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The Hazardous Drinking Games Measure (HDGM): A multi-site implementation

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Abstract

Background—Drinking game participation has been associated with increased frequency and quantity of alcohol use, as well as alcohol-related problems, in college students. To date, the assessment of drinking games typically entails the use of self-developed measures of frequency of participation and amount of alcohol consumed while playing.

Objectives—The Hazardous Drinking Games Measure (HDGM) is the first effort to create a comprehensive yet concise method of assessing drinking game participation. The HDGM assesses drinking during games, the specific types of drinking games played, and negative consequences experienced as a result of playing drinking games.

Method—Data from three samples of college students ($n = 1002$) who completed the HDGM and other self-report questionnaires of drinking behaviors were used for exploratory analyses.

Results—Exploratory analyses suggest that the HDGM adequately captures the nuances of drinking game participation in this population and demonstrates initial evidence of good content and criterion-related validity and test-retest reliability. However, the HDGM did not predict risky drinking above and beyond standard measures of drinks per week and alcohol-related problems in any samples.

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Conclusion—The HDGM may be useful for campus-wide assessment of drinking games and as a source of game-specific feedback when integrated into campus prevention and intervention efforts.

Keywords

Alcohol-related problems; assessment; college students; drinking games

Introduction

Recent research has demonstrated that participation in drinking games continues to be highly prevalent among college students (1,2). Drinking games have yet to be formally defined, but a common conceptualization is that: (a) they are social drinking activities, (b) involve some kind of mental and/or physical task, and (c) have a specific set of rules that promote elevated alcohol consumption (see 3). There are many different types of drinking games, varying in their rules, characteristics, and drinking behaviors (4–7). Because games are a structured social activity governed by rules that facilitate heavy consumption, they appear to be different than other high-risk drinking activities such as pre-gaming (aka “pre-partying” or “front-loading”; 8,9), 21st birthday celebrations (e.g. 10), and drinking at Greek parties (e.g. 11,12). Thus, researchers have examined drinking games as a distinct type of risky drinking behavior.

The college drinking game literature has grown considerably in recent years; the past decade has seen the publication of over 40 drinking game studies. Overall, research suggests that drinking game participation is associated with increased levels of alcohol use and negative alcohol-related consequences (13–15). Despite this growing body of research, the field has been limited by the lack of standardized and comprehensive measurement tools to assess drinking game behavior. Instead, previous studies have relied on a variety of self-developed measures, which typically measure only frequency of drinking game participation and quantity of alcohol consumed while playing as indices of drinking game behavior. Therefore, a standardized measure of the drinking game experience would be valuable (16,17), particularly one that assesses different aspects of this activity such as drinking while gaming, types of games played, and the experience of game-specific consequences.

Drinking during games

In previous research (1,18,19), frequency of drinking game participation has been assessed in a dichotomous (yes/no) and/or continuous (how many times in a particular time period) manner. In addition, participants have self-reported the number of drinks they consumed while gaming (e.g. drinks consumed on a specific occasion of game participation, typical or peak amount consumed).

Types of games

A cursory online search suggests that hundreds of different types of drinking games exist. While no one categorization system is widely accepted, researchers have attempted to create systematic classifications of these many varied games based on their specific characteristics and/or rules (1,14). Games characterized by competition and chance are more popular, while

games that require extreme drinking (e.g. chugging) tend to be less popular among students (1,15,20). Game type appears to have different ramifications for drinking. For instance, extreme consumption games are often linked to higher levels of consumption and intoxication (1,15,20). There has also been a focus on the rules of the game and how they influence alcohol use, such as whether players can make each other drink (e.g. targeted and skill games) or if drinking is due to other factors (e.g. chance games; 1). Research is ongoing as to which method of classification best categorizes drinking games and informs our understanding of students' gaming behaviors and their consequences.

