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College Drinking, What It Is, and What To Do about It: A Review of the State of the Science

*National Advisory Council
on Alcohol Abuse and Alcoholism
Task Force on College Drinking*
NATIONAL INSTITUTE ON ALCOHOL ABUSE AND ALCOHOLISM

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Introduction

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AWARENESS OF alcohol use and misuse on college campuses is not new. Anecdotal reports go back many years, and there is documentation in the United States for at least 50 years. Available research indicates that approximately 80% of college students drink and that half of college student drinkers engage in heavy episodic drinking. Excessive alcohol intake among college students is associated with a variety of adverse consequences: fatal and non-fatal injuries; alcohol poisoning; blackouts; academic failure; violence, including rape and assault; unintended pregnancy; sexually transmitted diseases, including HIV/AIDS; property damage; and vocational and criminal consequences that could jeopardize future job prospects. Students who engage in excessive drinking impact not just themselves. Fellow students experience secondhand consequences ranging from disrupted study and sleep to physical and sexual assault. Furthermore, the institutions they attend expend valuable resources to deal with institutional and personal consequences of their behavior.

To address these serious consequences of alcohol consumption by college students, the National Advisory Council to the National Institute on Alcohol Abuse and Alcoholism (NIAAA) established the Task Force on College Drinking in 1998. The composition of the Task Force was novel. College presidents and research scientists were put together to ensure that the product would at the same time contribute to the scientific basis for addressing college drinking and would be relevant to the practical challenges faced by college administrators. The Task Force was charged with integrating available scientific research with experiences reported by administrators, service providers and students.

Because of the breadth of information to be considered, two panels were formed: Panel 1 reviewed the Contexts

and Consequences of College Drinking, and Panel 2 focused on Prevention and Treatment of College Alcohol Problems. Additional information about the structure and composition of the Task Force and its two panels is available in their individual reports, which are on the NIAAA web page (www.niaaa.nih.gov). Each of the two panels commissioned review papers to inform discussions and to lead to construction of the overall Task Force Report (which is to be released in tandem with this supplement). The 18 articles appearing in this supplement are adapted from the review papers. Each panel's research recommendations follow that panel's introduction.

It must be noted that the extent and quality of the research base in each of the areas reviewed varied considerably. In fact, this very variation was a primary impetus for the initiation of the Task Force on College Drinking. Although college drinking has been a concern for some time, amelioration of the problem has been hampered by inconsistent attention from both college administrators and researchers. And, when attention is given, it is too often short lived and based on current fads, rather than on solid empirical evidence. The fundamental rationale for the Task Force on College Drinking is to organize and integrate existing information but, most importantly, to have the product of these efforts serve as a foundation for future research that will advance our ability to impact the problems in question. To this end, the articles in this supplement are offered as a foundation for the next generation of inquiry into this serious societal problem. Drinking on college campuses may seem to be entrenched and impervious to intervention; however, it is potentially modifiable with carefully targeted approaches endorsed by all stakeholders—including students—who truly value the institution.

Overview

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The articles in this supplement were commissioned by the two panels of the National Advisory Council on Alcohol Abuse and Alcoholism Task Force on College Drinking (see Introduction, this supplement). They are organized and discussed below according to panel.

Panel 1: The Contexts and Consequences of College Drinking

The ten Panel 1 articles on college drinking fall into three major categories: (1) the statistics of drinking in college; (2) the factors involved in college drinking—individual, developmental and institutional; and (3) the consequences of drinking, including theoretical ideas applied to the connection between alcohol consumption and three particularly serious consequences (risky sexual behavior, sexual assault and aggression.) Dowdall and Wechsler (“Studying College Alcohol Use: Widening the Lens, Sharpening the Focus”) outline how to select the types of institutions to be included, specify the population to be studied, choose the sample and decide on the methods of data collection and analysis when designing a study of drinking among college students. The authors indicate that advancing this field will require complex study designs, new variables and the incorporation of new data accrual and analytic methodology. They argue for future studies to investigate college drinking as a phenomenon that takes place in a larger social, economic and political context than just the college itself.

O’Malley and Johnston (“Epidemiology of Alcohol and Other Drug Use among American College Students”) examine the results of several large national studies on college student drinking: (1) the Harvard School of Public Health College Alcohol Study, (2) the Core Institute, (3) Monitoring the Future, (4) the National College Health Risk Behavior Survey and (5) the National Household Survey on Drug Abuse. Some studies were designed specifically to

evaluate college drinking, whereas others had a broader focus. Despite different strengths and weaknesses, all obtain strikingly similar findings: About 80% of college students drink, about 70% have had a drink in the past 30 days and about 40% engage in heavy episodic drinking. Racial/ethnic and gender effects are also consistent across studies; male students drink more than female students, and white students drink more than black or Hispanic students.

Many biological, social and psychological factors have been studied to explain the wide variation in drinking among individual college students. Baer (“Student Factors: Understanding Individual Variation in College Drinking”) reviews this literature, which is of varying quality, is largely dependent on questionnaire responses from cross-sectional convenience samples and has tended to focus on student personality characteristics. Nonetheless, a number of themes emerge. Drinking among college students is often associated with impulsivity/sensation seeking or the regulation of negative emotional states including depression and anxiety. Many students are heavily influenced by social factors, however. Studies have also indicated that religiosity is inversely related to drinking and sociability positively related to drinking and that members of Greek organizations and students involved in athletics drink more than other students. Studies on expectancies and individual perceived norms have indicated a relationship with drinking, although more work is needed. Also needed are more longitudinal studies, more investigations representative of the broader college population, additional work on the genetics of alcohol-related problems in this population and studies that use multivariate approaches.

Schulenberg and Maggs (“A Developmental Perspective on Alcohol Use and Heavy Drinking during Adolescence and the Transition to Young Adulthood”) examine alcohol use during adolescence and young adulthood in a developmental framework, which considers the tasks and challenges of adolescence. These fall within the broad domains of biology, cognition, identity, affiliation and achievement. The authors indicate a number of differing alcohol use trajectories at this time of life, some of which are more troublesome than others. They also examine risk and protective factors from a developmental perspective and within a so-

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ciocultural context. Five conceptual models that relate developmental transitions to substance use are offered: Overload, Developmental Mismatch, Increased Heterogeneity, Transition Catalyst and Heightened Vulnerability to Chance Events. Like other researchers represented in this supplement, Schulenberg and Maggs recognize the complexity of the influences on drinking among college students and recommend multiwave, contextually sensitive, longitudinal research. Finally, they suggest that a developmental perspective can inform and enhance intervention.

College students typically begin their collegiate careers in late adolescence, a time of continued development of the brain. Two important questions arise, therefore. First, is there something about the adolescent brain that affects sensitivity to alcohol's effects, or that intensifies the adolescent's inclination to drink? Second, does drinking during this period of brain development have enduring effects on the brain? Spear ("The Adolescent Brain and the College Drinker: Biological Basis of Propensity to Use and Misuse Alcohol") examines animal and human studies relevant to these critical questions. Although more work is needed, recent evidence indicates that adolescents may show reduced sensitivity to alcohol's effects and increased sensitivity to stressors, both of which may influence drinking behavior. In addition, alcohol exposure during adolescence may disrupt brain development and functioning. For example, hippocampal volume has been associated with alcohol consumption in human adolescents (De Bellis et al., 2000), and neuropsychological studies of adolescents have indicated a connection between drinking and memory deficits (Brown et al., 2000; Tapert and Brown, 1999). If supported by further research, such information might be disseminated to adolescents as part of an integrated intervention strategy.

