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Characteristics of pre-college sexual violence victimization and associations with sexual violence revictimization during college

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Abstract

Objective: To examine the prevalence and characteristics of pre-college sexual victimization (SV) experiences and associations with revictimization and recent substance use behaviors among a sample of college students who reported pre-college SV.

Participants: A sub-sample of 931 college students who reported pre-college SV at baseline data collection for an ongoing multi-site clinical trial.

Methods: Data were collected via electronic surveys between September 2015 and March 2017. Measures included pre-college and during college SV, recent substance use, and alcohol-related harm reduction behaviors.

Results: Pre-college SV characteristics associated with revictimization included: Non-penile penetration (aOR: 1.51, 95%CI: 1.04-2.19); pressured sex (aOR: 1.46, 95%CI: 1.06-2.01); and stranger assault (aOR: 2.03, 95%CI: 1.22-3.40). Past 30-day binge drinking was also associated with revictimization (aOR: 1.86, 95%CI: 1.36-2.54).

Conclusions: The relationship between pre-college SV and alcohol, especially binge drinking, may require a more integrated approach to preventing subsequent revictimization.

Keywords

sexual assault; alcohol; harm reduction

Background

Recent prevalence estimates of sexual violence (SV) on college campuses, which range from 15% to 44%,[1–3] have garnered substantial media and policy attention, catalyzing efforts across college campuses to prevent and respond to SV among their students.[4] A growing body of research points to the role of prior exposure to SV as a significant risk factor for SV revictimization,[5] yet pre-college SV experiences are rarely acknowledged or accounted for in prevention programs.

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One in three individuals who experience SV have their first SV experience before the age of 18, typically prior to beginning college.[6] A national survey of adolescent health behaviors found that 6.7% of high school seniors reported having experienced forced sexual intercourse, and 10.6% of students reported past 12-month sexual dating violence (e.g. being kissed, touched, or physically forced to have sexual intercourse with a dating partner).[7] As nearly 70% of high school seniors go on to matriculate on a college campus, a large number of young people entering college have already experienced SV.[8] Importantly, prior experiences of SV are associated with a 200-700% increased risk for subsequent SV.[1,9–11] Despite what is known regarding the risk of SV revictimization, little research has examined characteristics of sexual violence that may contribute to this risk.[5] Prior work has examined general pathways to revictimization that include changes in risk perception leading to increased risk taking behavior, however largely this work has not examined whether differences exist in the risk across the spectrum of SV experiences. These differences may be of great importance when determining where and how to focus intervention resources. Thus, it is critical to understand the impact specific SV experiences have on students' health and wellness during college.

The relationship between alcohol use and SV among college students is complex and multifaceted, with SV increasing the risk for alcohol use and binge drinking, and alcohol use increasing the risk of SV and revictimization.[12–15] Alcohol use, and binge drinking in particular, commonly accompanies SV on college campuses, with 50-70% of campus sexual assaults occurring with one or more of the involved parties being under the influence of alcohol.[16–18] Harm reduction strategies are one avenue being implemented to address these common and co-occurring issues.[19–21,22,23] Harm reduction messaging and strategies focus on promoting safety during drinking episodes (e.g. by not driving, or by setting drinking limits to avoid "blacking out"). Similar strategies are often promoted in campus SV prevention programming as potential ways to decrease ones risk of victimization.

Syndemic theory, states that multiple public health issues facing a population interact with one another resulting in poorer outcomes.[24–26] Syndemic theory offers a framework for examining the adverse interactions of multiple health issues, and is apt for examining the issues of campus sexual violence and substance use. Prior research suggests a potentially synergistic relationship between SV and alcohol, with SV increasing risk for binge drinking, while such hazardous drinking often occurs in contexts that increase risk for SV.[12,14,27–29] Further, syndemic theory suggests that early experiences of victimization may lead to additional risky behaviors (e.g. drug use, condomless sex), which can then exacerbate each other leading to additional health sequalae.[30–33] With past experiences of SV increasing the risk for alcohol use, drug use, and sexual risk behaviors, students who have experienced pre-college sexual victimization likely face an even more dire risk of revictimization.[15,33,34] Subsequently, examining and addressing the issues of alcohol use and SV among college students together rather than separately may be more beneficial in improving outcomes. The purpose of this exploratory analysis is to examine the prevalence and characteristics of pre-college SV experiences and associations with recent substance use and revictimization among a sample of college students seeking care in campus health and counseling centers.