Game-specific consequences

Drinking game participation is often correlated with overall measures of alcohol-related consequences. Only a few studies have measured alcohol-related consequences resulting specifically from drinking game participation. Among the female college students in Johnson and Stahl's study (21), drinking game participation was linked to frequency of engaging in a sexual behavior that one would not have participated in if not for playing a drinking game. A more recent study conducted with Australian college students found that students reported experiencing a variety of negative outcomes (e.g. lost consciousness, loss of work or study time, sustained an injury) after drinking game participation (14).

Study aims

The primary purpose of the present study was to administer a measure of college student drinking game behavior and evaluate its content and criterion-related validity (see 22). To accomplish these goals, we administered a comprehensive self-report questionnaire of drinking game behavior, the Hazardous Drinking Games Measure (HDGM), to college students from three distinct campuses. The HDGM was developed based on our own research (8,15,23) and was recently piloted in an adolescent sample (24). In the present study, we first examined the measure's content validity and accrued an overview of alcohol-related behaviors among college students who reported playing drinking games. Second, we correlated the responses to the HDGM to commonly used measures of alcohol use and consequences to test its criterion-related (convergent) validity. Third, we examined the HDGM's test-retest validity using longitudinal data from Site 1. Finally, we conducted regression models to examine whether the HDGM predicts risky drinking above and beyond self-reported alcohol use and problems.

Method

Study samples and design

This project evaluated baseline self-report data collected in three independent studies conducted at post-secondary institutions in the United States (see Table 1 for summary of demographic variables overall and by site). All procedures were approved by associated Institutional Review Boards.

Site 1—Data were extracted from a longitudinal trial evaluating stepped care with mandated students (25). Participants had violated campus alcohol policy, and had been mandated to receive an alcohol intervention. From 2007–2009, all participants ($n = 153$)

completed the HDGM as part of a baseline assessment prior to receiving a 15-min meeting with a peer counselor that included the provision of a booklet containing advice to reduce drinking. Follow-up assessments were conducted at 3, 6, and 9 months and received up to \$200 for participation.

Site 2—This project was a cross-sectional study of alcohol use behaviors among students at a women's college ($n = 101$). Students were volunteers who completed the HDGM as part of anonymous self-report surveys regarding their alcohol use, attitudes toward drinking, and other measures of personality and social behaviors. Respondents received course credit in exchange for participation.

Site 3—Participants in this project were college men and women attending two large public universities. A random sample of 1200 students was invited by letter and email to complete web-based assessments of alcohol use (including the HDGM), normative perceptions of drinking, as well as other measures of personality and health-risk behaviors. Respondents ($n = 748$) completed the confidential 30–40 min online survey for a \$25 incentive.

Measures

Hazardous Drinking Games Measure (HDGM; 24; Appendix 1)

In the HDGM, a drinking game was defined as an activity that has rules governing the consumption of alcoholic beverages. The items on the HDGM assess three components of drinking game participation: drinking during games (3 items), types of games played (8 items), and game-related consequences (8 items). First, to assess drinking game *drinking behaviors*, students indicated their frequency of past 30-day drinking games participation using a 5-point scale like that of the Alcohol Use Disorders Identification Test ($0 = \text{Never}$, $1 = \text{Once}$, $2 = \text{Two to Four Times a Month}$, $3 = \text{Two to Three Times a Week}$, $4 = \text{Four or More Times a Week}$) (26). Then, students reported the total number of drinks typically consumed when playing drinking games and the total minutes they play drinking games on a typical night when they played drinking games. We decided to assess time and drinks as continuous variables, as we had encountered significant variability in these items in our previous research. Furthermore, in our clinical work providing drinking game feedback to students we had noticed much more of an impact on students when providing discrete values rather than a range (e.g. 12 drinks versus 8–12 drinks) (e.g. 25,27). As such, we decided to assess drinks and time as a continuous variable.

