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I Can Play All Night: Examining the Relationship Between Perceived Tolerance and Drinking Game Alcohol Consumption

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Abstract

The present study examined the impact of perceived tolerance to alcohol on maximum alcohol consumption while playing drinking games. Participants were student drinkers (N=3,546) from two west coast universities. Among these students, 69.2% (n=2,290) reported playing a drinking game in the past month. Analyses demonstrated game players had higher perceived tolerances, and consumed more alcohol than non-game players. A regression model revealed that higher levels of perceived tolerance were related to increased maximal alcohol consumption while playing drinking games. Study limitations and implications for future research are discussed.

RÉSUMÉ

Cette étude examine 1'impact de la tolérance perçue lors de jeux impliquant la consommation d'alcool sur la consommation maximale d'alcool lors de ces jeux. L'échantillon est constitué d'étudiants consommateurs d'alcools (N = 3,546) issus de deux universités de la cote ouest. Parmi ces étudiants (n = 2,290), 69.2% ont déclaré avoir participé a un jeu impliquant la consommation d'alcool dans le mois précédent 1'étude. Les analyses ont démontré que les joueurs avaient une tolérance perçue supérieure et consommaient plus d'alcool que les non-joueurs. Une analyse de régression a révélé que des niveaux de tolérance perçue plus élevés était liés a des consommations maximales plus élevées lors des jeux impliquant la consommation d'alcool. Les limites de 1'étude ainsi que ses implications pour de futures études sont discutées.

RESUMEN

El presente estudio explora el impacto de la percepción de la tolerancia al alcohol en casos de máximo consumo de esta sustancia al participar en juegos para emborracharse. Los participantes eran estudiantes consumidores de alcohol (N = 3,546) de dos universidades de la Costa Oeste de los Estados Unidos. Entre estos estudiantes, 69.2% (n = 2,290) reportó que había participado en juegos para emborracharse durante el último mes. Los análisis demuestran que los participantes en estos juegos mostraron una percepción más alta de su tolerancia al alcohol y consumieron más esta sustancia que los no participantes. Un modelo de regresión revela que los niveles altos de percepción de tolerancia al alcohol se relacionan con un incremento de consumo máximo de

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Declaration of Interest

The authors report no conflicts of interest.

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alcohol al participar en juegos para emborracharse. Se discuten las limitaciones e implicaciones del estudio.

Keywords

alcohol; drinking games; perceived tolerance; college students; gender differences; Greek-status differences

INTRODUCTION

Drinking games are common on college campuses with over half of large college student samples reporting playing at least one of over 500 different types of drinking games in the past month (Borsari, 2004; Borsari, Bergen-Cico, & Carey, 2003). The high prevalence rate has caused growing concern as drinking games primarily serve to quickly intoxicate participants, commonly leading to negative alcohol-related consequences (Borsari, 2004; Hingson, Heeren, Winter, & Wechsler, 2005; Nagoshi, Wood, Cote, & Abbit, 1994). Further, emerging research suggests that drinking games may also serve as a medium to demonstrate tolerance to alcohol, a socially desirable skill for some (Mallett, Lee, Turrisi, & Larimer, 2009; Martinez, Steinley, & Sher, 2010) and a functionally desirable skill for game playing. The current study investigated drinking game players' perceived tolerance to alcohol through their estimates of personal drinking levels required to experience alcohol consumption-related consequences and how this perceived tolerance is associated with the maximum amount of drinks individuals report consuming when playing drinking games.

Research has consistently documented that drinking game players are at elevated risks for experiencing negative alcohol-related consequences (for review, see Borsari, 2004). This is not surprising as the primary purpose of drinking games is rapid and heavy alcohol consumption. Furthermore, intoxication resulting from drinking games mediates the relationship between drinking game participation and negative alcohol-related consequences (Nagoshi et al., 1994), suggesting the need to investigate both drinking game participation and levels of in-game consumption. While drinking game players have generally been shown to be at a higher risk for excessive alcohol consumption and resulting consequences, little research has investigated factors associated with heavy levels of drinking while actually playing drinking games.

One potential factor impacting heavy drinking game alcohol consumption is one's perceived tolerance to alcohol. Tolerance to alcohol is important to investigate in the context of drinking games, as drinking games provide a structured and measured means to convey to others in the social environment exactly how much you can drink (Mallett, Lee, et al., 2009). The college culture is known to value alcohol tolerance in the social context (e.g., I can drink more than the average drinker; others are impressed with how much I can drink; Mallett, Lee, et al., 2009). A recent study reported that 9.9% of college participants deliberately trained to increase tolerance (i.e., intentionally drinking excessive amounts of alcohol with the explicit intent of increasing tolerance; Martinez et al., 2010). The desire to increase and demonstrate tolerance to alcohol is particularly concerning as individuals' perceptions of their own tolerances are associated with more approving attitudes of drinking,

drinking intentions, and increased weekday, weekend, and peak drinking levels (Mallett, Bachrach, & Turrisi, 2009). While emerging research has indicated higher perceptions of tolerance are related to increased general drinking (Mallett, Bachrach et al., 2009; Mallett, Lee, et al., 2009), no studies have investigated how perceived tolerance may function in the context of drinking games, a high-risk activity that rewards higher tolerances through the ability to outlast and out drink other players.

