

# College Binge Drinking: What Is It? Who Does It?

James E. Lange, John D. Clapp, Rob Turrisi, Racheal Reavy, James Jaccard, Mark B. Johnson,  
Robert B. Voas, and Mary Larimer

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This article presents research included in the symposium at the 2001 Research Society on Alcoholism meeting in Montreal, Canada. James Lange was the organizer and provided the introduction of this article. Gayle Boyd was the chairperson, and Mary Larimer was the discussant. The presentations were (1) Defining binge-drinking quantities through resulting BACs, by James E. Lange and Robert B. Voas; (2) Environmental predictors of heavy episodic drinking events, by John D. Clapp; (3) Parents' continuing role in college binge drinking, by Rob Turrisi, Racheal Taki, and James Jaccard; and (4) Motivations of binge drinkers, by Mark B. Johnson, Robert B. Voas, and James E. Lange. The summary and discussion were provided by Mary Larimer.

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**D**RINKING BY COLLEGE students, once studied primarily as consequence of convenience samples, now constitutes a major field within alcohol abuse prevention research. The maturation of the field comes with the growing recognition among academic researchers that health and social-risk behaviors are occurring frequently right outside their laboratory doors, although usually late at night, long after they have left for home. Now that college student alcohol abuse is being taken seriously, we must too take seriously its study. That researchers are scrutinizing assumptions about measurement, etiology, and definitions is to be expected in an emerging field.

This symposium provides grist for the scrutinizing mill. The commonly used operational definition of binge drinking is challenged here. The drinking environment is treated as an important predictor of drinking behavior, as are motivations. Finally, a look at the continuing role of parents is discussed. These discussions help to move us beyond individual-level/demographic predictors of drinking (e.g., athlete, Greek, and so on) and the apparently endless list of problems associated with binge consumption, toward models that establish the interactive roles of development, mo-

tivations, and environment within the context of a more coherent understanding of the problem drinking we seek to prevent.

Clearly, this symposium is far from comprehensive, and to some degree it covers avenues being explored that are still underdeveloped. However, by helping to expand the universe of study and challenging measurement conventions, we can hope that it represents progress.

## DEFINING BINGE-DRINKING QUANTITIES THROUGH RESULTING BACS

*James E. Lange and Robert B. Voas*

Although a growing body of research on college students' binge-drinking behavior has been developing, less attention has been paid to the adequacy of the operational definition of binge drinking. An apparent consensus among researchers has emerged that defines students who consume five or more (5+) drinks during a single occasion as "binge" or "heavy" drinkers (e.g., Centers for Disease Control, 2000; Gfroerer et al., 1996; Johnston et al., 1995; Presley et al., 1994). Wechsler et al. (1995) have argued that a sex-specific definition is better, with 5+ drinks for men and four or more for women (5+/4+) to classify students as binge drinkers.

Regardless of the definition used, the concept of binge drinking has been discussed in two divergent ways: one as an excessive drinking event and the other as an indicator of alcohol-related problems. The excessive-drinking-event conceptualization of binge drinking, in which intoxication is likely, would fit with the vernacular use of the term. For example, Wechsler and Austin (1998) have argued that the term *binge* must be defined in such a way as to capture the qualities of "'drunken celebration' or 'excessive indulgence,' synonymous with 'orgy'" (p. 122).

The other conceptualization of binge drinking is as an indicator of alcohol-related problems. This is perhaps the

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*From Student Health Services (JEL) and the School of Social Work (JDC), San Diego State University, San Diego, California; Department of Psychology (RT, RR), Boise State University, Boise, Idaho; Department of Psychology (JJ), State University of New York, University at Albany, Albany, New York; Pacific Institute for Research and Evaluation (MBJ, RBV), Calverton, Maryland; and Psychiatry and Behavioral Sciences and Addictive Behaviors Research Center (ML), University of Washington, Seattle, Washington.*

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*Reprint requests: James Lange, PhD, Student Health Services, San Diego State University, 5500 Campanile Dr., San Diego, CA 92182-4701; Fax: 619-594-3639; E-mail: jlange@mail.sdsu.edu*

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more commonly used concept within the research community. Here, those who are classified as binge drinkers are compared with nonbinge drinkers on variables of interest. Recently, Wechsler (2000) has suggested that the definition of binge drinking is not intended to "determine if they are legally intoxicated at the time." Instead, he has argued, "The measure is designed to track how many students on college campuses nationwide are drinking at levels high enough to significantly increase the risk of possible problems for themselves and for those around them" (p. 2). Thus, in this application of the term, *binge* is used to classify individuals into problem and nonproblem drinkers—a characteristic of the individual, not of the occasion when drinking occurred.

However, if the drinker is not drinking excessively, then presumably his or her heightened risk to self or others is minimal. Also, relying on the occurrence of alcohol-related problems to define binge drinking will naturally cause varying criteria to emerge, depending on the type and severity of the problem studied. Further still, those who have linked binge-drinking classification to alcohol-related problems have generally permitted a temporal disconnection between the drinking and the problem event, apparently allowing the problem to occur before the drinking event (e.g., Wechsler et al., 1995).