Second, to assess *types of games*, participants selected the types of drinking games they played in the past 30 days: Consumption, Team, Media, Dice, Card, Verbal, Motor Skills, and Board. These drinking game categories were derived from Borsari's (4) and Kenney et al.'s (7) classification of drinking games. Finally, participants identified negative *consequences* they had experienced as a result of playing drinking games in the past 30 days (e.g. engaged in unplanned sexual activity that one later regretted). The Cronbach's alpha of the eight consequences items was 0.67 for the merged sample, slightly less than the recommended cut-off of 0.70 (28)

Alcohol use

All three sites assessed the number of drinks participants consumed per week. At sites 1 and 3, the standard definition of a drink was: 12 oz. beer, 5 oz. glass of wine, or 1.5 oz. of 80 proof hard alcohol; at site 2 it was: 12 oz. beer, 4 oz. glass of wine, or 1.25 oz. of 80 proof hard alcohol. Heavy episodic drinking (HED) episodes were measured using a gender-specific question; men and women reported the number of times that they consumed 5 or more drinks or 4 or more drinks, respectively, in the past month.

Alcohol Use Disorders Identification Test (AUDIT; 26)

All participants completed the Alcohol Use Disorders Identification Test (AUDIT), a 10-item measure of past-year hazardous alcohol use that indexes alcohol consumption levels, psychological dependence on alcohol, and negative drinking consequences. The items are summed to derive a total score, with higher scores indicating elevated levels of hazardous use. The Cronbach's alpha of the AUDIT for three sites ranged from 0.73–0.83.

Alcohol-related consequences

Site 1 used the *Brief-Young Adult Alcohol Consequences Questionnaire* (B-YAACQ; 29), a 24-item measure of alcohol-related consequences experienced in the past month. Sites 2 and 3 used the *Rutgers Alcohol Problems Index* (RAPI; 30), a 23-item list of problems associated with alcohol that was developed and validated for adolescents aged 12–21. Both the RAPI and BYAACQ utilized 1-month recall periods. Both measures have demonstrated reliability with mandated students, as well as in this sample (RAPI $\alpha = 0.84$; B-YAACQ $\alpha = 0.89$). To facilitate comparison among the three sites, the two scales were standardized (z-scores) prior to analysis.

Analysis plan

Consistent with our previous work with the HDGM (24), we calculated descriptive statistics with respect to the demographic and risky-drinking behaviors for the three sites. Second, we provided descriptive information regarding the responses to the items on the HDGM. Third, we examined correlates of three aspects of the HDGM – types of games, consequences, drinking behavior – with common measures of alcohol use and problems. To create the first two indicators, we summed the number of different types of games played and the sum of consequences experienced as a result of drinking game participation. Drinking behavior was represented with two HDGM items: frequency of drinking game participation and typical number of drinks consumed during a drinking game. We elected to use these individual items, and not a composite score, so that we could assess the individual effects of each variable. We also elected to forgo use of the number of minutes played because it was not assessed in the largest sample (Site 3). Our use of both frequency of play and quantity of alcohol consumed is consistent with the existing drinking game literature. Fourth, as Site 1 was a longitudinal study, we examined test-retest reliability of the HDGM (the similarity of responses on a measure that has been repeatedly administered to the same individuals; 22). To do so, we calculated coefficients of stability correlations between responses to the HDGM between 3, 6, and 9 month follow-up assessments. Finally, we conducted regression models to examine whether the four variables from the HDGM predicted concurrent AUDIT

scores above and beyond gender, alcohol use (typical drinks per week), and alcohol-related problems.

Results

As depicted in Table 1, the three sites showed considerable variability in gender, race, and alcohol use. Students at Site 1 demonstrated consistently higher rates of drinking and problems than those at Sites 2 and 3; this was not unexpected as mandated students (comprising the Site 1 sample) are known to engage in riskier drinking behavior than students who are research volunteers (e.g. 31,32). There were few differences in rates of alcohol use and problems between Sites 2 and 3. The mean AUDIT score at all three sites was above the recommended cutoff score of 6 that is indicative of hazardous use in college students (33).

