Surveying the Damage: A Review of Research on Consequences of Alcohol Misuse in College Populations

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ABSTRACT. This article provides a review and synthesis of professional research literature on the types, extent and patterns of negative consequences produced by students' misuse of alcohol in college populations based on survey research conducted during the last two decades. Considerable evidence is available documenting a wide range of damage by some students' drinking done to themselves as well as to other individuals, although some types of consequences remain speculative. Damage and costs to institutions are likely to be substantial, but this claim remains largely an inference based on current studies. Drinking by males compared with that of females produces more consequences for self and others that involve public deviance, whereas females' drinking contributes equally with males to consequences that are personal and relatively private. Research on racial/ethnic background, time trends and developmental stages reveals patterns in student data on consequences of drinking, but these data are very limited in the literature. Evidence suggests there is only a modest correlation between students' self-perception of having a drinking problem and the many negative consequences of drinking that are reported. (*J. Stud. Alcohol,* Supplement No. 14: 91-100, 2002)

ALCOHOL IS routinely cited by researchers, college administrators and staff, and also by students themselves, as the most pervasively misused substance on college campuses. Anecdotal evidence and dramatic examples of negative consequences of college student drinking are readily found in counseling and hospital records and police reports as well as in the simple observation of property damage and litter following many campus social events. Questions remain, however, about the actual patterns and pervasiveness of student alcohol misuse. What is the range and extent of negative consequences found in student populations? Are problems broadly experienced or are they concentrated primarily in certain individuals who tend to suffer many consequences, and what are the consequences for academic institutions? This article provides a review and synthesis of the existing professional research literature addressing these questions about the types and extent of negative consequences, what can be concluded about their distribution from consistent findings, what is more speculative based on limited research and what is still unknown due to the lack of research. A review of all the causal factors contributing to drinking problems on college campuses, however, is a task beyond the scope of this article.

This review of damage due to collegiate alcohol misuse draws most evidence from anonymous student surveys conducted and published within the last two decades. Some studies have collected large nationwide databases, thus providing the greatest generalizability. Studies based on data collected at individual colleges and universities are also included, demonstrating variation and similarity in certain types of consequences across regions and institutional contexts. Studies of single institutions also provide assessments of additional consequences or different measures of consequences that broaden the assessment of damage. Both the national and local studies report the prevalence of problems at varying historical moments and with measures spanning a variety of time frames (e.g., within the last week, within the academic year or over one's lifetime).

Finally, it is important to note that some studies provide prevalence rates among the entire student population whereas other studies report the prevalence of consequences only among drinkers. Both rates provide important information about negative consequences. The former provides a general measure of pervasiveness and the latter a risk measure indicating how likely it is that a student's drinking is going to result in a particular type of problem. Thus, where possible, based on the data provided in the published study, rates for drinkers are calculated and included in this review along with published rates of the entire student sample. Likewise, rates for the entire sample are calculated and included here along with published rates for drinkers only.

Types of Consequences

In surveying the collegiate damage that may accumulate from student alcohol misuse, it is useful first to divide the broad terrain of problems into categories depending on the

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object (self, others, institutions) and nature of the consequences. Table 1 presents the different foci used in cataloging the range of consequences in the college environment.

Damage to self

Risky drinking behavior may be the cause or important contributing factor in many different academic, emotional, physical, social and legal problems experienced by undergraduates. Indeed, the picture of extensive harm to at least a significant minority of students on most campuses is clearly supported by the research.

Academic impairment. A substantial amount of empirical research is available demonstrating a connection between alcohol consumption and impaired academic performance. Among 41,581 students responding to the Core Alcohol and Drug Survey in representative mail and classroom administrations at 89 institutions holding FIPSE drug prevention program grants nationwide in 1992-94, 22% indicated that they had performed poorly on a test or project (26% of drinkers), and 28% had missed a class during the last year (33% or one-third of drinkers) due to alcohol or other drug use (Presley et al., 1996). Wechsler et al.'s (1998) nationwide College Alcohol Study surveyed a nationally representative sample of 14,521 students attending 116 four-year colleges and universities in 1997 and found that 24% (30% of drinkers) reported missing a class within the current academic year as a result of drinking and 19% (23% of drinkers) reported getting behind in schoolwork during the current year as a result of drinking. Males drinking 5+ drinks or females drinking 4+ drinks in a row one or two times in a 2-week period were more than three times as likely to report getting behind in schoolwork due to their drinking in the current year in comparison with more moderate drinkers, and males drinking 5+ or females drinking 4+ drinks in a row on at least three occasions in a 2-week period were more than eight times more likely to report this problem.

Similarly, Engs et al.'s (1996) Student Alcohol Questionnaire administered to 12,081 students who were contacted in a demographically representative quota sample of 168 four-year institutions across the United States in 1994 revealed higher levels of consumption associated with markedly higher rates of alcohol-related academic problems. Among "low-risk drinkers" (males consuming 21 or fewer drinks and females consuming 14 or fewer drinks per week), 11% had missed class due to a hangover, and less than 3% noted having received a lower grade due to drinking. Among "high-risk" drinkers (22+ drinks/week for males and 15+ drinks/week for females), however, more than half of these survey respondents had missed classes due to a hangover, and more than 15% reported receiving a lower grade due to their drinking.

High rates of drinking-related academic problems can be found in demographically diverse campus settings. For example, Werch et al. (1987) found that 18% of a sample of 410 students (23% of drinkers in the sample) attending a midsize southern university admitted they had missed class due to a hangover in the past year. Perkins (1992) found one-third of students reporting they had missed classes or examinations or had performed poorly on assignments due to their drinking during the academic year in a sample of 584 students from a small, private college with few abstainers in the Northeast.

In addition to students' subjective determinations of academic impairment, a consistent association between self-reported grade averages and levels of alcohol consumption is revealed in several studies. For example, among Core Survey respondents nationally (Presley et al., 1996), A average students consumed an average of 3.4 drinks per week, B average students were drinking 4.5 drinks, C students were drinking 6.1 drinks, and D or F students typically drank 9.8 drinks. This pattern was found at 2-year schools as well as 4-year institutions. Likewise, Engs et al. (1996) reported a consistent inverse relationship between weekly drink averages and grade point average in their national study. Of course, correlation does not prove causality here. Although quite plausible, it cannot be determined with certainty from these cross-sectional data that heavier drinking per se was responsible for the lower grade performances. Wood et al. (1997) provided this caution based on their study of 444 students attending a large midwestern university. Although they also found a bivariate association between problematic alcohol use and academic problems, most of the association was accounted for by controlling for family background factors and student academic characteristics that existed before any collegiate drinking.

TABLE 1. Potential negative consequences of college student drinking

Damage to self
Academic impairment
Blackouts
Personal injuries and death
Short- and longer term physical illnesses
Unintended and unprotected sexual activity
Suicide
Sexual coercion/rape victimization
Impaired driving
Legal repercussions
Impaired athletic performance
Damage to other people
Property damage and vandalism
Fights and interpersonal violence
Sexual violence
Hate-related incidents
Noise disturbances
Institutional costs
Property damage
Student attrition
Loss of perceived academic rigor
Poor "town-gown" relations
Added time demands and emotional strain on staff
Legal costs

Blackouts. The phenomenon of alcohol-induced "blackouts" or memory loss during periods of heavy drinking is a common consequence found among alcoholics but has also been found in other populations of drinkers as well. It is not always clear whether such reports include partial forgetting, or perhaps mistaking *blackout* if undefined as passing out (Buelow and Koeppel, 1995). Nevertheless, in the nationwide College Alcohol Survey (Wechsler et al., 1998), 22% of students (27% of drinkers) reported at least one incident of having forgotten where they were or what they did due to drinking in the past year. Similarly, 26% of respondents (31% of respondents who drank) in the Core Survey indicated that they had "had a memory loss" due to drinking or other drug use in the past year (Presley et al., 1996). Upward to almost half of all students in several studies of regionally diverse single institutions reported having had such experiences within their lifetime (Buelow and Koppel, 1995; Sarvela et al., 1988; Werner et al., 1993). Meilman et al. (1990) found 4.4% of students reporting a blackout within the last week in a random sample attending a private university in rural New England.

Personal injuries. Injuries to oneself as a result of one's drinking are not an uncommon consequence. The College Alcohol Study found 9% of students (12% of drinkers) in this category within a 1-year period nationwide (Wechsler et al., 1998), and the Core Survey (Presley et al., 1996) revealed 13% (15% of drinkers) reporting injury to self as a consequence of alcohol or other drug use within the year. Perkins (1992) found one of five students having experienced this consequence within the academic year at a private northeastern college where more than 95% of students drank alcohol.

Physical illnesses. Short-term health-related consequences of heavy drinking such as hangovers, nausea and vomiting are experienced by a large minority, if not the majority, of students on most campuses. The Core Survey of students at 89 schools across the nation produced a self-report result of 40% with at least one hangover (47% of drinkers) and 47% (56% of drinkers) having nausea or vomiting as a result of alcohol or other drug use within the year (Presley et al., 1996). In one study at a New England university where almost all students (97%) drank alcohol within the year, however, 29% of the student sample reported that anywhere from .5 to 24 hours of their normal functioning were lost "in recovery" from drinking in the last week (Meilman et al., 1990). Alcohol poisoning as a result of excessive consumption and occasional fatalities that result from these extremely high blood alcohol levels are not unfamiliar incidents in campus health centers and local hospital emergency rooms. However, evidence of these tragic consequences is found only in news headlines and anecdotal reports. Systematically collected data on the prevalence of student alcohol poisoning are not available in the research literature.

Longer term consequences of heavy alcohol use to one's health may include reduced resistance to illnesses. Self-reported illnesses were correlated with drinks consumed per week among undergraduates enrolled in a general education course at a large midwestern university (Engs and Aldo-Benson, 1995). Although light to moderate consumption was not significantly associated with increased health risks, consuming an average of 22 drinks or more per week was associated with increased upper respiratory infections, and consuming 28 drinks or more was associated with greater acute illness on an aggregate measure, thus suggesting that heavy alcohol consumption contributes to lowered resistance to common illnesses among students. Of course, social background correlates of health care and drinking behavior may contribute to this association.

Unintended and unprotected sexual activity. In recent years, research has considered the potentially increased risk of engaging in sexual activity unintentionally as well as the increased risk of not using protection against pregnancy or sexually transmitted diseases. A variety of measures assessing the incidence of these different but related consequences (unintended and unprotected sexual relations) have been employed in student surveys. At a college in New York, Perkins (1992) found that one-quarter of the students reported engaging in either unintended or unprotected sexual activity at least once as a result of drinking during the academic year, with 15% of males and 10% of females reporting multiple occurrences. Wechsler and Isaac (1992) found that heavy episodic drinkers in Massachusetts colleges were about three times as likely as other drinkers to engage in unplanned sexual activity. Meilman (1993) found that one in five undergraduates at a southeastern college acknowledged having participated in sexual intercourse as a result of being under the influence of alcohol since coming to college, and 17% of undergraduates had abandoned safe-sex techniques under the influence of alcohol (9% had done so on more than one occasion). In the 1997 College Alcohol Survey (Wechsler et al., 1998), 18% of this sample (23% of drinkers) had engaged in unplanned sexual activity during the academic year, and 9% (11% of drinkers) reported not using protection due to their drinking.

Among students sampled at 12 universities across the United States, Anderson and Mathieu (1996) found that, of those who had one or more sexual partners in the last year, 33% of the men and 17% of the women had let themselves drink "more than normal" at least once as a disinhibitor to make sex easier. In those circumstances, one-quarter of the sample did not initiate condom use. In another study, using a convenience sample of 210 participants from a large southeastern university, more than one-third of respondents reported drinking to enhance sexual experiences, and two-thirds noted that their drinking had at some time had a negative consequence for them sexually (Poulson et al., 1998). In the same study, 70% of all students reported that

they were less likely to use a condom in sexual activity after they had been drinking. Research at another southeastern university showed that for both men and women the frequency and quantity of usual alcohol consumption as well as having consumed alcohol prior to the last occurrence of sexual activity were positively associated with having multiple sexual partners (Desiderato and Crawford, 1995). Condom use did not demonstrate a consistent pattern in relation to alcohol use, however, in this research.

Suicide. Although links between suicide and substance abuse can be found in the research and clinical literature of psychopathologies, there are very little empirical data to draw on from the studies of broad college populations. Although most reports are anecdotal, some systematic survey evidence of the potential for alcohol misuse to result in this extreme consequence is suggested by national Core Survey data (Presley et al., 1996). Specifically, 5.1% of respondents (6.1% of drinkers) confided that they had suicidal thoughts, and 1.6% (1.9% of drinkers) revealed that they had actually tried to commit suicide within the last year due to drinking or other drug use. It must be noted, of course, that the measure used is a self-perceived assessment of the causal order. It is certainly plausible that suicidal thoughts may lead to elevated drinking, as depression increases the propensity to drink heavily.

Sexual coercion and acquaintance rape victimization. The prevalence of sexual coercion and rape victimization among female undergraduates has received significant documentation in empirical research (see Koss et al., 1987). Much of this victimization experience has been linked to the victim's alcohol use (as well as to the perpetrator's consumption). Of those participating in the Core Survey nationwide (Presley et al., 1996), 12% of females (14% of female drinkers) reported having been taken advantage of sexually during the last year as a result of their drinking or other drug use. It is surprising to note that 11% of males (13% of male drinkers) also indicated this experience, given that most of the research has focused on female victimization.

Frintner and Rubinson (1993) found that 27% of a random sample of female undergraduates at a midwestern university were victims of sexual assault, attempted sexual assault, sexual abuse or at least one incidence of battery, intimidation or illegal restraint. Of women who were victims, 55% had been drinking at the time. Among drinking women who had experienced sexual assault or attempted sexual assault, 60% reported their judgment had been moderately or severely impaired at the time due to drinking. Similarly, Harrington and Leitenberg's (1994) research on 1,090 female undergraduates attending four New England universities revealed that 25% had been victims of sexual aggression by an acquaintance since age 16 and more than half of the victims were at least somewhat drunk when victimized. In a study of 1,025 single white female students between the ages of 17 and 23 at another large midwestern university, higher scores on a global measure of experiencing sexually coercive behaviors were linked to heavy drinking (Gross and Billingham, 1998).

Explanations for the association between female students' drinking and increased risk of sexual victimization most often point to (1) increased consensual sexual activity prior to the forced activity, as alcohol contributes to more casual sexual behavior that may be misinterpreted by the male as an invitation to further sexual contact; (2) the cultural stereotype of a drinking woman as "loose" and therefore more desirous of sexual contact; (3) the victim's diminished ability to communicate clearly her choice to reject sexual advances when she is intoxicated; and (4) the diminished ability of the victim to defend herself physically or flee from an aggressor. (Abbey and colleagues [Abbey, 1991; Abbey et al., 1996] provide a more in-depth review and theoretical analysis.) These explanations should not be interpreted as "blaming the victim." Rather, the point here as in the studies cited is that, regardless of the fact that the woman should always have the right to reject or limit sexual advances at any point in any intimate encounter, increased alcohol consumption substantially reduces her ability to avoid being victimized.

Impaired driving. For students who have access to cars, impaired driving performance may be another negative consequence of their collegiate drinking. National survey data reveal approximately one-third driving under the influence of alcohol during the academic year (Presley et al., 1996; Wechsler et al., 1998). According to Engs et al. (1996), 17% of males and 10% of females who were light-to-moderate weekly drinkers reported having driven while drunk at least once during the year, whereas 56% of males and 43% of females who were relatively heavy weekly drinkers reported having done so.

Legal repercussions. Alcohol misuse occasionally results in disciplinary action against students or in arrests and prosecutions for violation of liquor laws such as minimum age requirements, open container restrictions, public intoxication or driving while alcohol impaired. In nationwide survey data, findings range from 5% to 12% of students admitting trouble with police or campus authorities as a result of their alcohol use (Engs and Hanson, 1994; Presley et al., 1996; Wechsler et al., 1998). Student arrests for driving while intoxicated were reported at a rate of 1.7% (2.0% of all drinkers) in the Core Survey (Presley et al., 1996).

Impaired athletic performance. Many other personal consequences appear likely due to misuse of alcohol by various types of students, but systematic empirical research is lacking. Using national Core Survey data, Leichliter et al. (1998) have shown that athletic team members and, even more so, team leaders consume more alcohol per week than nonathletes. These athletes were more likely to consume in a heavy episodic fashion and generally incurred more nega-

tive consequences as a result. There are no data in the research literature on student athletes, however, that specifically assess impaired athletic performance due to their drinking. It can only be inferred that there is significant performance loss, given relatively high consumption levels each week by some athletes that could be detrimental to their physical capacities.

Damage to other people

While the research reviewed above makes clear the broad extent of damage that some students inflict on themselves as a result of their drinking, many consequences of student drinking are simultaneously or specifically inflicted on other people. Residents of local neighborhoods and campus visitors as well as college student, faculty and staff members may suffer as a result of individual students' heavy drinking.

Property damage and vandalism. Damage to neighborhood or residence hall personal space of others and the unsightly residue of intoxication, such as vomit and litter, are common complaints in the aftermath of student parties where alcohol is conspicuous. A consistent 8% of students admit damaging property or pulling a fire alarm in connection with their drinking during the year in several nationwide surveys conducted throughout the 1990s (Engs and Hanson, 1994; Presley et al., 1996; Wechsler et al., 1998). In Engs et al.'s (1996) national study, 6% of males and 2% of females who were "low-risk" in the amount they drank committed property damage in the last year, whereas 33% of males and 13% of females who drank at "high-risk" levels did so. Wechsler et al. (1995b) reported 12% of students claiming to have sustained property damage due to other students' drinking.

Fights and interpersonal violence. The interconnections of alcohol use to aggression and pathological behavior in late adolescent/young adult development in college have been discussed at length elsewhere (see Pezza and Bellotti, 1995; Rivinus and Larimer, 1993). Unfortunately, measures of violence used in studies of college populations frequently combine acts of verbal and physical aggression under the label of *fighting* even though the former may be more pervasive in college contexts. Nevertheless, 30% of all students (35% of drinkers) in the Core Survey nationally reported being involved in an argument or fighting as a result of their drinking or other drug use in the last year (Presley et al., 1996), and 14% of students (17% of drinkers) in another national study indicated having gotten into a fight after drinking in the last year (Engs and Hanson, 1994). Although the drinker reporting these incidents presumably experiences this fighting in most instances as a personal negative consequence, others are obviously the target of this aggression and thus experience the negative consequences of this student's intoxication as well, regardless of whether these other people had been drinking too. Indeed, 13% of students in one national survey stated that, as the result of another student's drinking during the academic year, they had been pushed, hit or assaulted; 22% stated they had experienced a serious quarrel; and 27% had been insulted or humiliated (Wechsler et al., 1995b).

Sexual violence. Drinking can also contribute to the violence and damage others experience as victims of sexual aggression. As an intoxicated student's inhibitions against inappropriate behavior are reduced or as one's cognitive ability to accurately perceive messages discouraging sexual advances is dulled, the likelihood of committing rape or some other unwanted sexual contact is significantly increased. Abbey et al. (1998) found that, among men attending a commuter university, greater alcohol consumption increased misperceptions of a woman's sexual intentions, which, in turn, produced a greater likelihood of sexual assault.

Presley et al. (1996) found 10% of all males (12% of male drinkers) and 3% of all females (4% of female drinkers) acknowledging that within the last year they had "taken advantage of someone sexually" as a result of their own drinking or other drug use. In another national study, 21% of students surveyed had experienced an unwanted sexual advance due to another student's drinking within the school year (Wechsler et al., 1995b). For female victims of sexual violence from male acquaintances at a midwestern university (27% of a random sample of female undergraduates), 68% of their perpetrators were reported to have been drinking—and in the judgment of the victims, almost all of these men were impaired to some degree (Frintner and Rubinson, 1993).

Other potential disturbances. A variety of other disturbances due to heavy drinking and intoxication are frequently noted in news reports and anecdotal accounts of college life, although reliable research on prevalence is slim or nonexistent. Hate-related incidents such as harassment due to one's race, religion or sexual orientation may be more likely to emerge when potential perpetrators are intoxicated, but this phenomenon has not been adequately researched. Noise disruptions generated by student drinking on campus are likely to affect the quality of other students' lives. Nationally, 43% of students noted they experienced interruptions in study or sleep because of someone's drinking within the academic year, and 44% reported having had to "babysit" another student who had drunk too much at least once (Wechsler et al., 1995b).

Institutional costs and damage

Student drinking can also deleteriously affect the institutional well-being of colleges and universities. Property damage reported by students due to drinking (cited above) certainly includes campus property that is vandalized or

destroyed by intoxicated students in residence halls and public restrooms or at campus concerts and athletic events, much of which will be a cost to the institution as a whole. Accurate research on these consequences is not available, but more than one-quarter of campus administrators surveyed at schools with relatively low drinking levels and more than half of administrators at schools with high drinking levels have reported "moderate" or "major" problems with damage to campus property (Wechsler et al., 1995b).

Given the prevalence of academic impairment previously cited as individual damage to self, one can extrapolate that alcohol misuse may contribute significantly to failure and dropout rates. This becomes an institutional cost as attrition rates and lost tuition revenue increase. The concomitant decrease in actual and perceived academic rigor due to heavy drinking may exact a further cost on the institution because much research suggests that the perceived academic rigor of a school is the most important factor in a student's choice of a school to attend. Strains in "town/gown" relations over student alcohol misuse may add to the institution's "image problem."