Given that the term *binge drinking* connotes drunkenness, it seems contradictory to claim that binge drinking as a construct is somehow distinct from the resulting high blood alcohol concentrations (BACs) that excessive consumption of alcohol produces. The problem, however, is that variables other than alcohol quantity play a role in the drinker's resulting BAC. In fact, Midanik et al. (1996) stated that "[t]he rationale for selecting the 5+ measure is that this variable should reflect the frequency of consuming a sufficient quantity that high blood alcohol levels are likely to result" (p. 1430). However, they offer no evidence that those reporting the consumption of 5+ drinks actually obtained high BACs. Given an extended drinking period, for instance between 10:00 PM and 2:00 AM, five drinks may only produce very modest BACs in the drinker.

Data being collected at the border crossing between San Diego, CA, and Tijuana, Mexico, are used here to test whether the standard definitions used for binge drinking (5+ or 5+/4+) are predictive of high BACs. We define high BACs as  $\geq 0.08$ , which is the per se limit for driving under the influence (DUI) violations in California. The border crossing is characterized by literally thousands of young Americans streaming into Tijuana each weekend night to patronize bars and nightclubs that offer inexpensive drinks and a legal drinking age of 18 years (Lange and Voas, 2000).

From October 1997 through January 1999, a monthly survey randomly sampled those entering Tijuana who planned to visit bars and then recontacted these participants on their return home. The objective of this survey was to evaluate the effectiveness of community efforts to re-

duce the problems associated with these drinkers. Although this survey was not conducted to address issues relating to the definition of binge drinking, it did provide an opportunity to measure typical alcohol consumption levels and BACs of young Americans in real-world drinking situations, in which many of them consumed more than enough to qualify as binge drinkers. A total of 1653 young people agreed to participate (32% of the eligible crossers recruited). Of those, data from only 1059 (547 men and 512 women) participants were used because only those entering Tijuana with 0.0 BACs and leaving Tijuana reporting some alcohol consumption could be used for our analysis.

Results demonstrated that drinking quantity was related to the time of exposure in Tijuana. The longer the participant stayed in Tijuana, the higher, on average, their reported consumption. The correlation between consumption of alcohol and duration in the drinking environment (which averaged 4.0 hr) may explain why those men who reported consuming exactly five drinks and women who reported consuming exactly four drinks returned with BACs that were much lower than 0.08.

With a regression analysis, we found that 8.2 drinks for men and 6.7 drinks for women predicted a BAC of 0.08. A slightly more conservative logistical regression analysis indicated that a criterion of 6+ drinks for men and 5+ drinks for women yielded an approximately 0.5 probability of having a BAC of 0.08 or higher.

Another analysis, which used the intended intoxication level reported before drinking initiation, provided similar results. Upon return, men reporting 6+ drinks and women reporting 5+ had a 0.5 probability of having reported an intention to get either "a little" or "very" drunk before entering Tijuana.

Although this study has some obvious limitations, the results indicate that the currently used 5+ and 5+/4+ criteria for binge drinking may be too low to adequately capture the excessive drunkenness quality of the term. Indicated here is the importance of alcohol consumption duration and the fact that those who consume five drinks in social situations may do so over a substantial period, producing only moderate BACs.

Clearly, selecting a level for binge drinking that is low will result in more people being included in the binge group. With Wechsler's 5+/4+ definition, 57% of our sample would have been classified as bingeing. With a 6+/5+ definition, however, 43% would be so classified—a 33% difference in binge rates. Given that more than half of those returning with BACs of 0.08 or greater would be expected to fit a 6+/5+ definition of bingeing, we are more comfortable with it as a more realistic predictor of excessive drinking behavior.

#### ENVIRONMENTAL PREDICTORS OF HEAVY EPISODIC DRINKING EVENTS

*John D. Clapp*

Much has recently been written about heavy episodic or binge (i.e., five or more drinks in one sitting for men and

four or more for women, or five drinks in a single sitting) drinking among college students (Presley et al., 1995; Wechsler et al., 1995, 1997, 1998). On the basis of the most recent national study of college drinking conducted by the Harvard School of Public Health, the prevalence rate for binge drinking among college students is 44% (Wechsler et al., 2000). Several studies have found that binge drinkers are more likely than nonbinge drinkers and abstainers to report a variety of personal and social problems (Wechsler et al., 1994, 1998, 2000).

DeJong et al. (1998) and Clapp et al. (2002) have noted the potential for environmental prevention approaches targeting alcohol problems within college populations. To date, little has been written concerning the environmental correlates of heavy episodic drinking. Such studies have potential importance for the development of environmental prevention strategies designed to reduce heavy episodic drinking and its attendant sequelae.