In addition to the novel setting of the drinking games environment, no research to our knowledge has investigated gender and Greek-status (i.e., membership in a fraternity or sorority) differences with respect to perceived tolerance. College males, particularly heavy drinkers, value tolerance to alcohol as it is commonly seen as a highly meaningful demonstration of masculinity (Capraro, 2000; LaBrie, Lamb, & Pedersen, 2008; Peralta, 2007; Perkins, 2002; West, 2001). Another group of high-risk student drinkers that often positively values alcohol tolerance is the Greek community (i.e., fraternities/sororities), where some individuals glorify high levels of alcohol use and seek to establish reputations for excessive alcohol use (Hansen, 1997; Reis & Trockel, 2003). Because of the increased value males and Greek-affiliated students place on tolerance along with their overall elevated risks for heavier drinking while in college, these demographic factors may play a role in how perceived tolerance relates to high-risk drinking during drinking game playing.

The current study investigated two primary aims. The first aim was to compare perceptions of tolerance to alcohol's negative outcomes between drinking game players and non-drinking game playing drinkers. The second aim was to examine the influence of perceived tolerance on the maximum amount of drinks consumed during game playing, which has been consistently linked to increased negative alcohol-related problems. Specifically, it was hypothesized that game players would report higher perceived tolerances than non-game players. It was also hypothesized that individuals with higher perceived tolerances would report higher general and drinking game specific alcohol consumption, and participate more frequently in drinking games. These trends were expected to be present when examining the difference between perceived tolerance groups as a function of both Greek-status and gender. Further, heavier overall drinkers were hypothesized to report higher maximum drinking levels during game playing than lighter overall drinkers. Finally, greater perceptions of one's tolerance were hypothesized to be associated with higher maximum levels of drinking during game playing.

METHOD

Participants

Participants were randomly selected undergraduate students from two west coast universities who were contacted via mail and e-mail to participate in an online survey. The two universities varied in size, type, and demographics and were selected to increase the generalizability of the study's findings. Of 11,069 potential participants, 4,984 (45.0%) responded and completed the survey (60.2% female). Campus 1 (n_1 = 3,164), a large, public university, has an enrollment of approximately 30,000 undergraduate students. Campus 2 (n_2 = 1,820) is a mid-sized private university with enrollment of approximately 6,000 undergraduates. The participants completing the survey from each campus were

demographically representative (i.e., age, sex, and Greek-status) of their respective student bodies. Recruitment rates were comparable to other large-scale studies among this population (e.g., Marlatt et al., 1998; McCabe, Boyd, Couper, Crawford, & D'Arcy, 2002; Neighbors et al., 2007).

The analyses for the current study only included participants who reported typically consuming one or more standard alcoholic drinks a week (N = 3,309; 66.4%). Of this regular drinking sample, the analyses considered two subgroups – drinkers who reported playing no drinking games, and drinking game players. A total of 1,019 (30.8% of regular drinkers) participants reported drinking at least one drink in a typical week with no drinking game participation in the past 30 days. This sample was 70.4% female with a mean age of 20.29 years (SD = 1.42). Over a quarter (26.3%) of this sample indicated they were a member of a fraternity or sorority. Race was varied: 45.5% Caucasian, 30.6% Asian, 10.8% multiracial, 9.4% other, and 3.7% African American. A total of 2,290 (69.2% of regular drinkers) participants reported typically consuming one or more alcoholic drinks in a typical week and playing at least one drinking game in the past 30 days. Of the drinking game player sample, 53.4% were female and had a mean age of 19.9 years (SD = 1.08) and 32.2% reported membership in a fraternity or sorority. Over half (60.4%) of participants identified as Caucasian, 18.8% Asian, 10.9% multiracial, 8.4% other, and 1.5% African American.

Procedures

Students were randomly selected from registrar rosters at both universities. Selected students received mailed and e-mailed letters inviting their participation in a web-based study of college student alcohol use. Recruitment targeted both drinkers and non-drinkers. The invitations included a URL to a 20-minute online survey, which gathered demographic, alcohol use, drinking games, and perceived tolerance data. Participants were provided the option to decline at any point. Survey completers were paid a $15 stipend for participation. Participants were informed that their responses were confidential and would not be connected to their name or e-mail address. The current study was approved by the Institutional Review Boards of both participating universities and a Federal Certificate of Confidentiality was obtained to further protect research participants. Prior to answering questions related to drinking behavior, standard drink sizes were defined.

Measures

Drinking game behavior was assessed with three items. Game playing frequency was assessed by asking participants: "In the past 30 days, how many days did you play drinking games?" Participants who reported playing drinking games at least once were asked two follow-up questions: "On occasions where you played drinking games, how many drinks did you typically consume overall? (include drinks consumed before and after playing drinking games)" and "How many drinks did you typically drink when you played the game you consumed the most drinks?" Participants responded with 0–25 drinks for each follow-up question.

Perceived tolerance to the negative effects of alcohol was assessed by asking participants to report on how many drinks, from one to 25, they believed it would take them to experience

"nausea," "hangover," "getting in trouble with law enforcement or campus authorities," "getting into a fight, acting bad, or doing mean things," "episode(s) of passing out or fainting suddenly," "feeling sad or depressed," "having problems with your memory," "hurting or injuring yourself," and "doing something embarrassing." This nine-item scale was derived from recent work by Mallett, Lee, Neighbors, Larimer, and Turrisi (2006) and modified to include a wider range of potential consequences experienced by college students. While no standardized measure exists for this construct, the scale used in the current study had a very strong inter-item reliability ($\alpha = .96$). The items were averaged to form an overall perceived tolerance composite.

Typical weekly drinking was assessed with the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985; Kivlahan, Marlatt, Fromme, Coppel, & Williams, 1990). The DDQ asks participants to report the typical number of drinks they consumed on each day of the week in the past 30 days. Typical weekly drinking was calculated by summing participants' responses for each day of the week. The DDQ has been used in numerous studies of college student drinking and has demonstrated good convergent validity and test–retest reliability (Marlatt et al., 1998; Neighbors, Dillard, Lewis, Bergstrom, & Neil, 2006).