Presley, Meilman and Leichter ("College Factors That Influence Drinking") consider the relationship of collegiate environments to student drinking. The authors note, however, that the existing literature in this area is sparse and typically has examined institutional variables one at a time, rather than in multivariate models. In general, studies indicate that the following institutional variables are related to student alcohol consumption: affiliations (e.g., historically black institutions, women's institutions), presence of a Greek system, role of athletics on campus, 2- or 4-year designation, type of residence hall, institution size, location, overall quantity of drinking on campus, the pricing and availability of alcohol and outlet density. The authors conclude that, at this time, research is insufficient to indicate which factors most affect student drinking. Additional as yet unstudied and/or unrecognized aspects of collegiate environments also may be important predictors of student drinking on particular campuses. Colleges and universities are themselves embedded in larger environments at the same time that they comprise smaller social and cultural environments. In con-

clusion, these authors emphasize the importance of a coherent model of student drinking that incorporates the environment, student campus culture and individual factors.

The consequences of college drinking were addressed in four papers commissioned by Panel 1. The first article presents an overview; those that follow offer more detailed analyses of three specific consequences: risky sexual behavior, alcohol-related sexual assault and alcohol-related aggression. Panel 1 decided that these three consequences warranted additional attention because of their potential to cause serious and long lasting problems.

Perkins ("Surveying the Damage: A Review of Research on Consequences of Alcohol Misuse in College Populations") reviews the literature on the nature, extent and patterns of negative consequences that result from alcohol consumption by college students. These consequences impact the individuals who drink, their fellow students and the institutions they attend. They range widely in severity and may have short, longer term or even lifetime sequelae. The consequences of student alcohol consumption include fatal and nonfatal injuries; hangover and vomiting; alcohol poisoning; blackouts; academic impairment or failure; violence, including rape and assault; unintended sexual activity; unintended pregnancy; sexually transmitted diseases, including HIV/AIDS; litter and property damage; and vocational and criminal consequences that could jeopardize future job prospects. One caveat is that the literature in this area is of mixed quality and has significant gaps such as a paucity of information on patterns of consequences among different racial/ethnic groups or on individual and global time trends. Nonetheless, this body of work indicates substantial adverse consequences, with patterns of damage that appear to follow patterns of drinking. Generally, more consequences are found among men than women and among whites and Native Americans than Hispanics and blacks. Research in this area also has shown that most students do not believe that they have a drinking problem, regardless of the alcohol-related consequences they experience.

Cooper ("Alcohol Use and Risky Sexual Behavior among College Students and Youth: Evaluating the Evidence") explores alcohol consumption and risky sex among college students and youth. The existing literature indicates a strong association between alcohol consumption and having multiple or casual sexual partners as well as alcohol use and the decision to have sex in the first place. There was an inconsistent relationship between alcohol consumption and the use of condoms and birth control. Available data indicate that a large percentage of college students drink, many are sexually experienced, and a substantial minority have experienced one or more adverse consequences of sexual risk taking. The author explores the effect of alcohol on the instigatory and inhibitory cues controlling sexual behavior, the role of alcohol expectancies in sexual risk taking and the extent to which an individual's life situation may ex-

plain both drinking and risky sexual behavior. She concludes that each of these models may explain some aspects of the association between alcohol and sexual risk taking. Drinking alcohol in sexual situations may increase the likelihood of intercourse depending on what drinking means to the individual. Alcohol consumption also increases the likelihood of indiscriminate sexual behaviors, but this may be moderated by the individual's stage in a relationship. The author concludes that historical context, developmental stage and chronological age confound the link between alcohol consumption and the use of protective measures in a sexual situation. In sum, a range of models plausibly relates alcohol to risky sex; consequently, research should be directed to understanding under what circumstances and for what individuals or subgroups of individuals different causal processes operate.

Abbey ("Alcohol-Related Sexual Assault: A Common Problem among College Students") focuses on sexual assault involving female victims and male perpetrators. She defines sexual assault to include the full range of forced sexual acts, including rape. Cross-sectional studies have used varying definitions and time periods, but consistently indicate 25-50% of women report such an experience. Fewer college men report committing sexual assault than women report experiencing it; according to Abbey, this discrepancy is likely related to gender differences in understanding of a woman's nonconsent. Of the sexual assaults on campus, at least half are associated with alcohol use by the perpetrator or the victim, but most often by both. In most cases, the victim knows the perpetrator, and about half of the time the assault occurs on a date. The strong association between alcohol and sexual assault does not demonstrate causality, however, and a number of causal pathways may explain some sexual assaults. Abbey presents a conceptual model of alcohol-related acquaintance sexual assault and reviews the studies that examine the factors that may interact with alcohol to make sexual assault more likely. These factors include expectations about the effects of alcohol; stereotypes about drinking women; alcohol's effects on cognition, behavior and motor skills; perceptions of control and responsibility; and peer environments that encourage heavy drinking and sexual activity. The author suggests that future studies include students of varying racial, cultural and ethnic backgrounds; ascertain the amount of alcohol consumed (and not just whether it was consumed); and follow students longitudinally. The review concludes that, because of the strong association of alcohol use and sexual assault, programming and intervention on campuses in these two areas should be coordinated.

Giancola ("Alcohol-Related Aggression during the College Years: Theories, Risk Factors and Policy Implications") examines research on prevalence and patterns of alcohol-related aggression and indicates there is a serious problem on college campuses. A large number of experimental stud-

ies (often, but not exclusively, conducted with college students) also link alcohol and aggression. Despite some limitations, this body of work indicates that the consumption of alcohol significantly increases the likelihood of aggressive behavior. Giancola reviews general theories of aggression and the theoretical formulations that have been advanced to explain the alcohol-aggression relationship. These conceptual models include disinhibition and expectancy models and a number of cognitive models that focus on processing of cues, self-awareness and executive functioning. Not all people become aggressive when they drink, however, nor do people become aggressive in all situations. Studies have suggested that individual differences in dispositional aggressivity; expectancies about the effects of alcohol on aggression; drinking history; executive functioning; hostile attributional biases; individual biochemistry and gender; and contextual variables such as blood alcohol concentration limb effects, alcohol type and dose, social pressure and provocation affect the relationship of alcohol consumption and aggression. Giancola concludes that alcohol consumption is not a factor in behavior for which there is no predisposition in the sober state.

Recommendations

After reviewing and discussing the material in this volume, the panel made recommendations to college administrators, funding agencies and the research community. The research recommendations were based on the panel's conclusion that sound, thoughtfully designed research studies are likely to have an impact on excessive and underage alcohol use among college students. The key research recommendations of the Panel on Contexts and Consequences follow:

- Characterize better the extent of clinical level problems (alcohol abuse and dependence) and alcohol-related comorbidity in the college population.
- Understand the relationship between clinical levels of drinking and student consumption indicators (e.g., heavy episodic drinking).
- Examine the predictive value of college drinking for later alcohol-related problems.
- Identify the economic consequences of college drinking, including the cost to colleges of damage to the physical plant.
- Assess the impact of community pricing policies on drinking among college students.
- Understand more completely the academic consequences of college drinking, including the mechanism(s) through which alcohol may influence academic outcomes.
- Refine understanding of the heterogeneity of heavy drinking trajectories in adolescence and early adulthood, through longitudinal studies, with a particular focus on what factors determine moving from a heavy drinking or high episodic drinking pattern to a lower one, and vice versa.

- Focus on how developmental transitions to college, to work afterward, to a new intimate partner or to a new friendship can serve as windows of opportunity for effecting change in behavior, including drinking.
- Examine the relationship between the prior drinking histories of incoming students and their use of alcohol in college and consider what other variables moderate this relationship.
- Assess whether alcohol use by college students interferes with their social and emotional development (both short- and long-term).
- Assess how institutional consequences (e.g., dismissal or other sanctions) impact drinking behavior.
- Identify those problem-related, individual-level variables (e.g., drinking motivations) that are potentially modifiable; use this information to point to opportunities for intervention.
- Discern how individual-level variables interact with the larger environment to identify possible environmental interventions that might reduce the risk of hazardous drinking for especially vulnerable individuals.
- Improve understanding of the association between alcohol consumption and both acute and chronic problems, recognizing the complexities of the relationships, the influence of other variables at the individual and situational levels and bi-directional causation; high priority research areas include the effects of alcohol consumption on sexual behavior, sexual assault and other aggression, academic performance and compliance with academic norms.
- Assess more carefully the validity of self-report measures of student alcohol use and explore the use of alternative data collection methods including observational, archival and biomedical methods.