Although there are few existing studies in this area, some correlates of heavy episodic drinking have been identified. By using random telephone interviews, Clapp and Shillington (2001) examined the environmental predictors of heavy, episodic drinking in the last-drinking occasions of 272 college students (past 28 days). In slightly more than 51% of the last-drinking occasions examined, respondents reported heavy episodic drinking. In bivariate analyses, several risk and protective factors for heavy episodic drinking were identified. Drinking beer [odds ratio (OR) = 7.6], hard liquor (OR = 7.5), having "many people intoxicated" at the event (OR = 23.4), smoking marijuana (OR = 24.6), and playing drinking games were all strong risk factors in heavy episodic drinking. In contrast, on occasions in which the respondent drank wine (OR = 0.24), family members were present (OR = 0.34), or the occasion was a date (OR = 0.32), the risk for heavy episodic drinking was greatly reduced. In a multivariate model, drinking beer (OR = 6.0), drinking hard liquor (OR = 11.8), having school friends present (OR = 2.4), or "many others intoxicated" (OR = 12.8) remained as significant risk factors, whereas events that were dates remained protective (OR = 0.30).

Others have found that students (especially men) consume beer at a higher rate when they are not served by a bartender (Geller and Kalsher, 1990). As for event type, fraternity parties have been found to result in higher BACs for participants than other types of parties (Glindemann et al., unpublished manuscript). Finally, Wechsler et al. (1995) found that living in a fraternity or sorority house significantly increased the risk for heavy episodic drinking.

Clapp et al. (2000) examined the last heavy episodic drinking occasions of 110 college students. Students were asked a detailed series of questions concerning the setting and environmental (social and physical) characteristics of the drinking event in which they consumed five or more drinks during the 2 weeks before being surveyed. Clapp et al. (2000) reported that having college friends present or food available at a drinking occasion was protective of

alcohol-related problems in heavy episodic drinking events. In contrast, heavy episodic drinking events in which illicit drugs were available were three and a half times more likely to result in a problem for respondents after controlling for other environmental factors. More detailed analyses also found sex differences. For instance, in heavy episodic drinking events attended by men when drinking games were played at the event (net of other factors), there was a 5-fold risk increase for problems. For women, having a roommate at the event was highly protective against risk for problems.

*Environmental Predictors of Heavy Episodic Drinking.* This study examined environmental predictors of heavy episodic drinking among college students attending two large public universities located in the southwestern United States. By using a computer-assisted interview schedule and data entry program, trained research staff interviewed 2411 randomly selected college students. Respondents were asked a series of detailed questions about the last occasion (within the past 28 days) on which they consumed alcohol. Specifically, respondents were queried about (1) the duration of the occasion, (2) transportation to and from the occasion, (3) who they were drinking with, (4) the social purpose of the occasion, (5) the physical setting of the occasion, (6) whether a number of environmental factors (e.g., food and nonalcoholic beverages) were present at the occasion, and (7) the consequences of their drinking at the occasion. Overall, 1468 drinking occasions were analyzed.

Females comprised 55.3% of the sample, and the mean age was 24.8 years (SD, 8.2 years). More than a third (36%) of the respondents were younger than 21 years. Approximately 61% of all respondents lived off-campus, either alone or with roommates, whereas 21.1% lived off-campus with their parents. Slightly less than 17% (16.8) of the respondents lived on-campus, and only 1% lived in a fraternity or sorority.

One fifth (20.5%) of the respondents reported heavy episodic drinking during their most recent drinking occasion, and the mean number of drinks consumed was 3.2 (SD, 8.0). Respondents typically drank with friends (63.0%) and in their own or someone else's home (57.1%). Slightly more than a third (34.6%) of all drinking occasions were in bars or restaurants.

The most commonly consumed (53.6%) and available (93.6% of occasions) beverage was beer. Illicit drugs were available at 12% of all events. Food was available at 72.8% of all events, whereas no-cost alcohol was provided at 37% of the occasions. Approximately a quarter (24.2%) of events were "BYOB" occasions (bring your own beer). Drinking games were played at 7.8% of the occasions.

Forced entry logistical regression analysis was used to identify environmental factors related to heavy episodic drinking (defined as five or more drinks on one occasion for both men and women). Three environmental characteristic variables significantly predicted risk for heavy episodic drinking during the last-drinking occasion: (1) the

occasion was in Mexico (OR = 1.4,  $p < 0.01$ ), (2) the occasion was a fraternity party (OR = 1.9,  $p < 0.05$ ), and (3) drinking games were played at the occasion (OR = 2.4,  $p < 0.001$ ). In addition to these factors, smoking marijuana (OR = 1.8,  $p < 0.05$ ), drinking beer (OR = 1.3,  $p < 0.001$ ), and drinking hard liquor (OR = 1.5,  $p < 0.001$ ) were all significant risk factors for heavy episodic drinking occasions. Being female was the protective variable identified in the analysis (OR = 0.39).