RESULTS

Data Analysis

First, mean differences on study variables between drinking game players and non-drinking game players were examined. Gender and Greek-status specific correlations were calculated for all study variables. Next, mean comparisons between drinking game players reporting either a high or low perceived tolerance were conducted as a function of gender and Greek-status. Finally, a hierarchical regression model controlling for participant's campus was implemented to predict maximum drinks consumed while playing drinking games from sex, Greek-status, overall consumption level, and perceived tolerance, while examining all two-way and three-way interactions. For significant interactions, standardized simple slopes were evaluated to determine if these slopes were significantly different from a horizontal slope of zero (Dawson & Richter, 2006).

Mean Differences

Table 1 presents mean differences between game players and non-game players. Game players drank more weekly drinks ($t = 20.30$, $p<001$) than non-game players, and also reported significantly higher total perceived tolerance ($t = 11.34$, $p<.001$).

Correlations

Table 2 presents gender and Greek-status specific correlations. The perceived tolerance composite significantly and positively correlated with drinking game frequency for all males and non-Greek females (ps<.001), overall drinks on drinking game occasions for all participants (ps<.001), and maximum drinks consumed while playing a drinking game for all participants (ps< .001). Maximum drinks consumed during drinking games was significantly and positively correlated with all other variables for all males (ps<.001) and non-Greek females ($p = .01$).

Means by High and Low Perceived Tolerance

Male drinking game players reported an overall perceived tolerance mean of 11.45 drinks (SD = 3.98) and females an overall perceived tolerance mean of 8.10 drinks (SD = 2.93). Drinking game players reporting an overall perceived tolerance above the mean of either 11.45 drinks for males (55.5% of sample) or 8.10 drinks for females (59.2% of sample) were considered to have a high overall perceived tolerance whereas those below their respective means were grouped in the low perceived tolerance category. Independent *t*-tests compared means between drinking game players reporting either a high or low perceived tolerance and were conducted as a function of gender and Greek-status (see Table 3). All individuals reporting a high perceived tolerance had significantly higher typical weekly drinking (*p*s<.001), past month game frequency (males: *p*s<.001; females: *p*s = .02), typical overall drinks when playing drinking games (*p*s<.001), and maximum drinking game drinks (males and non-Greek females: *p*s<.001; Greek females, $p = .01$).

Maximum Drinking Game Drinks Model

In the model assessing the role of perceived tolerance on typical maximum drinking game drinks, the covariate of campus was not significant ($\beta = -.03$, $p = .10$). All other predictors demonstrated significant main effects (Table 4): sex ($\beta = -.24$, $p<.001$), Greek-status ($\beta = .08$, $p = .01$), typical weekly drinks ($\beta = .23$, $p <.001$), and perceived tolerance ($\beta = .19$, $p<.001$). The following two-way interactions were significant: perceived tolerance × Greek-status ($\beta = .06$, $p = .03$), and Greek-status × sex ($\beta = .05$, $p = .03$). Finally, two three-way interactions were significant: perceived tolerance × typical weekly drinks × sex ($\beta = -.07$, $p = .01$) and perceived tolerance × typical weekly drinks × Greek-status ($\beta = -.06$, $p = .02$).

The three-way interaction of perceived tolerance × typical weekly drinks × sex is depicted in Figure 1 and standardized simple slopes analyses demonstrated all slopes were significant from zero: heavier male drinkers ($\beta = 0.28$, $p<.001$), lighter male drinkers ($\beta = 0.12$, $p = .04$), heavier female drinkers ($\beta = 0.15$, $p = .03$), and lighter female drinkers ($\beta = 0.21$, $p<.001$). All players, in shifting from low to high perceived tolerance, tended to consume a higher maximum number of drinks during drinking games. However, this increase in quantity is most prominent for heavier drinking males.

The three-way interaction of perceived tolerance × typical weekly drinks × Greek-status is shown in Figure 2. Only standardized slopes for heavier Greek drinkers ($\beta = 0.22$, $p<.001$), lighter Greek drinkers ($\beta = 0.26$, $p<.001$), and heavy non-Greek drinkers ($\beta = 0.22$, $p<.001$) were significant. The slope of lighter non-Greek drinkers ($\beta = 0.06$, $p = .19$) was not significant. All Greek-affiliated and heavier drinking non-Greek drinking game players tended to consume a higher maximum number of drinks during drinking games as perceived tolerance increased from low to high. However, among non-Greek game players who reported lighter overall drinking, the change in perceived tolerance did not affect the maximum number of drinks consumed during drinking games.

DISCUSSION

This study explored how perceptions of tolerance to the negative or unwanted effects of alcohol varied among drinking game players and non-game players, and how high levels of perceived tolerance are associated with heightened risk while playing drinking games. Specifically, the results present three major findings. First, perceived tolerance was significantly correlated with all drinking game-specific consumption variables, as well as general drinking. Second, analyses as a function of game playing status revealed that drinking game players reported higher perceived tolerance than non-game players while higher levels of perceived tolerance in turn were related to higher levels of risky (maximum) drinking during game playing for both heavier and lighter overall drinkers. These findings confirmed previous research indicating that drinking game players are indeed a higher-risk drinking population (Borsari, 2004), as evidenced by their higher perceived tolerance and elevated typical drinking levels. Furthermore, when examining the difference between perceived tolerance groups as a function of both Greek-status and gender, game players with high perceived tolerances reported higher levels of drinking for all alcohol consumption variables underscoring the risk of increased perceived tolerance. Third, the results identified differential patterns of risk for drinking game players associated with their tolerance perceptions and overall drinking rates. Heavier drinking game players were found to be at an increased risk (i.e., higher levels of maximum drinking game consumption) than lighter drinkers. Of these heavier drinkers, those with higher perceived tolerances consumed even higher levels of maximum drinking game drinks. These results suggest that heavier drinking and higher perceived tolerances have a synergistic effect in increasing risky drinking game consumption. Regression analyses revealed that this effect was especially pronounced for heavy male drinkers with higher perceived tolerances, indicating this subpopulation is at the greatest risk due to their high levels of in-game alcohol consumption.