Panel 2: Prevention and Treatment of College Alcohol Problems

The Panel on the Prevention and Treatment of College Alcohol Problems commissioned the eight articles appearing in this section. To place subsequent reviews in context, an overall review of practices currently in place to reduce alcohol-related problems on college campuses was completed by DeJong and Langford (“A Typology for Campus-Based Alcohol Prevention: Moving toward Environmental Management Strategies”). College administrations are under pressure, due both to public opinion and potential legal liability, to take action to prevent problems. Historically, these prevention efforts have focused on educational strategies, but accumulating research has indicated these strategies do not appear to be effective in isolation (Larimer and Cronce, this supplement). More likely to have significant impact are comprehensive interventions that include prominent environmental components. This position is entirely consistent with the recommendations of other authors in this supplement (see especially Toomey and Wagenaar; Hingson and Howland), the Panel Report on Prevention and Treatment of College Alcohol Problems and the full Report of the Task Force on College Drinking.

To reflect this position, DeJong and Langford adopt a social ecological framework that recognizes that health behaviors, including drinking, are affected through multiple levels of influence. A simple typology for describing intervention approaches is presented that crosses the levels of influence in the social ecological model (individual, group, institution, community and public policy) with intervention targets and methods (knowledge, attitudes and intentions; environmental change; health protection; and intervention/treatment). This sort of typology is useful in making comparisons among researched interventions, and it informed the final recommendations made by the panel. When such a typology is applied to ongoing prevention efforts, it becomes clear that the majority of work has been directed toward individual and group programs that target knowledge, attitudes and behavioral intentions; environmental change has been relatively neglected. In fact, a 1998 random sample survey of 2- and 4-year colleges in the United States indicates the existence of barriers to the institution of comprehensive programs. Many campuses do not have in place basic infrastructures and resources needed to implement and evaluate prevention strategies with an environmental management focus. Clearly, both research and dissemination efforts are needed in this regard.

Not all prevention and intervention strategies are directed toward the general college population, however. Population subgroups, based on risk for alcohol-related problems, were also considered by the panel in assessing the potential impact of specific intervention approaches, how they should be implemented, to whom delivered and the appropriate level of resources that should be allocated. The campus population includes approximately 19% abstainers, 37% “social” drinkers who do not engage in heavy episodic drinking, 21% higher risk drinkers who occasionally consume five or more (four or more for women) drinks on a single occasion and 23% who frequently consume five or more drinks. Approximately 47% of drinkers do so “to get drunk” (Wechsler et al., 2000). Drinkers who fall near the extreme end of this continuum are likely to need more intensive intervention, and such services should be available to this subset of the population. Lighter drinkers may be responsive to less costly approaches. It is critical that students who have chosen not to drink at all are also acknowledged and supported. Any successful comprehensive approach will ensure that these students are helped to resist pressures to drink if they so choose and will provide the means for minimizing the untoward effects of other students’ drinking (e.g., on their ability to study).

The following seven articles review and evaluate the research literature underlying intervention approaches for specific groups, make recommendations regarding future research and discuss effective implementation of the interventions studied. Each provided valuable information for the panel’s deliberations.

Larimer and Cronce ("Identification, Prevention and Treatment: A Review of Individual-Focused Strategies to Reduce Problematic Alcohol Consumption by College Students") review research on interventions directed toward individuals published between 1984 and 2000. Such interventions have long dominated campus efforts to reduce alcohol-related problems, but surprisingly few have been rigorously evaluated; fewer yet have been tested using randomized control designs. Hence, only 32 prevention studies were identified that met minimal methodological criteria for inclusion in the review.

The initial response to campus alcohol-related problems is generally educational. *If only students understood the risks involved, they would certainly modify their alcohol use behavior.* But in accord with earlier reviews, Larimer and Cronce report little evidence for the effectiveness of informational programs that do not also include other approaches. Much stronger support exists, however, for the effectiveness of skills-based and motivational enhancement programs. These approaches also provide alcohol information, but presented within a context that emphasizes its relevance to specific alcohol-related situations and decisions. For example, factual information about alcohol effects may be used to challenge erroneous alcohol expectancies held by many college students that are known to predict their drinking.

Multicomponent programs typically include some combination of expectancy challenge, self-monitoring, drink refusal skills, moderate drinking techniques, lifestyle skills/balance, normative feedback and motivational enhancement. Good evidence is reported for the effectiveness of multicomponent skills-based programs, as well as for some of their components that have been tested in isolation. These programs involve multiple sessions with trained leaders. Even when delivered in groups, however, they are resource intense, making them less attractive for large-scale implementation. Brief motivational interventions are a practical alternative that may be equally effective for many at-risk students, and current research suggests they may not always require one-on-one interaction with a provider. In contrast, little research has been carried out on treatment approaches for college students.

Emerging across all the prevention and treatment literature is the issue of identifying, recruiting and retaining students who are in need of alcohol programs. This issue remains a major challenge for both campus service providers and researchers. Larimer and Cronce emphasize the need for campus level coordination among multiple campus service systems (e.g., student health centers, emergency rooms, police) and for research on alcohol services delivery. This integration will require organizational changes. To date, no research exists on how such changes can be promoted and supported.

Perkins ("Social Norms and the Prevention of Alcohol Misuse in Collegiate Contexts") reviews theory and research

on an intervention approach that spans the individual versus environmental distinction. Campus norms for alcohol use, perceived or real, are a strong predictor of individual student drinking. He distinguishes attitudinal norms, which describe attitudes about acceptable or expected behavior, from behavioral norms, which describe what members of the group actually do. Perkins argues that, for college students, peer group and campus norms exert a stronger influence on behavior than do family expectations. It should be noted, however, that some recent research suggests parents may not be completely without influence if they make a concerted effort to moderate drinking by their older teens (Turrisi et al., 2001). Nevertheless, social norms are powerful. To potentially influence these norms, Perkins goes on to argue that faculty expectations about alcohol and academic standards be emphasized to incoming freshmen and that faculty become involved in outreach activities to direct problem drinkers into campus services. Resident advisers are identified as another potential reference group that could and should convey clear normative standards to students. The strongest and most immediate normative influence remains other students, however. Students appear to overestimate other students' actual drinking and approval for heavy drinking and to underestimate fellow students' support for drinking restrictions. The correction of these misperceived norms underlies normative feedback components in individual-focused interventions and is the goal of some campus-wide programs, including most social marketing campaigns (see DeJong, this supplement). Although this approach has become widespread, and some limited evaluation has been supportive, no rigorous research trials utilizing randomized control designs are yet available. Research of this nature is needed to justify allocation of limited campus resources to the approach and to explore more fully intervention characteristics and campus conditions that affect success.

In a related vein, a link between advertising and alcohol consumption is intuitively compelling, but has not been consistently supported by research. Saffer ("Alcohol Advertising and Youth") reviews the research and varying methodologies used to study the relationships among advertising, brand capital (name recognition and perceived value), market share and total market size (consumption). The concept of diminishing marginal return is key to understanding these relationships. It describes the response function of changes in a product's consumption in response to increases (or decreases) in its advertising. At low levels of advertising, an increase is followed by a measurable increase in consumption. At higher levels of advertising, however, this function flattens, and consumption is no longer responsive to increases in advertising. A similar but inverted function describes the relationship between counteradvertising and consumption. That is, at low levels of background counteradvertising, increases should result

in a marked decrease in consumption. At higher levels of counteradvertising, increases or decreases may not result in changes in consumption. Hence, because alcohol advertising is pervasive, econometric studies may not be sensitive to change or assess in a range where change actually makes a difference. In dealing with advertising, partial bans are not likely to be effective, and total bans are not practical. Advertising bans in one medium also are weakened by substitution of increased advertising in alternative media and/or other promotions. No data are available on campus-specific advertising and its potential role in conveying exaggerated campus drinking norms or in reinforcing positive drinking expectancies, however. Research in this area is clearly needed. Evidence for the effectiveness of counteradvertising with regard to tobacco use indicates a potentially effective strategy; additional research is needed on effective message content and placement.

