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Are Women at Greater Risk? An Examination of Alcohol-Related Consequences and Gender

Dawn E. Sugarman, M.S., **Kelly S. DeMartini, M.S.**, and **Kate B. Carey, Ph.D.**
Dawn E. Sugarman, Kelly S. DeMartini, and Kate B. Carey, Center of Health and Behavior, Syracuse University, Syracuse, NY 13244.

Abstract

Men typically drink more than women; however, women achieve higher BACs than men at equivalent consumption levels. This study investigated the unique effect of gender on individual alcohol problems by controlling both consumption and intoxication in a sample of 1,331 undergraduate drinkers. Gender independently influenced the risk of experiencing seven of nine negative consequences: (a) being female increased risk for tolerance, blacking out, passing out, drinking after promising not to, and getting injured; (b) being male increased risk for damaging property and going to school drunk. Gender patterns should be explored in a wider set of alcohol-related problems.

Keywords

alcohol-related consequences; gender; college students

College student drinking continues to be a threat to public health. A significant portion of this concern can be attributed to the negative consequences associated with collegiate drinking. Approximately 599,000 students are injured or hurt because of their own alcohol consumption, 696,000 students are assaulted or hit by another drinking college student, and 97,000 students are victims of sexual assault or date rape due to someone else's alcohol use (1). Moreover, heavy alcohol consumption (defined as four or more alcoholic drinks for women, and five or more drinks for men, on any one occasion) (2) is associated with academic, health, relational, and legal problems (1,3), and heavy drinking has a direct effect on the frequency of negative consequences (4).

Male college students typically report more alcohol-related problems than their female counterparts (3). This finding is often attributed to the fact that men drink more and are more likely to engage in heavy drinking than women (5–8). One might conclude that higher consumption mediates the impact of gender on problems. However, this explanation is unsatisfactory for two reasons. First, women reach higher blood alcohol concentrations (BACs) after a given amount of alcohol than men, due to differences in body size, composition, and metabolism (9). In college drinking environments, the higher alcohol consumption of men will often be reflected in higher BACs (10). However, recent studies have revealed that women are reaching equivalent BACs (11,12) or even higher BACs (13), even when the women are consuming less than men. This is an alarming trend given the research on the 'telescoping effect," which is described as the phenomena in which women progress more rapidly from drinking onset to problem drinking when compared to men (14,15).

Correspondence concerning this article should be addressed to: Kate B. Carey, Department of Psychology, Syracuse University, Syracuse, New York 13244. kbcarey@syr.edu; Phone: 315-443-2706; Fax: 315-443-4123.

This gender discrepancy between amount consumed and BAC achieved has implications for experiencing problems. For example, college women reported blackouts at the same rate as men, despite consuming much less alcohol (16). Women also experience alcohol-related physical illness at lower levels of alcohol consumption compared to men (17). Both findings may be explained if women are achieving high BACs with lower alcohol intake. Therefore, research on the association of alcohol-related problems and gender should consider levels of intoxication as well as levels of consumption.

Second, observed gender differences in alcohol problems in aggregate may be qualified upon closer examination of the types of problems reported (18,19). Male students tend to report more problems related to damage of property, other-directed physical violence, and problems with police than do women. Such acting out behaviors may be characteristic of male gender roles. However, when consequences are related to damage to self (i.e. blackouts, vomiting), the gender gap lessens (3). Even when gender differences are not apparent, the functional relationship between alcohol consumption and the experience of negative consequences may vary by gender. For example, a study of fraternity and sorority members found that the correlation between alcohol use and problems was stronger for females than for males (19).

In sum, a more nuanced examination of the role of gender in predicting consequences related to drinking independent of intoxication level and amount consumed is needed. When problems are measured in aggregate, gender differences in the experience of specific problems may be obscured. Thus, studies should examine the relationship between the type of problem experienced and gender. The current study investigated the effect of gender on individual alcohol problems, while controlling for both alcohol consumption and level of intoxication. This exploratory study used data from a study designed to examine the effects of a brief motivational intervention on college alcohol consumption (20). The goals of this study are twofold. First, we expected to replicate the finding that men would report drinking more drinks per week, have higher BACs, and report more alcohol-related consequences. Second, we hypothesized that after controlling for total number of drinks per week and average estimated BAC, rates of individual alcohol-related consequences would vary by gender.

