



# Alcohol-related injury among Greek-letter college students: Defining a target population for secondary prevention

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## Abstract

Members of Greek-letter societies are the heaviest drinkers on college campuses, and experience more alcohol-related problems than their peers. This study reports the results of a web-based survey administered to stratified random samples of college students from 10 North Carolina universities. Greek-letter status was a significant independent risk factor for increased injury (both experienced and caused to others), even after adjusting for drinking behaviors. Prevention, screening, and intervention strategies are discussed in the context of these results.

## Keywords

alcohol counseling, college students, Greek-letter, injury prevention

## Introduction

Four out of five college students drink, and half of them engage in heavy episodic drinking (Wechsler et al., 2000b, 2002). Factors influencing how much college students drink include class year (National Institute on Alcohol Abuse and Alcoholism (NIAAA), 2002), living arrangements (Presley et al., 2002), personality (Baer, 2002; Kuntsche et al., 2006), alcohol expectancies (Zamboanga et al., 2006), school size (Presley et al., 2002), school location (Presley et al., 2002), the price and availability of alcohol (Kuo et al., 2003; Wechsler et al., 2000a), the importance of athletics on campus (Leichtner et al., 1998; Presley et al., 2002), and

the presence of Greek-letter societies (Baer, 2002; Meilman et al., 1999; NIAAA, 2002).

Greek-letter societies offer benefits to college students; beyond friendship and social activity, fraternities and sororities provide opportunities for academic development, career networking,

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leadership training, and community service. However, there is considerable evidence that members of Greek-letter societies are the heaviest and most frequent drinkers on campus (Larimer et al., 2000; Wechsler et al., 2000a). Diverse explanations have been offered: continuation of pre-college drinking patterns (Sher and Rutledge, 2007), self-selection into peer groups that espouse heavy drinking (McCabe et al., 2005), socialization effects (McCabe et al., 2005), misperceptions of drinking norms (Larimer et al., 2004), and the physical environment of Greek-letter houses (Baer, 2002) which provides increased access to inexpensive alcohol (Wechsler et al., 2000a; Weitzman et al., 2003), greater tolerance for intoxicated behavior, and enabling assistance for those who suffer the negative consequences of over-indulgence (Larimer et al., 2000). Furthermore, risky alcohol consumption is a common initiation practice among Greek-letter societies. In a national study of undergraduate hazing (defined as 'any activity expected of someone joining or participating in a group that humiliates, degrades, abuses, or endangers them regardless of a person's willingness to participate'), 53% of students listed 'participation in a drinking game' as a part of their initiation behavior for a 'social fraternity or sorority' (Allan and Madden, 2008).

Alcohol use is a fundamental risk factor for injury (Schermer, 2006; Soderstrom et al., 2001). The consequences are devastating; in 2005, there were 1825 alcohol-related deaths among students ages 18–24, 599,000 unintentional injuries, 646,000 physical assaults, and 97,000 sexual assaults (Hingson et al., 2009). More than 3.36 million college students drove while intoxicated in 2005 (Hingson et al., 2009).

The objective of this study was to examine the extent to which risky drinking behaviors account for alcohol-related injuries within a large randomly selected sample of college students in Greek-letter societies.

## **Method**

In fall 2003, 2004, 2005, 2006, and 2007 random samples of undergraduate college students

attending 10 universities (eight public and two private) in North Carolina (NC) were invited to complete a web-based survey, as part of a randomized group trial of an intervention to prevent high-risk alcohol drinking and its consequences on college campuses and their surrounding communities ('The Study to Prevent Alcohol-Related Consequences' (SPARC)). The 10 colleges were randomized to intervention or control with equal probability and with respect to characteristics such as size of student population and type of institution (i.e. public or private). In 2007, two schools dropped out of the study and data were collected from random samples of undergraduate college students attending the remaining eight universities (seven public and one private).