Many college campuses have indeed employed counteradvertising to reduce college drinking. DeJong ("The Role of Mass Media Campaigns in Reducing High-Risk Drinking among College Students") reviews these campus media campaigns. Many have been informational and may be considered a form of counteradvertising. Some have been designed to correct misperceived social norms (social norms marketing campaigns). Others have sought support for particular policies or policy change (advocacy campaigns). Unfortunately, empirical evaluation of these campaigns has been limited. Most media messages on college drinking also have focused on negative consequences of drinking, an approach previously found to be ineffective and sometimes counterproductive. Instead, guidelines are presented for the development of media campaigns based on established practices in commercial marketing and public health campaigns, as well as experience with college populations. Most campus alcohol prevention efforts have not drawn on this material. A planning approach is described in which message design does not take place until broader questions regarding campaign strategy have been addressed. These campaigns should also expand their focus to the broader social and policy environment. The importance of formative, process and outcome evaluation is emphasized.

Toomey and Wagenaar ("Environmental Policies to Reduce College Drinking: Options and Research Findings") review environmental policies used or recommended to reduce college alcohol-related problems. Many of these policies have proven effective in the general population; their extension to college environments, including surrounding communities, is a logical next step. The authors acknowledge the importance of the social environment in individual drinking behavior, but suggest that the social environment is substantially shaped by public and institutional policies.

They identify four general types of environmental strategies used at the community level that are theoretically appropriate for the college population. The importance of

the first, enforcement of the minimum legal drinking age (MLDA) law, is addressed in depth in the article by Wagenaar and Toomey (this supplement). Because many undergraduate students are under age 21, this strategy is especially relevant for campuses. Two sources of alcohol for underage drinkers must be addressed: social providers and commercial providers. The former includes parents, other adults, older siblings, friends and social environments where alcohol is provided freely without regard to age of the consumer; the latter refers to licensed alcohol establishments. Strategies to reduce social access for college students include decreasing the number of large drinking parties, preventing underage access to alcohol at parties, increasing awareness of laws and enforcing laws against social provision. Commercial availability can be minimized through reduction of false identification, training of alcohol establishment management and staff, restriction of certain kinds of sales and vigorous enforcement of laws banning sales to minors.

A second group of environmental strategies is directed toward reducing overall consumption and risky alcohol use in the college population, regardless of drinker age. These efforts include restrictions on where, when and how alcohol is sold (e.g., outlet density, hours of operation), decreasing alcohol flow at parties (e.g., eliminating self-service), increasing the price of alcohol and restricting where alcohol can be sold. A third group of strategies has addressed specific alcohol-related problems, such as drunk driving. The final group of strategies de-emphasizes the importance of alcohol on campus. Examples include establishing alcohol-free residence halls, scheduling core courses on Fridays and establishing alcohol-free social venues. The authors provide some logical guidelines for how college administrators and other leaders might select policy goals for their particular campus. They caution, however, that most of these strategies have not been evaluated for college populations, and some are not well evaluated in the general population. The need for research is clear.

Wagenaar and Toomey ("Effects of Minimum Drinking Age Laws: Review and Analyses of the Literature from 1960 to 2000") review the extensive research literature on the relationship between MLDA, alcohol consumption by young persons and highway traffic fatalities. Although the federal government passed the Uniform Drinking Age Act in 1984, which prompted all states and the District of Columbia to establish age 21 as the MLDA, there are periodic calls to reconsider this policy, especially in light of campus drinking problems. Wagenaar and Toomey persuasively argue for the effectiveness of the current law, based on evidence from more than 100 studies utilizing a variety of outcome measures and study designs.

Fluctuations in the MLDA by state during the 1970s and the subsequent uniform shifts to age 21 in the late 1980s provided the opportunity for a variety of "natural

experiments.” Longitudinal studies of increases and decreases in MLDA were possible, as well as cross-sectional comparisons of states with different MLDA. These studies are summarized by design, methodology, outcome measures and findings in a series of tables that will be an excellent reference for others doing research in this field. Although findings are not always consistent, the preponderance of the data indicate inverse relationships between the MLDA and alcohol-related outcomes in the age group affected by the policy (i.e., ages 16-20). Outcomes include alcohol sales, self-reported consumption, fatal traffic crashes, alcohol-related crashes and injuries, drunk driving offenses, emergency hospital admissions, juvenile crime, nontraffic injuries and fatalities and self-reported alcohol-related problems.

The authors also review evidence regarding mediating factors that may influence whether an MLDA effect is observed. Most prominent is that the law has not been rigorously enforced. It is, in fact, striking that effects have been observed at all because implementation of the law in most locales has been minimal. Because few of the studies were specific to college populations, research directed toward this area would be useful to policy-makers. Such research is especially important because the MLDA law is frequently criticized. Doubts remain about its effectiveness, and some critics hypothesize that drinking by persons ages 18-20 could be better controlled if it were legal, especially in the college environment. In response, the authors list the most frequently raised criticisms and provide research-based responses. This section should be useful for policy-makers at all levels, as well as those that advocate for responsible alcohol-control policies.

These types of large-scale environmental interventions, particularly those involving policy change, require involvement of both community and campus leaders and their constituencies as well as interaction between the two. For example, regulation and limitation of alcohol availability cannot be accomplished by either campuses or communities in isolation. Similarly, enforcement of campus alcohol regulations and community ordinances will be more effective with formal communication and coordination between the two. Hence, colleges and communities must work together through “town-gown” coalitions to tackle the complex alcohol-related problems that plague them both.

Hingson and Howland (“Comprehensive Community Interventions to Promote Health: Implications for College-Age Drinking Problems”) review the research literature on just this sort of community-based approach. Comprehensive community interventions already have been promoted to address a variety of health risks, including high blood pressure and cholesterol levels, lack of exercise, smoking, drug use, unsafe sex practices and alcohol-related problems. No rigorous evaluations have been undertaken of campus-community coalitions, however, and campus populations have not been included in the existing studies. Twenty com-

munity interventions have been well evaluated in the general population. Although all programs evaluated were considered to be “comprehensive community interventions,” they varied considerably in approaches actually used, populations targeted, type of community and intended outcome. Some were primarily policy oriented (Communities Mobilizing for Change), whereas others relied most heavily on educational approaches (Midwestern Prevention Project). For some intervention targets, such as blood pressure or exercise, there were no obvious policy options. The community interventions reviewed had varying degrees of success, and in this review the authors seek common characteristics that predict effectiveness and can inform future efforts to reduce underage drinking, excessive drinking and related problems among college students.

Recommendations

Based on discussions of the material presented in this supplement and on other sources, the panel made recommendations to college administrators, funding agencies and the research community. Key research questions from the Panel on Prevention and Treatment follow:

Promoting health behaviors through individual- and group-focused approaches

- What are the campus-wide effects of providing individual- and group-focused interventions?
- How well do these interventions work with different campus populations, including students in Greek-affiliated organizations; incoming students; mandated students; adult children of alcoholics; athletes; students at various risk levels based on current alcohol practices; students living on- and off-campus; and members of different ethnic, religious and cultural groups?
- How effective are student-to-student interventions?
- What are the most effective uses of computer-based technologies in college alcohol initiatives?
- Should approaches be tailored to the needs and situations of underage students versus those age 21 and over?
- What are the most effective and cost-effective ways to conduct outreach for alcohol services?
- What criteria are appropriate for diagnosing college student alcohol problems? Do they differ from the general population criteria used in currently available instruments?
- How well do pilot programs work when taken to scale on different campuses?