Method

Participants

The sample consisted of 1,331 undergraduate drinkers (who reported at least one drink in the last month) from a large northeastern university. Participants were recruited from an introductory psychology course, and after providing informed consent, completed surveys in small groups about health behaviors, alcohol consumption, and alcohol-related problems experienced in the last month. In exchange for their participation, students received course credit. This study was one of several research studies that students could choose to participate in to fulfill their credit; those who did not want to participate in research completed a paper to obtain an equivalent amount credit. On average, students were 19.5 years old (*SD* = 2.2), predominately female (64%), and in their freshman year of college (52%). In addition, 19% reported membership in the Greek system, and 81% reported living in on-campus housing.

Measures

Alcohol consumption—Alcohol consumption in the past month was measured by typical drinks per week and estimated average estimated BAC. Participants were asked to reconstruct a typical week of drinking in the last month, using a 7-day grid. For each day of the week participants recorded the typical amount consumed in standard drink format (standard drink defined as 12 ounces of beer, 5 ounces of wine, or 1.5 ounces of liquor straight or in a mixed drink (21). Estimated average BAC (eBAC)was calculated by applying the formula (which

accounts for gender and weight) outlined by Matthews and Miller (22). eBAC is an approximation of BAC, subject to some error due to lack of control over conditions affecting individual rates of absorption and metabolism (23). eBAC and BAC have been found, however, to be significantly correlated at $r = 0.84$ (24) and $r = 0.54$ (11).

Alcohol-related problems—In order to examine individual problems, a subset was chosen from the 43 items used in the parent study (see Table 1 for list of subset). Problems in the parent study were measured over the past 30 days and derived from Berkowitz and Perkins (25), Wechsler et al. (26), and the Rutgers Alcohol Problem Index (RAPI; 27). Specific consequences were chosen *a priori* for these analyses if they were associated with gender in the literature and/or suggestive of DSM-IV criteria for abuse and dependence (28). Table 1 lists the nine negative consequences that fit these criteria.,

Results

In this sample, men consumed more drinks per week ($M = 19.6 \pm 15.4$ vs. $M = 11.6 \pm 10.3$; $t[1329] = 11.37$, $p < 0.001$) and reached higher estimated average BACs ($M = 0.10 \pm 0.05$ vs. $M = 0.07 \pm 0.05$; $t[1303] = 9.39$, $p < 0.001$) than did women. Additionally, men reported significantly more total problems than women ($M = 6.3 \pm 0.3$ vs. $M = 5.5 \pm 0.2$; $t[1329] = 2.48$, $p = 0.013$). The breakdown of each of the nine consequences by gender is summarized in Table 1. Getting into fights, developing tolerance, and blacking out were most frequently endorsed by both men and women (all ≥ 25%), although men and women differed in their rank order. Men were significantly older ($t = 4.10$, df = 1256, $p < .001$), and more advanced in college ($\chi^2 = 46.1$, $p < .001$) than women. Given that among underage college drinkers, year in school may have more relevance for social behaviors like drinking, all analyses controlled for year in school.

A series of logistic regression models were run to examine the effect of gender on the occurrence of each of the nine consequences, controlling for two aspects of alcohol consumption: drinks per week and estimated average BAC. Table 2 summarizes the results. Being male was predictive of getting into fights, going to school drunk, and damaging property; whereas being female was predictive of drinking after promising not to drink. Controlling for drinks per week, gender patterns emerged on seven of the problems. Males reported more instances of going to school drunk and damaging property, even at equivalent consumption levels. When consumption was controlled, being female was associated with 1.5 to 2 times the risk of developing tolerance, blacking out, passing out, drinking after promising not to, and getting hurt or injured. An identical pattern emerged for gender when controlling for estimated BAC.

The use of multiple tests gives rise to concerns about the inflation of experiment-wide alpha (i.e., Type I error), or the probability that our significant results were due to chance. The use of a statistical correction, such as an alpha reduction, was considered. Given that the analyses are exploratory in nature, this more conservative analytic strategy was not followed in order to demonstrate patterns in the data. Two factors lessen concern about Type I error effects in this set of analyses. First, many more significant findings were found than would be by chance alone. Second, the overall pattern of results was interpretable and consistent with previous literature.