Although this study identified some environmental and individual characteristics associated with heavy episodic drinking events, more research is needed to better understand how the physical and social environments influence students' drinking behavior. However, this study did identify the unique contributions of both personal and environmental variables to alcohol consumption and expanded on our earlier work (Clapp and Shillington, 2001) by looking at a larger pool of drinking events. The findings of this study differed from our previous study in that drinking in Mexico and at fraternity parties were both significant risk factors for heavy episodic drinking.

These results, however, should be viewed in light of the following limitations to the study. First, the study relied on self-reports of drinking occasions and asked about a somewhat limited range of environmental factors. Observational studies and expanded survey studies are needed to better understand the influence of environmental characteristics. In addition, this study did not use a well developed conceptual model of drinking occasions. Similar to the public health framework, our analytical strategy included agent, host, and environmental variables. More work is needed to determine how those domains influence and interact with each other as they contribute to alcohol consumption and, ultimately, alcohol-related problems.

#### PARENTS' CONTINUING ROLE IN COLLEGE BINGE DRINKING

*Rob Turrisi, Racheal Taki, and James Jaccard*

The problems associated with college student drinking have been well documented in recent years. As a result there has been a call to develop and evaluate novel interventions that have the potential for reaching large audiences, that are easy to implement, and that are cost-effective. To this extent, most colleges and universities have implemented policies or enacted campus-based interventions (e.g., alcohol awareness campaigns or drinking orientations). Although several of these interventions have shown some success in reducing heavy drinking or reoccurring alcohol-related consequences, they occur while students are at college. As such, they run the risks of having to compete with established heavy-drinking norms or missing large segments of the student population who do not participate in such programs. In contrast, this research developed and evaluated the short-term efficacy of an intervention strategy to reduce the onset and extent of binge

drinking in students during their first year of college by reaching the students before they go to college so as to make them resistant to influences that encourage heavy-drinking behaviors. The focus of the intervention was to educate parents of college-bound youth during the transition period between their final days in high school and their first days in college how to communicate to positively influence their sons and daughters. Despite the literature that links teen drinking to parental attitudes and beliefs (Hawkins et al., 1992), awareness of teen drinking (Beck et al., 1991), alcohol consumption (Ary et al., 1993), approval of alcohol consumption (Barnes, 1990), monitoring (Reifman et al., 1998), communication (Kafka and London, 1991), and other parenting tendencies, there have been no systematic theory-driven college-based interventions that use parents. This is perhaps based on the notion that the teens have grown up at this point and that parents are less influential. In contrast, there is considerable empirical evidence that parents play an important role in the success of their teens in college, supporting the viability of our approach (e.g., Amerikaner et al., 1994; Kashubeck and Christensen, 1995).

The theoretical framework guiding the selection of study variables for the intervention content was based heavily on Jaccard's behavioral alternative model (Jaccard, 1981) and Turrisi's model of drinking consequences (Turrisi et al., 2000). According to the behavioral alternative model, individuals perform behaviors that they have the most positive attitudes toward. The attitudes toward each alternative are influenced by their positive and negative beliefs and normative influences toward the alternatives. Thus, if an individual is more positively oriented toward drinking activities than nondrinking activities, the individual is more likely to drink. The establishment and reinforcement of nondrinking alternatives is an important element in our intervention. Second, according to the model of drinking consequences, not all individuals who drink experience negative consequences, and not all individuals who experience negative consequences are going to experience them every time they drink. The experience of negative consequences is going to be then based, in part, on factors other than drinking. Turrisi et al. have identified a series of cognitive and behavioral tendencies that are empirically related to the experience of negative consequences (e.g., positive transformations, social inhibitions, rule following, and judgmental errors). Thus, a second important feature of our intervention is in the establishment and reinforcement of cognitive and behavioral tendencies that decrease the risk of negative consequences.

The form of the intervention is a short handbook for parents divided into four sections: (1) an overview of the incidences and consequences associated with college alcohol consumption and binge drinking to educate parents about the problem, (2) strategies to improve communication with their teens so as to make the communications more effective, (3) methods parents can use to teach their

teens assertiveness skills to make them resistant to influences that encourage heavy-drinking behaviors, and (4) a discussion of the major variables in our theoretical network and how parents might discuss each with their teens.