Research suggests that college students may have trouble accurately estimating their perceived tolerance, potentially leading to increased risk. When comparing estimated versus actual event-level blood alcohol content (BAC), students generally underestimate their level of intoxication and this discrepancy increases the more intoxicated the students become (Grant, LaBrie, Hummer, & Lac, 2012). Moreover, in vivo underestimation of BAC has been shown to predict event-specific, alcohol-related negative consequences, over and above other consistently predictive factors including total drinks consumed (Grant, LaBrie, Hummer, & Lac, 2011). Because perceived tolerance is based on one’s own perceived level of intoxication, it is likely that students also have difficulty estimating their own perceived tolerance. Indeed, research has found that students commonly overestimate how many drinks it takes to experience negative alcohol-related consequences (Mallett et al., 2006), further indicating perceived tolerances may not be accurate. The inaccuracy and likely overestimation of perceived tolerance is problematic as the current results indicate that the higher a drinking game player’s perceived tolerance is, the more alcohol he or she will consume when playing drinking games.

Existing alcohol interventions may provide an effective framework for intervening with these high-risk students. Students commonly overestimate other students’ drinking behaviors, resulting in increased alcohol-related risk (for reviews, see Berkowitz, 2004;

Borsari & Carey, 2001; Larimer & Cronce, 2007). Personalized normative feedback interventions effectively correct these normative misperceptions (e.g., weekly drinks and attitudes of typical students) to reduce drinking levels (Larimer & Cronce, 2007; Walters & Neighbors, 2005). These types of interventions have been especially effective for high-risk groups of students such as student athletes and Greek-affiliated students (Baer, 2002; LaBrie, Hummer, Grant, & Lac, 2010; Park, Sher, & Krull, 2008). Existing normative feedback interventions typically focus solely on normative feedback to address risky drinking and alcohol-related consequences. While it is premature at this juncture to recommend incorporating perceived tolerance into feedback interventions, the current research suggests the clinical utility of exploring whether perceived tolerance might be amendable to personalized feedback interventions. In working toward this goal, future research should first use event-level data to assess whether individuals indeed overestimate their perceptions of tolerance to the unwanted effects of alcohol. Should such misperceptions exist, researchers would then need to find creative ways to challenge those misperceptions, which may include strategies such as the provision of personalized normative feedback or targeted education about the risks associated with having an over-inflated perception of one's tolerance to alcohol-related consequences. Thus, while preliminary in nature, the current study lays a foundation for a potentially fruitful avenue to pursue in future prevention- and intervention-oriented research.

Study Limitations

A limitation of this study is that the perceived tolerance measure has not been thoroughly evaluated to establish its validity and accuracy. The measure is bivariately related to drinking variables used in this study (i.e., typical weekly drinking, drinking game frequency, average drinking game drinks, and maximum drinking game drinks). The measure also has a high inter-item reliability ($\alpha = .96$); however, this could be due in part to no response set effects. The preliminary use of this scale appears promising, but further research is needed to more strongly establish the scale's psychometric properties. As discussed earlier, another limitation of the study is that perceived tolerance was not compared against one's own actual tolerance to determine if tolerance perceptions are accurately or inaccurately estimated. Furthermore, it is not clear if perceptions of tolerance differ under different circumstances (e.g., pre-parties, drinking game events) and what may be the cause of the misperceptions (e.g., ignorance, self-deception, desirability).

Additionally, this study does not use event-specific drinking game data. The variables utilized are reports of typical behaviors and experiences in the past month. While this allows for a general analysis of the impact of perceived tolerance, event-specific drinking levels and resulting consequences would allow for a more in-depth analysis of the effects of perceived tolerance and its potential interaction with other variables. Future research should collect event-specific data to expand upon the results; this study is only a brief analysis of the potential impact of perceived tolerance on relevant drinking outcomes. Subsequent research investigating the effects of perceived tolerance should also expand from drinking game players to include the general college population and other high-risk groups of students. Finally, investigating other relevant drinking outcome variables such as alcohol-related consequences, event-specific drinking, and average weekly drinks in more advanced

longitudinal models may better elucidate the mechanisms of influence resulting from perceived tolerance to negative alcohol-related consequences.

CONCLUSIONS

The current study highlights the role of perceived tolerance in increasing risk for college students who play drinking games. Perceived tolerance emerged as a predictor of peak drinking while playing drinking games, even when controlling for sex, Greek-status, and average weekly drinking. The emergence of perceived tolerance as a risk factor[1] among game players has implications for future research that may lead to perceived tolerance being utilized as another factor for use in prevention and intervention efforts. Further, perceived tolerance interacts with general drinking levels to increase risk when playing drinking games in heavier drinkers. Future research should also assess event-level effects of perceived tolerance and whether students' perceptions are accurate to help further understand the role of perceived tolerance in risky drinking behaviors.

Biographies

Phillip Ehret is the Research Coordinator at the Heads Up research lab at Loyola Marymount University and a doctoral student in Social Psychology at the University of California, Santa Barbara. His primary research focuses on designing effective health messaging and reducing defensive and resistant health message processing through self-affirmation.