Creating a healthy environment

- What is the effect of banning or stringently regulating alcohol on campus? Do problems simply move off campus? How are on-campus and off-campus cultures affected?
- Are parental notification policies effective? If so, what are the characteristics of effective parental notification programs? At what point should parents be notified for optimal results?

- What is the most effective type of campus disciplinary system for alcohol offenses? Should campus alcohol disciplinary systems and standards be extended to students who live off campus and in what circumstances? Should infractions be handled differently for those under age 21?
- How does the academic environment affect student drinking patterns? For example, would high-risk drinking be reduced if more classes were scheduled on Fridays or academic expectations were increased (e.g., reducing grade inflation, increasing difficulty of classes and requirements)?
- What is the impact of substance-free housing on alcohol-related problems?
- What approaches effectively reduce alcohol-related problems within the Greek system? Does the presence of a live-in resident adviser reduce drinking? Does delaying rush reduce alcohol-related problems? Do risk management efforts make a positive difference?
- What are the key environmental characteristics that influence drinking? How should environmental characteristics and environmental change be measured?
- Do alcohol-free activities and venues reduce college alcohol-related problems? What factors (e.g., frequency, timing, type, planning) influence effectiveness?
- How are social norms campaigns most effectively used (e.g., in combination with other activities, to set the stage for more comprehensive initiatives)?

Creating comprehensive college-community interventions

- Are comprehensive college-community interventions to reduce high-risk college drinking effective? What is the most effective mix of policy and program elements? What are the assets and liabilities for colleges and communities?
- Is it more effective to focus such efforts on drinking practices or on the health and social problems high-risk drinkers cause for themselves and others?
- Where should decision-making responsibility be focused: in city government, the college and university, another group or institution or a combination of players?
- What are the best strategies for mobilizing and optimizing the effectiveness of college-community coalitions?
- Do effects of college-focused programs extend to others in the community?
- What is the best way to enforce community alcohol-related ordinances?
- How can the results of alcohol research be effectively

- disseminated to community audiences, such as chiefs of police, parents and legislators?
- How effective are state-level coalitions that support individual campus-community collaborations.
- What planning structure or process is most effective in developing campus alcohol policies and programs?
- What is the relative effectiveness of different accountability structures for managing college alcohol programs?
- What are the costs and effects of alcohol prevention interventions, including campus-based and comprehensive campus-community efforts? How can programs be made more cost effective?
- Which alcohol policies and programs most benefit the college and university in terms of student recruitment, student quality and academic performance, student diversity, student retention, faculty behaviors, fund-raising and alumni relations?
- What are the most effective strategies for involving presidents, administrators, faculty, students, other staff and boards of directors in alcohol-related problem prevention programs?
- Is it effective to make prospective students aware of alcohol policies during the marketing or admissions process?
- What are the most effective ways of engaging, optimizing and maintaining the involvement of different student subgroups, including ethnic and racial minorities?
- How can higher education and secondary education work together on alcohol issues, including the transition from high school to college?

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Studying College Alcohol Use: Widening the Lens, Sharpening the Focus*

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ABSTRACT. *Objective:* The study was designed to assess current trends in studying, and emerging approaches to furthering understanding of, college drinking. *Method:* A literature review was conducted of findings and methods highlighting conceptual and methodological issues that need to be addressed. *Results:* Most studies address clinical, developmental and psychological variables and are conducted at single points in time on single campuses. Factors affecting college alcohol use and

methods of studying them are discussed. *Conclusions:* Most current studies of college drinking do not address the influence of the college and its alcohol environment. Our understanding of college drinking can be improved by expanding the scope of issues studied and choosing appropriate research designs. (*J. Stud. Alcohol*, Supplement No. 14: 14-22, 2002)

PERHAPS NO topic in alcohol research has been more intensively studied and widely discussed in the past decade as college student alcohol use and associated problems. A bibliographical search using the term *college* turned up more than 2,200 references in the National Institute on Alcohol Abuse and Alcoholism ETOH database. The hundreds of studies share more than a common topic. Most share a common point of view and general approach. The methods used by researchers very powerfully shape the messages that come from the research literature. Much of the literature has been shaped by assumptions drawn from the study of individual alcohol dependence and individual alcohol-related problems, usually at a single point in time and often just at one institution. Although the literature has succeeded in improving the understanding of some of the microdynamics of college drinking, it largely neglects the broader economic, political and organizational factors. This article calls attention to issues that will shape research about college drinking in the coming years. It is our belief that the literature needs to move away from single campus studies of individuals with alcohol-related problems toward multiple campus studies of the broader factors that shape college student drinking behavior. Questions about complex sampling designs, measurement of broader environments and issues, longitudinal designs and those done at multiple points in time and statistical analyses of causal processes will all come to the fore, and so are given special attention here.

To view college drinking more clearly, we argue for widening the lens and sharpening the focus of research.

It is humbling for contemporary researchers to revisit the pioneering research of Straus and Bacon, published in 1953 as *Drinking in College*. Written almost a half century ago, it stands as a remarkable contribution that is difficult to match. It is equally humbling to realize that college drinking poses as serious a problem, perhaps even more serious a problem, to us today as it did 50 years ago (Biden, 2000; Robert Wood Johnson Foundation, 2001). But it is also important to note how much progress has been made in the research methodologies available today.

Drinking behavior is complex, and there is a need to broaden the range of issues studied, particularly extending analysis to the economic, political and ecological factors that have thus far received far less study than the psychosocial issues. Such factors, listed in Figure 1, include the alcohol environment on campus and in the surrounding community. One would hardly know from current research findings that many colleges are surrounded by a ring of bars and other alcohol outlets, or that special promotions and low-price specials are constantly advertised on and off campus. Other key variables in Figure 1 include centers of drinking on campus, fraternities and sororities, as well as intercollegiate athletics (see also National Institute on Alcohol Abuse and Alcoholism, 1997, p. 310).

Contrasting the variables studied in the current college literature against this list of variables reinforces the need to reshape future research efforts. Our knowledge would be greatly enriched if this broadened focus shaped the next generation of research. We need to examine those factors unique to college populations so that we can better under-

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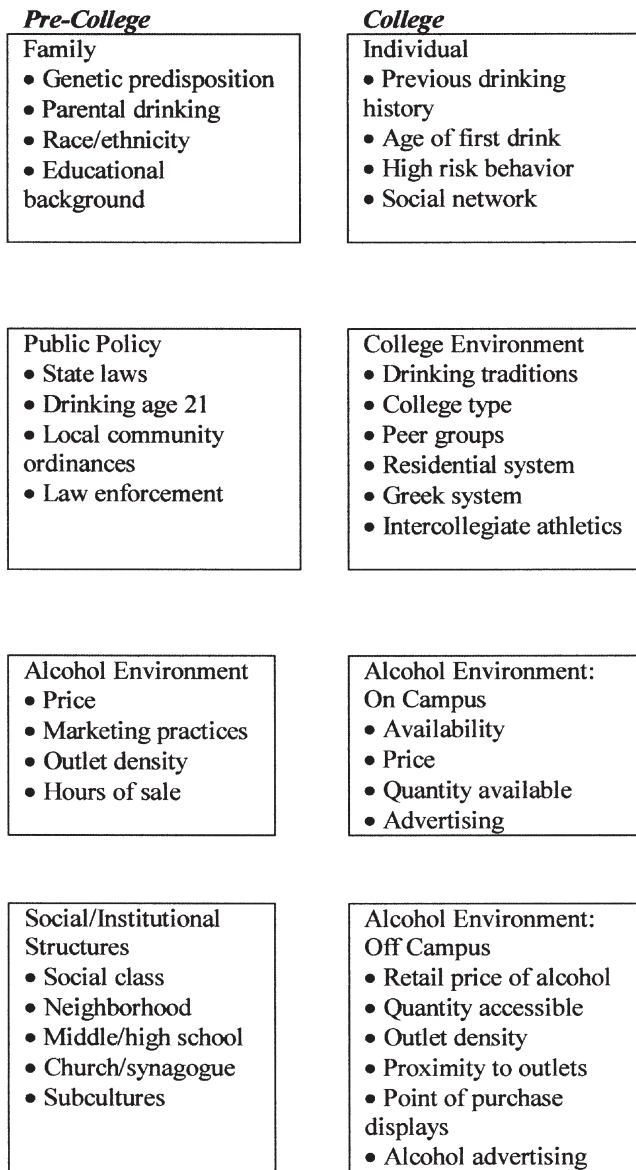


FIGURE 1. Factors affecting college drinking

stand why college students seem to be at higher risk of heavy episodic drinking than their peers who do not attend college.