Methods

As part of an ongoing cluster randomized controlled trial of a campus health center-based intervention designed to decrease alcohol use and increase knowledge of SV harm reduction strategies, 2,292 students attending a campus health or counseling center were recruited from 28 college and university campuses across Pennsylvanina and West Virginia and enrolled in the parent study.[35] Students were recruited in-person by research staff in the clinics, via email, and through the use of on campus flyers. After being assessed for eligibility and completing verbal informed consent processes, students completed baseline study measures via an online survey.[36] Students were compensated with a $15 gift card for their time following their clinic visit and completion of an immediate post-intervention exit survey. Full protocol details are published elsewhere.[35] All study procedures were approved by the University of Pittsburgh Institutional Review Board (IRB).

Measures

Sexual violence experiences and characteristics—Sexual violence victimization was measured using a 6-item modified version of the Sexual Experiences Survey (SES, Cronbach's alpha 0.83).[37–39] Participants were asked specifically about 6 types of SV experiences (e.g., "How many times has anyone fondled, kissed, or touched you sexually when you indicated that you didn't want to"; see Table 2 for full list of items) occurring both before college and during college. Participants indicated the number of times (0, 1, 2, 3, 4 or more) each type of SV occurred both prior to and since entering college. Students who endorsed any type of SV were further asked to specify their relationship to the perpetrator(s) (e.g. "Who did the unwanted sexual contact involve", see Table 2 for all item response) and what tactics perpetrator(s) used to facilitate the SV (e.g. pressure, threats, physical force, incapacitation, etc.; see Table 2 for full text of item responses); for both perpetrator and tactics items, participants could select all that apply.

Substance use and alcohol-related harm reduction strategies—Current alcohol use was measured using participant reports of the number of drinking days and number of binge drinking days (≥4/5 drinks in a two hour period for female/male students) during the past 30 days.[40] Each of these items was then dichotomized to indicate any past 30-day report of alcohol use or binge drinking. Alcohol-related harm reduction strategies were measured with 11 items from the National College Health Assessment (NCHA) survey[41] that asked about frequency of specific harm reduction behaviors in the past 12 months (e.g. avoid drinking games, use a designated driver) on a 5-point Likert scale ranging from "never" to "always" (see Table 3, Cronbach's alpha=0.82). Consistent with the NCHA reporting, each item was individually dichotomized into students who reported using a strategy "always" or "most of the time" compared to students who reported using a strategy less frequently.[41] While some work has been done using these items as a summary score,[20–22,42] we maintained individual items in the analysis both to allow for examination of whether individual items were related to the SV outcome and because it is unclear whether a one point change in the scale is a consistent or meaningful measure of change. Other substance use was measured using a modified version of the NCHA survey drug use questionnaire, which included separate items for frequency of past 30-day use of tobacco, marijuana,

prescription medications, and other drugs (ranging from “never used” to “used daily”)[41] As with alcohol use and binge drinking the other substance use items were dichotomized into any past 30-day use or no use for this analysis.

Analysis

Descriptive statistics were used to characterize the sample. Unadjusted analysis of differences between students who reported pre-college SV only and those that experienced revictimization during college were assessed using Wald log-linear Chi-square tests, accounting for clustered data. Finally, multivariable analysis using generalized linear mixed modelling with a random effect to account for clustering of participants within schools was used. A series of six multivariable models were built including variables in each category (e.g., type of SV, perpetrator relationship to victim, alcohol and alcohol-related harm reduction behavior use) that were associated in bivariate analyses at $p<0.05$. The final multivariable model included all domains in which any variable maintained significance during grouped multivariable analysis. As assessing revictimization was not the study’s primary aim, power calculations for sample size were not conducted for this analysis prior to data collection.[43] Data were analyzed using SPSS Version 24 and SAS Version 9.4.[44,45]

Results

Description of Sample

In total, 2,292 students met inclusion criteria and completed study enrollment.[35] At baseline, 931 (40.6%) reported experiencing at least one instance of SV prior to college. We limited our sample to this group to examine associations with experiencing SV revictimization during college. Of these 931 students who reported pre-college SV, the majority were female (85%) and white (77%). Table 1 presents additional demographic characteristics. Of this sample over half, (53%, n=492) reported experiencing any type of SV revictimization during college.