By using a four-step sampling procedure [discussed in Turrisi et al. (2002)], we collected efficacy data while the students were in college in the fall semester of 2000 on 106 individuals in the treatment condition (in which parents read the handbook and talked with their teens during the summer before college started) and 48 individuals in the control condition (in which parents did not have handbook and did not talk with their teens). Both sexes were approximately equally represented, and the sample was predominantly Caucasian (92%). Even though all teen respondents were below the legal age for drinking (mean age, 18.12 years), 30% indicated that they had consumed five or more drinks in the 2 weeks before the data collection period, and 28% indicated that they drank five or more drinks per occasion on a weekly basis. As part of a larger battery of scales, individuals were assessed on drinking and drunkenness tendencies (e.g., "Given that it is a typical week, how many drinks would you probably have on a Friday/Saturday" and "During the past 30 days, how many times have you gotten drunk, or very high from alcohol?"), binge drinking tendencies (e.g., "Number of times during the past 2 weeks that you had five or more drinks in a row on a single occasion"), drinking and drunkenness activities (e.g., "I would be motivated to go to a sporting event to drink alcohol, I would be motivated to go to a party to drink alcohol, I would be motivated to go to a bar to get drunk"), peer approval (e.g., "During the school year how often do you think that the typical student of your gender drinks alcohol? How much?"), parental approval (e.g., indicate the number of drinks that their fathers and mothers would consider an upper limit), and drinking consequences (e.g., number of times felt physically ill or psychologically dependent on alcohol in the past 30 days, number of times tried to cut down or quit drinking in the past 30 days).

We observed mean differences in the predicted directions (treatment condition had significantly lower means relative to controls; all  $t > 2.0, p < 0.05$ ) on all of the outcomes, with the exception of binge drinking tendencies. For this, the means were in the predicted directions but were not significantly different. Thus, the results comparing the teens in the treatment and control conditions revealed that the intervention seemed to reduce drinking and tendencies toward drunkenness, increase negative perceptions toward drinking activities, reduce peer and parental approval of drinking, and decrease drinking-related consequences.

The results of the short-term efficacy of the first year of the intervention are very promising. There are, however, several caveats that will be addressed in the subsequent years of the study. First, long-term effects will be examined to see whether the differences remain after the end of the first year of college. Second, there were individuals in the treatment condition who continued to drink, get drunk, and

engage in drinking and drunkenness activities. In our future analyses, we will attempt to explore moderators of intervention effectiveness. Finally, the focus of this analysis was on assessing the viability of a parent-based approach. Our future goals are to examine the processes underlying intervention effectiveness. In summary, the overall picture that emerged is a parent intervention that is grounded in existing theory and past empirical research that shows tremendous promise.

#### MOTIVATIONS OF BINGE DRINKERS

*Mark B. Johnson, Robert B. Voas, and James E. Lange*

College drinking has recently become a concern because of several alcohol-related student deaths (e.g., Goldberg, 1997; Stobier, 1999) and data suggesting that close to half of college students report recent binge drinking (e.g., Wechsler et al., 1994). Further, research suggests that high school students who go to college may actually drink more heavily than those who enter the workforce (Johnston et al., 1995; National Institute of Alcohol Abuse and Alcoholism, 1997). These data suggest that our universities are creating an environment where heavy drinking is encouraged.

Much of the alcohol consumption by college students, however, occurs off-campus. This may be particularly problematic for schools along the US borders with Mexico and Canada, where the minimum legal drinking age is lower and alcohol restrictions are perceived to be looser. In fact, there is substantial evidence that students from campuses on our southern border cross into Mexico to take advantage of the greater alcohol availability, and this frequently results in problematic behavior. Our data suggest that an average of more than 400 legally impaired drivers return to the United States from Tijuana each weekend night (Lange and Voas, 2000).

This paper examines the binge-drinking behavior of college students, focusing on motivational factors that predict excessive drinking (five or more drinks on a given occasion) and on traveling to unrestrictive environments (Mexico, in this case) to drink.

*Methods.* Data for this analysis come from two sources. First, a continuous random-digit-dialing survey was conducted on individuals living in residential households in San Diego County. The sample consisted of 800 participants (424 of whom were college students), with equal numbers of men and women from two age groups: 18 to 20 years and 21 to 30 years. Information was collected in seven areas: (1) demographics, (2) quantity/frequency of drinking, (3) reports of visits to Mexico, (4) perceptions of the San Diego/Tijuana nightlife scene, (5) perception of the extent of border DUI problems, (6) perceptions of the intensity of border DUI enforcement, and (7) perceptions of peer drinking norms.

Second, research assistants have conducted a survey of individuals from randomly selected groups as they crossed

into Tijuana from San Diego County on approximately one weekend per month since October 1997. Participants in this survey provide information on demographics, drinking history, bar features and their importance, and drinking intentions for that evening. They are also asked to provide a breath test. Furthermore, participants are given identification bracelets and asked to check in upon their return to San Diego. Participants are then asked more questions and requested to provide another breath test. This design provides us with a direct measurement of the drinking behavior through BACs, which can then be related to prior drinking intentions and other variables. Data from only one member of each naturally occurring group were analyzed to avoid violating assumptions of independent observation. We used data from 1080 participants, of whom 436 indicated being a college or university student.

**General Results.** The generalized linear model was used as an analytical tool (Statistica, version 5.5; StatSoft Inc., 1999) for all analyses. The first analysis was performed on the telephone survey of San Diego residents and focused on identifying factors that predicted recent binge drinking. Predictors in the analysis were the participants' importance ratings of seven drinking establishment features. These drinking establishment importance ratings follow: (1) opportunity to meet new members of the *opposite sex*, (2) opportunity to be *safe*, (3) low probability of getting *carded*, (4) *convenience*, (5) opportunity to let off *steam*, (6) opportunity to *get drunk*, and (7) opportunity to *get into a fight*. From these importance ratings, we had hoped to glean motivational characteristics that might predict binge drinking.