Responses to the HDGM are provided in Table 2. Approximately half of participants at Sites 2 and 3 reported participating in drinking games in the past month, while 90% of the mandated sample at Site 1 indicated that they had done so. As compared to participants at Sites 1 and 3, the all-female sample at Site 2 reported less frequent engagement in drinking games and the consumption of fewer drinks while gaming. In the combined sample, every type of game and every consequence linked to drinking games was endorsed. The most common types of games played were team games and card games. Approximately half of the combined sample reported experiencing a hangover following participation in drinking games. Correlations between responses to the HDGM and alcohol-related variables are presented in Table 3. The four variables from the HDGM were significantly and positively correlated with risky alcohol use, as indexed by the AUDIT (r s from 0.17–0.24, p 's < 0.001), but less so with measures focusing exclusively on general alcohol-related problems (r s from 0.05–0.17).

Test-retest reliability was assessed by calculating coefficients of stability for the participants who completed the HDGM at 3 and 6 ($n = 128$) and 6 and 9 ($n = 131$) month assessments. Results indicated positive and moderate correlations among DG frequency ($r_{3-6 \text{ mo.}} = 0.36$; $r_{6-9 \text{ mo.}} = 0.28$), DG typical drinks ($r_{3-6 \text{ mo.}} = 0.59$; $r_{6-9 \text{ mo.}} = 0.54$), time spent playing games ($r_{3-6 \text{ mo.}} = 0.40$; $r_{6-9 \text{ mo.}} = 0.77$) and DG consequences ($r_{3-6 \text{ mo.}} = 0.48$; $r_{6-9 \text{ mo.}} = 0.44$). To place these correlations in perspective, we also calculated coefficients of stability for other non-drinking game behaviors for the participants in the larger trial who completed the 3, 6, and 9 month assessments ($n = 179$). These supplemental analyses revealed comparable direction and strength of the correlations for peak blood alcohol level (BAC) ($r_{3-6 \text{ mo.}} = 0.53$; $r_{6-9 \text{ mo.}} = 0.60$), typical BAC ($r_{3-6 \text{ mo.}} = 0.56$; $r_{6-9 \text{ mo.}} = 0.64$), frequency of drinking ($r_{3-6 \text{ mo.}} = 0.20$; $r_{6-9 \text{ mo.}} = 0.15$), drinks per week ($r_{3-6 \text{ mo.}} = 0.59$; $r_{6-9 \text{ mo.}} = 0.65$), and the summary scores on the BYAACQ ($r_{3-6 \text{ mo.}} = 0.60$; $r_{6-9 \text{ mo.}} = 0.67$).

Finally, regression models were used to determine relationships between drinking game variables assessed via the HDGM and the AUDIT after first accounting for gender (Table 4). Participants with missing data were dropped from the final model, resulting in a total N of 741. Examination of the 248 individuals who were missing data on the AUDIT, typical drinks per week, and/or alcohol-related problems revealed no significant differences in their

responses to the HDGM except for participation in fewer DG types ($t_{(247)} = 2.05, p = 0.04$). In model 1, the HDGM is not predictive of AUDIT scores in the combined sample; indeed, it appears to be most predictive in Sample 1, which consisted of mandated and primarily male students. In model 2, the addition of typical drinks per week and alcohol-related problems raised the amount of variance accounted for by 36% ($F(7, 733) = 74.69, p < 0.001$; R^2 significant at $p < 0.001$). Furthermore, drinking game frequency and drinking game variety remained significant in the full model, yet the direction of the relationship for frequency was in the opposite direction as would be expected. Examination of the site-specific models revealed that the HDGM did not predict risky drinking above and beyond alcohol use and problems.

Discussion

This study administered the HDGM in three different samples of college students and provides initial evidence of the measure's content and criterion-related validity. Consistent with previous research (4), drinking games appear to be common on college campuses, with over half of the combined sample reporting having played in the past 30 days. Regarding content validity, the endorsement of all types of games and consequences on the HDGM across each of the three samples supports the relevance of the items to the experiences of the drinking game players on campus. Furthermore, the descriptive data provided through the HDGM indicated that students from the all-female sample reported less frequent participation in drinking games and reported consuming fewer drinks while playing, consistent with previous research highlighting gender differences in drinking game participation (8,14,34,35). That said, the sample of mixed-gender mandated students and the more general sample of mixed-gender students reported a similar degree of negative consequences, in contrast with research indicating that mandated students are a riskier sample than the general student population (see 36). As gender and mandated student status were nested by site, these results most likely reflect environmental influences on drinking game behaviors rather than validity of the HDGM *per se*.