Bivariate Analysis

Sexual Violence Experiences and Characteristics—The most commonly reported pre-college SV experience was unwanted sexual touching or contact; this was reported by 69% of the students who reported only pre-college SV and 73% of students who reported revictimization during college (Table 2). Pre-college unwanted vaginal sex was reported by 18% of students whose victimization occurred only pre-college, and by 24% of those who reported revictimization during college. Pre-college unwanted anal sex was the least frequently reported SV act, reported by 4% of students in the pre-college SV only group and 8% of students in the revictimization group. In bivariate analysis, differences between the pre-college SV only and revictimization groups were found for two of six SV acts that occurred prior to college: pre-college attempted sex and penetration with an object were both reported more frequently by the students who reported revictimization than those who reported SV before college only (69% vs. 57% and 29% vs. 18%, respectively).

As with the types of SV acts experienced, perpetrators and tactics (e.g. coercive, threatening or forceful behavior) used to perpetrate the SV were reported with varying frequency.

Threats of harm were the least frequently reported perpetrator tactic (7% of the pre-college SV only group and 9% of the revictimization group), and overwhelming with arguments or pressure was the most frequent (52% of the pre-college SV only group and 61% of the revictimization group). While all tactics were reported more frequently by students who experienced revictimization, two of the five measured tactics – overwhelming with pressure or arguments and take advantage of while incapacitated (e.g. by drugs or alcohol) – showed significant differences in bivariate analysis.

The most common reported perpetrators of SV were known to victims and included friends, ex-romantic partners, and casual acquaintances or hookups (Table 2). Four perpetrator categories (stranger, friend, teacher/professor, and casual acquaintance/hookup) were significantly associated with revictimization in bivariate analysis. Two categories (family members and “other”) were reported more frequently by the pre-college SV only group. However, these differences were not statistically significant.

Substance use and alcohol use harm reduction strategies—Students who reported revictimization during college were more likely to report past 30-day alcohol use and binge drinking than students who reported pre-college SV only (Table 3). They were also more likely to report all forms of substance use, including past 30-day tobacco use, marijuana use, prescription drug misuse and other illicit drug use. Differences between students who did and did not report revictimization were noted in four of the 11 alcohol-related harm reduction strategies they used (see Table 3). In each case, students who reported revictimization were less likely to report using a harm reduction strategy. Students who reported revictimization were less likely to have engaged in self-monitoring of their drinking behavior (such as avoiding drinking games; pacing to one or fewer drinks per hour). There were no differences noted in whether they relied on friends as a harm reduction strategy (e.g. have a friend let you know when you’ve had enough; stay with the same group of friends the entire time when drinking).

Multivariable Analysis

A series of domain specific models were built while controlling for demographics (race, gender, year in school, and current residence) to determine what domains to retain in the final model (Table 4). In the domain specific multivariable models, none of the drug use or alcohol-related harm reduction strategy variables were associated with revictimization and therefore these domains were excluded from the final model (Table 4, Models 4-6). While past 30-day alcohol use was significantly associated with revictimization in bivariate testing, this variable was excluded from the multivariable models given its high correlation with past 30-day binge drinking.

One characteristic from each pre-college SV characteristic domain (type of SV, perpetrator relationship to victim, perpetrator tactics) maintained associations with revictimization in the final model (Table 4, Model 6). Non-penile penetration (e.g. with an object or finger) increased the odds of revictimization (aOR: 1.51, 95% CI: 1.04-2.19). A perpetrator who used pressure or overwhelmed with arguments to facilitate SV was associated with a similar increase (aOR: 1.46, 95% CI: 1.06-2.01). Experiencing SV perpetrated by a stranger was

associated with the highest SV risk, increasing the odds of revictimization two-fold (aOR: 2.03, 95% CI: 1.22-3.40). Past 30-day binge drinking was associated with an almost two-fold increase in the odds of reporting revictimization (aOR: 1.86, 95% CI: 1.36-2.54).

