5.213 | 1, 142 | .024 |
| Typical Students | | | | | |
| Weekly Use | .261 | .261 | 50.901 | 1, 144 | <.001 |
| INQ | .261 | .000 | .013 | 1, 143 | .908 |
| PARDI | .262 | .001 | .088 | 1, 142 | .767 |
| Parents | | | | | |
| Weekly Use | .261 | .261 | 50.901 | 1, 144 | <.001 |
| INQ | .262 | .000 | 0.067 | 1, 143 | .796 |
| PARDI | .262 | .001 | 0.099 | 1, 142 | .753 |

*Note.* INQ = Injunctive Norms Questionnaire (Baer, 1994); PARDI = all Perceived Approval of Risky Drinking Inventory subscales (heavy drinking, drinking-related problems, coping-related drinking, sexual-risk taking) within the indicated referent group.