Other institutional costs might include added time demands and stress placed on college personnel who are required to deal with student alcohol misuse. Although detailed studies of lost time and emotional tolls are yet to be conducted, it is certainly the case that much of the counseling load in college counseling centers, calls for security staff assistance and administrative hearings on academic and disciplinary cases involve student alcohol misuse. In addition, the time and emotional energy that college administrators must devote to students and families when a student overdoses from drinking and is hospitalized or dies from alcohol poisoning or other alcohol-related incidents can be enormous. Finally, the legal costs of suits brought against academic institutions for liability in these circumstances present another major consequence that goes well beyond the scope of this review.

Patterns of Damage

Gender differences

Most research on negative consequences has typically found more total consequences of student drinking for males compared with females (Berkowitz and Perkins, 1987). Explaining gender differences in consequences of drinking is more complicated than simply pointing to commonly observed discrepancies between consumption levels of men and women. Gender differences in amounts consumed do not translate directly into the equivalent differences in intoxication levels because women can typically achieve the same blood alcohol concentration as men while consuming less alcohol due to biological differences in body weight, fat-to-water ratios and metabolic processing. Thus one nationwide study of students found that women who drank four drinks in a row were about as likely to experience negative consequences as men who drank five drinks in a row (Wechsler et al., 1995a).

Furthermore, Perkins (1992) has argued that gender differences in overall negative consequences have historically been overestimated based on most research that has not adequately taken into account types of consequences that commonly affect female students who drink. Public risk taking, aggression and deviance are much more culturally ingrained characteristics of the male gender role. Male students do, indeed, exhibit far more problems in public circumstances and in damage caused to other people as a result of their drinking. When damage to self and more private consequences are considered, however, this gender gap diminishes or even disappears. In a random sample of undergraduates at a college in New York, Perkins (1992) found that males were more than three times as likely to have damaged property and twice as likely to have physically injured others during the academic year as a result of drinking when compared with females. In contrast, only slight gender differences were found for the detrimental effect of drinking on poor academic performance and unintended sexual activity in this study, and there was no difference at all when memory loss and injury to self were considered. This pattern can also be found in Wechsler and Isaac's (1992) data from Massachusetts colleges. Men were two to three times as likely to commit property damage, get into fights and get into trouble with police due to drinking, but memory loss, poor academic performance and unplanned sexual activity showed virtually no gender differences when students were grouped by amounts consumed. Similarly, Lo's (1996) surveys of students at a midwestern university and a southern university and Cronin and Ballenger's (1991) study of American students attending college in West Germany revealed sizable gender differences in consequences from drinking when deviant public behavior was involved, but no significant differences in consequences to personal health such as blackouts, vomiting, hangovers, nausea and unintended sexual activity.

Racial and ethnic differences

Although studies exist showing heavier consumption patterns among white students in comparison with blacks and other racial and ethnic groups (for a review of this literature, see Prendergast, 1994), differences in actual consequences (both in consequences overall and in particular types) have not been equally documented. Data are available on racial/ethnic differences for a range of consequences, however, in the nationwide Core Survey (Presley et al., 1996) database. Native Americans and whites stand out as most problematic on almost all of the 19 items presented. Hispanic students come next in prevalence rates of conse-

quences matching that of whites on a few items. Asians and blacks exhibit the least problematic rates of consequences across all items. Thus it appears from these data that students' consequence rates from drinking closely follow the racial/ethnic patterns that have been reported in previous literature on consumption levels, regardless of the type of consequence. Moreover, one can adjust for racial/ethnic differences in abstinence rates by computing the negative consequence rates only for drinkers and still the same overall pattern among groups remains, albeit slightly less pronounced.

Time trends

Only a few studies document historical patterns in consequence levels over the last generation of college students. A report by Hanson and Engs (1992) provided nationwide data drawn in four comparable samples at 3-year intervals between 1982 and 1991. Significant and consistent decreases across the time period were noted on 3 of the 17 consequence items (where students were asked to note if the consequence had happened at least once in the previous year), all relating to drinking and driving. In contrast, three items showed a significant and consistent increase in consequences: experiencing a hangover, vomiting as a result of drinking and getting into a fight after drinking.

Wechsler et al. (1998) provided a comparison of consequences reported in 1993 and 1997 nationwide surveys of college students. Significantly higher percentages were found in all of the 12 consequence items in 1997, with the rate of increases ranging from 10% to 50%. This picture of increase in consequences must be tempered somewhat, however, in that absolute differences between time periods ranged from 0.2% to 4.5%, and statistical significance was easily achieved with these small differences given sample sizes of more than 11,000 in each sample. Furthermore, the percentages experiencing negative consequences here were for drinkers only, but the abstainer rate moved from 16% in 1993 to 19% in 1997 (a 22% increase), so the overall increases in negative consequences would be less for the total population of students.

Finally, Perkins' (1992) study of gender differences in consequences provided data that, although collected in only one undergraduate institution, are based on four representative samples collected across a 10-year period from 1979 to 1989. In six of the eight consequence types considered, there was no evidence of consistent change in the gender patterns. That is, where males were more highly represented on consequences, they tended to remain so across time, and where little or no difference existed between men and women in the earlier years, this remained the case as well. With regard to physical injury to others, however, the very large differences between men and women declined, and with regard to physical injury to self, the gender difference observed in the earlier years disappeared completely by 1989.

Frequency of consequences for individuals

Only a few studies cited in this review include any information about the frequency with which specific consequences occur for individuals. Presley et al. (1996) recorded six categories of response (never, once, twice, 3 to 5 times, 6 to 9 times and 10 or more times within the year) for consequences. Being hurt or injured, getting in trouble with the police and performing poorly on a test, if experienced at all, occurred only once or twice for most individuals that experienced them. For hangovers, driving a car under the influence and missing class, however, occurrences of 3 to 5 times within the year were just as frequent as reports of only two occurrences. These findings might suggest that although certain drinking outcomes may be viewed as negative by researchers, they may not be perceived or experienced as such by some students.

Developmental and contextual effects

The prevalence, amount and frequency of alcohol consumption typically increase in the transition from high school to college and typically decrease after graduation. This pattern may be indicative, in part, of developmental transitions from adolescence into early adulthood. Changing social contexts in late adolescence with greater access to alcohol and legal drinking age peers and the nature of the transition into and out of college environments may also play a role. Nationwide data comparing traditional age college students and their noncollege counterparts reveal notably higher rates of heavy episodic drinking (consuming five or more drinks in a row) among the college students (Johnston et al., 1997). This suggests that the culture of heavy alcohol use in peer-intensive campus contexts is a crucial factor for young adults. Analyses examining negative consequences of drinking across transition points are unfortunately very rare, however, and no comparisons of negative consequence rates between college and noncollege young adults were found in the body of research under review here. Nevertheless, a few studies reporting consequence measures across collegiate stages can be cited. Using an index of total negative consequences from drinking, Curtis et al. (1990) found no significant differences between first-year students and seniors at a midsized eastern college (large gender and ethnic differences were revealed on the measure of consequences, however). Presley et al. (1996) uncovered very few differences in rates across the cross-section of undergraduate class years. First-year students were less likely to have experienced a hangover during the year (55%) compared with seniors (65%). First-year students and sophomores were more likely to have gotten

into trouble with police or campus authorities (15% of each year) in comparison with seniors (9%). Driving while intoxicated steadily increased across class years from 28% to 38%. Being hurt or injured due to drinking during the year steadily declined from 15% to 11%. Having been taken advantage of sexually steadily declined from 14% to 10%. Among all the other negative consequences of drinking that were surveyed—poor academic work, missed class, property damage, arguments and fights, nausea and vomiting, memory loss, arrests for driving while intoxicated and suicidal thoughts and attempts—there were no appreciable patterns of difference across class years.

Perkins (1999) examined college to postcollege transitions in drinking behavior and motivations that included measures on a wide range of negative consequences. Graduate cohorts surveyed as undergraduates were again surveyed from 2 to 13 years since graduation about the same negative consequences. This study demonstrated sharp drops in single and multiple negative consequence rates in the first few years after graduation followed by continuing declines in these consequence rates in subsequent postcollegiate years.

Perceptions of self as a problem drinker

It seems quite reasonable to expect that students who report frequent negative consequences or a consistent pattern of problems resulting from their own drinking during the academic year would also be quite likely to identify themselves as having a drinking problem. Yet in an earlier review of research on problem drinking among college students, Berkowitz and Perkins (1986) pointed out that the literature demonstrated only a modest overlap at best between self-identified prevalence of problem drinking and rates of excessive consumption and negative consequences. The more recent research exploring this notion, albeit very limited, similarly does not provide evidence of a strong connection. For example, in Presley et al. (1996), the negative consequence rate for heavy episodic drinkers was greater than 40% on nine items ranging from performing poorly on a test (41%) to driving while intoxicated (57%) to nausea and vomiting (74%), and yet only 22% of these high-risk drinkers reported thinking at least once during the year that they might have a drinking or other drug problem. Posavac (1993) asked a small convenience sample of 133 undergraduate students about whether they thought various consequences would be indicative of a person having a drinking problem. Fully two-thirds of the respondents did not think that throwing up at a party due to drinking was indicative of a drinking problem if it only happened once a month. More than half of the students believed that missing classes or appointments after drinking did not constitute a problem if limited to only once a month. In the same study, about half of the males thought becoming sexually aggressive or promiscuous, getting into a fight or being unable to remember what happened after drinking, likewise, was not indicative of a drinking problem if limited to once a month. Furthermore, one-third of all respondents did not judge throwing up at a party due to drinking as indicative of a problem even if it happened more than once a month.

Need for Further Research in Academic Institutions

Although many studies on negative consequences of student drinking have been published, systematic assessment is far from complete. For example, the topics of impaired athletic performance and the cost of lost educational opportunities due to drinking have not been thoroughly assessed. There is little published on the clustering of consequences by type of consequence or among subgroups of students. Also, the negative consequence of increased risk of alcohol dependence in later life due to heavy college drinking is an important potential consequence to consider. Conducting empirical studies of this type of consequence is very difficult, however, given the need for longitudinal panel data over a significant period of time. Thus long-term consequences of college drinking remain largely speculative.

The need for longitudinal data goes beyond the desire to study long-term effects. Much of the current data linking the degree of problem behavior to reports about one's usual level of alcohol consumption are correlational studies. In this research, it is not at all clear whether some problem behaviors are a product of the drinking lifestyle of students or simply a covariate where both drinking and the problem behavior reflect other influences in one's social background. Current research on the association between grade point average and drinking presents an important example of this dilemma.

Alcohol-related highway crashes most certainly produce consequences for persons other than the drinking driver in many instances. Given the level of impaired driving noted by students in research cited earlier, it is likely that significant harm to self and others may result.

There can be little doubt that the cumulative individual damage to self and others as cited in this review produces a substantial demand on the resources of institutions where student alcohol misuse is relatively pervasive. Extra time required in police work, counseling, hospital services, custodial services and legal counsel, as well as in administrative "damage control" in public relations, seems apparent.

In short, an extensive accumulation of research on college drinking has led to a much clearer picture of the problems produced by student alcohol misuse. Yet more research on variation and concentration of consequences within college populations, longitudinal studies of student developmental behavior and studies of student perspectives on what

are experienced as negative consequences are all needed to portray more accurately the actual and perceptual landscape of drinking consequences in college.

Research Implications for Prevention

Although the picture is not complete, researchers surveying heavy drinking in college populations have demonstrated a wide range of negative consequences that personally affect the drinkers themselves, others with whom they come in contact and the institutions they attend. The prevalence rates for most negative effects on oneself and negative effects on others show that, for most of these consequences, at least 10% of students and frequently as much as one-third of the population are negatively affected in a given year. Moreover, there is no evidence that prevalence rates for most consequences are declining nationally. Thus the problems generated by student misuse of alcohol continue to present a major health hazard and social problem for higher education communities and for society at large.

Amid this assessment it is also important, however, to emphasize that these consequences are *not* occurring for the majority of students in most contexts and that this review should not be interpreted as an indictment against students in general. When the majority of students are misperceived among peers as more problematic than is the case and when students and staff think the majority of students carelessly let drinking hurt themselves and others—misperceptions of the norms that widely occur in most college populations (Perkins et al., 1999)—then these misperceptions will facilitate or give social license to the students who are problematic and destructive in the misuse of alcohol (Perkins 1997; Perkins and Berkowitz, 1986; Perkins and Wechsler, 1996). Thus prevention planners must simultaneously keep in mind and publicly promote to students the fact that the majority of students are typically not problematic with regard to drinking.

Furthermore, the effectiveness of traditional prevention strategies that simply rely on warnings about harm to oneself must be questioned when used in attempts to reduce types of consequences found to be relatively pervasive in student populations and for types of consequences that are just as likely to occur multiple times as to occur only once for the individual during the academic year. These findings suggest that such consequences may not be experienced or perceived as particularly negative by students reporting them even though academic staff and prevention specialists may view the consequences as negative. Otherwise, frequent or repeated occurrence of particular consequences would be discouraged once students had experienced the consequence. Indeed, there is only a modest overlap between self-identified problem drinking and the incidence of objectively defined negative consequences. Thus simply making students more aware of drinking hazards that they do not perceive or subjectively experience as indicative of a problem, or simply attempting to scare students with reports of problem rates, is not likely to be an effective prevention approach.

Thinking that consequences to oneself will "teach a lesson" must be questioned, not only by the fact that multiple instances of some drinking consequences occur during the academic year for a significant minority of students, but also by the fact that, for most types of consequences, the evidence does not suggest a notable decline in rates from one year to the next as students progress through the college years. An intoxicated student who behaves obnoxiously in public may feel no embarrassment or condemnation at all if the student's peers complacently ignore him or her or if both this student and the student's peers simply think of the student's actions as typical of most students. A student who vomits during participation in a drinking game may experience the physical discomfort as only a relatively minor negative side effect of his or her drinking when weighed against his or her erroneous notion that this type of activity is common among almost all students and his or her actual experience of immediate peer approval in the cheers of other participants.

Furthermore, many consequences identified in this review do not directly affect the student who produces them. Indeed, the lists of consequences to others and to institutions from students' drinking are equally problematic, and these consequences often occur without any immediate negative result for the student who is misusing alcohol. Thus prevention approaches are needed that enlist faculty, staff and, most importantly, the majority of students in reacting negatively and in a clear and direct fashion to students who do misuse alcohol and in communicating not only the acceptability but also the normality of healthy student behavior, so that negative consequences of drinking are not inadvertently enabled or rewarded in academic communities. The extensive and tragic list of consequences due to persistent student alcohol misuse makes clear the stake all higher education community members have in conveying this message.

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Alcohol Use and Risky Sexual Behavior among College Students and Youth: Evaluating the Evidence*

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ABSTRACT. *Objective:* To evaluate the empirical associations between alcohol use and risky sex at two levels of analysis. Global associations test whether individuals who engage in one behavior are more likely to engage in the other, whereas event-specific associations test whether the likelihood of engaging in one behavior on a given occasion varies as a function of engaging in the other on that same occasion. *Method:* Studies examining the association between drinking and risky sex in samples of college students and youth were reviewed. Those published in the past 10 years and using event-level methodology or random sampling were emphasized. *Results:* Findings were generally consistent across levels of analysis, but differed across types of risky behaviors. Drinking was strongly related to the decision to have sex and to indiscriminate forms of risky sex (e.g., having multiple or casual sex partners), but was inconsistently related to protective behaviors (e.g., condom use). Moreover, the links among alcohol use, the decision to have sex and indiscriminate behaviors were found in both between-persons and within-persons analyses, suggesting that these relationships cannot be adequately explained by stable individual differences between people who do and do not drink. Analysis of event characteristics showed that drinking was more strongly associated with decreased protective behaviors among younger individuals, on first intercourse experiences and for events that occurred on average longer ago. *Conclusions:* Future efforts aimed at reducing alcohol use in potentially sexual situations may decrease some forms of risky sex, but are less likely to affect protective behaviors directly. (*J. Stud. Alcohol,* Supplement No. 14: 101-117, 2002)

THE MAJORITY of young people (75% of boys and 60% of girls; Alan Guttmacher Institute, 1994) have had sex by the time they graduate from high school, and the majority of those who have not will have their first sexual experience while in college. Sexual experience during this developmental period, however, tends to be sporadic, furtive and poorly managed (for reviews, see Brooks-Gunn and Paikoff, 1997; Miller et al., 1993). Thus even sexually experienced students enter college with much to learn in the sexual arena. College life, with its greatly expanded opportunities for self-governance and independence, provides an important new context in which young people learn to manage their sexual relationships and their sexuality.

Like most learning processes, learning to manage one's sexuality provides opportunities for mastery and growth, but also poses risk of emotional trauma and pain and of costly physical health consequences such as unplanned pregnancy, sexually transmitted diseases and, in rare cases, even death. To evaluate the extent to which drinking among collegiate youth is associated with increased participation in sexual behaviors that lead to negative outcomes such as these, this article reviews and evaluates empirical research on the link between alcohol use and high-risk sexual behavior to determine whether and, if so, to what extent the two behaviors reliably covary among youth in general and college youth in particular.

This review is organized in three parts. The first part provides relevant background and contextual information, including a brief overview of theoretical explanations for the link between drinking and risky sexual behavior. The second part summarizes the data on prevalence of drinking and sexual behavior among college students and then reviews and evaluates the evidence on the co-occurrence or overlap of the two behaviors. The issue of overlap is addressed at two levels of analysis in this review. The first level examines the extent to which an individual who engages in one behavior is more likely to engage in the other (called *global overlap* by Leigh and Stall, 1993). The second level examines whether a person who engages in one behavior on a specific occasion is more likely to engage in the other behavior on that same occasion (*situational overlap*). To enhance the generalizability of findings from this review, data from studies using randomly selected samples are emphasized where possible. To ensure the relevance of the data to contemporary drinking and sexual practices, findings from more recent studies (primarily those conducted in the past 10 years) also are emphasized. Finally, the third part concludes with a summary of findings and offers recommendations for intervention and research.

For the purposes of the present review, *high-risk sexual behavior* is defined as any behavior that increases the probability of negative consequences associated with sexual contact, including AIDS or other sexually transmitted diseases

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(STDs) and unplanned pregnancy. These behaviors are considered in two broad categories: (1) indiscriminate behaviors, including having multiple partners; having risky, casual or unknown partners; and failure to discuss risk topics prior to intercourse and (2) failure to take protective actions, such as use of condoms and birth control. Alcohol effects on the decision to have intercourse is also examined in that the occurrence of intercourse per se can be viewed as the ultimate root cause of sexual risk taking. Frequency of intercourse is not, however, treated as a risk behavior. Although more frequent intercourse, all other things being equal, increases risk of exposure (de Vincenzi, 1994), intercourse frequency is significantly associated with having an exclusive sexual partner (Cooper et al., 1998). Thus intercourse frequency, analyzed without reference to relationship status (as is typically the case), is an ambiguous risk indicator at best.

Background and Overview

Adverse consequences of sexual risk taking on college campuses

Extant data suggest that negative consequences associated with sexual risk taking are common on college campuses. According to results of a recent nationwide survey, for example, 15% of college students have been pregnant or gotten a partner pregnant (Douglas et al., 1997). Statewide studies conducted in California (Patrick et al., 1997) and Texas (Wiley et al., 1996) found similar overall rates (14% and 22%, respectively). Moreover, across all studies, women reported higher rates than men (from 20% to 40%) (Table 1).

A nationwide study of Canadian college freshmen found that nearly 6% of sexually experienced students had been diagnosed by a doctor with an STD at least once (MacDonald et al., 1990). Rates among U.S. college students range from 12% of sexually experienced students in California (Patrick et al., 1997) to nearly 25% on a midwestern campus (Reinisch et al., 1995). The higher rates found in U.S. studies may reflect cultural, geographic or methodological differences, but at least partly reflect the younger age of students in the Canadian sample. Across all studies, rates of STDs were higher (in some cases, nearly twice as high) among women than men. Finally, estimates of HIV infection rates (from seroprevalence studies) range from 0.0% to 1.0% on individual campuses, with an average rate across 19 U.S. campuses of 0.2% (Gayle et al., 1990; see also Kotloff et al., 1991).

In sum, these data suggest that although aggregate rates of HIV infection are low among college students, the rates on some campuses are alarmingly high: as high as 1 in 100 students. Moreover, the experience of pregnancies and other STDs appears relatively common on college campuses, particularly among women. Considered together, these data indicate that a substantial minority of college students suffer one or more adverse consequences associated with sexual risk taking and support the need to identify factors, particularly modifiable ones like alcohol use, that might contribute to sexual risk taking in this population.

Alternative explanations for the link between alcohol use and risky sexual behavior

Targeting drinking proximal to intercourse as part of a strategy to reduce sexual risk taking will prove effective, however, only to the extent that drinking causally promotes risky behaviors. Although alcohol is widely assumed to cause such behaviors, a number of plausible alternative models exist that might account for their relationship (Cooper, 1992; Halpern-Felsher et al., 1996), only some of which posit a causal effect for alcohol. The two most widely endorsed models are briefly described below.

Acute causal effects of alcohol. The first model assumes that the acute effects of alcohol intoxication cause one to take sexual risks that otherwise would not be taken. At least two plausible mechanisms have been theorized to underlie this effect. According to alcohol myopia theory (Steele and Josephs, 1990), alcohol disinhibits behavior primarily as a result of its pharmacologic effects on information processing. By reducing the scope and efficiency of information processing, simple, highly salient cues that instigate behavior (e.g., sexual arousal) continue to be processed, whereas more distal and complex cues that would ordinarily inhibit behavior (e.g., the possibility of getting AIDS) are no longer adequately processed. Accordingly, alcohol is hypothesized to have its strongest effects when a behavior is controlled by instigatory and inhibitory cues that are strong and nearly equal in force. When instigatory cues are strong and inhibitory cues are weak, the behavior is likely to occur regardless of the individual's sobriety. Under the reverse circumstance, the behavior is unlikely to occur, again regardless of the individual's sobriety. Thus only in situations where both sets of cues would otherwise be strong should the reduced processing of inhibitory cues lead to more extreme (or different) social behavior.