Discussion

This study produced two findings of interest. First, when gender differences emerge on problem endorsement, men report more antisocial behaviors (e.g., fights, property damage, attending school while drunk), whereas women report more self-related problems (e.g. drinking after

promising not to drink). This pattern is consistent with previous literature that makes the distinction between damage to others and damage to self (3). Second, gender is an independent risk factor for alcohol-related problems. Inconsistent with a mediation hypothesis, gender effects were not reduced when consumption and intoxication are controlled, rather they become stronger. Although correlated with consumption and intoxication, gender's influence is not explained by them. These results extend the current literature by showing that when women drink equivalent amounts they surpass men on negative consequences associated with risk for personal harm (e.g., blackouts, passing out, injury) and dependence symptoms (e.g., tolerance, inability to limit drinking). Women in this sample reported lower estimated BACs than men; however, those achieving levels of intoxication equivalent to men were more likely to experience five out of nine alcohol-related problems. Based on these findings, the trend to drink like male friends (29) puts women at a greater risk for experiencing consequences.

We acknowledge limitations of this study. First, these were post-hoc analyses on an existing data set, designed to provide justification for a more systematic exploration of gender patterns on alcohol-related problems. Second, the potential for reporting bias (30) needs to be considered. It is possible that women are more willing to admit to experiencing certain alcohol-related consequences than men. Third, limitations of using estimated BACs need to be considered. In particular, equations to estimate BACs are less accurate for levels over .08, and men in our sample reported estimated BACs at .10 (24). Moreover, the results of this study may not be generalizable to non-college populations or drinkers over the legal drinking age. Lastly, we acknowledge that this study is preliminary and therefore the results should be interpreted accordingly.

Future research should examine the independent effects of gender and consumption patterns on the likelihood of experiencing alcohol-related consequences. Event-level analyses may allow more precise measurement of relationships between gender, consumption, and consequences (cf. 31). Such information could inform and enhance the effectiveness of prevention efforts.

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Table 1

Prevalence of reported alcohol-related problems by gender

	Male *n* = 484		Female *n* = 847		
Alcohol-related problems	***n***	**%**	***n***	**%**	**Pearson χ^2**
Getting into fights	145	30	208	25	4.40*
Going to school drunk	111	23	83	10	42.30***
Developing tolerance	135	28	251	30	0.49
Blacking out	128	26	221	26	0.01
Passing out	61	13	132	16	2.33
Drinking after promising not to drink	76	16	183	22	7.11**
Experiencing withdrawal symptoms	27	6	37	4	0.94
Damaging property	98	20	39	5	81.03***
Getting hurt or injured	61	13	113	13	0.18

*** $p < 0.001$

** $p < 0.01$

* $p < 0.05$

Table 2

Results of logistic regressions examining the effect of gender on the occurrence of alcohol-related problems, first controlling only for year in school, and then also controlling for drinks per week and typical BAC

Alcohol-related problems	Male vs. Female			Male vs. Female (drinks per week controlled)			Male vs. Female (BAC controlled)		
	OR	SE	95% CI	OR	SE	95% CI	OR	SE	95% CI
Getting into fights	.77*	.10	.60– 99	1.2	.17	.89–1.6	1.1	.15	.80–1.4
Going to school drunk	.36***	.06	.26–.49	.51***	.09	.37–.72	.45***	.08	.32–.63
Developing tolerance	1.0	.13	.77–1.3	1.6**	.23	1.2–2.1	1.4*	.21	1.1–1.9
Blacking out	.93	.12	.72–1.2	1.8**	.27	1.3–2.4	1.5*	.22	1.1–1.9
Passing out	1.2	.21	.88–1.7	1.7**	.31	1.2–2.4	1.6**	.29	1.1–2.3
Drinking after promising not to drink	1.4**	.22	1.1–1.9	1.7**	.28	1.3–2.4	1.8***	.30	1.3–2.5
Experiencing withdrawal symptoms	.80	.21	.48–1.3	1.1	.32	.65–1.9	1.0	.29	.59–1.8
Damaging property	.19***	.04	.13–.29	.26***	.06	.17–.40	.24***	.05	.16–.37
Getting hurt or injured	1.1	.19	.77–1.5	1.6*	.30	1.1–2.3	1.5*	.29	1.1–2.2

Note: Male coded as 0, Female coded as 1 in analyses.

*** $p < 0.001$

** $p < 0.01$

* $p < 0.05$