Joseph W. LaBrie is currently the Special Assistant to the President, Professor of Psychology, and Director of the Heads Up research lab at Loyola Marymount University. He obtained a PhD in Clinical Psychology in 2002 from the University of Southern California, in addition to holding a MDiv in Theology and a MS in Mathematics. His research interests

[1]The reader is reminded that the concepts of "risk factors" as well as "protective factors" are often noted in the literature without adequately noting their dimensions (linear, non-linear; rates of development; anchoring or integration, cessation, etc.), their "demands," the critical necessary conditions (endogenously as well as exogenously; from a micro to a meso to a macro level) that are necessary for either of them to operate (begin, continue, become anchored and integrate, change as de facto realities change, cease, etc.) or not to, and without clarifying whether their underpinnings are theory-driven, empirically based, individual and/or systemic stake holder-bound, or based upon "principles of faith," historical observation, precedents and traditions that accumulate over time, perceptual and judgmental constraints, "transient public opinion," etc. It is necessary to consider and to clarify the above if these terms are not to remain as yet additional shibboleth in a field of many stereotypes, tradition-driven activities, "principles of faith," and stakeholder objectives.

are focused on prevention and intervention efforts for risky behaviors among young adults and adolescents. Dr LaBrie has published over 90 research articles in this area and been the recipient of numerous private and federal grants to study young adult health behaviors and approaches to prevention and intervention.

Justin F. Hummer is the Assistant Director of the Heads Up research lab at Loyola Marymount University and a doctoral student in the Clinical Psychological Science program at the University of Southern California. His primary research interests consider how social and cognitive factors relate to the etiology, prevention, and treatment of health-risk behaviors among college students, family systems, and aging populations.

GLOSSARY

Drinking games
Drinking games encompass a variety of games in which losing or defeated players are penalized through obligatory alcohol consumption.

Greek-affiliated students
These are undergraduate students that have chosen to join single-sex, initiatory social organizations. North American Greek organizations (i.e., fraternities and sororities) are analogues to European corporations.

Perceived tolerance
An individual's self-reported number of drinks required for him or her to consume to experience negative, alcohol-related consequences.

REFERENCES

Baer JS. Student factors: understanding individual variation in college drinking. Journal of Studies on Alcohol, Suppl. 2002; 14:40–53.

Berkowitz AD. The social norms approach: Theory, research, and annotated bibliography [Electronic Version]. 2004 [Retrieved May 1, 2011] from http://www.alanberkowitz.com/articles/social_norms.pdf.

Borsari B. Drinking games in the college environment: a review. Journal of Alcohol and Drug Education. 2004; 48(2):29–51.

Borsari B, Bergen-Cico D, Carey KB. Self-reported drinking-game participation of incoming college students. Journal of American College Health. 2003; 51(4):149–154. [PubMed: 12735390]

Borsari B, Carey KB. Peer influences on college drinking: a review of the research. Journal of Substance Abuse. 2001; 13(4):391–424. [PubMed: 11775073]

Capraro RL. Why college men drink: alcohol, adventure, and the paradox of masculinity. Journal of American College Health. 2000; 48(6):307–315. [PubMed: 10863874]

Collins R, Parks GA, Marlatt G. Social determinants of alcohol consumption: the effects of social interaction and model status on the self-administration of alcohol. Journal of Consulting and Clinical Psychology. 1985; 53(2):189–200. [PubMed: 3998247]

Dawson JF, Richter AW. Probing three-way interactions in moderated multiple regression: development and application of a slope difference test. Journal of Applied Psychology. 2006; 91:917–926. [PubMed: 16834514]

Grant SP, LaBrie JW, Hummer JF, Lac A. Underestimations of blood alcohol concentration predict event-specific negative consequences. Substance Use and Misuse. 2011; 46(10):1309–1317. [PubMed: 21619446]

Grant SP, LaBrie JW, Hummer JF, Lac A. How drunk am I? Misperceptions of intoxication in the college drinking environment. Psychology of Addictive Behaviors. 2012; 26:51–58. [PubMed: 21604830]

Hansen, WB. A social ecology theory of alcohol and drug use prevention among college and university students. In: Baker, K.; Maas, J.; McAuliffe, A.; Wojdyslawksi, S.; Zweig, K., editors. Designing alcohol and other drug prevention programs in higher education: Bringing theory into practice. Newton, MA: Education Development Center; 1997. p. 155-176.

Hingson R, Heeren T, Winter M, Wechsler H. Magnitude of alcohol-related mortality and morbidity among U.S. college students ages 18–24: changes from 1998 to 2001. Annual Review of Public Health. 2005; 26:259–279.

Kivlahan DR, Marlatt G, Fromme K, Coppel DB, Williams E. Secondary prevention with college drinkers: evaluation of an alcohol skills training program. Journal of Consulting and Clinical Psychology. 1990; 58(6):805–810. [PubMed: 2292630]

LaBrie J, Lamb T, Pedersen E. Changes in drinking patterns across the transition to college among first-year college males. Journal of Child & Adolescent Substance Abuse. 2008; 18(1):1–15. [PubMed: 25589826]

LaBrie JW, Hummer JF, Grant S, Lac A. Immediate reductions in misperceived social norms among high-risk college student groups. Addictive Behaviors. 2010; 55(12):1094–1101.

Larimer ME, Cronce JM. Identification, prevention, and treatment revisited: individual-focused college drinking prevention strategies 1999–2006. Addictive Behaviors. 2007; 52(11):2439–2468.