Comment

A history of SV experiences increases risk for future victimization.[5] We aimed to examine whether unique risk or protective factors for SV related to pre-college SV experiences could be identified among a sample of college students who reported experiencing SV prior to entering college. More than half (53%) of students who reported experiencing pre-college SV also reported revictimization during college. Notably, while we identified some characteristics of pre-college SV associated with elevated risk for subsequent revictimization during college, these characteristics covered a wide range of SV scenarios, and are not reflective of any one pattern. This is contrasted by the consistent relationship between recent binge drinking and revictimization among our sample.

The relationship between past 30-day binge drinking and revictimization aligns with prior literature, and highlights the importance of concurrently addressing alcohol use and SV in prevention programing.[46–48] While we are not able to identify the order of events with these cross-sectional data related to students' binge drinking and SV revictimization, one possibility is that alcohol use may be a means to cope with trauma, or its physical and mental health sequelae, which then places students at higher risk for subsequent revictimization. If this is the case, alcohol use programming that fails to address these motivations for drinking is unlikely to promote maximum change in students who arrive to college with histories of SV. Similarly, SV prevention programming that fails to account for these pre-college experiences by providing access to trauma-informed physical and mental health services, including alcohol and drug use treatment and harm reduction options, may be failing to address the overlap of these risk factors.[49]

Given the ubiquity of drinking on college campuses and the relationship between drinking to cope and alcohol misuse,[50,51] identifying students who may be using drinking as a strategy to manage physical and psychological symptoms of trauma and providing them with strategies for alcohol-related harm reduction and opportunities to develop healthier coping skill represents a largely neglected area of research and intervention.[23,52] It is noteworthy that in our study, the relationship between alcohol-related harm reduction strategies and revictimization was attenuated in multivariable models. However, given the self-monitoring and use reduction nature of the harm reduction items that were associated with revictimization (e.g, choosing not to drink and pacing to one drink or fewer per hour), it is possible that any impact harm reduction behaviors had was overshadowed by the high proportion of the sample (59%) that reported past 30-day binge drinking, and the relationship between binge drinking and revictimization. Further examination of harm reduction strategies that do not rely on alcohol use reduction is needed to determine whether they impact sexual violence, to tailor future interventions.

The finding that students who reported pre-college pressured or coerced SV experiences were more likely than those who did not to report revictimization during college highlights a

need to recognize the impact of SV broadly on health and subsequent risk, not solely forcible rape. While pressured or coerced sex may not meet legal definitions of sexual assault or rape, it does not negate the impact on victims. Prior work has demonstrated that students often do not formally report or seek help following SV experiences because they feel they are not severe enough or that they will not be believed.[1,2,53,54] Students who experience coerced or pressured sex are perhaps the least likely to seek care or help related to their SV experiences, which may contribute to their increased risk for revictimization. Further work to better elucidate the role that feeling pressured into sex has on students' care seeking and risk-taking behaviors is needed. Additional specific characteristics of pre-college SV that were associated with revictimization require further investigation. Pre-college unwanted object penetration, strangers as perpetrators, and overwhelming with arguments span a wide range of SV scenarios, and taken together do not offer a clear pattern. A variety of unwanted sexual experiences prior to college appear to increase risk for SV revictimization, suggesting that universal interventions to address the full range of pre-college SV experiences should be integrated into campus discussions of SV prevention.