Issues in Research about College Drinking

Types of colleges and universities. Colleges and universities vary considerably, and researchers and administrators in higher education make use of a standard scheme for capturing the basic institutional types. The Carnegie Foundation for the Advancement of Teaching has produced several editions of such a scheme. The Carnegie categories have been used by others, such as the widely used *Higher Education Directory* (Rodenhouse, 2001) and *America's*

Best Colleges (2001), which has adapted the Carnegie schemes in its frequent (and controversial) rankings. The Carnegie categories are Doctoral/Research Universities—Extensive and Intensive; Master's Colleges and Universities I and II; Baccalaureate Colleges—Liberal Arts and General; Baccalaureate/Associates Colleges; Associates Colleges; Specialized Institutions; and Tribal Colleges and Universities. Of the nearly 4,000 institutions in existence, less than one-third are the types usually represented in the college alcohol-related literature.

The existence of such a varied assortment of colleges should alert researchers to the importance of clearly specifying what type of institution is included in the study. Other institutional categories may be crucial to particular studies. For example, Dowdall et al. (1998) reported important differences in drinking behavior between those women who attend women's colleges and those who attend coeducational colleges. Similarly, identifying public or private historically black colleges and universities (HBCUs) is of great importance in understanding the role of race in higher education. Other categorizations emphasize the organizational diversity of contemporary higher education. Given the importance of religion as a correlate of alcohol use (Wechsler et al., 1995a), researchers might want to assess the religious affiliation of institutions (Rodenhouse, 2001). Another particularly critical issue concerns the differences among residential and commuter institutions, as well as the large number of institutions that matriculate both types of students.

Colleges and universities as organizations. The study of college drinking would be strengthened with more attention to the changing organizational scene in higher education. As the research university, comprehensive university and community college replace the undergraduate liberal arts college as centers of higher education, new organizational models, in which "student life" recedes as the center of attention, come to the fore. College drinking research needs to link with a more complex organizational understanding of higher education, including how going to college influences student behavior (Astin, 1993; Pascarella and Terenzini, 1991). Sampling of the entire diversity of organization forms becomes an imperative. Attention to how students select specific colleges should be increased, along with a better understanding of how their precollege experience shapes college life.

Another issue that needs to be explored is the community and state in which the college is located. Location raises the issues of availability of alcohol, price and marketing, as well as local drinking traditions. Localities also enact and/or enforce ordinances controlling the sale of alcohol as well as laws concerning the behavior of persons under its influence.

Colleges have rich histories of traditions and customs, some of which focus on the use of alcohol (Horowitz, 1987).

The past controls or at least influences the present, indirectly through such traditions and customs and more directly through the role of the college's alumni, who may exert powerful influence over alcohol use on or near campus.

Sampling of colleges and students. Decisions about the population to be studied and sampling are critical. In college alcohol studies, particularly critical decisions concern whether the college students under study are of traditional college age or are older, whether they attend 4-year colleges and universities or the full range of higher education institutions and whether they are full-time or part-time students.

Because there are almost 4,000 institutions and more than 14 million students in higher education, some form of sampling almost always is used by researchers. In many studies, individual students are sampled, although some researchers sample organizations or behaviors. It is difficult to overestimate the importance of random sampling in attempting to learn about large populations, and it has become virtually a requirement of descriptive studies of college student behavior.

Much of what is known about college drinking has been gathered using convenience samples at single colleges. Because drinking behavior varies across students and across colleges, however, generalizing from these types of studies is problematic. This is particularly true in research that seeks to generate point estimates for specific outcomes, such as establishing what percentage of students engage in problematic or harmful alcohol-related behaviors. National studies (including those of college students) usually employ multistage probability sampling designs, in which probability samples are first taken at the institutional level followed by probability sampling of students at those institutions selected in the first stage. These designs usually require specialized schemes of statistical weighting to take into account the fact that several different sampling stages make up the process. Multistage samples also raise the challenge of taking into account the hierarchical character of the resulting sample, because students at the same college share some important characteristics.

Sampling students must take into account their growing diversity. American higher education has never been more diverse in this respect, yet we do not understand very well how racial and ethnic diversity shapes drinking behavior. Wechsler et al. (1994, 1998, 2000b) reported significant differences, with black men and especially black women reporting significantly lower rates of heavy episodic drinking than their peers. As American race relations evolve, survey research items that force individuals to identify only one racial or ethnic identity seem overly simplistic; current federal planning for understanding race and ethnicity allows individuals to report a more complex pattern. Data from the 2000 U.S. Census will shape discussion of this issue.

Equally important to the selection of students is the selection of colleges and universities for study. Single college studies are particularly problematic, in the light of the Harvard School of Public Health College Alcohol Study finding that rates of heavy episodic drinking at 140 colleges ranged from 1% to 70% of students in 1993, with even more variation in 1997 and 1999 (Wechsler et al., 1994, 1998, 2000b). In national multicollge studies, the selection of colleges is optimally based on randomized or representative sampling, rather than less expensive but ultimately unsatisfactory opportunistic strategies.

Although representativeness is of major importance in sample selection, size also matters. Scientifically valid samples of sufficient size to detect small to medium-sized effects are of great importance (Cohen, 1992). It is likely that the complex processes in college drinking are best understood as a large set of many factors, each with relatively small effects. Research about interventions might also be guided by similar assumptions: A relatively large number of countermeasures, no one of which has a large effect, may turn out to be useful in reducing heavy episodic drinking and associated problems (Ross, 1992).

Longitudinal designs. Much of the literature about college student alcohol use is based on observations made at a single point in time, such as the pioneering research of Straus and Bacon (1953) mentioned earlier. Longitudinal designs allow researchers to study how change takes place over time (Cook and Campbell, 1979). Trend, cohort and panel designs shed light on change over time, although questions of cost and practicality once again limit researcher choice.

Using retrospective questions in single-shot cross-sectional surveys can help to shed light on change over time, although it is difficult to pose questions about complex behavior (such as alcohol consumption) for distant past time periods in more than general terms. Although there are few longitudinal studies of college drinking, they shed much light on patterns of change, such as the heightened risk of alcohol-related problems in middle age associated with much earlier college alcohol-related problems (Vaillant, 1996), or whether fraternity and sorority members continue their heavy drinking after leaving college (Sher et al., 2001).

Although longitudinal samples are valuable, they also have problems of sample attrition over the time period under study. Attrition may occur at two stages: first, in the original sample, when students may hesitate to enroll in a study that stretches into the future; and second, when students drop out of the later stages of follow-up.

Validity and reliability of self-reports. Much research about college alcohol-related issues has relied on self-reports about a student's substance use and other behavior. A substantial body of empirical research suggests that self-reports by adolescents about alcohol, tobacco and illicit

drug use can, under the right circumstances, yield valid and reliable measures.