In these analyses, we controlled statistically for sex and age and entered all seven motivational variables into the model equation simultaneously. We also added data from 263 nonstudent workers to see if any of the motivational variables predicted binge-drinking differences between students and nonstudents. The results of this analysis suggest that individuals were *more* likely to binge drink to the extent that meeting new people of the *opposite sex* was important, as well as to the extent that they felt that being able to *get drunk* was important. However, individuals were less likely to binge drink to the extent that they indicated that *safety* and *convenience* were important. Overall, there was no strong evidence distinguishing college students from nonstudent workers.

A similar analysis was conducted on the likelihood that respondents had visited bars and nightclubs of Tijuana within the past year. Once again, we controlled for age and sex and regressed whether participants visited Tijuana bars onto the seven motivational variables. Results revealed that people who value convenience are less likely to have visited a bar or nightclub in Tijuana during the past year, and people who indicated that the *potential for getting drunk* was very important were more likely to have gone into Tijuana. Furthermore, two motivational factors predicted differences between students and nonstudents when they visited

Tijuana. The relationship between wanting to meet new men and women and visiting Tijuana bars was *stronger* for nonstudent workers than for students, but valuing *safety* more strongly inhibited visiting Tijuana for students than for nonstudents.

In the third analysis, we predicted binge drinking from the survey of individuals as they crossed into, and then returned from, Tijuana. This analysis used the same seven motivational variables as before. The primary difference between this analysis and the previous one is that we could collect their importance ratings right before the drinking. Further, all participants in this sample went into Tijuana, whereas only a portion of those in the telephone sample had visited Tijuana during the past year.

Analysis revealed that, regardless of vocational status, people were less likely to binge drink to the extent that *safety* was important to them. They also were less likely to binge drink to the extent that it was important that they *get into a fight*, but they were more likely to binge if being able to *get drunk* was important to them. There was no evidence from this analysis that any of the importance variables predicted binge drinking differently for students than for nonstudents.

Analysis from both a random-digit-dialing telephone survey and a survey of pedestrians crossing the San Diego-Tijuana border revealed that the importance of being able to *get drunk* was associated with a higher probability of binge drinking, whereas the importance of *safety* predicted a lower probability of binge drinking. The telephone survey data revealed a similar pattern regarding the likelihood of crossing into Tijuana to drink. It seems that one intervention to reduce binge drinking would be to heighten college students' awareness of safety issues associated with binge drinking.

## SUMMARY AND DISCUSSION

Mary E. Larimer

College student drinking prevention is a rapidly maturing field of research, with numerous important advances achieved in the past 5 to 10 years. Much of the growth and development in this field is a direct result of the leadership demonstrated by the Prevention Research Branch of the NIAAA in supporting innovative research in this area. The collection of papers represented in this symposium is at the cutting edge of research in this field and demonstrates what we have accomplished, as well as the challenges we continue to face, in addressing what remains a pressing public health threat.

Much of the progress in college drinking prevention has been in the development of effective individually focused interventions for heavy-drinking students (Borsari and Carey, 1999; Larimer and Cronce, 2002; Marlatt et al., 1998). From an effectiveness standpoint, however, these interventions are often limited by low participation rates (Larimer et al., 2001). Dr. Turrissi's work is an example of

an innovative approach to rectifying this limitation, through intervening with parents (and, through parents, students themselves) before problems develop in college. Initial results suggest that parents on average are willing and even eager to participate in such interventions, and this strategy is effective in preventing excessive alcohol consumption by students once they come to campus (challenging the common assumption that parents do not influence the behavior of college-aged individuals). Although more research is needed to replicate these effects and evaluate long-term outcomes, the results are encouraging and suggest that parent-based interventions might be an important additional tool in the prevention strategies kit.

Developing strategies to modify the environment within which heavy drinking takes place is another promising avenue for intervention research on college campuses. Research in this area has been limited, however, by challenges in identifying and reliably measuring environmental influences on college drinking, developing a comprehensive conceptual framework for understanding and addressing these influences, and identifying appropriate outcomes to assess the efficacy of these interventions. Each of the papers in this symposium addresses some aspect of these challenges.

Drs. Lange and Voas tackle the somewhat controversial issue of what constitutes excessive alcohol consumption, in an attempt to refine our recommendations and better understand our outcomes. Their results indicate that the conventional cutoff of five or more drinks for men and four or more for women to define excessive or binge drinking may overestimate intoxication levels, with a more appropriate cutoff being six or more drinks for men and five or more for women. These findings contribute to the larger debate on the issue of appropriate definitions of risky drinking and highlight the importance of multiple sources of data in resolving these issues, including direct behavioral observation and physiological measures.