Mallett KA, Bachrach RL, Turrisi R. Examining the unique influence of interpersonal and intrapersonal drinking perceptions on alcohol consumption among college students. Journal of Studies on Alcohol and Drugs. 2009; 70(2):178–185. [PubMed: 19261229]

Mallett KA, Lee CM, Neighbors C, Larimer ME, Turrisi R. Do we learn from our mistakes? An examination of the impact of negative alcohol-related consequences on college students' drinking patterns and perceptions. Journal of Studies on Alcohol. 2006; 67(2):269–276. [PubMed: 16562409]

Mallett KA, Lee CM, Turrisi R, Larimer ME. Assessing college students' perceptions of tolerance to alcohol using social cues: the Social Tolerance Index. Addictive Behaviors. 2009; 34(2):219–222. [PubMed: 19004562]

Marlatt G, Baer JS, Kivlahan DR, Dimeff LA, Larimer ME, Quigley LA, Williams E. Screening and brief intervention for high-risk college student drinkers: results from a 2-year follow-up assessment. Journal of Consulting and Clinical Psychology. 1998; 66(4):604–615. [PubMed: 9735576]

Martinez JA, Steinley D, Sher KJ. Deliberate induction of alcohol tolerance: empirical introduction to a novel health risk. Addiction. 2010; 105(10):1767–1770. [PubMed: 20840199]

McCabe S, Boyd CJ, Couper MP, Crawford S, D'Arcy H. Mode effects for collecting alcohol and other drug use data: web and U.S. mail. Journal of Studies on Alcohol. 2002; 63(6):755–761. [PubMed: 12529076]

Nagoshi CT, Wood MD, Cote CC, Abbit SM. College drinking game participation within the context of other predictors of alcohol use and problems. Psychology of Addictive Behaviors. 1994; 8(4): 203–213.

Neighbors C, Dillard AJ, Lewis MA, Bergstrom RL, Neil TA. Normative misperceptions and temporal precedence of perceived norms and drinking. Journal of Studies on Alcohol. 2006; 67(2):290–299. [PubMed: 16562412]

Neighbors C, Lostutter TW, Whiteside U, Fossos N, Walker DD, Larimer ME. Injunctive norms and problem gambling among college students. Journal of Gambling Studies. 2007; 23(3):259–273. [PubMed: 17394053]

Park A, Sher KJ, Krull JL. Risky drinking in college changes as fraternity/sorority affiliation changes: a person-environment perspective. Psychology of Addictive Behaviors. 2008; 22(2):219–229. [PubMed: 18540719]

Peralta RL. College alcohol use and the embodiment of hegemonic masculinity among European American men. Sex Roles. 2007; 56(11–12):741–756.

Perkins H. Surveying the damage: a review of research on consequences of alcohol misuse in college populations. Journal of Studies on Alcohol, Suppl. 2002; 14:91–100.

Reis J, Trockel M. An empirical analysis of fraternity and sorority individual-environmental interactions with alcohol. Journal of Applied Social Psychology. 2003; 33(12):2536–2552.

Walters ST, Neighbors C. Feedback interventions for college alcohol misuse: what, why and for whom? Addictive Behaviors. 2005; 30(6):1168–1182. [PubMed: 15925126]

West LA. Negotiating masculinities in American drinking subcultures. Journal of Men's Studies. 2001; 9(3):371–392.