These findings have relevance for campus SV and alcohol use programming and policies. Failure to address the underlying impact of prior victimization in SV prevention efforts leaves vulnerable students at higher risk for additional SV. Simultaneously, not identifying and accounting for past trauma when responding to students' alcohol use has the potential to perpetuate unhealthy coping strategies and increase risk for negative health outcomes. Viewing these issues as a syndemic highlights the interconnectedness of risk factors within a population may offer a way to reframe the discussion regarding alcohol and SV on college campuses. Rather than trying to understand and address the components separately, a more comprehensive approach which takes into account each of the factors is needed. Syndemic frameworks have been used extensively to understand and intervene in HIV prevention and treatment settings and have previously identified the complex multidirectional relationship between substance abuse, violence, and sexual risk behaviors.[25,55,56] Given the relationship between alcohol use, SV, and sexual risk behaviors on college campuses, syndemic theory is useful for guiding the design of tailored interventions to prevent and respond to both alcohol use and SV in this setting. For example, responses to violations of campus alcohol policies could include SV information and service referrals, assessment of student stressors and drinking motivations, and skills building related to coping and harm reduction strategies for safer alcohol use and reducing risk for SV revictimization.

Implications for College Health Providers

While we know that students are unlikely to seek out formal help for issues related to violence or alcohol on campus, [2,57]our data demonstrate that students seeking care at campus health centers have complex histories of SV and alcohol use. Providers should be aware not only of SV as an issue that students face during their time in college, but also as an important aspect of their prior history and contributing to their current health and risk behaviors. Providers should be equipped to share information, resources, and referrals regarding SV and its health consequences with students. Providers should also have a low threshold for more direct inquiry into SV as a potential stressor for students – while students

rarely state they are seeking care specifically for a sexual assault (less than 1% of our sample), students were still seeking care, and therefore not unreachable.

Limitations

Our findings must be taken in the context of study limitations. First, the use of cross-sectional survey methods to collect historical data introduces opportunities for bias and limits understanding temporality. Our sample is also comprised of students seeking care in campus health and counseling centers, thus reflecting a sample of students who may have more complex trauma and health histories than non-care seeking students. While the campuses are located in Pennsylvania and West Virginia and provide a mix of larger and smaller, private and public schools, findings may not be generalizable to all college students. The study does, however, provide insight into the challenges facing students who are seeking health care on-campus.

While we were able to capture experiences prior to and since college separately, the low prevalence of students who reported some SV characteristics (i.e. specific perpetrators, anal sex, and use of verbal threats) limited our ability to detect some differences. While gender was adjusted for in multivariable models, the limited number of male and transgender or non-binary students in the sample precluded our ability to examine potential gender differences in risk and protective factors in separate models. Additionally, while we adjusted for age in our models, as some students were still early in their college experience, we may not have captured the full extent of SV revictimization events during college years. Lastly, revictimization was not the study's primary outcome – this opens our analyses to the limitations of secondary analysis including, the potential for issues with statistical power, identification of spurious results as a result of multiple comparisons, and use of measures that did not allow for precise counts of SV incidents to better assess potential the strength of the relationship between specific SV characteristics.

Conclusions

A substantial number of college students seeking care in health and counseling centers on their campuses have been exposed to SV both prior to and during college. While a great deal of attention is being paid to on-campus prevention and responses to SV, far less research and programmatic work has been done to address the experiences of trauma students bring with them to college. These experiences prior to college are important risk factors for revictimization during the college years. The relationship between SV and alcohol, especially binge drinking, may also warrant a more integrated, syndemic approach to address their potentially synergistic relationship in contributing to negative health and social outcomes among college students.

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Table 1.

Student demographics by sexual violence (SV) experience status, [n (%)]