In contrast, expectancy models posit that an individual's behavior after drinking is driven by preexisting beliefs about alcohol's effects on behavior, in the manner of a self-fulfilling prophecy (Lang, 1985). Thus individuals who believe that alcohol promotes risky sexual behavior should be more likely to engage in risky behaviors when they drink than those who do not hold these beliefs. Expectancy formulations thus indicate that the strength and nature of individually held beliefs about alcohol's effects should moderate the acute effects of alcohol on sexual risk taking. In short, although these two theories differ in the factors hypothesized to moderate the effects of alcohol on risky behav-

TABLE 1. Estimates (from population-based studies) of sexual experience and alcohol use with sex among college students

Study	% ever had sex/anal sex	% had sex (recent past)	No. sexual partners	BC use	Condom use	Alcohol use with sex	% ever pregnant/ had STD
Nationwide studies							
Douglas et al. (1997)	80/NR	62 (3 Mo) 55 (30 D)	26% ≥6 LT	44% @ LS	38% @ LS 37% always/most of time	19% @ LS	15/NR
MacDonald et al. (1990)	71/17	NR	31% ≥5 LT 14% >10 LT	NR	28% never 23% always	NR	NR/6
Wechsler et al. (1994)	NR/NR	NR	NR	NR	NR	(1) 19% drank before unplanned sex ≥1 time in past 12 Mo (2) 10% drank before unsafe sex ≥1 time past 12 Mo	NR/NR
Wechsler et al. (1998, 2000[a])	73/NR	72 (30 D)	6% >1 past 30 D	NR	24% never 40% always	NR	NR/NR
Statewide or regional studies							
DiLorio et al. (1998)[b]	NR[c]/NR	81 (3 Mo)	54% ≥2 past 12 Mo	NR	36% never/sometimes	34% ever drank before sex	NR/NR
Lewis et al. (1996)	84/NR	NR	18% >1 LT[d] 19% ≥10 LT	22% @ LS	48% @ LS	NR	NR/NR
O'Leary et al. (1992)	NR/NR	NR	NR	NR	M = 6.6 times had sex w/o condom past 2 Mo	M = 1.9 times drank before sex past 2 Mo	NR/NR
Patrick et al. (1997)	71/NR	74 (3 Mo)	76% >1 LT 18% ≥10 LT	41% @ LS	41% @ LS	22% @ LS	14/12
Wiley et al. (1996)	82/NR	NR	44% ≥1 past 3 Mo	26% @ LS	40% @ LS	30% @ LS	22/NR
Studies on individual college campuses							
Baldwin et al. (1992)	80/15	NR	M = 2.0 past 12 Mo	NR	M = 31% time used condom w/sex past 3 Mo	NR	NR/NR
Hale et al. (1993)	84/NR	NR	35% >1 past 12 Mo 19% >10 LT	16% @ FS (pill only)	36% @ FS	NR	40[e]/19
Pepe et al. (1993)	62/NR	NR	10% ≥3 LT	NR	NR	NR	NR/NR
Reinisch et al. (1995)	76/18	NR	M = 6.9 LT M = 2.2 past 12 Mo 37% >5 LT	40% @ LS	37% @ LS	NR	NR/25
Senf and Price, Study 1 (1994)	NR/NR	NR	M = 1.6 past 6 Mo	NR	54% @ LS	26% @ LS	NR/NR

Notes: BC = birth control; LT = lifetime; LS = last sex; FS = first sex; Mo = months; D = days; M = mean; NR = not reported. Except for the % reporting sexual experience, percentages are given as a proportion of the sexually experienced (nonvirgin) sample. Data reported for BC use reflect use of reliable methods such as condoms, the pill, or an IUD, and exclude unreliable methods such as douching and withdrawal.
[a]Unpublished data provided by Wechsler et al. [b]Percentages were estimated from breakdowns provided by class standing. When class standing was not a significant predictor of a given outcome, a simple unweighted mean was calculated. When class standing was a significant predictor, a weighted (by class size) mean was calculated. [c]All analyses were conducted among the subset of sexually experienced students who were single and between the ages of 18 and 25. It is unclear how many of the 857 students (35% of the sample) so eliminated were dropped because they were virgins, married, out of the age range, or for a combination of these reasons. Hence, the percentage of nonvirgins in the full sample cannot be calculated. [d]Values estimated from data broken down by age. [e]Among females only.

iors (viz., the nature and strength of competing cues versus individually held beliefs about alcohol effects), both nevertheless attribute causality to the acute effects of alcohol intoxication and assume that these effects unfold over a brief time course.

Results of two recent studies lend strong support to the importance of instigating and inhibiting cues in the immediate situation. In one study (MacDonald et al., 2000b), male undergraduates were randomly assigned to one of three conditions (no alcohol control, placebo, intoxicated) and then divided into low and high arousal groups on the basis of their self-reported response to a film depicting a potential sexual encounter between an attractive couple. Results showed that only those subjects who were both intoxicated *and* aroused reported stronger intentions to have unprotected sex. Presumably, intoxicated subjects had sufficient cognitive capacity to process arousal cues, but unlike their sober counterparts, lacked sufficient capacity to process simultaneously more remote inhibiting cues. In a second study, MacDonald et al. (2000a) showed that stamping the hands

of college students as they entered a bar with a message highlighting the threat of AIDS reduced the negative effects of alcohol on intentions to use condoms. By increasing the salience of AIDS, the hand stamp presumably facilitated retrieval of condom-related cues among intoxicated patrons who otherwise lacked the cognitive capacity to retrieve these cues. Together these studies suggest that intoxicated individuals respond to the more salient of the two sets of cues in a given situation, be they instigatory or inhibitory.

At the same time, compelling evidence also supports expectancy formulations. In a recent laboratory study (George et al., 2000), participants who believed that they had consumed alcohol (although in fact none had been consumed) reported greater sexual arousal, perceived their interaction partners as more sexually disinhibited and showed erotic slides to their partner significantly longer if and only if they also held strong beliefs about alcohol's capacity both to disinhibit and to enhance sexual experience. In other words, the mere belief that alcohol had been consumed activated preexisting beliefs about alcohol's effects, which in turn generated feelings, cognitions and behaviors in line with these beliefs.

Finally, results of a recent correlational study suggest that both expectancy and cue effects operate in real-world situations. Dermen and Cooper (2000) examined alcohol effects on condom use for three different occasions of intercourse (first ever, most recent first and last). Drinking was associated with lower rates of condom use at first intercourse, but only among those who both believed that alcohol increases sexual risk taking and were highly conflicted about using a condom on that occasion. Expectancies alone were found to moderate alcohol effects on the second occasion, whereas conflict alone moderated alcohol effects on the final occasion. Thus the best available evidence suggests that alcohol effects on sexual risk taking are likely to be conditional on individually held beliefs about alcohol's effects on sexual behavior, situation-specific contingencies controlling the behavior or a combination of the two.

Spurious model. A second alternative model invokes a third-variable explanation in which stable aspects of the individual or of his or her life situation are thought to cause both drinking and risky sex. For example, a person may engage in both behaviors to satisfy thrill or sensation-seeking needs, because of poor impulse control or coping skills or in an effort to cope with negative emotions (Cooper, 1992; Leigh and Stall, 1993). Alternatively, an individual may drink and have risky sex as part of a larger lifestyle, such as being single or living in a fraternity house (Baer, 1994), where both behaviors are tacitly or, in some cases, explicitly encouraged. Extant research lends support to this perspective by showing that the same personality factors (impulsivity and negative emotionality) prospectively predict involvement in both behaviors (Caspi et al., 1997), and that parallel motivational processes underlie both behaviors (Cooper et al., 2000). A more direct test of this hypothesis was provided by two recent studies in which the relationship between measures of alcohol use and risky sexual behavior was estimated both before and after controlling for plausible third variables. In both studies, sensation seeking was found to account completely for the relationship between drinking and risky sex (Justus et al., 2000; Kalichman et al., 1996). Thus it seems plausible that, under at least some circumstances or for some individuals, the link between drinking and risky sex can be adequately explained by third variable causes.

In sum, two widely held models have been advanced to account for the relationship between drinking and risky sex. Moreover, even though these models appear to offer opposing accounts of the relationship between drinking and risky sex, empirical evidence supports both. Thus, despite commonly endorsed beliefs that alcohol causally promotes risky sexual behavior, theory and empirical data paint a more complex picture of their relationship. In the following section, studies examining the link between drinking and risky sexual behavior among college students are reviewed and evaluated in light of these models.

Drinking and Risky Sex: Overlapping Behaviors among College Students?

Prevalence of both behaviors on college campuses

As described elsewhere (O'Malley and Johnston, this supplement), the vast majority of college students drink, and a substantial minority (about 40%) can be classified as heavy episodic (HE) drinkers (often defined as having five or more drinks on a single occasion during a specified time period, such as the past 2 weeks). Similarly, most college students are sexually experienced, and many engage in multiple forms of risky sexual behavior (Table 1). According to findings from the National College Health Risk Behavior Survey (Douglas et al., 1997), 8 of 10 college students between the ages of 18 and 24 years have ever had intercourse. Of these, 62% had recent (past 3 months) intercourse. More important, about 25% of students have had six or more lifetime sex partners, and only a minority take adequate precautions to prevent pregnancy or sexual infection. For example, 4 in 10 had used the "pill," and about as many had used a condom, at last sex. Fewer than 4 in 10 reported that either they or their partner had always used a condom in the past 30 days. Finally, in a national study of Canadian college students (MacDonald et al., 1990), 17% reported having ever had anal sex, but fewer than 25% reported always using a condom.

Although none of the above national studies included detailed measures of indiscriminate partner choice, several

studies conducted on individual college campuses suggest that many students exercise poor judgment in partner choice. For example, a random sample survey of students at a midwestern university found that women reported an average of three and men an average of five "one-night stands" (i.e., having sex with someone once and only once) in their lifetime (Reinisch et al., 1995). Moreover, 1 in 20 University of Maryland students reported having had sex with at least one high-risk partner (i.e., someone who had HIV or was an IV drug user, a hemophiliac, a male bisexual or a female prostitute [Kotloff et al., 1991]).

Although the above data indicate that alcohol use, sexual behavior and failures to use protection are commonplace among college students, they do not establish whether the same person engages in all of these behaviors or, more importantly, whether the likelihood of engaging in one behavior depends on involvement in another. Indeed, because of the high base rates of these behaviors, we would expect a nontrivial proportion of students both to drink and to engage in some form of risky sexual behavior by chance alone. For example, given that 9 of 10 students drink and 8 of 10 have had sex, 7 of 10 students should both drink and have had sex by chance alone. Similarly, given that 4 of 10 students are HE drinkers and 3 of 10 have had six or more sex partners, more than 1 in 10 should have engaged in both behaviors by chance alone. Thus simply demonstrating that some percentage of college students engages in both behaviors does not mean that the two behaviors are reliably linked. Existing data (reviewed next) do, however, document a reliable global association between these behaviors.

Alcohol use and risky sexual behavior at the global level

Studies examining the link between alcohol and risky sex at the global level typically ask participants about their overall involvement in some high-risk behavior and their overall frequency and quantity of alcohol use. Studies using this approach have generally found strong relationships between alcohol use and indiscriminate behaviors, but inconsistent ones between alcohol use and protective behaviors.

A national survey of more than 17,000 collegiate youth, for example, found that HE drinkers were nearly three times as likely to have had multiple sex partners in the past month than were non-HE drinkers (Wechsler et al., 1995). Similarly, a national study of more than 4,000 sexually experienced youth ages 14 to 21 years (Santelli et al., 1998) found that adjusted proportions of young men who had multiple partners in the past month rose from 23% to 61% as the number of alcohol-related behaviors increased, whereas the proportions among young women rose from 8% to 48%. Based on another national study of young adults (18- to 30-year olds), Graves (1995) reported that rates of multiple partnerships were two to three times greater among HE than non-HE drinkers and were similar for men and women. In contrast to the consistent positive link between general drinking patterns and having multiple partners, HE and non-HE drinkers were not found to differ in rates of condom use in the previously cited study of collegiate youth (Wechsler et al., 1994). The Youth Risk Behavior Survey (a national sample of noncollege youth) also found that alcohol experience failed to discriminate condom users from nonusers at last intercourse (Lowry et al., 1994). However, in her national sample of young adults, Graves (1995) found that more frequent HE drinking was associated with lower rates of condom use.

Although several studies using convenience samples of college youth point to links between alcohol use and protective behaviors (e.g., McEwan et al., 1992), many of these studies were flawed. For example, McEwan et al. reported that the proportion of British university students who had had unprotected sex with a stranger rose from 4% among nondrinkers to 27% among heavy drinkers. Their measure, however, confounded indiscriminate partner choice with failure to use a condom, thus making it unclear whether the observed covariation with drinking pattern reflects variance due to the indiscriminate behavior or to nonuse of condoms. Other studies have reported that the frequency of drinking proximal to intercourse is positively associated with the frequency of having unprotected sex or with the number of unprotected sex episodes in a given time period (O'Leary et al., 1992). Such data are confounded, however, because both the alcohol and risky sex measures depend on frequency of intercourse. Finally, numerous studies have interpreted the fact that college students say they did not use protection *because* they were drinking as evidence for a causal link between drinking and protective behaviors (Meilman, 1993; Wechsler et al., 1994). However, because people are notoriously poor at correctly identifying the causes of their behavior (Nisbett and Ross, 1980), such reports are better interpreted as expectancies or beliefs about alcohol's effects on risky sexual behavior, rather than as veridical accounts of alcohol effects on behavior. In short, the extant data reveal an inconsistent link between alcohol use and precautionary measures, a pattern that appears similar for men and women.

Co-occurrence of alcohol use and risky sexual behavior at the situational level

Although the above data indicate that people who drink are more likely to engage in indiscriminate sexual behaviors such as having multiple partners, they do not help us to adjudicate between competing explanations for the link between alcohol and risky sex. In fact, such data are equally compatible with both causal models. Determining whether alcohol use and risky sexual behaviors are reliably linked on a specific occasion, however, allows us to begin to ad-

TABLE 2. Results from event-level studies examining the relationship between alcohol use and risky sexual behaviors

Study	Year data collected	Method/ event	*N*	Age (years)	Prevalence/frequency		Results	Statistical test	
					Alcohol use	Sexual behav.		B/S	W/S
Intercourse probability									
(1) Cooper and Orcutt, 1997	1994-95	Most recent 1st date at Time 1	1,678	M = 16.7	14% of dates one or both partners drank	9% had sex	21% had sex when male only drank; 7% female only drank; 20% both drank; 8% neither drank	Sig+ male use/NS female use	Sig+ male use/NS female use
		Most recent 1st date at Time 2	1,780	M = 21.4	25% of dates one or both partners drank	14% had sex	(1) 28% had sex when male only drank; 18% female only drank; 24% both drank; 11% neither drank	Sig+ male use/NS female use	
							(2) b = 1.03 predicting intercourse probability from quantity consumed	Sig+	
(2) Harvey and Beckman, 1986	1984	2-3 Mo daily diary	69	M = 24.0	—	—	Initiated .78 mean sex activities on nondrinking days; .32 on mod.-drinking days; .41 on heavy-drinking days	—	Sig-
(3) Leigh and Schafer, 1993	1990	Heaviest drinking occasion past 12 Mo	153	R = 12-17	43% males, 13% females drank >8 drinks	32% males, 30% females had sex	23% who drank 1-2 drinks had sex; 19% who drank 2-4 drinks; 33% who drank 4-8 drinks; 45% who drank >8 drinks	Sig+	—
		Heaviest drinking occasion past 12 Mo	512	M = 23.8[a] R = 18-30	47% males, 18% females drank >8 drinks	29% males, 31% females had sex	14% who drank 1-2 drinks had sex; 21% who drank 2-4 drinks; 29% who drank 4-8 drinks; 41% who drank >8 drinks	Sig+	
Partner intimacy									
(4) Cooper et al., 1989, 1990	1987	1st sex	160	M = 16.5	33% drank	19% had casual partner	M partner intimacy (high score = more intimate): no alc = 3.7; low intox = 3.7; high intox = 2.5	Sig+ η^2 = .231	—
		FMRP	103	M = 17.5	35% drank	32% had casual partner	M partner intimacy: no alc = 3.4; low intox = 2.9; high intox = 2.7	Sig+ η^2 = .082	
		Last sex	96	M = 18.5	15% drank	2% had casual partner	M partner intimacy: no alc = 4.0; low intox = 3.8; high intox = 4.0	NS η^2 = .011	
(5) Cooper et al., 1994	1989-90	1st sex	1,176	M = 14.5	10% drank	30% had casual partner	M partner intimacy (high score = more intimate): no alc = 4.1; alc = 3.4	Sig+ η^2 = .020	Sig+
		FMRP	898	M = 17.0	18% drank	36% had casual partner	M partner intimacy: no alc = 4.1; alc = 3.4	Sig+ η^2 = .065	
(6) Graves, 1995	1990	FMRP (past 12 Mo)	285	M = 23.8[a]	41% drank	44% had casual partner	(1) 83% men who drank had casual partner vs 32% who did not	Sig+	—
							(2) 61% women who drank had casual partner vs 15% who did not	Sig+	
							(3) 48% men who drank knew partner <3 wks vs 22% who did not	Sig+	
							(4) 38% women who drank knew partner <3 wks vs 16% who did not	Sig+	
(7) Testa and Collins, 1997	1995	FMRP events w/ and w/out alc	123	M = 24.0 and 23.8 for alc and no-alc events	100% vs 0% drank	11% had sex w/stranger @ 1 of 2 events; 89% had sex w/ known partner @ both events	11% had sex w/stranger on alc but not on no-alc event vs <1% had sex w/stranger on no-alc but not on alc event	—	Sig+

Continued

TABLE 2. *Continued*

Study	Year data collected	Method/ event	*N*	Age (years)	Prevalence/frequency: Alcohol use	Prevalence/frequency: Sexual behav.	Results	Statistical test: B/S	Statistical test: W/S
Risk discussion									
(8) Cooper et al., 1989, 1990	1987	1st sex		———Same as study 4———		40% discussed no risk topics before sex	M no. topics (of 3) discussed: no alc = .65; low intox = .55; high intox =.31	Sig+ η^2 = .076	—
		FMRP		———Same as study 4———		42% discussed no risk topics before sex	M no. topics (of 3) discussed: no alc = .74; low intox = .30; high intox =.35	Sig+ η^2 = .157	
		Last sex		———Same as study 4———		52% discussed no risk topics before sex	M no. topics (of 3) discussed: no alc = .48; low intox = .34; high intox = .62	NS η^2 = .011	
(9) Cooper et al., 1994	1989-90	1st sex		———Same as study 4———		37% discussed no risk topics before sex	M no. topics (of 4) discussed: no alc = 1.11; alc = .82	Sig+ η^2 = .006	Sig+
		FMRP		———Same as study 5———		33% discussed no risk topics before sex	M no. topics (of 4) discussed: no alc = 1.36; alc = .99	Sig+ η^2 = .012	
(10) Freimuth et al., 1992	—	FMRP	81	M = 20.7[b]	42% both partners drank or used drugs	63% initiated discussion re: CU	Alc/drug use predicted lower likelihood of initiating discussion in discriminant analyses	Sig+	—
(11) Testa and Collins, 1997	1995	FMRP events w/ and w/out alc		———Same as study 7———		44% discussed no risk topics before either occasion; 15% discussed risk before both	32% discussed risk in no-alc but not in the alc event vs 12% discussed risk in the alc but not in the no-alc event	—	Sig+
Condom/birth control use									
(12) Boldero et al., 1992	—	Last sex	144	M = 18.7	—	65% used C	B = -.29 predicting CU from alc	NS	—
(13) Cooper et al., 1989, 1990	1987	1st sex		———Same as study 4———		43% used C; 52% used BC	(1) % used C: no alc = 44; low intox = 54; high intox = 31	NS η^2 = .019	—
							(2) M BC effectiveness: no alc = 2.2; low intox = 2.2; high intox = 2.0	NS η^2 = .007	
		FMRP		———Same as study 4———		57% used C; 67% used BC	(1) % used C: no alc = 66; low intox = 40; high intox = 44	Marg+ η^2 = .049	
							(2) M BC effectiveness: no alc = 2.7; low intox = 2.6; high intox = 2.3	NS η^2 = .026	
		Last sex		———Same as study 4———		53% used C; 79% used BC	(1) % used C: no alc = 54; low intox = 34; high intox = 56	NS η^2 = .010	
							(2) M BC effectiveness: no alc = 2.9; low intox = 2.8; high intox = 3.5	NS η^2 = .034	
(14) Cooper et al., 1994	1989-90	1st sex		———Same as study 5———		46% used C	44% no alc used C vs 33% w/alc	Sig+ η^2 = .004	NS
		FMRP		———Same as study 5———		46% used C	43% no alc used C vs 44% w/alc	NS η^2 = .000	
(15) Dermen and Cooper, Study 1, 2000	1993	FMRP	308	M = 18.8	29% drank	72% used C	β = -.121 predicting CU from alc use (coded 0 = none to 2 = ≥4 drinks)	NS	—
(16) Dermen and Cooper, Study 2, 2000	1994-95	1st sex	465	M = 16.7	11% drank	68% used C	β = -.205 predicting CU from alc use (coded as in study 15)	NS	—