Test-retest reliability of the HDGM was also evident. Although the observed coefficients of stability for the HDGM were lower than recommended cut-offs of 0.80 for constructs such as personality or intelligence (22), they were in the same direction and strength as those of non-drinking game related alcohol use and consequences assessed over the same 6-month period of time. Further, drinking and drinking game participation varies over the school year due to exams, breaks, etc. Therefore test-retest reliability is understandably lower than conventional cutoffs for more stable traits.

Regarding criterion-related validity, findings indicate that drinking game frequency, quantity consumed during games, types of games played, and consequences experienced as a result of playing drinking games were all associated with general alcohol use. Furthermore, site-specific models indicated that the HDGM items had more predictive power for the (mostly male) mandated at site 1. Considering that this population played the most drinking games (by time and type) and reported the most drinking game related consequences, this suggests that the HDGM may be tapping a unique aspect of risky drinking behaviors that are of unique relevance to mandated students. That said, the HDGM did not appear to be a

particularly strong predictor of general risky drinking above and beyond the more common predictors such as drinks per week and alcohol-related problems. The counter-intuitive negative relationship between drinking game frequency and AUDIT scores, despite a positive univariate correlation between the two variables, suggests possible multicollinearity among the highly correlated predictors in the final model.

Despite these concerns, the HDGM may have clinical utility. A recent literature review (37) has noted the limited research on prevention and intervention strategies specifically designed to address drinking game behavior. Personalized feedback interventions (PFIs) have also emerged as an effective tool in reducing risky alcohol use among college students (38). PFIs typically collect data from a student regarding their use of alcohol, and the data is in turn used to create a personalized feedback form addressing the student's pattern of alcohol use and associated risks. As noted by Walters and Neighbors (39) and more recently by Miller et al. (40), existing PFI studies have employed a variety of feedback components. Therefore, the information obtained by the HDGM could be incorporated into PFIs as a way to provide game-specific feedback either as a stand-alone intervention or in the context of a clinical encounter (e.g. brief motivational interventions). Specifically, educating individuals on the frequency and amount of alcohol they consume during drinking games in conjunction with the resultant game-specific consequences can increase the salience of the risks associated with this activity. The consequences included on the HDGM are likely to be seen as undesirable by the majority of college students (41), which may in turn result in an interest in changing personal behaviors.

Feedback regarding the type of game and its associated risks (e.g. consumption games) may also highlight a menu of options that can reduce personal risk of future consequences, such as reducing frequency or time of participation, reducing drinks consumed if playing, or avoiding certain types of drinking games. These efforts may be further enhanced by the use of the HDGM with other measures that assess other drinking behaviors or related constructs (e.g. depression, social anxiety, perceived norms). For instance, understanding students' motivations for gaming or perceptions of others' gaming behaviors may help in presenting HDGM-related personal feedback in a manner that increases its relevance to a particular student. There are other aspects of drinking games that may also be important to assess. For example, the categories of drinking games in the HDGM do not capture targeted drinking, and there have been recent compelling efforts to incorporate this aspect into drinking game classification (1). Such measures may lend additional credence and relevance to prevention or intervention efforts.