Participation in the survey was voluntary. In addition to demographic variables and alcohol consumption behaviors, the SPARC survey measured participation in extracurricular activities. Students involved in Greek-letter societies (fraternities or sororities) were asked to identify themselves as either 'members' or 'pledges' (the period of initiation prior to being accepted as members). Binge drinking was defined by the widely used gender-specific measure of four and five or more alcoholic beverages in a row for females and males (0.6 oz or 14 grams of pure alcohol = one standard drink), respectively (NIAAA, 2002). To assess drunkenness, students were asked, 'In a typical week, how many days do you get drunk?' where drunk was defined as 'unsteady, dizzy, or sick to your stomach', a standard definition used in college surveys (Wechsler et al., 1994). The survey also measured consequences experienced from one's own drinking, consequences experienced as a result of other students' drinking, and injuries that occurred after drinking alcohol. Injuries were assessed with the following item: 'In the past 12 months, while you were at school, have you experienced an injury requiring medical treatment as a result of your drinking?' The total number of items varied slightly from year to year, but the survey had up to 300 items (with multiple skip patterns based on reported behaviors), and took between 17 and 24

minutes to complete. Each student received \$10.00 via PayPal™ for completion of the survey. The protocol was approved by the Institutional Review Board (IRB) of the university conducting the research. The review boards of other universities participating in this study either approved this study or officially deferred to the IRB of the investigating authors.

Univariate analysis on injury prevalence and drinking behaviors was performed using descriptive characteristics and cross-tabulations. For bivariate and multivariable analyses, data were analyzed using mixed-effects logistic regression using a generalized linear mixed models approach. College was treated as a random effect in the analyses, thereby adjusting for the intra-school correlation of drinking behaviors and student characteristics. Adjusted odds ratios (AOR) and 95% confidence intervals (95% CI) were calculated for the two aggregate injury outcomes ( $p < .05$ ) from logistic models. Multivariable models were adjusted for age, gender, race, residence, academic classification (freshman, sophomore, junior, senior), drinking status in high school, past 30-day drinking, survey year, intervention condition, and within-school clustering. All statistical computations were performed using SAS version 9.2 (SAS Institute, Cary, NC).

## Results

A total of 18,901 students completed the survey over five annual waves. Twelve percent (12.1%) of students were either Greek-letter society pledges (720 students; 232 men and 485 women) or members (1571 students; 640 men and 919 women). The mean age of Greek-letter students was 19.9 years ( $SD = 1.6$ ). Student demographics by Greek-letter status (non-pledge/member, pledge, or member) are provided in Table 1.

Student drinking behaviors are presented in Table 2.

### *Greek-letter students and Injury*

Eleven percent of non-Greek-letter students, 18% of Greek-letter pledges, and 13% of Greek-letter

members experienced one or more alcohol-related injuries that required medical treatment in the 12 months preceding the survey. Female pledges and members were significantly more likely to have been sexually assaulted than non-Greek females (3.6% and 2.1% vs 1.6%, respectively;  $p = .001$ ). Greek-letter pledges were much more likely to have experienced a fall that required medical attention, compared to both non-Greek-letter students and Greek-letter members (4.7% vs 2.2% and 3.3%, respectively;  $p < .001$ ). Greek-letter members were more likely to have been stabbed, shot, or burned in the 12 months preceding the survey, compared to non-Greek-letter students (1.4% vs 1.0%,  $p = .022$ ; 1.4% vs 0.8%,  $p = .004$ ; and 5.1% vs 3.8%,  $p < .001$ ). They were also more likely to have caused an injury to another person that required medical treatment (4.4% vs 2.8%;  $p < .001$ ).

In multivariable models that adjusted for typical weekly drunkenness and drinking behaviors in high school, Greek-letter pledges were more likely than other students to experience one or more injuries (AOR = 1.51; 95% CI: [1.23, 1.86]) or to cause injuries to others (AOR = 1.46, 95% CI: [1.03, 2.07]). Additionally, pledges who got drunk at least once a week had more than three times the odds of experiencing a fall from a height that required medical attention, compared to all other students. However, in multivariable modeling, although getting drunk increased the odds of sexual assault by 75%, being a female Greek-letter pledge or member was not a significant indicator of increased risk for assault after adjusting for drunkenness. Greek-letter pledges of both genders were significantly at higher risk for a fall from a height that required medical attention, independent of their drinking behaviors (AOR = 1.57; 95%CI: [1.08, 2.27]). The association of injuries and drunkenness among Greek-letter pledges and members is shown in Table 3.