Continued

TABLE 2. *Continued*

Study	Year data collected	Method/ event	*N*	Age (years)	Prevalence/frequency		Results	Statistical test	
					Alcohol use	Sexual behav.		B/S	W/S
		FMRP	1,136	M = 19.7	20% drank	61% used C	β = -.150 predicting CU from alc use (coded as in study 15)	NS	
		Last sex	984	M = 22.0	17% drank	42% used C	β = .252 predicting CU from alc use (coded as in study 15)	Sig-	
(17) Desiderato and Crawford, 1995	1991	Last sex	262	M = 20.4[b]	60% drank	54% used C	Specific results not provided	NS	—
(18) Fortenberry et al., 1997	—	Diaries completed for M of 9.2 wks	82	R = 16-19	27% reported ≥1 subs-related event over study period	Cs used w/ 55% of sex events; 12% never used; 38% always used	C used on 58% of events w/subs and 63% of events w/out subs, among 22 women reporting both types of events	—	NS
(19) Freimuth et al., 1992	—	FMRP	173	——Same as study 10——		43% used C	Alc/drug use unrelated to CU in discriminant analysis	NS	—
(20) Gold and Karmiloff-Smith, 1992	1990	Most recent sex w/ and w/out C	115	79% between 18 and 21	24% mod/ extreme intox @ unsafe event	100% vs 0% used C	M intox (low score = more intox) = 3.61@ unsafe event vs 3.73 @ safe event	—	Sig+
(21) Graves, 1995	1990	FMRP (past 12 Mo)		———Same as study 6———		32% used C; 70% used BC	(1) 32% w/no alc used C vs 31% w/alc	NS	—
							(2) 72% w/no alc used BC vs 65% w/alc	NS	
(22) Harvey and Beckman, 1986	1984	2-3 Mo daily diary	69	M = 24.0	—	—	% used BC: no-alc events = 77; mod alc events = 81; heavy alc events = 77	—	NS
(23) Kraft et al., 1990	1989	1st sex	1,171	M = 15.9[b]	35% drank	42% used C	(1) 46% males w/no alc used C vs 31% w/alc	Sig+ OR = 2.1	—
							(2) 50% females w/no alc used C vs 32% w/alc	Sig+ OR = 2.3	
(24) Kraft and Rise, 1991	1989	Last sex	1,171	M = 18.3[b]	24% drank	31% used C; 39% used BC	(1) 39% males w/no alc used C vs 35% w/alc	NS	—
							(2) 26% of females w/no alc used C vs 25% w/alc	NS	
							(3) 38% males w/no alc used BC vs 28% w/alc	Sig+	
							(4) 48% females w/no alc used BC vs 20% w/alc	Sig+	
		Most recent sex w/casual partner	475	M = 17.8[b]	80% drank	25% used C; 18% used BC	(1) 26% of males w/no alc used C vs 36% w/alc	NS	—
							(2) 26% of females w/no alc used C vs 23% w/alc	NS	
							(3) 14% males w/no alc used BC vs 18% w/alc	NS	
							(4) 26% females w/no alc used BC vs 14% w/alc	Sig+	
(25) Leigh et al., 1995	1990	1st sex	611	M = 22.1[b]	17% drank (21% males, 14% females)	38% used C; 48% used BC	1) 39% w/no alc used C vs 30% w/alc	Marg+	
							(2) 49% w/no alc used BC vs 39% w/alc	Marg+	
(26) Senf and Price, Study 1, 1994	1991	Last sex	452	M = 21.2	26% one or both partners drank	54% used C	(1) 65% of men w/no alc used C vs 56% w/alc	NS	—
							(2) 48% of women w/no alc used C vs 47% w/alc	NS	
(27) Senf and Price, Study 2, 1994	1992	Last sex	111	M = 22.6	32% one or both partners drank	51% used C	(1) 42% of men w/no alc used C vs 27% w/alc	NS	—
							(2) 52% of women w/no alc used C vs 64% w/alc	NS	
(28) Senf and Price, Study 3, 1994	1992	Last sex	79	M = 17.7	18% drank	69% used C	69% w/no alc used C vs 62% w/alc	NS	—

Continued

TABLE 2. *Continued*

Study	Year data collected	Method/ event	*N*	Age (years)	Prevalence/frequency: Alcohol use	Prevalence/frequency: Sexual behav.	Results	Statistical test: B/S	Statistical test: W/S
(29) Testa and Collins, 1995	1995	FMRP events w/ and w/out alcohol	———	Same as study 7 ———		51% used C both events; 89% used protection both events; 4% used nothing @ either event	(1) 16% used C in no-alc but not in alc event vs 19% used C in alc but not in no-alc event (2) M no. drinks: C users = 6.26; nonusers = 6.32	— NS	NS
(30) Traeen and Kvalem, 1996	1990	Last sex	385	M = 17.4[b]	24% drank	72% used BC	48% w/no alc used BC vs 23% w/alc	Sig+	—

Notes: *N* = sample size; B/S = between subjects; W/S = within subjects; M = mean; NS = not significant; Mo = month; dash (—) = not reported or not applicable; R = range; FMRP = first sex with most recent or current partner; BC = birth control; C = condom; CU = condom use; OR = odds ratio. Significant positive results (Sig+) indicate results that support a link between alcohol use and increased risky behavior, regardless of the direction in which behavior was coded in the study. Significant negative results (Sig-) indicate results that showed a link between alcohol use and decreased risky behavior. Results designated as significant were significant at $p < .05$ by the relevant statistical test; marginal results (Marg+) were significant at $p < .10$.
[a]Age at time of event estimated by subtracting 6 months from age at time of the interview. This assumes that events occurred on average 6 months, about half-way, through the 1-year reporting window. [b]Age estimated from categorical data for the event. For Leigh et al. (study 25), 49% of the sample had sex more than 5 years ago. Hence, age at the time of interview (the only age given) substantially overestimates average age at first intercourse. Accordingly, age at first intercourse was adjusted downward in the analyses of sample age (reported in the text), although unadjusted age is reported here.

judicate between the two models because covariation on a given occasion is a necessary but not sufficient condition for attributing risky sexual behaviors to acute alcohol intoxication.

Evidence from multiple studies shows that college students regularly combine drinking with sex on specific occasions (see Table 1). As previously argued, however, some overlap would be expected by chance alone. Thus two strategies have been used to test whether drinking and risky sex reliably covary at the situation level: (1) between-persons tests in which the behavior of people who drink on a given occasion are compared with those who do not drink to determine if drinkers exhibited riskier behaviors on that occasion and (2) within-persons tests in which the behaviors of individuals are compared on drinking and nondrinking occasions to determine whether riskier behaviors were exhibited on drinking occasions. Although most studies have used between-persons comparisons, such comparisons cannot rule out the possibility that stable individual differences cause people both to drink and take risks on a given occasion (Cooper et al., 1990). In contrast, because an individual's personality or lifestyle is unlikely to change from event to event, within-persons comparisons are less vulnerable to this alternative explanation and thus enable stronger attributions to alcohol use as the causal agent.

Using both analytic strategies, three key questions have been addressed at the situational level of analysis: (1) Does drinking in potentially sexual situations alter the probability that intercourse will occur? Once intercourse occurs, does drinking beforehand (2) increase indiscriminate risky sexual behaviors, or (3) decrease protective behaviors? Studies addressing each of these questions are summarized in Table 2 and are reviewed next.

Alcohol use and intercourse probability. Using data from three independent samples, a total of seven between-persons and three within-persons tests of the link between alcohol and intercourse probability have been conducted. Across these studies, five of the seven between-persons tests were significant and positive, and two were nonsignificant. The within-persons tests yielded one positive, one negative and one null finding. Despite the pattern of inconsistent results, a closer examination of these studies suggests a potentially heuristic integration.

In the first study to provide a within-persons test (Harvey and Beckman, 1986), 69 university women kept daily logs of their alcohol use and sexual behavior. Contrary to the women's self-professed beliefs about alcohol's capacity to increase sexual desire, they were actually *less* likely to initiate intercourse after a drinking than after an alcohol-free period. In the second study to provide a within-persons test (Cooper and Orcutt, 1997), alcohol use and sexual behavior were measured on two different first-date occasions, separated by 4.5 years. Results showed that intercourse probability across the two dating occasions covaried with male, but not with female, partner use. (Supplemental analyses indicated that the male partner effect was not due to coercion.)

Together, these studies raise the possibility that alcohol can either inhibit or promote sexual contact, depending on characteristics of the individual and the relationship. Given that reliable effects were found only among men in the Cooper and Orcutt (1997) study, the use of an all-female

sample in Harvey and Beckman's (1986) study could account for the discrepant result. Perhaps more important, only individuals in stable relationships were included in Harvey and Beckman's study, whereas Cooper and Orcutt examined first-date situations, which are likely to involve new or casual partners. According to alcohol myopia theory, alcohol effects on intercourse probability should be greatest in situations where both strong instigating (e.g., sexual arousal) and strong inhibiting (e.g., fear of disease, anticipation of guilt or regret) cues control the behavior. Although instigating cues might be similar when having sex with a new versus established sex partner, inhibiting cues are unlikely to be. Consistent with this analysis, Cooper and Orcutt (1997) found that intercourse probability increased only among men who both drank and were highly conflicted (i.e., perceived both strong benefits and strong costs) about having sex on the date.

This finding may also help explain why the effect was restricted to men. For women, the perceived costs of having sex (e.g., loss of reputation) substantially outweighed perceived benefits, thus creating little conflict. In contrast, costs and benefits were nearly equal in strength among men, leading to greater conflict about whether to have sex. In short, these data suggest that alcohol has the potential to disinhibit sexual behavior among both men and women, but that whether it will depends on what the behavior means to the individual in the situation.

Alcohol use and indiscriminate sexual behaviors. Two different indicators of indiscriminate sexual behavior have been examined: having sex with a casual or hardly known partner and failure to discuss risk topics prior to intercourse. Using data from four independent samples, a total of nine between-persons and two within-persons tests of the link between drinking and partner intimacy have been conducted. Eight of the nine between-persons tests and both of the within-persons tests were significant, with all effects indicating a positive link between drinking and having a more casual partner. Using data from four independent samples, a total of six between-persons and two within-persons tests of the link between alcohol and risk discussion were also conducted. Five of the six between-persons and both of the within-persons tests were significant, with all effects showing decreased risk discussion among individuals who drank prior to intercourse. In the studies that reported results separately for men and women (Graves, 1995) or tested gender interactions (Cooper et al., 1994), no evidence for gender differences in either outcome was found.

It is interesting to note that the two null results (for partner intimacy and discussion) were obtained in the same study for the same event—last intercourse (Cooper et al., 1989, 1990). Because this event included only sexual experiences with an established sexual partner, few respondents considered their partner casual (see Study 4, Table 2); thus simple restriction of range may account for the null finding. In addition, it seems likely that individuals who intended ever to discuss risk topics would have done so by their last intercourse experience, which occurred in the Cooper et al. (1989, 1990) study about 1 year after first intercourse with that partner. Although an individual might feel conflicted about bringing up risk-related topics with a new sex partner, it is unlikely that he or she would continue to feel conflicted a year later with the same partner. A related possibility is that these behaviors index qualitatively different phenomena in the early versus later stages of a relationship. In an established relationship, for example, perceiving your partner as less intimate may indicate a stagnant or troubled relationship, whereas failure to discuss risk topics may indicate intimacy avoidance or social skill deficits on the part of one or both partners. Thus, although these behaviors may validly index risk in the early stages of a relationship, their meaning—and hence their relationship to alcohol use—may shift over time.

Alcohol use and protective behaviors. A total of 25 between-persons and 4 within-persons tests of the link between alcohol and condom use have been conducted using data from 15 independent samples. Of these, only five between-persons tests (two at $p < .10$) and one within-persons test showed a significant inverse relationship between drinking and condom use. Of the remaining 23 between-persons tests, one revealed significantly more condom use among those who drank (Dermen and Cooper, 2000), whereas 22 were nonsignificant. Ten between-persons and one within-persons tests of the link between alcohol and birth control use were conducted using data from five independent samples. Of these, five between-persons tests showed a significant or marginally significant relationship between drinking and decreased birth control use, whereas the remaining six tests were nonsignificant.

Comparison of sexual events for which significant decreases in condom or birth control use were found with events that yielded null results pointed to several factors that might explain the variability in results. First, sample size was significantly positively associated with obtaining an alcohol effect (mean [SD] size = 504 [303.6] versus 318 [302.3], $t = 1.7$, $p < .10$, for studies finding significant versus nonsignificant effects). Second, a preponderance of significant effects were found for lifetime first intercourse: 5 of 8 such tests were significant, compared with 2 of 13 tests for first time with most recent or current partner and 3 of 15 tests for last intercourse ($\chi^2 = 6.3$, 2 df, $p < .05$). Third, participants were significantly younger at the time of sexual events for which an inverse effect of alcohol use on protective behaviors was found (mean = 17.4 [1.6] years) compared with events finding no such effect (mean = 19.6 [2.5] years; $t = 3.4$, $p < .01$). Fourth, significant alcohol effects were more likely for events that occurred longer ago; $r = -.37$ ($p < .05$) between year of data collection and finding a significant inverse effect. Indeed, all significant

effects were found for events that occurred during or prior to 1990. Because event (first intercourse versus other events), age at time of intercourse and year in which the event occurred were interrelated (*r*'s ranged from .38 to .54, *p*'s < .05), a logistic regression analysis was conducted to determine whether the three event characteristics independently predicted the likelihood of obtaining a significant alcohol effect. Results showed that although the set of event characteristics was significant (χ^2 = 12.2, 3 df, p < .01), none of the characteristics individually predicted outcome. This suggests that effects among these factors cannot be adequately parsed. Finally, other event characteristics (including gender and racial composition of the samples, whether the sample was a college or noncollege sample, whether a random or convenience sample was used, whether condom or birth control use served as the dependent measure and whether a between-persons or within-persons test was conducted) were not related to obtaining a significant effect. In short, these data suggest that the link between drinking and failure to take protective actions is likely circumscribed by historical context, as well as by developmental stage and chronological age.

Conclusions and Recommendations for Research and Prevention

Summary and conclusions

The above research supports a number of conclusions about the link between alcohol use and risky sexual behavior among college students and more generally among adolescents and young adults. First, existing research indicates that alcohol use and certain types of sexual behavior covary. Not only does the likelihood that an individual has ever drunk alcohol predict the likelihood he or she has ever had sex, but level of alcohol involvement also predicts level of sexual involvement. Equally strong evidence suggests that drinking in a potentially sexual situation (e.g., on a date) is associated with an increased probability of intercourse on that occasion and that drinking prior to intercourse is associated with risky partner choice as well as with decreased risk discussion on that occasion. Each of these relationships has been observed using within-persons designs, thus ruling out the possibility that strictly between-person differences can account for the data. These effects, however, may be qualified by relationship status and, in the case of intercourse probability, perhaps by gender as well.

In contrast to the relatively clear-cut results linking alcohol use to increased participation in indiscriminate sexual behaviors (especially having casual sex), studies examining the link between drinking proximal to intercourse and decreased protective behaviors (i.e., condom and birth control use) reveal a weaker link. Indeed, the overwhelming majority of studies, whether examining global or situation-specific associations, found no effect whatsoever. The primary exceptions to this pattern were found for younger, sexually inexperienced adolescents and for sexual events occurring during or prior to 1990. Thus these data suggest that the link between alcohol use and protective behaviors is both developmentally and historically limited.

Gender and race differences in the relationship between drinking and risky sexual behaviors are equivocal. Although gender differences have been reported (e.g., Cooper and Orcutt, 1997), they have not been consistently observed across different behaviors or across different studies investigating the same behavior (e.g., Dermen and Cooper, 2000). Evidence on race differences is inconclusive because of the small number of studies that have included black youth and because few black adolescents and young adults drink in sexual situations (Cooper et al., 1994; Leigh et al., 1995).

Despite the complexity of these findings, the overall pattern of data can be parsimoniously interpreted within the framework of Steele and Josephs' (1990) alcohol myopia theory. As previously described, alcohol is hypothesized to affect behavior only when that behavior is controlled by competing cues (one set favoring action and one inhibiting action) of nearly equal strength. Theoretically, then whether alcohol affects behavior in a given situation should be determined by the relative strength and content of the dominant versus peripheral cues governing behavior in that situation. For example, when dominant cues favor inaction and peripheral cues favor action, alcohol may lead to behavioral *inhibition* as opposed to *disinhibition*. Thus, to the extent that the nature and strength of competing cues (or costs and benefits) related to having sex with a particular partner or to engaging in any specific sexual behavior vary across the life span of the relationship, alcohol's effects on those behaviors should also vary across time (or stage) within that relationship. Likewise, because the nature and strength of these cues are thought to follow a distinctive course for men and women at different stages of relationship development (McCabe and Collins, 1984), the nature of alcohol effects on behavior may differ for men and women at some, although not necessarily all, stages of a relationship (cf., Cooper and Orcutt, 1997). Indeed, it is likely that any classificatory variable (e.g., age, historical period, race) that can be shown to moderate alcohol effects on sexual behavior is in fact a proxy for mean or group-level differences in the type and relative strength of competing cues that control the behavior in question. This line of reasoning therefore suggests that direct assessment of the competing cues and associated levels of conflict about engaging in the behavior should yield more precise specification of the conditions under which alcohol leads to increased or perhaps even *decreased* sexual risk taking.

At the same time, beliefs about the effects of alcohol on risky sexual behavior also appear to play an important role. Indeed, overwhelming evidence indicates that people *be-*

lieve that alcohol causally promotes risky sexual behaviors. These beliefs, in turn, have been shown to promote drinking in sexual or potentially sexual situations (Dermen and Cooper, 1994; Leigh, 1990) and (in the absence of actual alcohol) to elicit disinhibited sexual behavior consistent with individually held expectancies in laboratory studies (George et al., 2000). Evidence that individually held expectancies moderate alcohol's effects on risky sexual behavior, however, is less consistent (see Dermen and Cooper, 2000; Dermen et al., 1998; Leigh, 1990). Although such inconsistencies could reflect well-known statistical difficulties associated with detecting interactions in correlational data (McClelland and Judd, 1993) or difficulties inherent in predicting complex behaviors in specific situations (Epstein, 1983), they might also reflect a need for greater refinement in our theories and methods for testing these theories. One possibility is that the strength and relevance of an individual's beliefs about how alcohol affects sexual behavior vary across situations and that these variations are partly determined by the specific meaning that engaging in the behavior has for the individual on that occasion. Consider, for example, an individual who experiences conflict about having sex on two different occasions. On the first occasion, conflict arises because he is aroused, but fears that having sex will lead to undesired expectations on the part of his partner with whom he has no intention of pursuing a relationship. On the second occasion, the individual is again aroused by the prospect of having intercourse, but this time experiences conflict because he fears that having sex might damage a relationship that he hopes will develop into a more serious one. Thus the belief that alcohol leads to excesses in behavior might provide a plausible post hoc excuse for having sex in the first situation, but would be irrelevant in the latter situation to concerns about damaging an incipient relationship. In short, a complex match may be required between the content of one's beliefs about alcohol effects on behavior and the perceived costs and benefits of engaging in that behavior on a given occasion. Such possibilities underscore the potentially crucial role that an individual's idiosyncratic construction of his or her behavioral options in a given situation play, as well as the need to integrate expectancy and conflict inhibition models of alcohol effects on behavior.

One question that remains unanswered, however, is why drinking should be more reliably linked to indiscriminate behaviors than to protective behaviors. At least two interrelated explanations may account for this pattern of findings. First, alcohol effects on protective behaviors may be entirely indirectly mediated by its effects on indiscriminate behaviors (Cooper et al., 1999). According to this possibility, drinking directly affects the likelihood of having a casual partner and of discussing risk-relevant topics, and these behaviors in turn affect the probability of taking protective actions. Differences in the magnitude of the relationships, and hence the ease with which they can be detected, would follow as a consequence of one being a direct effect and the other being an indirect one. The second possibility is a subset of the first one in that it invokes a specific type of intervening variable model in which the direct and indirect (or spurious) effects are opposite in sign. Specifically, Cooper and Orcutt (2000) have shown that this circumstance (known as suppression) may arise because people are more likely both to drink and to use a condom if they have sex with a casual than a serious partner. It therefore follows that the overall association between drinking and condom use includes this pathway of positive influence, which would attenuate, or possibly mask altogether, any adverse direct effects of drinking on condom use. To the extent that this analysis is accurate, the total effect of alcohol use on condom use would necessarily be smaller than its direct effect, after controlling for partner intimacy. Consistent with this interpretation, we found that the total effect of alcohol use on condom use was -.04 and not significant, but that its direct effect after controlling for partner intimacy ratings was -.17 and significant. Findings reported by Gold et al. (1992), who reported the only significant within-persons effect for condom use among the previously reviewed studies, lend further credence to this interpretation. The key difference between their study and the remaining studies was that they controlled for partner intimacy by limiting their analyses to the subset of individuals who had equally intimate partners across the two occasions. To summarize, these data suggest that the overall magnitude of the relationship between alcohol use and protective behaviors is small because these behaviors are part of a larger multivariate network of relationships in which the two variables are only indirectly linked, or in which any direct relationship they have is obscured by a countervailing process.