These findings suggest many promising areas for future research. First, the observed site differences on gender and mandated status highlight the need to determine how demographic factors (e.g. size and location of campus) impact responses on the HDGM and highlight the need for future work to clarify demographic differences on responses to the measure. Second, this study is just a first step in establishing the validity of the HDGM. For example, construct validity can be further established by exploratory factor analysis and may reveal a reduced number of items that adequately assess types of drinking games and consequences from playing games. Future studies correlating responses on the HDGM to drinking game behaviors in the laboratory (18,42) or in the field (43) would further enhance

confidence in the validity of the HDGM. For example, laboratory or field studies assessing blood alcohol level (BAC) could be a useful way of determining how accurate drinking game players are when asked to estimate their BACs. Specifically, students could be administered a breathalyzer after playing a drinking game, and then asked to estimate their BAC concurrently or at a later time (e.g. the next morning, 44 for examples, see 45). Third, there may be other constructs not measured by the HDGM that would be worthy of inclusion. For example, assessing weight on the HDGM would permit the calculation of participants' typical BAC achieved during drinking game participation (18,42,46). Other constructs such as participants' perceived tolerance (47), rules and strategies implemented during drinking games (1), and motives for playing (48) may have particular relevance.

The findings of this study must be considered in the context of some limitations. First, although the data was collected in three sites, findings may not generalize to other colleges and universities in other regions of the country (e.g. Southern US). Second, the lack of common measures across the three sites that measured constructs hypothesized to be both related (e.g. impulsivity) and unrelated (e.g. neuroticism) to drinking game participation limited the investigation of construct validity of the measure. Third, the self-report data was collected without collateral verification. Although self-report data has not been found to be significantly biased in college students (49,50), it is possible that the participants underestimated or overestimated their drinking game related alcohol consumption in spite of our implementation of several strategies to facilitate accuracy of participants' alcohol use (e.g. assurances of anonymity, provision of standard drink definition). In addition to the unfortunate frequency of missing data which reduced the power of our regression models, accurate estimation of the number of drinks consumed while playing drinking games may also be complicated by the drinking environment itself. For example, drinking games are often nested into a session of drinking, making it difficult to judge how many drinks are only attributable to game play. Similarly, the practice of having "side beers" (e.g. alcohol beverages consumed outside of, but during game play) may convolute indices of the amount of alcohol consumed due solely to the drinking game. Furthermore, the type of elevated alcohol consumption typically seen with drinking games is associated with impaired memory which may further decrease the reliability of drink estimation. Lastly, because the duration of and amount of alcohol consumed varies by the type of game played, the "typical" amount reported by a student who plays more than one type of game is more complicated to measure and therefore likely to be less accurate.

In conclusion, drinking games are prevalent among college students and associated with increased alcohol consumption and negative consequences. The HDGM was designed to assess various aspects of drinking game behavior. Initial analyses suggest that the measure possesses both content and criterion-related validity and preliminary evidence of test-retest reliability. Future studies are needed to further assess the psychometric properties of the HDGM in order to fully establish its utility in both research and clinical contexts.

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Appendix 1

Hazardous Drinking Games Measure

The following questions ask about your involvement with drinking games. A *Drinking Game* is defined as an activity that has rules governing the consumption of alcoholic beverages.

In the past 30 days, how often did you play drinking games?

- Never
- Once
- 2 to 4 Times a Month
- 2 to 3 Times a Week
- 4+ Times a Week

How many **total drinks** do you typically consume when you are playing drinking games?

In the past 30 days, please indicate how long you played on a typical night when you played drinking games. _____ (in minutes)

In the past 30 days, which types of drinking games have you played? Please check all that apply.

- Consumption Games (e.g. Chugging/Power Hour/Keg Stands)
- Team Games (e.g. Beer Pong/Beirut/Beer Races)

- Media Games (Game involving a TV show, movie or song; e.g. “Have a Drink on Me”)
- Dice Games (e.g., 7–11 Doubles/3 Man)
- Card Games (e.g. Kings/B.S./Cheat)
- Verbal Games (e.g. Never Have I Ever/The Name Game/Animal)
- Motor Skills (e.g. Jenga/Quarters/Thumper)
- Board Games (e.g. Monopoly/Pictionary/Scrabble)

During the past 30 days, have any of the following things happened to you as **a result of playing drinking games**? Please check all that apply.