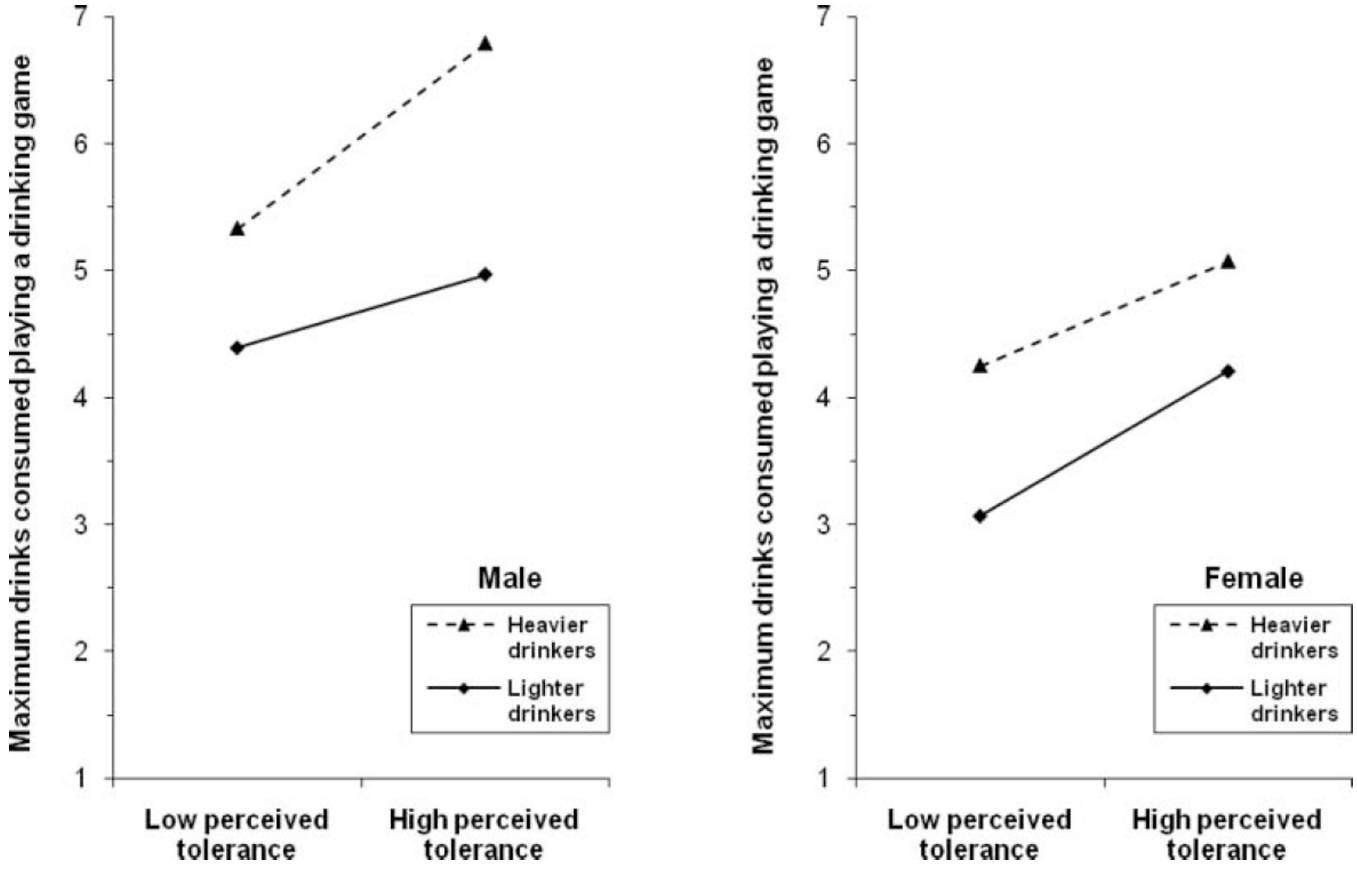

FIGURE 1.

Maximum drinks consumed playing a drinking game for perceived tolerance × typical weekly drinks × gender.

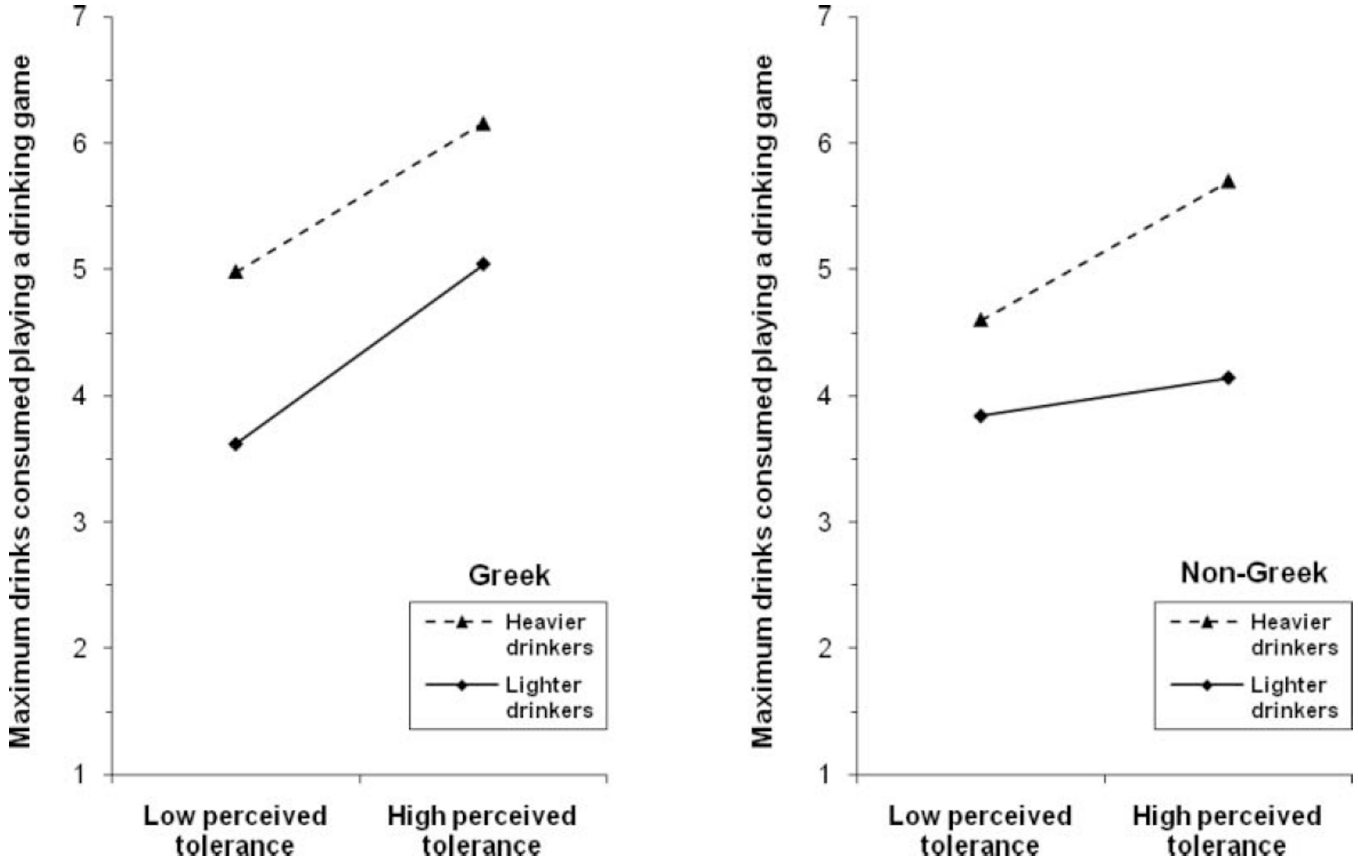

FIGURE 2.

Maximum drinks consumed playing a drinking game for perceived tolerance × typical weekly drinks × Greek-status.