Finally, because of pragmatic concerns with the potentially devastating consequences of acute alcohol intoxication, the present review has focused to a substantial degree on this particular explanation for the link between drinking and risky sex. This focus should not be interpreted, however, as a statement about the greater plausibility or importance of this causal model relative to other possible models. In fact, given the highly conditional nature of the link between alcohol and risky sex at the level of the situation, it seems unlikely that acute alcohol effects alone could adequately account for the robust associations observed between these behaviors at the global level. Moreover, even though within-persons procedures show that the same person is more likely to engage in risky sex on drinking than on nondrinking occasions, these data do not unambiguously point toward a causal effect of alcohol on risky sexual behavior. Indeed, they are equally compatible with both reverse causal and third-variable situational explanations as well (Cooper, 1992; Cooper et al., 1994). In short, the extant data indicate that no single causal model can adequately

account for the relationship between alcohol use and risky sexual behavior and rather that a range of plausible models must be embraced. The present review focused on two such models that are both consistent with the evidence on covariation and plausible in terms of what is known about alcohol use, risky sex and their interrelationship. Together these considerations suggest that it is time to move beyond the question of which model better accounts for the observed covariation of these two behaviors and to begin instead to address the question of under what circumstances, or for which individuals or subgroups, different causal processes operate.

Recommendations for future research and intervention efforts

Based on the above review, a number of recommendations can be offered for future research and intervention efforts.

Study design. The vast majority of research on this topic has been cross-sectional and included only global assessments of behavior. Although such studies (assuming known sampling parameters) can provide useful data on the prevalence and magnitude of the contemporaneous association of these behaviors, they are not optimal for illuminating processes by which these behaviors are linked. The strongest tests of hypotheses concerning acute alcohol effects, for example, require short-term, repeated measures in which multiple sexual or potentially sexual events are examined. Diary studies, although they present formidable methodological challenges (Reis and Gable, 2000), nevertheless represent the most rigorous, ecologically valid approach currently available for testing key premises of acute effect models. Compared with the more widely used critical event approach in which alcohol and sexual behaviors are described for some past occasion such as first intercourse, diary studies can collect data virtually online. The resulting proximity in time of the self-report to the actual experience greatly reduces, if not eliminates, retrospective recall bias, thus leading to substantially more accurate reporting.

Critical event methodology will remain an important adjunct to diary studies, however, in part because of its greater flexibility and ease of use. For this reason, it will be important to develop a better understanding of the limits of the critical event approach, as well as to identify ways to enhance its validity. Regardless of whether a critical event or diary method is used, data should be collected for at least two events (that vary on alcohol consumption) and analyzed using within-persons procedures. Such procedures offer one of the only feasible ways to rule out stable individual differences as an alternative interpretation of any observed linked between drinking and risky sexual behavior.

Although issues of external validity are paramount, controlled experimentation can also play an important role. Small-scale laboratory analog studies designed to test highly focused hypotheses about underlying mechanisms (cf., Fromme et al., 1999) can explore subtle aspects of causal process that would otherwise be difficult to isolate. Carefully designed field experiments (cf., MacDonald et al., 1996) and intervention studies (cf., Dermen and Thomas, 2000) have been underutilized to date, yet hold substantial promise for exploring causal processes in an externally valid manner. To be maximally informative, however, such studies should be theoretically informed and focus on testing relevant mediation and moderation hypotheses.

Finally, future studies examining the link between drinking and risky sexual behavior should include data from both partners. Because sexual behavior is played out in intimate, interpersonal contexts and requires mutual action, gaining the perspective of only one partner is inherently limited. This may be especially true in the present arena where alcohol effects on risky sexual behaviors appear to depend heavily on individual meanings ascribed (presumably by both partners) to the focal behavior.

Measurement issues. The majority of studies to date have focused on global assessments of alcohol use and risky sexual behavior and ignored theoretical variables that might mediate or moderate the links between them. The present review suggests that continued progress in this area depends on more refined assessments of all three sets of variables.

First, assessment of alcohol use can be improved in at least two important ways. Unlike most studies where drinking is assessed for the participant only, a separate measure of partner alcohol use should be obtained. Given the unique effects of male and female partner use previously discussed (Cooper and Orcutt, 1997), this simple step seems crucial. In addition, future researchers should attempt to measure situation-specific expectancies (Dermen and Cooper, 1994) or reasons for drinking (Cooper, 1994) on a given occasion. Only by directly assessing what the individual expects to happen as a result of drinking in a given situation (expectancies), or hopes to gain by drinking in that situation (motives), can we begin to unravel the differential effects of drinking on risky sexual behavior, both across persons and within persons across situations.

Second, several recommendations for improved assessment of risky sexual behaviors also can be offered. Direct assessment of conflict about engaging in the focal behavior appears critical. Toward this end, Cooper and colleagues (Cooper and Orcutt, 1997; Dermen and Cooper, 2000) developed a simple but promising approach in which individuals rate the degree to which they felt conflicted, uncertain or ambivalent about engaging in a given behavior on a specific occasion (e.g., using a condom at last sex). As previously discussed, conflict ratings were found to moderate alcohol effects on intercourse probability and condom use in theoretically consistent manners. Ratings of costs and benefits associated with these behaviors also were

shown to discriminate among qualitatively different forms of conflict—namely, conflict in which costs outweigh benefits versus benefits outweigh costs. Our research suggests that this distinction provides leverage for discriminating between situations where drinking leads to behavioral inhibition versus disinhibition (Cooper and Orcutt, 1997) and should therefore be included whenever possible.

Future assessments of sexual risk taking should move beyond their near-exclusive focus on condom use. This approach, while tapping the most essential element from an AIDS prevention perspective, leaves unmined important aspects of the sexual encounter that in and of themselves pose risk or help to define risk from the individual's perspective. For example, an individual may not construe failure to use a condom as risky or may not experience conflict about nonuse if other birth control is used. Also, failure to use protection cannot be construed as risky if one is intentionally trying to conceive. Thus assessing pregnancy intentions as well as other forms of birth control use should provide crucial insights into the individual's psychological experience of the situation.

Although rarely included in prior research, more careful attention to risk discussion as an outcome appears warranted. A recent meta-analysis (Sheeran et al., 1999) found that communication between partners about condom use was the single strongest predictor of condom use (r = .46) among 56 different variables examined. At the same time, asking a partner about his or her past sexual experiences may inadvertently lead to increased risk taking because people sometimes intentionally misrepresent their past sexual experiences to have sex (Cochran and Mays, 1990). These considerations suggest the need for separate assessments of discussion of protective behaviors and discussion of other risk topics.

The heterogeneity of alcohol effects on risky behaviors observed in the present review underscores the need to assess multiple risk behaviors as well as to develop differentiated hypotheses regarding links between drinking and individual risk behaviors. Indeed, the fact that risk behaviors themselves are related to one another in complex ways suggests the need to move toward multivariate models in which alcohol use is embedded within a network of interrelated risk behaviors (cf., Cooper and Orcutt, 2000).

Finally, greater attention needs to be paid to the relationship context, even in studies where data are collected from only one partner. In past research, participants have typically been asked to describe the nature of the relationship with their partner at the time of intercourse, for example, on a scale ranging from someone they just met to a fiancé or spouse. Alternatively, participants may be asked how long they have known, dated or been with their partner or to rate how well they know their partner. Although such assessments appear to sort individuals reliably along a crude intimacy continuum, they fail to capture the rich psychological terrain that characterizes most sexual relationships. Thus, to the extent possible, measures aimed at assessing a broader range of relationship dimensions and functioning (e.g., interdependency, power, passion, trust, commitment) should be included. Of course, such assessments assume that a relationship of at least some duration exists between the two partners. When this is not the case, assessing the individual's goals or intentions vis-à-vis the partner or the specific sexual encounter may adequately capture his or her orientation to the relationship.

Despite the potential of data such as these to illuminate crucial aspects of the link between drinking and risky sexual behavior, they are not without their limitations. Retrospective reports of perceived aspects of events or relationships, particularly when collected substantially after the fact, are highly subjective and vulnerable to distortion. However, by comparing retrospective self-reports of experiences obtained from both partners, or by comparing retrospective reports to diary data, we may begin to identify aspects of sexual experience that are more (and less) reliably indexed by retrospective self-reports, as well as variations in assessment procedures that enhance the accuracy of such reports.

Implications for intervention. The present review has a number of important implications for intervention. First, existing evidence supports the plausibility of multiple causal models. The existence of multiple models underscores the need for caution in interpreting evidence of covariation between these behaviors as prima facie evidence for a causal link. It also highlights the need for diverse methodological approaches for exploring alternative models and raises the possibility that different intervention strategies will be optimally effective among individuals or subgroups for whom different causal processes predominate. Among people who chronically drink and engage in risky behaviors, for example, the relationship between alcohol use and sexual risk taking may primarily arise from an underlying common cause or causes. For such individuals, more universal change strategies targeting the hypothesized common cause (e.g., a risk-seeking propensity) should be maximally efficacious. In contrast, carefully designed intervention studies aimed at reducing drinking in settings where drinking and potential partners co-occur (e.g., in college bars) could provide important insights into the nature of situational processes that give rise to the link between drinking and risky sex, as well as lower sexual risks associated with drinking for those individuals who are vulnerable to acute intoxication effects, situational influences or both.

In short, future intervention studies should attempt to match individuals to different intervention approaches on the basis of theoretical considerations about plausible underlying causes. A series of well-controlled, theoretically informed trials would not only shed light on the nature of multiple causal processes that underpin the link between alcohol and risky sex, but also provide a set of effective

intervention strategies that could be targeted for use with different audiences. Although the main findings of Project MATCH (Project MATCH Research Group, 1997, 1998) did not support the notion of patient-treatment matching, it is possible that the basis for matching to treatments in that study was not sufficiently sensitive to variations in underlying causal structures. Accordingly, careful efforts to identify reliable markers of different underlying process models will be needed to maximize the likelihood of success of such an endeavor.

In sum, the relationship between alcohol use and risky sexual behavior appears to be both complex and highly circumscribed. Nevertheless, the fact that this relationship appears most potent in the context of new or casual dating and sexual relationships heightens the importance of this issue among college students who, on average, have more than eight new sex partners over their 4 years in college (see Table 1). Because of limited drinking and sexual experience typical of most students prior to college, and the unprecedented freedoms to experiment that college environments typically provide, college students—more so than most other groups—may combine drinking and sex in ways that jeopardize their mental and physical well-being.

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Alcohol-Related Sexual Assault: A Common Problem among College Students*

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ABSTRACT. *Objective:* This article summarizes research on the role of alcohol in college students' sexual assault experiences. Sexual assault is extremely common among college students. At least half of these sexual assaults involve alcohol consumption by the perpetrator, the victim or both. *Method:* Two research literatures were reviewed: the sexual assault literature and the literature that examines alcohol's effects on aggressive and sexual behavior. *Results:* Research suggests that alcohol consumption by the perpetrator and/or the victim increases the likelihood of acquaintance sexual assault occurring through multiple pathways. Alcohol's psychological, cognitive and motor effects contribute to sexual assault. *Conclusions:* Although existing research addresses some important questions, there are many gaps. Methodological limitations of past research are noted, and suggestions are made for future research. In addition, recommendations are made for college prevention programs and policy initiatives. *(J. Stud. Alcohol,* Supplement No. 14: 118-128, 2002)

ALCOHOL-RELATED sexual assault is a common occurrence on college campuses. A college student who participated in one of our studies explained how she agreed to go back to her date's home after a party: "We played quarter bounce (a drinking game). I got sick drunk; I was slumped over the toilet vomiting. He grabbed me and dragged me into his room and raped me. I had been a virgin and felt it was all my fault for going back to his house when no one else was home." A male college student who forced sex on a female friend wrote that, "Alcohol loosened us up and the situation occurred by accident. If no alcohol was consumed, I would never have crossed that line."

This article reviews the literature on college students' sexual assault experiences. First, information is provided about the prevalence of sexual assault and alcohol-involved sexual assault among college students. Then theories about how alcohol contributes to sexual assault are described. After making suggestions for future research, the article concludes with a discussion of prevention and policy issues.

Incidence and Prevalence of Sexual Assault among College Students

The term *sexual assault* is used by researchers to describe the full range of forced sexual acts including forced touching or kissing; verbally coerced intercourse; and physically forced vaginal, oral and anal penetration. The term *rape* is typically reserved for sexual behaviors that involve some type of penetration due to force or threat of force; a lack of consent; or inability to give consent due to age, intoxication or mental status (Bureau of Justice Statistics, 1995; Koss, 1992). Less than 5% of adolescent and adult sexual assault victims are male, and when men are sexually assaulted, the perpetrator is usually male. Thus, most research focuses on female victims and male perpetrators.

Rates of sexual assault reported by college women

The most methodologically rigorous study of sexual assault prevalence was completed by Koss et al. (1987), who surveyed 6,159 students from 32 colleges selected to represent the higher education enrollment in the United States. They used 10 behaviorally specific questions to assess women's experiences with forced sexual contact, verbally coerced sexual intercourse, attempted rape and rape since the age of 14. In this survey, 54% of the women had experienced some form of sexual assault. Fifteen percent of the women had experienced an act that met the legal definition of completed rape; an additional 12% had experienced attempted rape. Of these women, 17% had experienced rape or attempted rape in the previous year. Only 5% of the rape victims reported the incident to the police; 42% told no one about the assault.

Similar prevalence rates have been found in studies conducted at colleges throughout the United States (Abbey et al., 1996a; Copenhaver and Grauerholz, 1991; Mills and Granoff, 1992; Muehlenhard and Linton, 1987). Most of these studies have been cross-sectional. In the prospective study that followed students for the longest period of time, Humphrey and White (2000) surveyed women from one

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university beginning in the fall of their first year and ending in the spring of their fourth year. Annual prevalence rates were alarmingly high, although they declined slightly each year. In their first year of college, 31% of the women experienced some type of sexual assault; 6.4% experienced completed rape. In their fourth year of college, 24% of the women experienced a sexual assault; 3.9% experienced completed rape. Greene and Navarro (1998) reported that none of the college women in their prospective survey reported their sexual assault to any college official. Women who reported their sexual assaults to authorities often labeled their treatment by the system as "a second rape." Awareness of the derogatory manner in which many victims are treated deters others from reporting.

A few studies have focused on prevalence rates among minority students. Rates of sexual assault experienced by black, Hispanic, Asian and white college women appear to be relatively comparable (Abbey et al., 1996a; Koss et al., 1987; Mills and Granoff, 1992).

Rates of sexual assault reported by college men

College men acknowledge committing sexual assault, although at lower rates than these acts are reported by women. In Koss et al.'s (1987) national study, 25% of the college men surveyed reported committing some form of sexual assault since the age of 14; 7.7% reported committing an act that met the standard legal definition of rape since the age of 14. Similar results have been found by other researchers (Abbey et al., 1998; Kanin, 1985; Muehlenhard and Linton, 1987; Rapaport and Burkhart, 1984). About two thirds of college men who acknowledge committing sexual assault report being multiple offenders (Abbey et al., 1998). Koss and her colleagues (Koss, 1988; Koss et al., 1987) suggested that college men report rates lower than college women do because many men view the woman's nonconsent as vague, ambiguous or insincere and convince themselves that their forcefulness was normal seduction not rape.

Prevalence of Alcohol-Related Sexual Assault

On average, at least 50% of college students' sexual assaults are associated with alcohol use (Abbey et al., 1996a, 1998; Copenhaver and Grauerholz, 1991; Harrington and Leitenberg, 1994; Presley et al., 1997). Koss (1988) reported that 74% of the perpetrators and 55% of the victims of rape in her nationally representative sample of college students had been drinking alcohol. Most studies do not include sufficiently detailed questions to determine if the quantity of alcohol consumed is an important factor. An exception is a study by Muehlenhard and Linton (1987), which compared the characteristics of dates that did and did not involve sexual assault. Sexually assaultive dates were not more likely than nonassaultive dates to involve drinking; however, heavy drinking was more common on sexually assaultive dates.

Typically, if either the victim or the perpetrator is drinking alcohol, then both are. For example, in Abbey et al. (1998), 47% of the sexual assaults reported by college men involved alcohol consumption. In 81% of the alcohol-related sexual assaults, both the victim and the perpetrator had consumed alcohol. Similarly, in Harrington and Leitenberg (1994), 55% of the sexual assaults reported by college women involved alcohol consumption. In 97% of the alcohol-related sexual assaults, both the victim and the perpetrator had consumed alcohol. The fact that college sexual assaults occur in social situations in which men and women are typically drinking together makes it difficult to examine hypotheses about the unique effects of perpetrators' or victims' intoxication.

In general, alcohol consumption is more common among whites than blacks (Caetano et al., 1998). Thus, not surprisingly, alcohol-related sexual assaults appear to be more common among white college students than among black college students (Abbey et al., 1996a; Harrington and Leitenberg, 1994). Rates of alcohol-related sexual assault have not been examined in other ethnic groups.

Overall, the characteristics of alcohol-involved sexual assaults and sexual assaults that do not involve alcohol are similar. Approximately 90% of the sexual assaults reported by college women are perpetrated by someone the victim knew; about half occur on a date (Abbey et al., 1996a; Koss, 1988). Only about 5% involve gang rapes. The most common locations are the woman's or man's home (this includes dormitory rooms, apartments, fraternities, sororities and parents' homes) in the context of a date or party. Alcohol-involved sexual assaults more often occur among college students who know each other only casually and who spent time together at a party or bar (Abbey et al., 1996a; Ullman et al., 1999).

Explanations for the Relationship between Alcohol Consumption and Sexual Assault

The fact that alcohol consumption and sexual assault frequently co-occur does not demonstrate that alcohol causes sexual assault. The causal direction could be the opposite; men may consciously or unconsciously drink alcohol prior to committing sexual assault to have an excuse for their behavior. Alternatively, other variables may simultaneously cause both alcohol consumption and sexual assault. For example, personality traits, such as impulsivity, or peer group norms may lead some men both to drink heavily and to commit sexual assault.

It is likely that each of these causal pathways explains some alcohol-involved sexual assaults. A complex behavior such as sexual assault has multiple determinants both

across different perpetrators and for any one perpetrator. Abbey (1991) proposed seven different explanations for the relationship between alcohol and sexual assault. An expanded version of this model is described below and is summarized in Figure 1 (for a more thorough review, see Abbey et al., 1996b). This model focuses on the most common type of sexual assault that occurs between men and women who know each other and are engaged in social interaction prior to the assault, the prototypic college sexual assault situation. As can be seen in the figure, a combination of preexisting beliefs and situational factors contribute to acquaintance sexual assault. Alcohol has independent and synergistic effects. Some general information about causes of acquaintance rape are described below because alcohol often exacerbates dynamics that can arise without alcohol.

Two general caveats are needed before the literature supporting each element of the model is reviewed. First, there are personality characteristics (e.g., impulsivity, low empathy) and past experiences (e.g., childhood sexual abuse, delinquency) that have been consistently linked to sexual assault perpetration. This literature has been extensively reviewed elsewhere (Seto and Barbaree, 1997; White and Koss, 1993). Consequently, this article focuses on attitudinal and situational factors that interact with alcohol consumption to increase the likelihood of sexual assault occurring among college students. These factors are more likely to be amenable to change, and suggestions for prevention and policy initiatives are made at the end of this article.

A second important caveat concerns the relationship between explanations and causal responsibility. As the quotes at the beginning of this article indicate, perpetrators often use alcohol to excuse sexual assault perpetration, whereas victims often feel guilty because they were drinking. However, men are legally and morally responsible for acts of sexual assault they commit, regardless of whether or not they were intoxicated or felt that the woman had led them on previously. The fact that women's alcohol consumption may increase their likelihood of experiencing sexual assault does not make them responsible for the man's behavior, although such information may empower women when used in prevention programs.

Traditional gender role beliefs about dating and sexuality

American gender role norms about dating and sexual behavior encourage men to be forceful and dominant and to think that "no" means "convince me." Men are expected to always be interested in sex, whereas women learn that they should not appear too interested in engaging in sexual activities or that they will be labeled "fast" or "promiscuous." Women are expected to set the limits on sexual activities and are often held responsible when men overstep them (Clark et al., 1999; Werner and LaRussa, 1985). Men often interpret a woman's sexual refusal as a sign that they should try harder or a little later rather than that they should give up. Although such beliefs may sound outdated, surveys of college students consistently find that men are

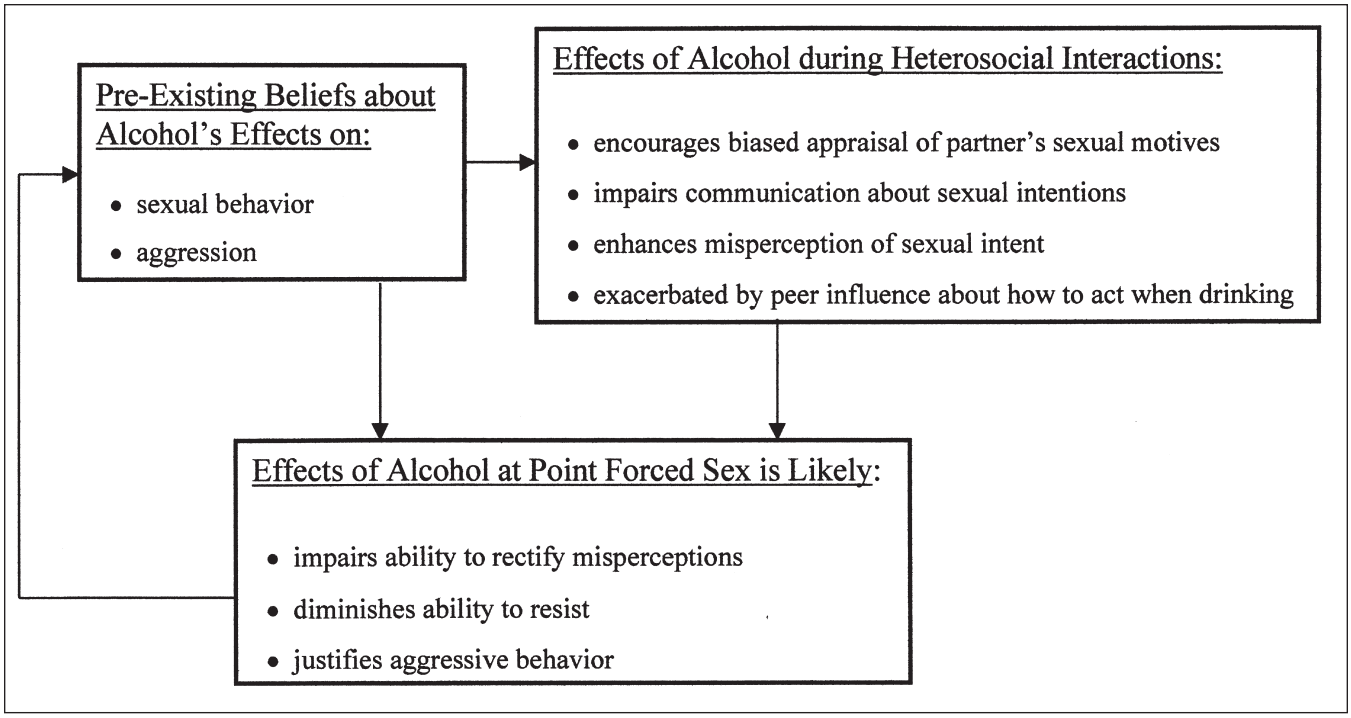

FIGURE 1. Conceptual model of alcohol-related acquaintance sexual assault

expected to initiate sexual relations and that women are expected to set the limits on how much sexual activity occurs (Clark et al., 1999; Wilsnack et al., 1997).