- I engaged in unplanned sexual activity that I later regretted
- I had a hangover (headache, sick stomach) the morning after
- I got physically sick (threw up)
- I found it difficult to limit how much I drank
- I became rude, obnoxious or insulting
- I was unable to recall large stretches of time
- I passed out from drinking alcohol
- I drove a car when I knew I had too much to drink to drive safely

Table 1

Demographic information for total sample and by individual site.

Variable	Site 1 M (SD)/n (%)	Site 2 M (SD)/n (%)	Site 3 M (SD)/n (%)	Total M (SD)/n (%)
<i>n</i>	153	101	748	1002
Location in US	Northeast	Northeast	Northwest	
Data collection	2007–2009	2008	2007–2008	
<i>Demographics</i>				
Age in years	18.85 (0.77)	18.83 (1.43)	20.29 (1.43)	19.92 (1.49)
Sex				
Male	114 (74.5)	0 (0)	265 (34.4)	379 (37.8)
Female	39 (25.5)	101 (100)	483 (64.6)	623 (62.2)
Race				
Asian	1 (0.7)	17 (16.8)	88 (11.9)	106 (10.6)
Black/African-American	1 (0.7)	7 (6.9)	19 (2.6)	27 (2.7)
Hispanic/Latino	2 (1.3)	6 (5.9)	0 (0.0)	8 (0.8)
White	146 (95.4)	60 (59.4)	484 (65.2)	690 (69.3)
American Indian	0 (0.0)	1 (1.0)	6 (0.8)	7 (0.7)
Mixed	1 (0.7)	9 (8.9)	73 (9.8)	83 (8.3)
Other	2 (1.3)	1 (1.0)	56 (7.5)	59 (5.9)
Pacific Islander	0 (0.0)	0 (0.0)	16 (2.2)	16 (1.6)
<i>Alcohol use variables</i>				
No. HED episodes ^a	5.43 (3.91)	1.64 (2.33)	2.66 (4.26)	3.04 (4.18)
Average no. drinks: per week ^a	16.16 (11.51)	4.17 (4.10)	5.54 (8.62)	7.28 (9.77)
AUDIT	9.91 (4.67)	6.03 (4.05)	6.36 (5.17)	6.91 (5.15)
RAPI	–	5.83 (8.33)	3.55 (6.86)	3.80 (7.06)
YAACQ	8.08 (6.34)	–	–	8.08 (6.34)
Alcohol problem z-score	–0.34 (0.79)	0.24 (1.24)	–0.11 (0.99)	–0.11 (0.97)

HED, heavy episodic drinking; AUDIT, Alcohol Use Disorders Identification Test; YAACQ, Young Adult Alcohol Consequences Questionnaire; RAPI, Rutgers Alcohol Problem Index.

^aPast month.

Table 2

Responses to the Hazardous Drinking Games Measure by site and for total sample.