## Discussion

Student health and university counseling centers combine to serve a large number of students

**Table 1.** Student demographics by Greek-letter society status (reported as *N* (%) or mean  $\pm$  SD).

Characteristic	Non-pledges/members ( <i>N</i> =16,610 87.9%)	Society pledges ( <i>N</i> =720 3.8%)	Society members ( <i>N</i> =1571 8.3%)	Overall ( <i>N</i> =18,901)
Gender <sup>b</sup>				
Male	6248 (38)	232 (32)	640 (41)	7120 (38)
Female	10,265 (62)	485 (67)	919 (59)	11,669 (62)
No response	97 (<1)	3 (<1)	12 (<1)	112 (<1)
Academic classification <sup>b</sup>				
Freshman	5554 (33)	441 (61)	67 (4)	6062 (32)
Sophomore	4004 (24)	190 (26)	502 (32)	4696 (25)
Junior	3498 (21)	63 (9)	462 (29)	4023 (21)
Senior	3000 (18)	23 (3)	463 (29)	3486 (18)
Other	439 (3)	3 (<1)	71 (5)	513 (3)
No response	115 (<1)	0	6 (<1)	121 (<1)
Age <sup>b</sup>	20.4 $\pm$ 2.9	18.8 $\pm$ 1.2	20.4 $\pm$ 1.5	20.3 $\pm$ 2.8
Race <sup>b</sup>				
Non-Hispanic White	13,033 (78)	572 (79)	1307 (83)	14,912 (79)
African-American	1433 (9)	50 (7)	98 (6)	1581 (8)
Hispanic	576 (3)	34 (5)	62 (4)	672 (4)
Asian/Pacific-Islander	700 (4)	28 (4)	45 (3)	773 (4)
Other	816 (5)	35 (5)	56 (4)	907 (5)
No response	52 (<1)	1 (<1)	3 (<1)	56 (<1)
Campus residence <sup>b</sup>				
On-campus	9323 (56)	598 (83)	892 (57)	10,813 (57)
Off-campus	7223 (43)	119 (17)	675 (43)	8017 (42)
No response	64 (<1)	3 (<1)	4 (<1)	71 (<1)

Note: <sup>b</sup>*p*-value < .001.

**Table 2.** Drinking behaviors by Greek-letter society status (reported as *N* (%) or mean  $\pm$  SD).

Characteristic	Non-pledges/ members ( <i>N</i> =16,610 87.9%)	Society pledges ( <i>N</i> =720 3.8%)	Society members ( <i>N</i> =1571 8.3%)	Overall ( <i>N</i> =18,901)
Drank in last year in High School <sup>b</sup>				
Yes	8459 (51)	474 (66)	936 (60)	9869 (52)
No	8089 (49)	245 (34)	631 (40)	8965 (47)
No response	62 (<1)	1 (<1)	4 (<1)	67 (<1)
Typical number of drinks per week during last year in high school <sup>b</sup>	2.58 $\pm$ 3.30	3.43 $\pm$ 3.45	3.18 $\pm$ 3.45	2.67 $\pm$ 3.33
Past 30 day drinker <sup>b</sup>				
Yes	10,954 (66)	600 (83)	1396 (89)	12,950 (69)
No	5527 (33)	118 (16)	172 (11)	5817 (31)
No response	129 (<1)	2 (<1)	3 (<1)	134 (<1)
Number of days drank alcohol in past 30 <sup>b</sup>	4.31 $\pm$ 5.57	6.41 $\pm$ 5.86	6.96 $\pm$ 5.85	4.61 $\pm$ 5.66
Most number of drinks in a row in past 30 <sup>b</sup>	4.27 $\pm$ 4.43	6.42 $\pm$ 4.69	7.00 $\pm$ 4.66	4.58 $\pm$ 4.54
Highest hourly rate of drinking <sup>a,b</sup>	1.31 $\pm$ 1.40	1.96 $\pm$ 1.64	1.77 $\pm$ 1.15	1.37 $\pm$ 1.40
Binge drinker <sup>a,*b</sup>				
Yes	7126 (43)	469 (65)	1091 (69)	8686 (46)
No	9162 (55)	241 (33)	444 (28)	9847 (52)