Both men and women agree that there are circumstances that make forced sex acceptable. For example, McAuslan et al. (1998) asked college students to indicate the extent to which it was acceptable for a man to verbally pressure or force a date to have sexual intercourse. More than half the men thought verbal pressure was acceptable if she kissed him, if they had dated a long time or if he felt she had led him on. More than 20% thought verbal pressure was acceptable if either of them was drinking alcohol or if they met at a bar. Force was viewed as less acceptable than verbal pressure, although 17% of men accepted force as a strategy under some circumstances. Overall, fewer women than men perceived pressure or force as acceptable, although the rank ordering of circumstances was comparable for both genders. Malamuth (1989) asked college men how likely it was that they would rape a woman if they were certain that there would be no negative consequences. On average, one-third of college men indicated that they would be at least somewhat likely to rape a woman if they could be certain they would not be caught. The data from these two lines of research are disturbing because they demonstrate how commonly held beliefs set the stage for date rape and why it is so seldom perceived as a crime. As is described in more detail below, these beliefs are more likely to be acted on when men have been drinking alcohol.

Men's expectations about alcohol's effects

Men anticipate feeling more powerful, sexual and aggressive after drinking alcohol (Brown et al., 1980; George and Norris, 1991; Presley et al., 1997; see the first box in Figure 1). These expectancies can have a power of their own, independent of the pharmacological effects of alcohol. Expectancies tend to become self-fulfilling (Snyder and Stukas, 1999). Thus, if a man feels powerful and sexual after drinking alcohol, then he is more likely to interpret his female companion's friendly behavior as being a sign of sexual interest, and he is more likely to feel comfortable using force to obtain sex. In one study, college men who had perpetrated sexual assault when intoxicated expected alcohol to increase male and female sexuality more than did the college men who perpetrated sexual assault when sober (Abbey et al., 1996b). Although these cross-sectional results do not demonstrate causality, they suggest that beliefs about alcohol's effects may have encouraged these students' behavior.

Several studies have demonstrated that college men who thought they were drinking alcohol were more sexually aroused by depictions of forcible rape than college men who did not think they had consumed alcohol (George and Marlatt, 1986; George and Norris, 1991). Actual alcohol consumption did not affect these men's sexual arousal. George and Marlatt argued that the belief that one has consumed alcohol provides justification for engaging in socially inappropriate sexual behavior. If a man can say to himself, "I did that only because I was too drunk to know what I was doing," then he does not have to label himself as deviant.

Stereotypes about drinking women

Many college men perceive women who drink in bars as being sexually promiscuous and, therefore, appropriate targets for sexual aggression (Kanin, 1985; Martin and Hummer, 1989). For example, a college man who reported sexually assaulting a woman in one of our studies justified his behavior by writing, "She was the sleazy type . . . the typical bar slut."

In vignette studies, women who drink alcohol are frequently perceived as being more sexually available and sexually promiscuous than women who do not drink alcohol. For example, George et al. (1995) asked college students to read a vignette about a couple on a date. A woman who drank several beers was perceived as being more promiscuous, easier to seduce and more willing to have sex than a woman who drank cola. College students believe that dates are more likely to include sexual intercourse when both participants drink alcohol (Corcoran and Thomas, 1991).

Alcohol as a sexual signal

The studies reviewed above involve clearly consensual sexual situations. Other authors have asked college students to evaluate vignettes that depict forced sex between dating partners. Even when force is clearly used, the mere presence of alcohol leads many students to assume the woman wanted sex. For example, Norris and Cubbins (1992) found that nondrinking college women and men were most likely to view a depiction of acquaintance rape as consensual when both members of the couple had been drinking alcohol. Norris and Kerr (1993) found that nondrinking college men who read a forced sex vignette indicated that they were more likely to behave like the man in the story when the man had been drinking alcohol than when he was sober. Finally, Bernat et al. (1998) asked college men to listen to a depiction of a date rape and evaluate at what point the man was clearly forcing sex. Men who had previously committed sexual assault and who thought the couple had been drinking alcohol required the highest degree of female resistance and male force to decide the man should stop. In combination, these studies suggest that when forced sex occurs after a couple has been drinking together, men, and sometimes women, are much less likely to recognize that

the woman does not want to have sex. The results of these studies are not due to pharmacological effects of alcohol because sober individuals made these judgments. Instead, these studies suggest how strongly men equate drinking with a woman and having sex with her.

Men's misperceptions of women's sexual intent

Men frequently perceive women's friendly behavior as a sign of sexual interest, even when it is not intended that way. In a series of studies with college women and men, Abbey and her colleagues (Abbey, 1982; Abbey et al., 2000) have demonstrated that men perceive women as behaving more sexually and as being more interested in having sex with their male partner than the women actually are. Male observers make judgments similar to those made by male actors, and female observers make judgments similar to those made by female actors (Abbey, 1982), indicating that these are general gender differences in perceptions of women's behavior. Cues used to convey sexual interest are often indirect and ambiguous; thus it is easy to mistake friendliness for flirtation. For example, when an opposite sex acquaintance is very attentive, this might be a sign of sexual attraction. Alternatively, it might be a sign of politeness or merely an active interest in the topic of conversation.

Men usually feel responsible for making the first move because of gender role expectations about who initiates dating and sexual relations. Due to the embarrassment associated with rejection, these initial moves are usually subtle. For example, the man may stand close or ask the woman to slow dance or suggest they go to his apartment to talk. If he perceives an encouraging response (she does not back away or she agrees to dance or she goes to his apartment), then he will make another move (e.g., rub her back, tell her his roommates are not home). Both men and women are used to this indirect form of indicating sexual interest and usually manage to make their intentions clear and save face if their companion is not interested (Abbey, 1987). However, because the cues are vague, miscommunication can occur. Also, college men expect to have intercourse much earlier in a relationship than women do (Roche and Ramsbey, 1993); hence men are likely to initiate sexual advances before women expect them.

The man's alcohol consumption enhances the likelihood that misperception will occur and will escalate to the point that he forces sex (see second box in Figure 1). Alcohol consumption disrupts higher order cognitive processes such as abstraction, conceptualization, planning and problem solving, making it difficult to evaluate complex stimuli (Hindmarch et al., 1991; Peterson et al., 1990). When intoxicated, people have a narrower perceptual field; they are less able to attend to multiple cues and instead tend to focus on the most salient cues (Chermack and Giancola, 1997). Steele and Josephs (1990) labeled this phenomenon "alcohol myopia." Thus, if an intoxicated man is sexually attracted to his female companion, it is easy for him to interpret any friendly cue as a sign of her desire to have sex with him and to ignore or discount any cue that suggests she is not.

Muehlenhard and Linton (1987) compared the characteristics of college students' dates that did and did not involve sexual assault. Men believed that dates on whom they had forced sex had "led them on" to a greater extent than did dates on whom they had not forced sex. Similarly, women who had experienced forced sex on a date were more likely than those who had not to believe that the man felt "led on," although women reported that this had not been their intention. In a more focused examination of the relationships between misperception, alcohol consumption and sexual assault, Abbey et al. (1998) found that the more frequently college men had misperceived a woman's sexual intentions and the more frequently they were drinking alcohol when they misperceived a woman's intentions, the more frequently they had committed sexual assault.

Alcohol's effects on men's willingness to behave aggressively

If a man feels that he has been led on or teased by his date he may feel justified forcing sex when sober (McAuslan et al., 1998). However, research consistently indicates that alcohol increases the likelihood that individuals will behave aggressively, especially if they feel as if they have been threatened or harmed (see third box in Figure 1). Experimental studies demonstrate that intoxicated men retaliate strongly if they feel threatened or provoked (Taylor and Chermack, 1993). Furthermore, once they begin behaving aggressively, it is difficult to make intoxicated men stop unless nonviolent cues are extremely salient.

In the case of sexual assault, a man may feel his aggressiveness is justified if he believes his partner encouraged his sexual interest and that once led on a man has a right to sex. Intoxication limits one's ability to consider the long-term negative consequences of behavior because it limits one's focus to short-term immediate cues. Thus an intoxicated man is likely to focus on his sexual arousal and sense of entitlement rather than the potential pain and suffering of his victim or the possibility that he will be punished. An alcohol-induced sense of disinhibition and reduction in anxiety and self-appraisal makes it easier for men to use physical force to obtain sex (Ito et al., 1996).

Alcohol's effects on women's ability to assess and react to risk

A woman who is drinking alcohol experiences the same types of cognitive deficits as a man does. Thus, if a woman feels that this is a platonic relationship or that she has made

it clear that she is not interested in sexual intercourse at this point in time, alcohol will make her less likely to process potentially contradictory cues and realize that her partner is misperceiving her. For example, imagine a man and a woman who have been dating several weeks. After seeing a movie together, the man may suggest going back to his apartment for a drink. His underlying message is "let's go back there to have sex" but he does not say that directly. The woman may respond, "Well, I guess I could come back for one drink, but I really can't stay long." Her underlying message is "I'd like to get to know you better but I'm not spending the night." However, she is also being indirect. Cognitive deficit theories (Steele and Josephs, 1990; Taylor and Chermack, 1993) suggest that when drinking it is very easy to focus only on the part of the message that one wants to hear. In this example, the man may hear only the confirming part of the message, "I'll come to your apartment," and ignore the disconfirming part of the message, "I won't stay long." In contrast, the woman focuses on the message she wants to hear, "I want to spend more time with you," rather than the message the man is trying to send, "I want to be alone with you so we can have sex."

In their study of college sexual assault victims, Harrington and Leitenberg (1994) examined whether alcohol consumption was related to consensual sexual activity prior to the assault. Overall, 74% of the women had engaged in kissing or another form of sexual contact prior to the forced sex. Victims who were intoxicated were more likely to have engaged in consensual sexual activities with the man than were sober victims. This finding supports the argument described above. Intoxicated women are less likely to realize that by kissing the man they are encouraging him to expect sexual intercourse. A woman in one of our studies wrote, "Alcohol put me in the mood for petting, kissing, holding and hugging, and he may have interpreted that as going further with sexual activity."

In addition, if and when a woman realizes that she has been misperceived, she must decide how to respond. Norms of female politeness and indirectness regarding sexual communication are so well internalized that some women find it difficult to confront a man directly, especially if they like him and hope to continue the relationship (Lewin, 1985). Unfortunately, if the woman is not direct and forceful about her lack of interest in sex, her companion is likely to perceive her behavior as flirtation or coyness, rather than as a refusal. Even a direct "no" is often interpreted as "try later" (Byers and Wilson, 1985); thus repeated, direct refusals are often needed for a woman to make her intentions clear to a persistent man. The longer a man continues to believe that consensual sex will occur, the more likely it is that he will feel justified forcing sex because he feels that he has been led on (McAuslan et al., 1998; Muehlenhard and Linton, 1987).

Testa and Livingston (1999) interviewed sexual assault victims, half of whom were college students. Women who were drinking at the time of the sexual assault reported that their intoxication made them take risks that they normally would avoid. For example, they felt comfortable taking a ride home from a party with a man they did not know well or letting an intoxicated man into their apartment. These women indicated that alcohol made them feel comfortable in situations that they usually would have perceived as dangerous. Norris et al. (1996) observed that when interacting with men on dates or at parties women must often "walk a cognitive tightrope" (p. 137). Women want men to like them and have been socialized to wear revealing clothes, act friendly and assume responsibility for maintaining positive social relationships by laughing at men's jokes, complimenting them and appearing interested in what they have to say. However, women also realize that sexual assault is common and that they must be on the alert to be assured that they can trust the man with whom they are interacting. Thus women's affiliation and safety motives are in conflict. On a date or with friends at a party or bar, women (and men) typically assume they can trust their companions. Being intoxicated allows women to let down their guard and focus on their desire to have fun and be liked rather than on their personal safety. Thus alcohol myopia may lead women to take risks they would not normally take.

Alcohol's effects on women's ability to resist effectively

Alcohol's effects on motor skills may limit a woman's ability to resist sexual assault effectively. There is some evidence that attempted as opposed to completed rapes are more common among sober than intoxicated victims, suggesting that sober victims are more able to find a way to escape or resist effectively (Abbey et al., 1996b). For example, a woman in one of our studies wrote, "I was very drunk and could not drive or get away from him even though we were in my car." Harrington and Leitenberg (1994) found that acquaintance rape victims who reported being at least somewhat drunk were less likely to use physical resistance strategies than were victims who were not drunk.

Many men who have committed sexual assault realize that it is harder for women to resist sexual advances when intoxicated; thus they try to get their female companion drunk as a way of obtaining sex (Kanin, 1985; Mosher and Anderson, 1986). Three-quarters of the college date rapists interviewed by Kanin indicated that they purposely got a date intoxicated to have sexual intercourse with her. Playing drinking games has been related to sexual victimization (Johnson et al., 1998). Women drink more than usual when playing drinking games, and men may use these games to get women drunk with the hope of making it easier to have sex with them.

Alcohol's effects on perceptions of responsibility

Alcohol consumption is sometimes used as a justification for men's socially inappropriate behaviors (Berglas, 1987). Of the college date rapists interviewed by Kanin (1984), 62% felt that they had committed rape because of their alcohol consumption. These men believed that their intoxicated condition caused them to initially misperceive their partner's degree of sexual interest and later allowed them to feel comfortable using force when the women's lack of consent finally became clear to them. These date rapists did not see themselves as "real" criminals because real criminals used weapons to assault strangers. Figure 1 (first box) includes a feedback loop between feeling that alcohol justifies aggressive behavior and preexisting beliefs about alcohol's effects. Once a man has used intoxication to justify forced sex, he is more likely to believe that alcohol causes this type of behavior and to use this as an excuse in the future.

In contrast, women tend to feel more responsible for sexual assault if they had been drinking alcohol (Norris, 1994). Women are often criticized for losing control of the situation, not communicating clearly, not resisting adequately and failing in their gatekeeper role. In one of our surveys, a woman replied to a question about if the assault was avoidable, "Yes, if I had not been intoxicated . . . I would have been more in control of myself and the situation."

Other people also tend to blame intoxicated women for sexual assault. For example, Richardson and Campbell (1982) asked male and female college students to read a story about a college woman raped by a guest while cleaning up after a party. Both male and female students perceived the perpetrator as less responsible when he was intoxicated. In contrast, both male and female students perceived the victim as more responsible when she was intoxicated. The woman was also perceived as less likable and moral when she was drunk; however, alcohol consumption did not affect these judgments about the male. A more recent study (Hammock and Richardson, 1997) replicated the findings regarding the victim's alcohol consumption. Victims of sexual assault were held more responsible by male and female college students when they were intoxicated. These findings may help explain why less than half of college student sexual assault victims tell anyone about what happened (Koss et al., 1987). They may anticipate being blamed rather than supported.

Several other studies have found that judgments about sexual assault vignettes depend on whether both the victim and perpetrator were drinking or only the victim was drinking. For example, Stormo et al. (1997) found that when both the man and the woman were equally intoxicated, drinking women were held more responsible for sexual assault; in contrast, drinking men were held less responsible. However, a sober man was judged to be more responsible when he assaulted an intoxicated woman, perhaps because he was seen as taking advantage of her. It is noteworthy that observers sometimes derogate men for taking advantage of an intoxicated woman, although many sexual assault perpetrators seem to experience no remorse about using this strategy to obtain sex (Kanin, 1985; Mosher and Anderson, 1986).

Peer environments that encourage heavy drinking and sexual assault

For some drinkers, alcohol provides a justification for engaging in behaviors that are usually considered inappropriate. This excuse-giving function is only effective if one's peer group shares the same beliefs. The peer group norms in some college social environments, including many sororities and fraternities, accept getting drunk as a justification for engaging in behaviors that would usually be embarrassing. The peer norms for most fraternity parties are to drink heavily, to act in an uninhibited manner and to engage in casual sex (Martin and Hummer, 1989; Norris et al., 1996). Although researchers have focused on Greek organizations, heavy episodic drinking and forced sex are not condoned by all fraternities or all members of fraternities. Other types of formal (e.g., athletic groups) and informal college peer networks can encourage drunken excess and inappropriate behavior.

Martin and Hummer (1989) argued that many fraternities create a social environment in which sexual coercion is normalized because women are perceived as commodities available to meet men's sexual needs. Alcohol is used to encourage reluctant women to have sex. One fraternity man stated that at parties, "We provide them [Little Sisters] with 'hunch punch' and things get wild. We get them drunk and most of the guys end up with one" (p. 465). With no remorse or guilt, this fraternity man described his plans to get one particular woman drunk by serving her punch without letting her know it was spiked for the challenge of having sex with a "prim and proper sorority girl" (p. 465).

Research has also been conducted with sorority women to determine the types of social pressure that they experience. Norris et al. (1996) found that most sorority women know that the emphasis at many fraternity parties is on heavy drinking and casual sex. In focus groups, they articulated warning signs such as getting too drunk or receiving attention from specific men who have a reputation for forcing sex. However, most of these women believed that they were "too smart to be raped" (p. 132). Thus these sorority women recognized that being drunk makes women easy targets, yet they thought they were better than other women at staying alert when drunk. These sorority women also seemed unwilling to report sexual assault when it occurred. They thought that the Greek system received too

much negative press; thus they felt responsible to be positive about it.

Summary of research regarding alcohol's role in college sexual assaults

Alcohol increases the likelihood of sexual assault occurring among acquaintances during social interactions through several interrelated pathways. These pathways include beliefs about alcohol, deficits in higher order cognitive processing and motor impairments induced by alcohol and peer group norms that encourage heavy drinking and forced sex. There is a synergistic relationship between men's personality traits (e.g., low empathy, high impulsivity), attitudes (e.g., believe forced sex is sometimes acceptable, believe women are coy about their sexual intentions and enjoy forced sex) and alcohol's effects. If a man believes forced sex is acceptable and women cannot be trusted, he may be comfortable raping when sober. Alcohol makes it even easier for men to feel comfortable forcing sex because alcohol myopia helps them focus solely on their desire to have sex rather than on the woman's signs of refusal and pain. Although data have been presented to support each of these arguments, causality cannot be firmly established because each study had methodological limitations. In combination, however, these studies demonstrate the many ways in which alcohol consumption can contribute to sexual assault.

Directions for Future Research

Given how many sexual assaults occur in high school and how many high school students report heavy episodic drinking, long-term longitudinal studies are needed that follow youth from early adolescence into adulthood. Prospective research would allow potential causes, such as stereotypes about drinking women, alcohol expectancies and usual alcohol consumption, to be measured prior to the experience of college sexual assault.

More precise measurement is needed of the amount of alcohol consumed in sexual assault situations. Because most researchers assess only whether or not any alcohol was consumed, it is impossible to evaluate whether perpetrators or victims were intoxicated at the time of the assault. The effects of one glass of wine with dinner are likely to be very different from the effects of 10 beers consumed within a 2-hour period at a party. Another difficult measurement issue concerns how to enhance the accuracy of drunken recall. If a woman was so drunk she was unconscious when she was raped, it may be impossible for her to fully and accurately describe what occurred. Methodological studies are needed that focus on how best to ask questions to enhance accurate recall of events that occurred under various levels of intoxication.

In-depth qualitative studies are necessary to better understand the precise role of alcohol in sexual assault. These studies need to include students from different cultural and ethnic backgrounds. Research with minority students, students at commuter schools and gay students is needed. A few authors have focused on Greek organizations and athletes; however, students with other interests and lifestyles also need to be represented in qualitative research.