<i>Variable</i>	Site 1 M (SD)/n (%)	Site 2 M (SD)/n (%)	Site 3 M (SD)/n (%)	Total M (SD)/n (%)
<i>Drinking game frequency</i>				
Never	14 (9.2)	49 (49)	395 (53.0)	458 (45.9)
Once per month	14 (9.2)	30 (30.0)	133 (17.9)	177 (17.7)
2–4 times per month	54 (35.3)	19 (19.0)	156 (20.9)	229 (22.9)
2–3 times per week	70 (45.8)	2 (2.0)	55 (7.4)	127 (12.7)
4+ times per week	1 (0.7)	0 (0.0)	6 (0.8)	7 (0.7)
<i>Typical no. of drinks</i>	4.14 (2.23)	2.66 (2.27)	5.11 (2.69)	4.49 (2.67)
<i>Typical game play (min)</i>	106.19 (145.53)	37.87 (46.53)	–	80.00 (122.56)
<i>Game type</i>				
Consumption	41 (26.8)	7 (6.9)	109 (31.1)	157 (26.0)
Team	145 (94.8)	22 (21.8)	279 (79.7)	446 (73.8)
Media	23 (15.0)	11 (10.9)	56 (16.0)	90 (14.9)
Dice	24 (15.7)	2 (2.0)	33 (9.4)	59 (9.8)
Card	106 (69.3)	26 (25.7)	216 (61.7)	348 (57.6)
Verbal	70 (45.8)	22 (21.8)	85 (24.3)	177 (29.3)
Skill	100 (65.4)	1 (1.0)	62 (17.7)	163 (27.0)
Board	22 (14.4)	4 (4.0)	24 (6.9)	50 (8.3)
<i>Total types of games played</i>	3.47 (1.99)	0.94 (1.20)	2.47 (1.39)	2.47 (1.73)
<i>Consequences</i>				
Unplanned sexual activity	7 (4.6)	2 (2.0)	22 (6.3)	31 (5.1)
Hangover	72 (47.1)	22 (21.8)	198 (56.6)	292 (48.3)
Physically sick	27 (17.6)	6 (5.9)	82 (23.4)	115 (19.0)
Difficulty limiting drinks	10 (6.5)	10 (9.9)	60 (17.1)	80 (13.2)
Acted rude or obnoxious	26 (17.0)	3 (3.0)	32 (9.1)	60 (10.1)
Unable to recall periods of time	33 (21.6)	3 (3.0)	79 (22.6)	115 (19.0)
Passed out	20 (13.1)	2 (2.0)	47 (13.4)	69 (11.4)
Drove a car while intoxicated	6 (3.9)	0 (0.0)	15 (4.3)	21 (3.5)
<i>Total drinking game consequences</i>	1.31 (1.60)	0.48 (0.92)	1.53 (1.55)	1.30 (1.52)

Consequences and game type refers to positive endorsements from participants who indicated played drinking games in the past 30 days.

Table 3

Correlations between Hazardous Drinking Games Measure constructs and alcohol use.

	1	2	3	4	5	6	7	8
1. DG frequency	–	0.75**	0.84***	0.61***	0.67***	0.66***	0.24***	0.05
2. DG typical drinks		–	0.71***	0.59***	0.62***	0.59***	0.17***	0.07*
3. DG type			–	0.63***	0.61***	0.60***	0.23***	0.05
4. DG consequences				–	0.55***	0.55***	0.20***	0.15***
5. Typical drinks per week					–	0.87***	0.31***	0.07*
6. HED episodes						–	0.28***	0.08*
7. AUDIT sum							–	0.58***
8. Alcohol problem z-score								–

DG, drinking games; HED, heavy episodic drinking; AUDIT, Alcohol Use Disorders Identification Test.

n ranges from 775–999;* $p < 0.05$;** $p < 0.01$;*** $p < 0.001$.

Table 4

Predictors of the AUDIT total scores.

Variable	Model 1				Model 2			
	Full sample	Site 1	Site 2	Site 3	Full Sample	Site 1	Site 2	Site 3
Constant								
Gender	-0.07	-0.08	-	0.01	-0.07*	-0.06	-	0.03
DG frequency	0.09	0.02	0.31	-0.05	0.08	-0.06	0.12	-0.02
DG typical drinks	-0.06	0.25**	-0.05	0.04	-0.13**	0.14	-0.07	-0.03
DG consequences	0.09*	0.33***	0.28*	-0.01	-0.07	0.03	-0.04	-0.03
DG game variety	0.13	0.16	0.12	0.07	0.14*	0.11	0.10	0.06
Typical drinks per week					0.20***	0.27***	0.47***	0.05
Z problems					0.58***	0.46***	0.41***	0.64***
R ²	0.07	0.35	0.34	0.01	0.42	0.56	0.74	0.41
F	11.10***	14.81***	11.12***	0.37	74.69***	26.50***	36.64***	49.16***
R ²					0.35***	0.21***	0.40***	0.40***

DG, drinking games;

Full sample $n = 741$, Site 1 = 141, Site 2 = 90, Site 3 = 510; Coefficients are standardized β ;* $p < 0.05$;** $p < 0.01$,*** $p < 0.001$.