

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)?
- 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?

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

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