TABLE 1

Table of item-level and composite perceived tolerance, and weekly drinks means for drinkers

	Measures	Non-drinking game players (*n* = 1,019): mean (SD)	Drinking game players (*n* = 2,290): mean (SD)	*t*
Mean drinks to experience:	Nausea	6.77 (3.38)	8.61 (3.82)	13.00***
	Hangover	7.48 (3.47)	8.99 (3.94)	10.41***
	Getting in trouble with authorities	8.77 (4.26)	10.39 (4.64)	9.10***
	Getting into a fight, acting bad, or doing mean things	8.80 (4.35)	10.31 (4.50)	8.63
	Passing out or fainting suddenly	9.25 (4.26)	11.12(4.58)	10.71***
	Feeling sad or depressed	8.01 (4.20)	9.72 (4.63)	9.50***
	Memory of concentration problems	7.62 (3.82)	9.03(4.11)	9.08**
	Injuring yourself	8.63 (4.32)	10.04 (4.47)	8.12*
	Doing something embarrassing	7.13 (3.74)	8.31 (3.98)	7.86**
	Perceived tolerance composite	8.02 (3.58)	9.64 (3.84)	11.34***
Typical weekly drinks		5.08 (5.35)	11.61 (9.76)	20.30***

* $p<.05$;

** $p<.01$;

*** $p<.001$.

TABLE 2

Correlation matrix of variables by gender and Greek-status for drinking game players

		Variable	1	2	3	4	5
Non-Greek							
	1	Perceived tolerance	–	.29**	.16**	.42**	.33**
	2	Typical weekly drinks	.25**	–	.55**	.45**	.37**
	3	Past month game frequency Typical overall drinks on occasions	.14**	.49**	–	.27**	.25**
	4	Where drinking games were played	.35**	.50**	.30**	–	.63**
	5	Maximum game drinks	.24**	.31**	.18**	.66**	–
Greek							
	1	Perceived tolerance	–	.28**	.18**	.39**	.21**
	2	Typical weekly drinks	.24**	–	.54**	.55**	.37**
	3	Past month game frequency Typical overall drinks on occasions	.08	.61**	–	.28**	.22**
	4	Where drinking games were played	.36**	.47**	.25**	–	.50**
	5	Maximum game drinks	.22**	.34**	.15**	.59**	–

** $p<.01$.

Note. Males above the diagonal; females below the diagonal.

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TABLE 3

Means for drinking game players by mean split of perceived tolerance by gender and Greek status

	Non-Greek males			Greek males			Non-Greek females			Greek females		
	Low perceived tolerance (*n* = 405)	High perceived tolerance (*n* = 299)		Low perceived tolerance (*n* = 164)	High perceived tolerance (*n* = 162)		Low perceived tolerance (*n* = 481)	High perceived tolerance (*n* = 343)		Low perceived tolerance (*n* = 223)	High perceived tolerance (*n* = 175)	
Variable	**Mean (SD)**	**Mean (SD)**	***t***	**Mean (SD)**	**Mean (SD)**	***t***	**Mean (SD)**	**Mean (SD)**	***t***	**Mean (SD)**	**Mean (SD)**	***t***
Typical weekly drinks	10.23 (7.89)	14.74 (10.49)	6.50	17.06 (12.55)	24.14 (13.88)	4.83	6.78 (5.03)	9.15 (6.99)	5.65	9.39 (6.21)	12.87 (8.37)	4.77
Past month game frequency	3.45 (2.99)	4.66 (3.72)	4.76	5.65 (3.76)	7.96 (5.33)	4.53	2.68 (2.29)	3.05 (2.35)	2.28	4.00 (3.08)	4.83 (3.78)	2.43
Typical overall drinks												
When drinking games were played	6.83 (2.81)	9.22 (3.69)	9.75	7.28 (3.13)	9.86 (3.96)	6.53	4.92 (1.96)	6.36 (2.97)	8.41	5.03 (1.99)	6.41 (2.42)	6.24
Maximum game drinks	4.90 (2.28)	6.52 (3.17)	7.85	5.43 (3.08)	6.62 (3.22)	3.39	3.66 (1.82)	4.49 (2.35)	5.74	3.51 (1.63)	4.12 (2.41)	3.00

Note. Mean for perceived tolerance was 11.45 drinks for males, 8.10 drinks for females; range was 1–25 drinks.

* $p<.05$.

** $p<.01$.

*** $p<.001$.

TABLE 4

Hierarchical multiple rlegression evaluating maximum drinking game drinks with campus, gender, Greek-status, perceived tolerance, and typical weekly drinks as predictors

		At Step		Final model		
	Predictor	**R^2 Change**	**R^2 Total**	***B***	***SE***	***β***
Step 1:	Covariates	.001	.001			
	Campus			−0.09	0.05	−.03
Step 2:	Main effects	.229***	.229***			
	Sex			−0.62	0.06	−.24***
	Greek-status (Greek)			0.21	0.07	.08***
	Typical weekly drinks (Drinks)			0.60	0.06	.23***
	Perceived tolerance (Tolerance)			0.50	0.07	.19***
Step 3:	Two-way interactions	.009***	.235***			
	Tolerance × Sex			−0.01	0.06	−.00
	Tolerance × Greek			0.14	0.07	.06*
	Tolerance × Drinks			0.07	0.06	.03
	Drinks × Sex			−0.09	0.07	−.04
	Greek × Sex			0.14	0.06	.05*
	Greek × Drinks			0.01	0.06	.00
Step 4:	Three-way interactions	.006**	.240**			
	Tolerance × Drinks × Sex			−0.15	0.06	−.07*
	Tolerance × Drinks × Greek			−0.12	0.06	−.06*
	Tolerance × Sex × Greek			−0.06	0.07	−.02
	Drinks × Greek × Sex			−0.10	0.06	−.04

*$p<.05$;

**$p<.01$;

***$p<.001$.

Note. Campus (0 = Campus 1; 1 = Campus 2); Sex (0 = Male; 1 = Female); Greek (0 = Non-Greek; 1 = Greek).