Can the self-report data be corroborated by a known outside measure (e.g., chemical tests or alcohol sales data)? Freier et al. (1991) validated self-reported tobacco use by testing saliva samples. They concluded that "adolescents report truthfully about their tobacco use when proper data collection procedures are followed" (p. 25). Other investigators (Cooper et al., 1981; Kupitz et al., 1979; Rachal et al., 1980) have generally confirmed the validity of self-reports. Midanik (1988) reviewed a large number of studies that attempted to validate self-report data by using collateral reports of alcohol use (i.e., from friends, spouses, employers), official records (arrests, hospitalizations), alcohol sales data and observational data. She concluded that although most validation studies indicate that self-reports are basically valid, variation does exist, and certain forms yield more validity. For example, reports of recent consumption are more easily validated than questions about longer term patterns of use.

Turning to the question of construct validity, does the self-report of alcohol use make sense in relation to other responses of the individual in the way theories of adolescent behavior or development predict? Johnston (1973), Kandel (1975) and Jessor and Jessor (1977) developed theoretical models into which self-report findings fit.

Are self-reports consistent over time? Bachman et al. (1984) analyzed reliability and stability of drug use from longitudinal data in the Monitoring the Future Project and found "a rather high order of stability" (p. 634). In agreement with Midanik's (1988) conclusions, Bachman et al. indicated that certain information (i.e., recent reports of use) is more likely to be remembered than other information (frequency of use over a longer time). Reinisch et al. (1991) examined inconsistent and incomplete data within a questionnaire and inconsistencies between questionnaires in their Project Alert. They found very little inconsistency and concluded that questionnaires were valid. Other investigators (Barnea et al., 1987; Single et al., 1975) reported similar results. Analysis of all three forms of validity (external, construct and internal) indicates that self-report data are generally valid; Harrison and Hughes (1997) provided a useful review of the validity of self-reports about drug use.

Biological measures. Researchers can directly measure the use and impact of various licit and illicit substances by students, again with human subjects' approval and the voluntary cooperation of research subjects. A recent North Carolina study (Foss et al., 1999) used blood alcohol concentration (BAC) tests to assess how much alcohol students returning to their dorms had actually consumed. Time-bounding issues are particularly important in making comparisons to survey results, which are often about much longer time periods than detectable using BAC levels. Biological measures stand as an important check on the valid-

ity and reliability of self-reports, but their cost as well as the restrictiveness of their representativeness of conduct remain problematic (for a detailed discussion, see Harrison and Hughes, 1997; Winters, 1999).

Field studies of college drinking. Survey and experimental approaches to studying college drinking predominate. The field is in need of more research that looks at college drinking using field research techniques. Studies such as one based on the direct observation of students at a large state university (Moffatt, 1991) yield "thick description" of actual student behavior in natural settings and are particularly helpful in gaining insight into how the participants themselves view their own conduct (see also Geller et al., 1986). Generalizing from the results of field research is often problematic. There is a large gap between how researchers and administrators view college drinking, emphasizing its negative effects and the heightened risk of health and behavioral consequences, and how students view their use of alcohol.

Ecology of alcohol use. Empirical research has been conducted about alcohol outlet availability and various indicators of crime and violence in several U.S. settings, with most research suggesting a substantial relationship. One national study (Wechsler et al., 1994) reported that colleges located more than a mile from the nearest alcohol outlet had lower rates of heavy episodic drinking than colleges with outlets within a mile. Clearly more structured research is needed on where and when students use alcohol. Developments in evaluating community initiatives (Fulbright-Anderson et al., 1998) should help in understanding these issues.

In part because of the dramatically lower cost and greater analytic power of geographic information systems (GIS) software and in part because of greater interest in how access to alcohol and other substances shapes behavior, GIS and mapping have become of much greater interest in research. In alcohol studies, the relationship between alcohol outlets and several outcomes such as violence and car crashes has been researched, yielding insight into the role of supply in shaping alcohol-related problems (e.g., Gruenewald et al., 1996; Rich, 1999). Mapping has become an active area of research about crime and justice issues more generally. Much will be learned about the occurrence of college alcohol-related problems by examining its spatial patterning (Croner et al., 1996), both for communities (Gruenewald et al., 1996; Scribner et al., 1999) and for campuses.

Measures of alcohol involvement. Particularly critical to research about college drinking are measures of alcohol involvement, including measures of consumption (especially alcohol use, quantity and frequency measures), and alcohol-related consequences (including alcohol-related problems and substance use disorders). Researchers have

developed a set of measures now widely used in the field (Clark and Hilton, 1991).

Use: Quantity and frequency measures. Self-report survey items have been developed that measure the amount of alcohol and frequency of drinking, specifying a time period of daily, weekly or biweekly, monthly or yearly intervals (Clark and Hilton, 1991; Straus and Bacon, 1953; Wechsler and McFadden, 1979). Following epidemiological standards, these measures yield current or lifetime estimates of the incidence and prevalence of alcohol and other drug use. Dufour (1999) reviewed the literature about how to measure the frequency and amount of drinking, noting the methodological issues involved in measuring alcohol consumption levels and drinking patterns. Her review assessed the major research approaches currently in use in measuring these issues as well as the question of how to establish what constitutes "moderate" drinking.

Heavy episodic drinking and frequency of intoxication. Research about youth alcohol use has tended to use some type of measure indicating heavy episodic drinking. (This has been called "binge drinking" by a number of investigators and organizations, including the Monitoring the Future Study, the Core Alcohol and Drug Survey, the U.S. Surgeon General, the Centers for Disease Control and Prevention, the World Health Organization and the Robert Wood Johnson Foundation. The policy of the *Journal of Studies on Alcohol* discourages use of that phrase in this context, and so "heavy episodic drinking" is used throughout this article.) There has been general agreement about the desirability of using this measure (usually constructed as drinking five or more drinks in a row or at a sitting), with national studies such as the Monitoring the Future series, the Harvard School of Public Health College Alcohol Study and the Core Institute series all using a similar definition.

Wechsler et al. (1995b) examined the five-drink measure using a large national sample. Men who regularly drink five drinks or more in a row run roughly the same risk of alcohol-related problems as women who regularly drink four drinks or more in a row. They proposed use of a gender-specific (5/4) measure of heavy episodic drinking.

Wechsler and Austin (1998) indicated that the 5/4-drink measure should be viewed as a cutoff, beyond which students increasingly report higher likelihood of alcohol-related problems. Importantly, several different national studies of college drinking all report roughly two in five college students are current heavy episodic drinkers.

Frequent heavy episodic drinkers were defined in the same study as those students who had three or more episodes of heavy episodic drinking in the 2 weeks before responding to the survey. Roughly one in five college students can be so classified, and this 23% of students consumes 72% of all alcohol used by college students and experiences more than 60% of the major alcohol-related problems of college students (Wechsler, 2001; Wechsler et

al., 1999). These frequent heavy episodic drinkers are at much higher risk of alcohol-related problems than are infrequent heavy episodic drinkers. Occasional and frequent heavy episodic drinkers also have much higher rates of drinking with the intention of getting drunk. Self-report measures of the frequency of drunkenness are helpful in understanding alcohol-centered lifestyles.

Finally, use of the timeline follow-back diary technique will help to shed light on these issues. The timeline follow-back asks respondents to make estimates of their alcohol consumption using calendars kept over a specific period of time. Midanik et al. (1998) reported that use of this technique has demonstrated good validity and reliability with several different types of samples, although generating estimates of overall alcohol consumption that vary from those collected using summary measures. Summary measures are thought to underestimate real consumption, so this aspect of the use of the timeline follow-back technique may be one of its strengths.

Acute health and behavioral consequences. It is useful to distinguish between effects that occur to the individual drinker as opposed to those that occur to others in the immediate environment. The former might be called the primary effects, and the latter might be called secondary or second-hand, as in second-hand smoke (Wechsler et al., 1995c).

Some of the most important primary effects are captured by survey items that ask whether an individual has experienced particular effects over a specific period of time as the result of his or her own drinking. These include educational, health, psychological, interpersonal and behavioral consequences.