Dr. Clapp addressed aspects of the drinking situation that relate to heavier consumption by college students, through interviewing a large random sample of college students. He identified three situational variables (the party being in Mexico or at a fraternity and drinking games played at the party), three behavioral variables [smoking marijuana, drinking beer, and drinking hard liquor (as opposed to wine)], and one individual difference variable (male sex) as risk factors for heavy episodic drinking on the most recent drinking occasion. Similarly, Johnson et al. used two different methodologies—a random-digit-dialing survey and a border survey—to identify motivational factors related to heavier consumption for both college and noncollege students. Participants rated the importance of several drinking establishment characteristics, including opportunities to meet members of the opposite sex, safety, low enforcement of age restrictions, convenience, and the opportunity to get drunk. Their telephone survey findings indicated that the importance of opportunities to meet new

people of the opposite sex and to get drunk were related to a higher probability of excessive consumption, whereas the importance of safety and convenience were related to a lower likelihood of excessive consumption. Similarly, their border survey indicated that the importance of the opportunity to get drunk was strongly predictive of excessive drinking during the trip into Tijuana, whereas the importance of safety was related to decreased consumption. These results suggest that students who drink excessively often intend to do so, tend to choose drinking situations that facilitate this choice (Mexico or a fraternity party), and do so particularly in situations where they may be meeting new romantic partners (a high-risk situation for sexually coercive events). These findings provide additional guidance into environmental interventions (such as increased supervision and enforcement in less restrictive environments and limiting drinking games), as well as individual or interpersonal interventions (such as social skills training for facilitating social interactions with potential new partners) that may affect students' drinking behavior.

Although the research studies reported in this symposium represent advances in our approach to college drinking prevention, much work remains to be accomplished. There is an urgent need for improved assessment measures, particularly in the domain of environmental assessment, and for conceptualizing environmental and individual intervention strategies within a broader theoretical framework addressing the multiple determinants of excessive drinking in this population. There are also many lingering questions regarding the appropriate integration of individual and environmental prevention strategies, optimal timing of preventive interventions, and moderators and mediators of intervention efficacy. Finally, implementation of interventions with documented efficacy, on the broader scale, will require additional effectiveness research and program evaluation to address the many challenges of "going to scale." All of this will require time, money, and the collaborative efforts of many individuals working in diverse areas of prevention research. Despite these remaining challenges, the past decade has been a period of considerable progress, and the research presented here provides the foundation for greater progress in the future.

## REFERENCES

- Amerikaner M, Monks G, Wolfe P, Thomas S (1994) Family interaction and individual psychological health. *J Counseling Dev* 72:614-620.
- Ary DV, Tildesley E, Hops H, Andrews J (1993) The influence of parent, sibling, and peer modeling and attitudes on adolescent use of alcohol. *Int J Addict* 28:213-228.
- Barnes GM (1990) Impact of the family on adolescent drinking patterns, in *Alcohol and the Family: Research and Clinical Perspectives* (Collins RL, Leonard KE, Searles JS eds), pp 137-161. Guilford, New York.
- Beck KH, Summons TG, Matthews MP (1991) Monitoring parent concerns about teenage drinking and driving: a focus group interview approach. *J Alcohol Drug Educ* 37:46-57.