**Table 2.** (Continued)

Characteristic	Non-pledges/ members (N=16,610 87.9%)	Society pledges (N=720 3.8%)	Society members (N=1571 8.3%)	Overall (N=18,901)
No response	322 (2)	10 (1)	36 (2)	368 (2)
Number of days binge drank** in past 30 <sup>p</sup>	2.35 ± 4.12	4.26 ± 5.10	4.49 ± 5.09	2.61 ± 4.31
Get drunk in typical week <sup>p</sup>				
Yes	5356 (32)	431 (60)	936 (60)	6723 (36)
No	11,103 (67)	287 (40)	632 (40)	12,022 (64)
No response	151 (<1)	2 (<1)	3 (<1)	156 (<1)
Number of days drunk in a typical week <sup>p</sup>	0.54 ± 0.96	1.14 ± 1.20	1.11 ± 1.20	0.61 ± 1.01
Thinks getting drunk is 'OK' <sup>p</sup>				
Yes	8550 (51)	506 (70)	1209 (77)	10,265 (54)
No	7958 (48)	213 (30)	357 (23)	8528 (45)
No response	102 (<1)	1 (<1)	5 (<1)	108 (<1)

Note: \* Hourly rate of most # of drinks in a row in past 30 days for only those students who drank in past 30 days (69%);

\*\*Binge drinking is defined as one or more episodes where males drank five drinks in a row or four drinks in a row for females in past 30 days.

<sup>p</sup>p-value < .001.

**Table 3.** Association of injuries and high-risk drinking and Greek-letter society status.

Injury	AOR**	95% CI for AOR	p-value
Experiencing 1+ injuries* requiring medical attention			
Society pledge	1.51	(1.23, 1.86)	< .001
Society member	1.17	(1.01, 1.38)	.049
Getting drunk in a typical week	1.67	(1.50, 1.86)	< .001
Causing 1+ injuries to others* requiring medical attention			
Society pledge	1.46	(1.03, 2.07)	.034
Society member	1.22	(0.92, 1.62)	.165
Getting drunk in a typical week	2.33	(1.91, 2.84)	< .001
Burn requiring medical attention			
Society pledge	1.27	(0.92, 1.75)	.143
Society member	1.13	(0.87, 1.46)	.362
Getting drunk in a typical week	2.01	(1.69, 2.38)	< .001
Fall from height requiring medical attention			
Society pledge	1.57	(1.08, 2.27)	.017
Society member	1.22	(0.90, 1.65)	.206
Getting drunk in a typical week	2.10	(1.69, 2.62)	< .001
Sexually assaulted (female students only)			
Society pledge	1.49	(0.93, 2.39)	.099
Society member	1.23	(0.81, 1.85)	.329
Getting drunk in a typical week	1.75	(1.32, 2.31)	< .001

Notes: \*One or more of the following injuries: automobile crash, motorcycle crash, bicycle crash, all-terrain vehicle, pedestrian struck by motor vehicle, fall from a height, sexual assault, non-sexual assault, assault involving intimate or domestic partner, stab wound, gunshot wound, burn, or other serious injury.

\*\*Adjusted odds ratio from multivariable mixed-effects logistic regression model adjusted for gender, age, race, drinking status in high school, residence location, survey year, intervention group, and within-school clustering (except model for sexual assault for females not adjusted for gender).

and are a source for a variety of healthcare services (Gallagher, 2009; Keeling, 2001). There is evidence that alcohol interventions provided in university counseling centers can reduce alcohol use and increase students' use of protective behavioral strategies (Martens et al., 2007). Recent studies have demonstrated the efficacy of screening and brief intervention for reducing high-risk drinking and its consequences in student health centers (Amaro et al., 2010; Fleming et al., 2010; Schaus et al., 2009), in university counseling centers (Martens et al., 2007), and through electronic means (Carey et al., 2009; Dumas and Anderson, 2009). Very brief interventions can impact alcohol use outcomes (Kulesza et al., 2010). A meta-analysis of 62 studies of alcohol prevention interventions on college campuses found that individual interventions that provide feedback and normative comparisons were most likely to reduce alcohol-related problems over time (Carey et al., 2009). Greek-letter pledges and members should be specifically targeted by injury prevention strategies during routine visits to campus-based health care services (both university health centers and university counseling centers). It may be beneficial to expand alcohol screening during students' initial visits to campus-based health services, using a 'healthy lifestyles' context that emphasizes harm reduction rather than abstinence.