Measures of the secondary effects of heavy episodic drinking include being awakened or disturbed; being insulted; being assaulted verbally, physically or sexually; or having property vandalized.

Academic consequences. Some studies (e.g., Wechsler et al., 1994) found a strong association between current alcohol use or heavy episodic use and self-reported academic problems. Wood et al. (1997) examined how well freshman year alcohol involvement predicted academic problems in college using a longitudinal design and academic performance data taken from college transcripts. They concluded that much of the association is due to preexisting student characteristics present on admission to college. In addition to better understanding of academic consequences, studies of the impact of substance use on persistence through college are needed. A whole range of important educational issues remain to be studied, such as the effects of alcohol policy or program changes on size and quality (e.g., SAT scores) of future applicant pools, the dropout or completion rate and academic achievement.

Short screens for problems. Several forms of short screening for alcohol-related problems have been used ex-

tensively in empirical research, such as the Michigan Alcoholism Screening Test (MAST; Selzer, 1971). Such short screening forms involve asking only a few questions to identify quickly and crudely whether a person may be experiencing alcohol-related problems. Among the most widely used is the CAGE (Mayfield et al., 1974). Winters (1999) presented a detailed discussion of the strengths and limitations of the CAGE and the MAST and other instruments for screening and assessment of substance dependence and/or misuse.

Time bounding and duration issues. Some of the most challenging issues in this field deal with the measurement of time and the duration of problem drinking. Because recall of long-term complex behavior is difficult for research subjects, questions about alcohol consumption often are limited to the past 2 weeks, month or year. But enough is known about patterns of behavior to suggest that present behavior is shaped by patterns stretching out over many years, raising very serious and intractable problems for contemporary research. A particularly important area for future study is the pattern of behavior from high school to college, part of the developmental issues of young adulthood (Bachman et al., 1997). Another related problem concerns the uneven and complex behavior of people over time, so that patterns of behavior shift over time. Developments in statistical analysis, variously called event history analysis or time failure analysis (e.g., Allison, 1984), help in analyzing these patterns, but data collection remains problematic.

Crime and crime victimization. Considerable research has been done in fields such as criminology about the appropriate measurement of crime and crime victimization, topics of great importance to better understanding college drinking. Measuring crime and crime victimization calls for research that reflects this complexity. A national study of crime on campus by Fisher (1998) reported that alcohol use and misuse are significant factors in "campus crime." Her research employed an adaptation of the National Crime Victimization Survey methodology to the study of college populations.

Date rape and sexual assault. Of particular concern at colleges and universities is the issue of sexual assault and date rape. For example, Koss and Gaines (1993) produced extensive research about how to measure the amount of sexual assault and acquaintance rape on college campuses. Considerable anecdotal evidence and reviews of a diverse literature (Abbey, 1991; National Center on Addiction and Substance Abuse [CASA] at Columbia University, 1999) suggest that alcohol misuse is strongly associated with the risk of sexual assault. Recent data for college campuses show that sexual victimization is widespread and associated with alcohol misuse (Brener et al., 1999; Fisher et al., 2000). Research on this and related topics (e.g., involuntary sex) remains a high priority.

Sexual orientation. Among those topics yet to be addressed extensively is the issue of sexual orientation. Anecdotal evidence suggests that many students of traditional college age must deal with issues of sexual identity during college, but little research has been done about how this influences their use and misuse of substances such as alcohol. DeBord et al. (1998) reported that gay, lesbian and bisexual students were more likely to use and/or misuse alcohol than were heterosexual students.

Routine activities. The field of college drinking could be enhanced by attention to promising theoretical and empirical approaches used in adjacent areas of study. One of the most promising is the "routine activities" model currently employed in criminology to assess the heightened risk of crime victimization or offending associated with certain patterns of behavior (Dowdall et al., 1999; Fisher, 1998). The approach moves analysis from preoccupation with the motivations of the individual offenders or victims to an understanding of situational factors. Routine activities suggest facets of behavior that might be modified with an eye toward preventing crime victimization among college students (Fisher, 1998). Osgood et al. (1996) demonstrated that participation in certain routine activities is strongly associated with both heavy alcohol use and use of illicit drugs in a study of 18- to 26-year olds.

Supply-side factors. Among the most understudied areas in college drinking are the supply-side factors. Most traditional-age college students are under 21, so consumption of alcohol often involves the violation of state and local laws by students and alcohol providers. The role of availability and context shapes behavior, but little is known about the issue, and even less about local alcohol markets, legal or otherwise. Evidence (e.g., Chaloupka and Wechsler, 1996, 1997) suggests that the cost of alcohol is an important factor. Wechsler et al. (2000a) found that availability, price and the use of beer were the strongest predictors of heavy episodic alcohol use in underage students.

Student residence and social context. Extensive research about the lives of college students (Astin, 1993; Pascarella and Terenzini, 1991) suggests that the formal structures of college life are of relatively less importance than the ways in which peer groups influence behavior. Gfroerer et al. (1997) examined data from the National Household Survey on Drug Abuse, finding that educational status and living arrangements were significant in predicting substance use among those of traditional college age. During the past decade there has been extensive growth in student living arrangements beyond the traditional dichotomy of dormitory or home. The rise of "resimuters," students who live near their institutions but are unsupervised by parents or colleges, needs to be more adequately studied.

Whether alcohol is permitted in the dormitory or the entire campus is related to the level of drinking, alcohol-related problems and secondhand effects experienced by

nondrinking students. Wechsler et al. (2001a,b) examined substance-free dorms and campuses that ban alcohol, controlling for previous drinking behavior of these students in substance-free environments.

Social norms. Considerable attention has been given to the question of the prevailing norms that surround college drinking. One school of thought (Haines, 1996; Haines and Spear, 1996) suggests that students misperceive the actual behavior of their peers, assuming much higher rates of substance use than in fact prevails. This has led some to suggest that correcting the misperception of norms might lower alcohol use, although empirical evidence seems to be conflicting, with some universities reporting decreases and others reporting no change (Haines, 1996; Keeling, 2000). In addition, Wechsler and Kuo (2000) concluded that the potential role of social norms in influencing college students' drinking may have been overstated. Research is needed on other types of student norms, such as supplying alcohol to underage drinkers and tolerating disruptive secondhand effects, as well as on local community norms.

Causal models. Nonexperimental causal models such as path analysis and structural equation modeling can help shed light on some key issues in college drinking research. Of particular interest is the ability to include analysis of how variables play a role in selecting individuals into situations that themselves influence the risk of heavy episodic drinking. For example, certain students (with high rates of substance use in high school) choose certain colleges (with active fraternity systems and high rates of heavy episodic drinking) and then certain living arrangements (such as in fraternity houses). Causal models hold out the promise of helping to understand this process, moving findings beyond complaints about selection bias (Olmstead and Bentler, 1992).

Complex sample designs. In college drinking research, complex sample designs are coming into wider use. Such designs might first create representative samples at the college level and then sample randomly among students at each college. The resulting complex sample requires special statistical analysis to take into account that the students at a single college may share certain characteristics. Statistical tools, such as generalized estimating equations and hierarchical linear modeling, allow adequate statistical analysis of such samples (Bryk and Raudenbush, 1992). Statistical packages such as SAS (SAS Institute, Inc., Cary, NC) now allow analysis of these samples.

Conclusions

Since Straus and Bacon (1953) published their pioneering work about drinking in college, there has been much progress in understanding the issue. Much more, however, remains to be learned. We have argued for widening the lens; incorporating new perspective, variables and method-

ologies; and sharpening the focus through better conceptualization, measurement and sampling. Substance misuse is arguably the nation's number one health problem, as much for college students as for other Americans (Robert Wood Johnson Foundation, 2001). A view of college drinking that is both expanded and clarified holds promise for advancing understanding and enhancing prevention.

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