Alcohol administration studies are required because only when participants are randomly assigned to drink an alcoholic or nonalcoholic beverage can one be certain that differences in their behavior are due to alcohol rather than other factors such as prior drinking history. Because sexual assault cannot be an outcome in laboratory studies, appropriate proxies must be used. Some researchers have exposed participants to pornography as a proxy for sexual assault (George and Marlatt, 1986; Hall and Hirschman, 1994). Other researchers have asked participants to evaluate written or audio depictions of sexual assault when intoxicated or sober (Bernat et al., 1998; Norris and Cubbins, 1992). Whenever participants read stories about sexual assault, there is a concern that they may not respond in the same way that they would to an event in their own lives. Research that helps explain how other people react to sexual assault victims is important in its own right because victims are so often blamed by others.

Many of the studies that have informed theory about alcohol's role in sexual assault have examined general aggressive and sexual behavior. Additional research in these areas can be used to develop prevention and treatment programs. For example, research can investigate the circumstances under which men are most willing to aggress against a female confederate (Taylor and Chermack, 1993) or delineate the types of cues that intoxicated men are most likely to misperceive (Abbey et al., 2000).

Prevention and Policy Implications

There are many potential prevention and policy implications that stem from this review. The suggestions provided here are derived from the literature; however, they have not been evaluated. It is crucial that colleges develop evaluation plans so that they can determine the effectiveness of the programs they utilize.

One simple, but important, policy implication that derives from this review is that the individuals on campus who are responsible for programs on the prevention of alcohol misuse must work in conjunction with those individuals responsible for programs on the prevention of sexual assault. Most acquaintance rape prevention programs discuss alcohol as a risk factor, but many do not emphasize it (Bohmer and Parrot, 1993). In a similar manner, programs that describe responsible drinking do not typically empha-

size sexual assault as a consequence of heavy drinking. Programs on prevention of alcohol misuse can provide students with the precise definition of sexual assault in their state and information about the prevalence of alcohol-related sexual assault among college students. These programs can also explain that alcohol is not legally considered a mitigating factor for sexual assault and that having sex with someone too intoxicated to give consent is legally rape.

Most research currently being conducted to explain alcohol's effects on behavior focus on the role of alcohol-induced cognitive deficits in producing a variety of risky, socially disapproved of behaviors. According to alcohol myopia theories (Steele and Josephs, 1990; Taylor and Chermack, 1993), alcohol causes people to focus on the most salient cues in the situation and ignore or minimize peripheral cues. In the domain of sexual assault, the assumption is that the man's immediate sexual arousal and anger are much more salient than the potential risk of being accused of sexual assault.

This argument suggests that increasing the salience, explicitness and centrality of inhibitory information should be an effective prevention strategy. If the costs of sexual assault are obvious, undesirable and immediate, then intoxication-driven sexual assaults are less likely to occur because the potential perpetrator cannot forget about the likely, undesirable consequences. This suggests that colleges need strong, consistent, well-publicized policies that no one can ignore. Men need to know that "no means no" and that forced sex is a crime that the university will not tolerate. Students need to know how to report sexual assault to university authorities, how cases will be evaluated and what the sanctions are for the perpetrator and organizations that facilitated the assault. The campaign to reduce driving while intoxicated has used a similar approach by making the legal and social consequences of driving while intoxicated more salient and serious, and it has been successful in reducing the incidence of this crime (Voas et al., 1998).

The second predominant theory regarding how alcohol exerts its effects concerns the role of people's beliefs about alcohol. If students believe that alcohol makes them do wild and crazy things that they would not do otherwise, then they are much more likely to act out when drinking. The policy implications of this research are twofold. First, educational efforts are needed to change students' alcohol expectancies and to emphasize negative consequences such as making bad decisions, feeling embarrassed the next day and doing poorly in school. Second, these programs have to make it clear that intoxication does not excuse illegal or immoral behavior, so claiming "I did it because I was drunk" will not reduce the consequences. General interventions designed to challenge college students' expectancies about alcohol's effects have been effective in reducing alcohol consumption (Darkes and Goldman, 1993), suggesting that those specifically targeted at expectancies regarding sex and aggression may also be beneficial.

Many college women realize that getting drunk at a fraternity party puts women at risk of being sexually assaulted (Norris et al., 1996). However, a sense of personal invulnerability leads women to believe that they are too smart for it to happen to them. These college women are not unique; many psychological studies have demonstrated that young people feel personally invulnerable to the consequences of a wide variety of risky behaviors (Weinstein and Klein, 1996). Prevention programs that strip away some of this sense of personal invulnerability are necessary so that women will take more precautions. Optimism is in many ways psychologically adaptive; thus programs must avoid scare tactics that make women feel helpless and unable to trust any man. Although the rates of sexual assault are very high, the probability of any one date or party involving sexual assault is low. Thus women must be able to enjoy themselves most of the time, but remain alert for men that are trying hard to get them to drink alcohol, take drugs or accompany them to an isolated location.

Women sometimes seem to feel that it is easier to give in than to fight a sexually coercive man. Lewin (1985) quoted a college woman who wrote, "I feel that I had to go through with the complete sex act because of a feeling of pressure. . . . I felt perhaps I would let him down and as a result he would like me less . . . in fact he never spoke to me after the experience. . . . I should have been as selfish as he was" (p. 184). Some authors have suggested that a passive response is most likely if the man is a current or past boyfriend who feels that he is entitled to sex (Testa and Livingston, 1999). The myth that it is impossible for a sexually aroused man to control himself still seems to be believed by many male and female college students. These findings about some women's reluctance to be forceful with sexually persistent men have prevention and policy implications. Educational programs for women need to encourage them that they have the right to refuse sex at any time, with anyone, regardless of their relationship or previous degree of sexual interaction. In addition, women need to know that being verbally and physically assertive are often effective resistance strategies and that when they are drunk they will have a harder time effectively resisting. Educational programs for men need to teach them to take subtle signs of disinterest seriously. If a woman says "no, I don't want to do that now," that comment should be enough to stop their sexual advances; a woman should not have to scream or kick to get her point across. Many female and male college students engage in sexual activities they later regret, because they are uncomfortable being straightforward in sexual communications. Programs that help students learn to talk about sex with potential sex partners are

needed. Because alcohol makes it easy to ignore subtle signals, men need to be particularly careful when they are drinking to communicate their sexual desires clearly and to obtain active consent from a woman before engaging in sex.

Prevention programs should begin in middle school, as dating relationships begin to develop. College students are still open to new ideas; thus sexual assault prevention messages need to be provided to male and female college students early and frequently. New students can be provided with information at orientation about the many consequences of heavy drinking, including sexual assault. Programs need to be interesting and to use a variety of modalities including videos, theater groups, role playing and coed discussion groups. Peer leaders are crucial to demonstrate that other students share these concerns. Special efforts need to be made with Greek organizations, sports teams and other large social groups to enlist their support in prevention efforts. Students are motivated by their peers' beliefs. Demonstrating that not all members of Greek organizations or athletes approve of heavy drinking or forced sex can empower more students to show their disapproval. Conducting needs assessment surveys and focus groups with students on campus can provide information that helps tailor prevention programs to the specific needs of students at that institution. Faculty, staff and administrators need to be well informed so that they can support program efforts. Women who report being sexually assaulted after drinking heavily at a party need to know that they will be treated with respect and concern by campus personnel, or they will continue to keep this crime a secret.

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Alcohol-Related Aggression during the College Years: Theories, Risk Factors and Policy Implications*

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ABSTRACT. *Objective:* The purpose of this article is to present an overview of the research literature on alcohol-related aggression with a focus on college students. *Method:* Data from both survey studies and experimental laboratory investigations conducted on college students are reviewed. Various methodological approaches to studying the alcohol-aggression relation, and their associated limitations, are then presented and discussed. *Results:* The literature indicates that alcohol consumption facilitates aggressive behavior and increases the risk of being the victim of a violent act, particularly in heavy drinkers. Results from these studies are then placed into a context by reviewing 12 influential theories of aggression and alcohol-related aggression. On the basis of these theories and empirical data, a preliminary risk profile is presented to help identify which factors are likely to be important in predicting who will and who will not become aggressive after drinking alcohol. *Conclusions:* Although much research is still needed to elucidate the intricate causes of alcohol-related aggression, current prevention efforts might focus on modifying key risk factors such as poor cognitive functioning and inaccurate expectations about the effects of alcohol. Other prevention efforts directed specifically at college students might focus on helping them to identify risky situations that might facilitate the expression of intoxicated aggression. (*J. Stud. Alcohol,* Supplement No. 14: 129-139, 2002)

ENTRANCE INTO college marks a time of significant change in the life of a young adult. For many students, college is a place where drinking alcohol either begins or increases in frequency. Subsequent to this rise in drinking, a substantial number of college students develop alcohol-related problems. Fortunately, for the majority of students, this rise in "college drinking" diminishes after they graduate, at which time they go on to live more productive lives (Chen and Kandel, 1995; Gotham et al., 1997). However, what is problematic for these individuals are the consequences of their drinking during the college years.

Very little research has been conducted to characterize the prevalence and patterns of alcohol-related aggression in college students. Although not specifically intended to target college students, a large study on adolescent development found that of 391 young adults between 18 and 22 years of age (mostly college students), 30% of males and 25% of females reported having engaged in a fight while intoxicated (H. White, personal communication, 1999). In another large study that sampled college students from 140 U.S. colleges in 1993 and then resampled students from 130 of these schools in 1997, it was found that 19-24% of students reported being intoxicated while exhibiting verbal aggression, 9-10% reported being intoxicated while engaging in property damage and 4-6% reported being intoxicated when apprehended by police (Wechsler et al., 1998). However, these numbers were found to be substantially higher in heavier drinkers (Wechsler et al., 1994, 1998). Furthermore, another report on this sample indicated that a large proportion of college students reported being victimized by intoxicated individuals. Specifically, 12% reported being pushed, hit or assaulted; 20% reported being the recipients of unwanted sexual advances; and 22% reported being involved in verbally aggressive interactions (Wechsler et al., 1995). Again, these percentages were found to be significantly higher in heavy drinkers. Interestingly, this suggests that one is more likely to be victimized by an intoxicated assailant if one is a heavy drinker. Finally, when considering schools with high levels of student drinking, 61% of college administrators indicated that physical assaults were a moderate or major problem at their school, 53% indicated a problem with damage to campus property and 86% indicated a problem with sexual assault (Wechsler et al., 1995).

Methodological Approaches and Limitations

The studies described above indicate that alcohol-related aggression is a serious problem both on and off our college campuses. However, methodological issues surrounding the correlational nature of these findings preclude the formulation of statements suggesting a causal relationship between alcohol use and aggressive behavior. At best, what can be determined from these investigations is the percentage of individuals apprehended for, or reporting, an alcohol-related

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incident. Another difficulty is one of base rates. That is, the above results do not indicate whether alcohol is associated with aggression at a higher rate than would be expected by chance alone. Furthermore, there is the problem of directionality. That is, does alcohol cause aggression or do aggressive individuals tend to drink more? Other limitations of some of the above studies include insufficient information regarding whether alcohol was present at the time of the transgression and a reliance on self-report methods that are troubled by response biases, problems in recollection and problems with making inferences about another person's state of intoxication. Despite these limitations, these studies portray a compelling relation between alcohol and aggression, particularly on college campuses. Nevertheless, it is clear that more survey studies utilizing innovative methodologies are needed to characterize the alcohol-aggression relation in college students. The literature pertaining to sexual assault among college students serves as a good example of worthy approaches for documenting the alcohol-aggression link with survey data (Abbey, this supplement).

In addition to these studies, a large number of controlled experimental laboratory investigations have also demonstrated a strong relation between alcohol use and aggressive behavior. Experimental studies are advantageous over correlational studies in that their design structure allows for the formulation of causal inferences. Furthermore, for the purposes of this article, another important reason for paying attention to the results of experimental studies is that although many of these studies utilize samples of convenience, these samples tend to consist mainly of college students.

Most experimental studies that have investigated the alcohol-aggression relation in college students have measured aggression using the Taylor Aggression Paradigm (TAP; Taylor, 1967). Using the TAP, subjects compete against a fictitious opponent under the guise of a reaction time (RT) task. Prior to each RT trial, subjects select 1 of 10 shock intensities that they wish to administer to their opponent. An RT trial then follows. In the event that the subject wins the trial, his or her opponent ostensibly receives the selected shock. In the event that the subject loses the trial, the subject receives a shock ostensibly from his or her opponent. To manipulate the level of provocation, subjects receive both high and low intensity shocks. In actuality, no opponent exists. The TAP operationalizes aggressive behavior as the average shock intensity selected over trials. In some modifications of the TAP, shock duration is also used as a dependent variable. The TAP is a useful tool for assessing the effects of alcohol on aggressive behavior. This is accomplished by comparing shock intensity and duration selections between sober and intoxicated persons.

The TAP has been criticized for having a number of limitations, including adhering to demand characteristics, measuring constructs other than aggression and not incorporating a nonaggressive response option (Tedeschi and Quigley, 1996). However, a number of theorists have responded to these and other concerns (Anderson and Bushman, 1997; Berkowitz and Donnerstein, 1982; Giancola and Chermack, 1998). Furthermore, they have shown that the construct validity of the TAP is well established, in part, by studies demonstrating its convergent and discriminant validity. Convergent validity has been shown through positive associations between shock selections and self-report measures of physical assault, behavioral hostility and outwardly directed anger (Giancola and Zeichner, 1995a; Hammock and Richardson, 1992). Discriminant validity has been demonstrated through the lack of relations between shock selections and measures of guilt, suspicion, resentment, inwardly directed anger (Giancola and Zeichner, 1995c), helping and competition (Bernstein et al., 1987). Additional data supporting the construct validity of the TAP come from studies showing that adolescents with high teacher ratings of aggression are more aggressive on a modified version of the TAP than adolescents with low ratings (Shemberg et al., 1968; Williams et al., 1967). Violent offenders also respond more aggressively on the TAP compared with nonviolent offenders (Hartmann, 1969; Wolfe and Baron, 1971). Although the criticisms marshaled against the TAP reveal some of its limitations, available data indicate that the TAP is a good index of aggression. Because most tools that assess complex social constructs such as aggression are less than perfect, it is recommended that a better manner in which to measure these variables is to employ multiple and diverse metrics.

In most investigations that have used the TAP to study alcohol-related aggression, subjects have typically been assigned to one of three beverage groups: alcohol, no alcohol or placebo. Placebo groups are used to control for the possibility that aggression is the result of the mere belief that one has consumed alcohol. Although some studies have shown full (Lang et al., 1975) or partial (Pihl et al., 1981) placebo effects on aggression, the majority of investigations have found that the mere belief that alcohol has been consumed does not significantly influence aggressive behavior in college students (e.g., Chermack and Taylor, 1995; Giancola and Zeichner, 1995b; Zeichner and Pihl, 1979, 1980). Moreover, three large meta-analytic reviews concur that believing that alcohol has been consumed plays a negligible role in affecting aggression (Bushman and Cooper, 1990; Hull and Bond, 1986; Steele and Southwick, 1985).

Parenthetically, a methodology termed the balanced placebo design was created to separate the pharmacological effects of alcohol from placebo effects. This design involves the use of the three groups described above as well as a group of subjects who receive alcohol but are told that they are consuming a nonalcoholic beverage (i.e., "antiplacebo" condition). Although this design is theoretically useful, it is not practically useful because of the near impossibility of

convincing antiplacebo subjects that they have not consumed alcohol, particularly at the higher doses needed to facilitate aggression (Martin and Sayette, 1993). To the author's knowledge, only two studies have used the balanced placebo design to examine the effects of alcohol on aggression as measured by the TAP (Lang et al., 1975; Pihl et al., 1981). Results were mixed in that only one study found an increase in aggression for the antiplacebo group (Pihl et al., 1981).

A series of more than 20 studies on the alcohol-aggression relation, conducted by Taylor and colleagues, using the TAP, documented robust and reliable findings. College students who received alcohol evidenced higher levels of aggression than those who received placebo or nonalcoholic beverages (e.g., Bailey and Taylor, 1991; Chermack and Taylor, 1995; Leonard, 1989; Taylor and Gammon, 1975; Taylor et al., 1976). Using a modified version of the TAP, Pihl and colleagues also found (in more than 10 studies) that college students who received alcohol administered higher shock intensity levels and longer shock durations compared with those who received a placebo or a nonalcoholic control beverage (e.g., Hoaken et al., 1998; Lau and Pihl, 1994; Pihl et al., 1990; Pihl and Zacchia, 1986; Zeichner and Pihl, 1979). Furthermore, using other modifications of the TAP, Giancola and colleagues replicated the above results (Giancola et al., in press; Giancola and Zeichner, 1995b,c, 1997; Zeichner et al., 1994, 1995). Clearly, the results of these studies support a strong relation between acute alcohol consumption and aggressive behavior in college students.

Many of the investigations reviewed above, and others, have been included in meta-analytic studies. As would be expected, the results of these studies support the contention that acute alcohol intoxication facilitates aggressive behavior. For example, Bushman and Cooper (1990) determined that the average effect sizes for alcohol versus placebo conditions and placebo versus nonalcohol conditions were 0.61 and 0.10, respectively. In a later study, Bushman (1993) reported similar mean effect sizes for these comparisons (i.e., 0.49 and 0.0028). In summary, these statistics clearly indicate that acute alcohol consumption significantly increases the expression of aggressive behavior in college students.

Theoretical Perspectives

General theories of aggression

Clearly, there is a need for effective prevention interventions aimed at attenuating alcohol-related aggression in college students. However, it has been argued that for prevention interventions to make a significant and lasting impact, they must spawn from theoretically based empirical research that elucidates the causal structure of the alcohol-aggression relation (Chermack and Giancola, 1997). Given the important need for theory in guiding research, some important models of alcohol-related aggression are presented below. However, insofar that such specialized models are a subset of more general theories, it would be useful first to review some broad theories of aggression. Geen (1990) and Berkowitz (1993) provided two such prominent contemporary theories.

Geen's (1990) major premise is that the elicitation of aggression is dependent on the interaction of two general factors. The first involves "background variables" such as genetics, physiology, temperament, personality, social-cultural expectations and exposure to violence. According to Geen, deviations on these variables serve to predispose toward aggression. The second factor involves frustrating or provocative environmental stimuli that produce stress, arousal and anger. These stimuli can take many forms such as a verbal or physical attack, family conflict, hot temperatures and physical pain. Geen explained that the manner in which these provocative or frustrating stimuli are interpreted will moderate the amount of stress, arousal and anger that is experienced, which will then affect whether aggression is or is not expressed. Specifically, if an aversive situation is interpreted as justifiable or nonintentional, the result will be little arousal and anger, which will lead to little or no aggression. Conversely, if a situation is interpreted to be malicious or arbitrary, the result will be high levels of arousal and anger and thus a higher probability of an aggressive response. Finally, Geen added that even in a highly aroused or angered state, the expression of aggression can still be moderated by paying attention to alternative nonaggressive means of coping with the situation. However, if such attentional resources are lacking, the probability of an aggressive response will be heightened.

Berkowitz (1993) put forth a theory postulating that the desire to behave in an aggressive manner is the result of experiencing negative affect. Negative affect is defined as any unpleasant feeling that can be brought on by a number of factors such as frustration, insults, attacks, hot temperatures and noise. Berkowitz made the point that it is not the direct effect of such instigating factors that produces aggression (i.e., damaged self-image, being punched in the face), but instead the psychological damage (i.e., negative affect) that they produce. According to the theory, the experience of negative affect results in the activation of aggression- or fear-related cognitions, feelings and expressive-motor and physiological reactions that are associated with both basic fight and flight tendencies. Once the primary reactions to an aversive event have occurred, more differentiated feelings later arise as the result of higher order cognitive processing (e.g., making causal attributions, thinking about possible consequences of aggression, paying attention to social rules). According to Berkowitz, this higher order reasoning differentiates the original more ba-

sic experience, thus intensifying some of its aspects and suppressing others. Therefore, an initial basic response to aggress can be modified by "thinking" about alternative nonaggressive solutions to the situation.

Although these theories have not been covered in great detail, both attempt to explain aggressive behavior by implicating fairly broad constructs and processes (i.e., arousal, anger, negative affect, social cognition). Furthermore, both theories also suggest that variations in a number of key individual difference variables (e.g., biology, personality) and situational variables (e.g., provocation, temperature) are crucial for the expression of aggression. These models are important because they provide good overarching explanations of aggressive behavior and offer excellent conceptual frameworks from which to test more specific hypotheses about the causes of aggression.

Alcohol and aggression: Disinhibition and expectancy models

The disinhibition model is considered to be a very general explanation of the alcohol-aggression relation. It contends that alcohol has a direct effect on aggression by pharmacologically disinhibiting brain centers important in maintaining inhibitory control over behavior (Graham, 1980). This model has limited empirical support because not all persons become aggressive when they drink alcohol.

In direct opposition is the expectancy model, which stipulates that it is not the pharmacological properties of alcohol that facilitate aggression, but rather the mere belief that one has consumed alcohol (MacAndrew and Edgerton, 1969). This model rests on the assumption that people have a priori beliefs that alcohol will lead to aggression. As noted above, previous studies have demonstrated negligible differences in aggression between subjects receiving a placebo beverage versus those who knowingly drank a nonalcoholic beverage. These data are typically used to argue against the position that alcohol expectancies affect aggressive behavior. However, this is an erroneous argument because placebo manipulations do not take into account individual differences in beliefs that alcohol will increase aggression. That is, it may be that placebo manipulations are indeed effective in increasing aggression but only in persons who believe that alcohol will increase aggression. The few published studies that take into account individual differences in alcohol expectancies for aggression have shown modest to good support that expectancies interact with alcohol to increase aggression (Chermack and Taylor, 1995; Dermen and George, 1989; Leonard and Senchak, 1993).