- Borsari BE, Carey KB (1999) Understanding fraternity drinking: five recurring themes in the literature, 1980–1998. *J Am Coll Health* 48:30–37.
- Centers for Disease Control (2000) Youth risk behavior surveillance—United States, 1999. *MMWR Morb Mortal Wkly Rep (CDC Surveillance Summaries)* 49:SS–5.
- Clapp J, Segars L, Voas R (2002) A conceptual model of the alcohol environment of college students: implications for prevention and evaluation. *J Hum Behav Soc Environ* 5:73–90.
- Clapp JD, Shillington AM (2001) Environmental predictors of heavy episodic drinking. *Am J Drug Alcohol Abuse* 27:301–313.
- Clapp JD, Shillington AM, Segars L (2000) Deconstructing contexts of heavy episodic drinking among college students. *Am J Drug Alcohol Abuse* 26:139–154.
- DeJong W, Vince-Wittman C, Colthurst T, Cretella M, Gilbreath M, Rosati M, Zweig K (1998) *Environmental Management: A Comprehensive Strategy for Reducing Alcohol and Other Drug Use on College Campuses (microform)*. Higher Education Center for Alcohol and Other Drug Prevention, Newton, MA.
- Geller ES, Kalsher MJ (1990) Environmental determinants of party drinking: bartenders vs. self-service. *Environ Behav* 22:74–90.
- Gfroerer J, Wright D, Gustin J (1996) *Preliminary Estimates From the 1995 National Household Survey on Drug Abuse (Advance Report No. 18)*. Substance Abuse and Mental Health Services Administration, Office of Applied Studies, US Department of Health and Human Services, Public Health Service, Rockville, MD.
- Goldberg C (1997) A drinking death rattles Elite M.I.T.; Latest fraternity party case underscores nationwide problem. *The New York Times* October 1: Nation Desk Section.
- Hawkins JD, Catalano RF, Miller JY (1992) Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: implications for substance abuse prevention. *Psychol Bull* 112: 64–105.
- Jaccard J (1981) Attitudes and behavior: implications for attitudes toward behavioral alternatives. *J Exp Soc Psychol* 17:286–307.
- Johnston LD, O'Malley PM, Bachman JG (1995) *National Survey Results on Drug Use From the Monitoring the Future Study 1975–1994*. National Institute on Drug Abuse, Rockville, MD.
- Kafka RR, London P (1991) Communication in relationships and adolescent substance use: the influence of parents and friends. *Adolescence* 26:587–598.
- Kashubeck S, Christensen SA (1995) Parental alcohol use, family relationship quality, self-esteem, and depression in college students. *J Coll Student Dev* 36:431–443.
- Lange JE, Voas RB (2000b) Youth escaping limits on drinking: bingeing in Mexico. *Addiction* 95:521–528.
- Larimer ME, Cronce JM (2002) Identification, prevention, treatment: individually-focused strategies to reduce excessive alcohol consumption by college students. *J Stud Alcohol (suppl 14)*:148–163.
- Larimer ME, Turner AP, Anderson BK, Fader JS, Kilmer JR, Palmer RS, Cronce JM (2001) Evaluating a brief alcohol intervention with fraternities. *J Stud Alcohol* 62:370–380.
- Marlatt GA, Baer JS, Kivlahan DR, Dimeff LA, Larimer ME, Quigley LA, Sommer JM, Williams E (1998) Screening and brief intervention for high-risk college student drinkers: results from a two-year follow-up assessment. *J Consult Clin Psychol* 66:604–615.
- Midanik LT, Tam TW, Greenfield TK, Caetano R (1996) Risk functions for alcohol-related problems in a 1988 US national sample. *Addiction* 9:1427–1437.
- National Institute of Alcohol Abuse and Alcoholism (1997) *Ninth Special Report to Congress on Alcohol and Health (NIH Publication No. 97-4017)*. National Institutes of Health, Bethesda, MD.
- Presley CA, Meilman PW, Lyster R (1994) Development of the Core Alcohol and Drug Survey: initial findings and future directions. *J Am Coll Health* 42:248–255.
- Presley CA, Meilman PW, Lyster R (1995) *Alcohol on American College Campuses: Use, Consequences, and Perceptions of the Campus Environment*. Vol 2. The CORE Institute Student Health Programs, Southern Illinois University, Carbondale.
- Reifman A, Barnes G, Dintcheff BA, Farrell MP, Uhteg L (1998) Parental and peer influences on the onset of drinking among adolescents. *J Stud Alcohol* 59:311–317.
- StatSoft Inc. (1999) *STATISTICA for Windows* (program manual). StatSoft, Inc., Tulsa, OK.
- Stobier J (1999) Death at Penn spurs alcohol ban: the college forbade drinking at some undergraduate parties. An alumnus died after a fraternity bash. *Philadelphia Inquirer*, March 27:A01.
- Turrissi R, Hughes K, Wiersma K (2000) College student drinking: an examination of theoretical models of drinking tendencies in freshman and upperclassmen. *J Stud Alcohol* 61:598–602.
- Turrissi R, Jaccard J, Taki R, Dunnam H, Grimes J (2001) Examination of the short-term efficacy of a parent-based intervention to reduce college student drinking tendencies. *Psychol Addict Behav* 14:366–372.
- Wechsler H (2000) Binge drinking: should we attack the name or the problem? *Chronicle Higher Educ Chronicle Rev* October 20. Available at: <http://chronicle.com/review>.
- Wechsler H, Austin SB (1998) Binge drinking: the five/four measure (correspondence). *J Stud Alcohol* 59:122–123.
- Wechsler H, Davenport A, Dowdall G, Moeykens B, Castillo S (1994) Health and behavioral consequences of binge drinking in college: a national survey of students at 140 campuses. *JAMA* 272:1672–1677.
- Wechsler H, Dowdall GW, Davenport A, Castillo S (1995) Correlates of college student binge drinking. *Am J Public Health* 85:921–926.
- Wechsler H, Dowdall GW, Maenner G, Gledhill-Hoyt J, Lee H (1998) Changes in binge drinking and related problems among American college students between 1993 and 1997: results of the Harvard School of Public Health College Alcohol Study. *J Am Coll Health* 47:57–68.
- Wechsler H, Fulop M, Padila A, Lee H, Patrick K (1997) Heavy episodic drinking among college students: a comparison of California with other states. *J Am Coll Health* 45:273–277.
- Wechsler H, Lee JE, Kuo M, Lee H (2000) College binge drinking in the 1990s: a continuing problem—results of the Harvard School of Public Health 1999 College Alcohol Study. *J Am Coll Health* 48:199–210.