Greek-letter pledges and members comprise a defined social network on college campuses. Organizing prevention-based outreach within Greek-letter societies might allow university counseling center staff and other campus-based health professionals to obtain localized information on common situations where students are at risk for injury and sexual assault. These types of groups would inform campus service providers in order to improve assessment and intervention, while creating a collaborative environment where Greek-letter pledges and members can voice their concerns regarding peer health and safety. Interventions should include information about the increased risk of alcohol-related injury among Greeks. To enhance self-motivated behavior change, both self-referred

and mandated Greeks can be offered cognitive skills training, norms clarification, and nonjudgmental feedback about risky drinking. Counseling strategies to address alcohol misuse will be more effective if they recognize and accommodate the developmental processes (and challenges) of young adults (Scholl and Schmitt, 2009).

Peer-group attitudes may be negative toward students who seek help for alcohol problems (MacNeela and Bredin, 2011). Greek-letter students may benefit from tailored interventions that address the strong cultural influences that encourage high-risk drinking in this population, in an empathetic and collaborative manner that recognizes the autonomy of young adults. Both group and individual settings may be used by counselors to explore the discrepancies between high-risk drinking behaviors, the culture of hazing, and the key tenets of traditional Greek-letter societies: leadership; self-control; and mutualism. Finally, routine screening for risky drinking on college campuses may be hindered by lack of time and lack of resources (Foote et al., 2004). In a representative sample of colleges in the United States, 21% of college administrators were unaware of the 2002 recommendations of the NIAAA Task Force on College Drinking (Nelson et al., 2010), and intervention programs with documented efficacy for high-risk students were offered at only 50% of colleges (Nelson et al., 2010). University counseling centers and health centers should be allocated the necessary resources for widespread implementation of prevention, screening, and brief intervention, including the hiring and training of staff, physical space, and support for monitoring intervention effectiveness.

### *Limitations*

Self-report data have been validated in previous studies of alcohol use in college students (Del Boca and Darkes, 2003; Dowdall and Wechsler, 2002); however, it is possible that students may have over- or under-estimated their alcohol use. Furthermore, although the survey was anonymous, different patterns of



levels of drinking might be associated with different amounts of response bias.

We did not examine personality constructs such as sensation-seeking. In a recent study of 12,900 students who sought routine care at five college health clinics, sensation-seeking disposition was associated with an increased risk of alcohol-related injury (Mundt et al., 2009). Personality traits such as sensation-seeking and impulsivity have been associated with risky alcohol use among college students (Cyders et al., 2009; Magid et al., 2007), but it is not known whether these characteristics are overly represented among Greek-letter students. Additional research is necessary to clarify the relationship between individual disposition, alcohol, and injury risk among Greek-letter pledges and members.

We did not specifically assess whether alcohol-related injuries were the result of hazing. Future studies on injury among Greek-letter students should specifically address hazing practices.

The study was limited to college students from a particular geographic area; there is regional variation in alcohol consumption among college students (NIAAA, 2002). Sixty-one percent of Greek-letter survey respondents were female, and 82% identified themselves as non-Hispanic White, limiting the generalizability of the results. However, post-hoc analysis confirmed that the sample reflected the ethnic and racial compositions of the study campuses. Furthermore, the demographic profile of this sample reflects that of undergraduate students in the USA (United States Department of Education, 2006).

This survey was designed for and administered on the Internet, an effective methodology for collecting data on college students' alcohol use (Couper, 2000; McCabe et al., 2006; Moore et al., 2005), but several demographic and technologic criteria may introduce variability in response rates. These include gender and school year, as well as the prevalence of computer use in the everyday life of the university.

Finally, this survey used cross-sectional data, which limits our ability to assess causal relationships. Future studies should follow

college students longitudinally to assess the trajectory from college entry to pledging Greek-letter society membership.

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## Competing Interests

None declared.

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