Another model, a more refined version of the disinhibition explanation, is the indirect cause model (Graham, 1980). This model suggests that alcohol detrimentally affects certain psychological and/or physiological processes that then lead to the expression of aggressive behavior. Some of the most prominent contemporary theories of alcohol-related aggression are variants of the indirect cause model. Specifically, most of them are cognitive models that suggest that alcohol disrupts a specific type of cognitive function that then increases the probability of aggression. Due to their influential nature in the current research literature on alcohol-related aggression, seven of these models are reviewed below.

Cognitive models

Pernanen (1976) hypothesized that alcohol consumption increases the probability of an aggressive reaction by reducing the number of available psychological coping mechanisms that rely on conceptual/abstract reasoning. According to this model, alcohol creates a "narrowing of the perceptual field" (p. 415), which reduces the ability to detect both internal and external cues that may provide crucial information about another person's intentions in a precarious situation. Consequently, a reduction in these cues will result in a random or an arbitrary interpretation of the other person's intentions. Accordingly, when intoxicated, it is this tendency to interpret incoming information as random or arbitrary (especially if the incoming information is aggressive in nature) that will increase the probability of a violent response.

Taylor and Leonard (1983) postulated that aggressive behavior is determined by the relative balance of a combination of both instigative (e.g., threats, insults) and inhibitory (e.g., anxiety, norms of reciprocity) cues present in hostile interpersonal situations. Instigative cues increase the probability of an aggressive encounter, whereas inhibitory cues decrease that probability. These theorists reasoned that the cognitive disruption produced by alcohol reduces the number of information sources (i.e., cues) that one can attend to in any given situation. Therefore, aggressive behavior is most likely to occur in a context where instigatory cues are paramount as opposed to a situation dominated by inhibitory cues.

Steele and Josephs (1990) proposed an attention allocation model in which alcohol interferes with information processing in such a manner as to disrupt the ability to allocate attention to multiple aspects of a situation effectively. Accordingly, alcohol creates a "myopic" or narrowing effect on attention, which results in attention being allocated only to the most salient aspects of a particular situation and not to other less salient cues. Alcohol will therefore decrease the ability to extricate important meaning from less salient, possibly inhibitory, cues. It is thus maintained that in a conflict or a provocative situation, alcohol's myopic effect on attention may facilitate aggression by forcing attention to the most salient (i.e., provocative) aspects of that situation and not to other less salient (i.e., inhibitory) cues.

As can be seen quite clearly, Taylor and Leonard's (1983) and Steele and Josephs' (1990) models are very similar (i.e., both maintain that alcohol impairs the ability to attend to inhibitory cues). The main difference between the two models is that Steele and Josephs explicitly posited the hypothetical mechanism of inhibition conflict as a determinant of when alcohol will, and will not, facilitate aggression. Inhibition conflict refers to the magnitude of conflict between two opposing response tendencies (Steele and Southwick, 1985). According to Steele and colleagues (Steele and Josephs, 1990; Steele and Southwick, 1985), a considerable degree of inhibition conflict must be present if alcohol is to facilitate aggression. Steele and Josephs' model predicts that an intoxicated person is likely to attack another individual in the presence of both inhibitory and instigatory cues (high conflict) because attention will be focused on the most salient cues (i.e., provocative/instigatory). However, in the absence of any inhibitory cues (low conflict), the model predicts that the effects of alcohol will be irrelevant. That is, without inhibitory cues, an attacker will be just as likely to emit an aggressive response in either an intoxicated or a sober state due to the lack of any internal or external proscriptions against aggression. Similarly, if no provocative cues are present, a person should not react aggressively whether intoxicated or sober. Parenthetically, the mechanism of inhibition conflict is nonetheless implicit in Taylor and Leonard's model.

Pihl et al. (1993) posited a biosocial model of intoxicated aggression in which cognitive functioning is but a single aspect of a multidimensional mechanism. According to these theorists, acute alcohol consumption disrupts the functioning of the prefrontal cortex and its subcortical connections, especially the hippocampus, which, according to Pihl et al., "is involved in the recognition of threat" (p. 134). Thus, by disrupting these neural regions and circuits, alcohol eliminates signals of punishment through its anxiolytic effects (i.e., reduces fear reactions), resulting in decreased inhibitory control over behavior. Pihl et al. also posited that aggressive responses are enhanced through alcohol's psychomotor stimulant properties and an increased sensitivity to cues of physical pain.

Hull (1981) proposed a general model of the effects of alcohol on self-awareness in which it is suggested that alcohol intoxication engenders aggressive behavior through a reduction in self-awareness. According to his model, alcohol disrupts self-awareness by interfering with the higher order cognitive encoding of self-relevant information necessary to attain a self-aware state. Such interference then purportedly disrupts the ability to evaluate self-relevant social and environmental information that putatively provides feedback concerning appropriate forms of behavior. Without access to this information, Hull posited the heightened probability of aggressive behavior.

Sayette (1993) advanced an appraisal disruption model of alcohol's effects on stress. Ito et al. (1996) invoked this model to account for the alcohol-aggression relation. According to Sayette, if alcohol is consumed before the onset of anxiety-eliciting cues, it will disrupt the cognitive appraisal of those cues, thus resulting in anxiolysis. In such a case, as noted by Ito et al., alcohol may facilitate aggression indirectly by reducing fear and inhibition. This model shares a commonality with that of Pihl et al. (1993) in that both make the point that alcohol disrupts, in essence, the same cognitive ability (i.e., recognition of threat [Pihl et al.] and information appraisal [Sayette]), which then facilitates aggression through an attenuation of fear and inhibition.

Giancola (2000a) advanced the idea that all of the cognitive abilities implicated in the above models are components of a more general construct termed executive functioning. Executive functioning is defined as a higher order cognitive construct involved in the planning, initiation and regulation of goal-directed behavior (Luria, 1973, 1980; Milner, 1995). The cognitive abilities subsumed within this construct include attentional control, previewing, information appraisal, strategic goal planning, abstract reasoning, temporal response sequencing, self- and social monitoring, abstract reasoning, cognitive flexibility, hypothesis generation and the ability to organize and adaptively utilize information contained in working memory (Kimberg and Farah, 1993; Stuss and Benson, 1984). Giancola argued that, compared with models that invoke only one cognitive ability, a more general model that incorporates a cluster of conceptually and empirically related abilities would more accurately reflect the richness and complexity of the cognitive mechanisms influencing the alcohol-aggression relation. Based on data showing that low executive functioning is related to increased aggression and that acute alcohol consumption disrupts executive functioning, Giancola put forth a new model. This model postulates that (1) executive functioning mediates the alcohol-aggression relation in that acute alcohol intoxication disrupts executive functioning, which then heightens the probability of aggression and (2) executive functioning moderates the alcohol-aggression relation in that acute alcohol consumption is more likely to facilitate aggressive behavior in persons with medium to low, rather than high, executive functioning.

Beginning to Sketch a "Risk Profile" for the Alcohol-Aggression Relation

Although research shows that acute alcohol consumption is related to the expression of aggressive behavior, there is a wide range of individual differences among these data. In other words, not all people become aggressive when they drink. Therefore, it can be argued that alcohol does not directly cause aggression solely through its pharmacological actions (Bushman and Cooper, 1990). Rather, accumulating evidence indicates that intoxicated aggression is

the product of individual difference and contextual variables interacting with alcohol pharmacodynamics (Chermack and Giancola, 1997). Currently, very little is known about the manner in which these latter variables, and their interactions, serve as underlying mechanisms of intoxicated aggression. Therefore, a useful task for investigators would be to identify which traits characterize individuals who typically exhibit intoxicated aggression and which situational conditions are most likely to facilitate such behavior. Below is a brief examination of some individual difference and contextual variables that may serve as "risk factors" for alcohol-related aggression.

Individual difference variables

Dispositional aggressivity. Dispositional aggressivity, typified by the tendency to be aggressive across a range of situations, has been shown to be strongly related to self-reported husband-to-wife violence (Leonard and Senchak, 1993) and violent behavior in male college students (Dermen and George, 1989). Interestingly, dispositionally aggressive individuals, such as those with antisocial personality disorder or conduct disorder, are also characterized by low executive functioning (Malloy et al., 1990; Moffitt and Henry, 1989). Only one study has assessed the combined effects of acute alcohol consumption and dispositional aggressivity on aggression as measured by the TAP in college students (Bailey and Taylor, 1991). Acute alcohol consumption increased aggression in men with high levels of dispositional aggressivity but not in those with low or moderate levels.

Alcohol expectancies. Alcohol expectancies are defined as beliefs about the effects of alcohol on behavior (Leigh, 1987). As noted above, some research suggests that intoxicated aggression results, in part, from the belief that alcohol increases aggression. It is well known that people vary in their belief that alcohol increases arousal, power, assertiveness, verbal aggression and physical aggression (Brown et al., 1980; Rohsenow and Bachorowski, 1984). Significantly, self-report studies indicate that the association between alcohol consumption and aggression is stronger among individuals who *expect* alcohol to increase aggression (Dermen and George, 1989; Leonard and Senchak, 1993). One published study, using the TAP, attempted to determine whether individual differences in alcohol-aggression expectancies would affect aggression under the influence of alcohol in male college students (Chermack and Taylor, 1995). Results indicated that under conditions of high provocation, intoxicated subjects with high expectancies about the effects of alcohol on aggression were more aggressive than were those with low expectancies.

Drinking history. Quantity of past alcohol consumption is positively related to self-reported aggression in male (Dermen and George, 1989) and female (West et al., 1990) social drinkers. Theory suggests that increased alcohol consumption and aggressive behavior are both components of an overarching construct of "deviant behavior" (Jessor and Jessor, 1977; Pernanen, 1991). However, the underlying mechanisms, or causal dynamics, of that construct are not known. One laboratory study found that acute alcohol consumption increased aggression on the TAP in male college students, but only in those with *low*, rather than moderate or high, levels of past-year drinking (LaPlace et al., 1994). The authors hypothesized that alcohol's detrimental effects on cognition were greater in those with a low tolerance for alcohol compared with those with a higher tolerance.

Executive functioning. Low executive functioning capacity has been found to be related to increased aggression in young boys and young adult males; fighting in normal preadolescent boys; and increased disruptive, delinquent and physically aggressive behavior in adolescent females (Giancola and Zeichner, 1994; Giancola et al., 1996, 1998; Seguin et al., 1995). It has been hypothesized that low executive functioning facilitates the expression of aggression by impeding the cognitive regulation of behavior and interfering with the ability to generate alternative, nonaggressive responses in provocative situations (Giancola, 1995, 2000a).

Only one study has assessed the relation between executive functioning, acute alcohol consumption and aggression (Lau et al., 1995). Normal male college students were administered two neuropsychological tests of executive functioning and were then separated into "high" and "low" functioning groups. They were administered either an alcohol or a nonalcohol beverage and then tested on the TAP. Alcohol and low executive functioning had independent effects on aggression; however, an interaction between executive functioning and alcohol consumption was not observed. An interaction was predicted because theory suggests that alcohol increases aggression to a greater extent in individuals with medium to low, compared with high, executive functioning (Giancola, 2000a). Conclusions from this study are limited because only two executive functioning tests were used, and statistical power was too low to detect a significant Executive Functioning × Alcohol interaction.

Hostile attributional biases. Research has shown that aggressive children are more likely than their nonaggressive counterparts to erroneously attribute hostile intent to another child's provocative actions, even if those actions are, from an objective standpoint, ambiguous in intent (Dodge, 1980; Dodge and Frame, 1982). Furthermore, hostile attributional biases have been shown to be positively related to undersocialized aggressive conduct disorder, reactive aggression and number of violent crimes committed in a sample of highly aggressive juvenile offenders (Dodge et al., 1990). These data suggest that erroneous hostile attributional biases may be, in part, responsible for increased aggression in children. Others have found that adults are also vulnerable to making erroneous hostile attributions in

ambiguous interactions (Epps and Kendall, 1995). Therefore, with respect to intoxicated aggression, it is possible that alcohol may disrupt information processing to the extent that an individual may distort and/or misinterpret ambiguous interpersonal information or cues, thus resulting in the attribution of a hostile bias, which may then lead to an increased probability of emitting an aggressive response.

Biochemistry. Both animal and human research have demonstrated a positive relation between testosterone levels and physical aggression (Volavka, 1995). Berman et al. (1993) found that healthy male college students with high levels of testosterone, measured in saliva, were more aggressive on the TAP than those with low levels. Moreover, heightened aggression has also been related to low levels of the brain neurotransmitter serotonin (Berman et al., 1997). Interestingly, a study using the TAP demonstrated increased aggression in healthy college males who received a tryptophan-depleted dietary mixture (Pihl et al., 1995). Tryptophan is the biochemical precursor for serotonin; its dietary depletion leads to lowered brain serotonin levels. Theorists have argued that serotonin is involved, in part, in the inhibition of behavior (Spoont, 1992; Volavka, 1995). As such, it may be that the aggression enhancing effects of alcohol are more likely to occur in individuals with higher baseline levels of testosterone and lower levels of serotonin.

Currently, very little is known about the acute effects of alcohol on testosterone and serotonin in the human brain. Animal research suggests that low doses of alcohol tend to enhance blood testosterone levels whereas high doses tend to have a suppressing effect (K. Miczek, personal communication, 2000). Animal research also suggests that acute alcohol consumption initially increases, but then decreases, brain serotonin levels (reviewed in LeMarquand et al., 1994). Although far less work has been conducted on humans than on animals, current research suggests that acute alcohol consumption depletes blood tryptophan levels, thus suggesting depletions in brain serotonin (reviewed in Badawy, 1998).

Gender. There exist only a small number of published studies on alcohol-related aggression in women. In a survey investigation, White et al. (1993) reported that adolescent males engaged in more alcohol-related aggression (e.g., fights, hurting someone, forced sex, vandalism, setting fires) than their female counterparts. In contrast, a laboratory study found that low doses of alcohol increased verbal aggression on an adjective checklist in females but not in males (Rohsenow and Bachorowski, 1984). In a study using a modified version of the TAP, Bond and Lader (1986) found that alcohol equally increased aggression (i.e., tone blasts) for men and women when they were exposed to low levels of provocation (i.e., low intensity tone blasts). However, when highly provoked, only men showed increased aggression with alcohol (Bond and Lader, 1986). In a study using a point subtraction task, Dougherty et al. (1996) showed that alcohol increased aggression for women. In another study using men and women, Dougherty et al. (1999) reported that alcohol equally increased aggression for both genders. In contrast, however, Gustafson (1991) found that alcohol and provocation had no effects on aggressive responding (i.e., shock administration) in women.

Giancola and Zeichner (1995b) reported that alcohol increased aggression in the form of shock intensity and shock duration for men; however, it only slightly increased shock duration for women. Furthermore, high provocation (i.e., receiving high intensity shocks) increased aggression for men and women, regardless of whether they received alcohol. Hoaken and Pihl (2000) found that alcohol increased shock intensity and duration for men but not for women. Although alcohol did not affect aggression for women, higher levels of provocation increased their aggressive responding to the same degree as intoxicated men.

Contextual variables

Blood alcohol concentration limb effects. Studies have generally shown that a blood alcohol concentration (BAC) of .08% is typically sufficient to facilitate aggression (Gustafson, 1985; Pihl and Zacchia, 1986). Given this, the assumption has generally been that as long as one is at a BAC of .08% or higher, there is a greater likelihood for aggression. However, Giancola and Zeichner (1997) showed that this assumption is indeed correct, but only for the ascending limb of the BAC curve (when alcohol levels in the bloodstream are rising). That is, in a study measuring two different groups of male college students on the TAP, those tested on the ascending limb of the BAC curve (.08% BAC) were significantly more aggressive that those tested on the descending limb of the curve (.08% BAC). Those tested on the descending limb were no more aggressive than were sober control subjects. The authors explained this finding by noting that greater executive functioning deficits are found on the ascending limb compared with the descending limb of the BAC curve.

Alcohol type and dose. Intoxicated aggression varies depending on the type of alcoholic beverage that is consumed. Specifically, distilled beverages such as vodka and bourbon elicit significantly more aggression on the TAP compared with brewed beverages such as beer (Pihl et al., 1984). Further, the dose of alcohol administered also affects aggression. Research has shown that the relation between alcohol dose and aggressive behavior follows an inverted U-shaped curve. That is, at low doses that produce BACs around .03-.04%, alcohol produces rather small increases, if any, in physical aggression (reviewed in Pihl, 1983). Greater levels of aggression are typically seen at BAC levels of .08% or higher (Giancola and Zeichner, 1995b, 1997; Pihl, 1983). Of course, studies that produce excessively high BACs cannot be ethically conducted. However, based on

animal data and anecdotal reports, it is roughly estimated that, for most persons, BACs above .20-.30% will induce a biological and psychological state where aggression, and most other organized and complex behaviors, will not be possible.

Social pressure. It has been demonstrated that social pressure also helps to moderate the alcohol-aggression relation. In a study by Taylor and Sears (1988), confederates were asked to encourage sober and intoxicated male college students to behave more aggressively toward their opponent on the TAP. Results demonstrated that only intoxicated subjects were influenced by the confederates' suggestions to behave aggressively.

Provocation. Provocation is a necessary ingredient in an interpersonal interaction if aggressive behavior is to occur. In their review of the literature on alcohol and violent crime, Murdoch et al. (1990) reported that verbal altercations tend to precede violent interactions. In her study of 307 assaultive criminals, Mayfield (1976) reported that "in 50% of the cases the victim attacked or made a move which was interpreted by the subject as an impending attack immediately prior to the assault" (p. 289). In the context of a provocative situation, research has shown greater aggression on the TAP in intoxicated, compared with sober, male college students (Taylor et al., 1979).

Clearly, multiple factors contribute to the expression of alcohol-related aggression. It should be made clear, however, that the risk factors described here are not an exhaustive list. Other traits that are potentially important in moderating the alcohol-aggression relation include age, perspective-taking, self-awareness, negative affect, temperament, affect regulation, emotionality, sensation seeking, anxiety, irritability, hostility, frustration tolerance, impulsivity, psychopathology, early physical abuse, perceived self-esteem and tolerance and sensitivity to alcohol. Unfortunately, there is no single profile that will predict intoxicated aggression in all persons. However, studying these and other variables is important because it will provide researchers with a better understanding of the mechanisms that underlie the alcohol-aggression relation.

Policy Implications

This article makes the point that acute alcohol consumption per se does not directly cause aggression. Instead, it argues that alcohol interacts with a host of individual difference and contextual variables to facilitate aggression. In other words, although alcohol does have some involuntary biological effects that predispose toward aggression (impairing brain functioning), there are also a number of psychological factors that contribute to alcohol-related aggression. Other than attempting to institute radical and clearly untenable preventative initiatives (e.g., alcohol prohibition, lacing alcoholic beverages with serotonin-enhancing and testosterone-reducing additives), changes in social policy will probably have little effect on the biological causes of alcohol-related aggression. However, one area in which both scientists and policy-makers can direct their attention is the development of psychological harm reduction strategies, strategies aimed at reducing the possibility of alcohol-related aggressive behavior.

This article identifies a number of psychological risk factors for intoxicated aggression. What appears to be needed are intervention programs aimed at modifying key risk factors so that alcohol consumption will be less likely to engender aggression. However, to be most effective, these interventions must be implemented in the proper context. For example, such programs could begin by educating people about the effects of alcohol on behavior. Specifically, it can be clarified that alcohol, in and of itself, does not cause aggression; it merely "drowns" the inhibitions that typically keep us from behaving aggressively or inappropriately. The message must be clearly sent that alcohol will not facilitate any behaviors for which there is no psychological predisposition. Given the early ages at which adolescents begin to consume alcohol in the United States, it would be prudent to begin such interventions at the junior high-school level and continue throughout the college years. This message could be conveyed through classroom teachings. Furthermore, fraternities, sororities, dormitories, athletic programs and other establishments and institutions could also be required to convey these messages to their members and residents. In addition, cognitive restructuring techniques could be similarly implemented to alter preexisting expectations that alcohol causes aggressive behavior (Darkes and Goldman, 1993).

With regard to executive functioning, interventions could be modeled after neuropsychological rehabilitation efforts aimed at strengthening cognitive functioning (Giancola, 2000b). Moreover, interventions could also be aimed at teaching social interaction and interpretation skills so that persons with aggressive or hostile dispositions and attributional biases can remain nonargumentative and nonviolent when drinking. Such interventions would probably be implemented most successfully in specialized mental health clinics for disruptive, delinquent and violent children, adolescents and adults. Finally, interventions can also be used to educate about contextual influences on intoxicated aggression, particularly those that can be prevented or avoided (e.g., alcohol type, social pressure, provocation). Again, these messages can be conveyed in classrooms from junior high on to college as well as other college settings such as dormitories, fraternities and athletic programs.

The risk factors for intoxicated aggression that are listed in this article are clearly not specific to college students. However, when it comes to focusing on this special population, other well-known variables come into play that are as important, if not more important, than those listed above.

These would include contextual factors such as "keg" parties, sporting events, fraternity life and coed dormitories. It would also be important to consider other dispositional traits that could increase the probability of exposure to such "high-risk" contexts such as problem behaviors prior to college and preexisting attitudes that promote disinhibited behavior, violence and excessive drinking. Although many universities and colleges already have educational programs in operation, at various levels, to inform students about the dangers of alcohol, negative, and sometimes disastrous, outcomes are nonetheless still too high. Clearly, a problem cannot be effectively prevented or treated if the cause is not known. If effective policy aimed at reducing intoxicated aggression in college students is to be implemented, more research will be needed to understand how alcohol interacts with basic dispositional traits, environmental variables, problem behaviors and attitudes that are present before one arrives at college and contextual variables that are typically specific to college life.

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