	Overall (*n*=931)	**SV Pre-College Only (*n*=439)**	**SV Prior to and During College (*n*=492)**	***p***
Race				0.193
Asian	41 (4.4)	18 (4.1)	23 (4.7)	
Black or African American	100 (10.7)	54 (12.3)	46 (9.3)	
White	720 (77.3)	339 (77.2)	381 (77.4)	
Multiracial	45 (4.8)	17 (3.9)	28 (5.7)	
Other	21 (2.3)	11 (2.5)	10 (2.0)	
Gender				**<0.001**
Male	123 (13.2)	80 (18.2)	43 (8.6)	
Female	793 (85.1)	352 (80.2)	441 (89.6)	
Other gender[a]	14 (1.5)	6 (1.4)	8 (1.6)	
Any sex with same gender partner[b]	105 (13.3)	47 (13.0)	58 (13.6)	0.794
Year in school				**<0.001**
1st year undergraduate	266 (28.5)	159 (36.2)	107 (21.7)	
2nd year undergraduate	240 (25.8)	114 (26.0)	126 (25.6)	
3rd year undergraduate	175 (18.8)	69 (15.7)	106 (21.5)	
4th year undergraduate	150 (16.1)	57 (13.0)	93 (18.9)	
Other	95 (10.2)	37 (8.4)	58 (11.8)	
Current residence				**<0.001**
Campus residence hall	479 (51.4)	256 (58.3)	223 (45.3)	
Fraternity or sorority house	14 (1.5)	2 (0.5)	12 (2.4)	
Parent/guardian's home	35 (3.8)	17 (3.9)	18 (3.7)	
Other	397 (42.6)	160 (36.5)	237 (48.2)	

Notes: P-values listed for Wald log-linear chi-square differences in proportion accounting for clustered data and comparing SV pre-college only to SV prior to and during college groups. Percentages may not total 100 due to missing data.

[a]Includes transgender, non-binary, and other gender responses

[b]For students reporting sexual activity, (*n*=787)

Table 2.

Characteristics of pre-college sexual violence (SV) experienced by students, [n (%)]

	SV Pre-College Only (*n*=439)	SV Prior to and During College (*n*=492)	*p*
Type(s) of *pre-college* SV[a]			
Unwanted sexual touching	304 (69.2)	357 (72.6)	0.122
Attempted unwanted sex	**249 (56.7)**	**339 (68.9)**	**<0.001**
Unwanted vaginal sex	79 (18.0)	116 (23.6)	0.093
Unwanted oral sex	106 (24.1)	149 (30.3)	0.073
Unwanted anal sex	19 (4.3)	38 (7.7)	0.059
Unwanted penetration (with finger, object)	**79 (18.0)**	**140 (28.5)**	**<0.001**
Perpetrator behavior(s) used to facilitate *pre-college* SV[a]			
overwhelm you with arguments about sex or continually pressure you for sex	**227 (51.7)**	**298 (60.6)**	**0.008**
threaten to physically harm you or someone close to you	29 (6.6)	43 (8.7)	0.152
use physical force (such as holding you down)	120 (27.3)	158 (32.1)	0.163
take advantage of you when you were incapacitated (e.g., by drugs or alcohol) and unable to object or consent	**73 (16.6)**	**136 (27.6)**	**<0.001**
the person did something else that is not listed here	202 (46.0)	220 (44.7)	0.750
Pre-college SV perpetrator(s)[a]			
Stranger	**34 (7.7)**	**71 (14.4)**	**0.003**
Friend	**161 (36.7)**	**216 (44.0)**	**0.007**
Family member	29 (6.6)	21 (4.3)	0.062
Co-worker	13 (3.0)	23 (4.7)	0.243
Employer/Supervisor[b]	1 (0.2)	4 (0.8)	0.378
Teacher/Professor[b]	**0 (0)**	**7 (1.4)**	**0.016**
School or University Staff[b]	0 (0)	3 (0.6)	0.252
Current romantic partner	40 (9.1)	51 (10.4)	0.583
Casual acquaintance or hookup	**66 (15.0)**	**102 (20.7)**	**0.007**
Ex-romantic partner	143 (32.6)	165 (33.5)	0.683
Other	30 (6.8)	26 (5.3)	0.372

Notes: P-values listed for Wald log-linear chi-square differences in proportion accounting for clustered data and comparing SV pre-college only to SV prior to and during college groups.

[a]Categories are not mutually exclusive.

[b]Fisher's Exact test used due to small cell size, not accounting for clustering.

Table 3.

Student reported alcohol and substance use behaviors by sexual violence (SV) prior to and since college experience status, [n (%)]

	Overall	SV Pre-College Only	SV Prior to and During College	*p*
Alcohol use behaviors (past 30-day)[a]				
Any alcohol use	715 (87.4)	301 (82.5)	414 (91.6)	**<0.001**
Any binge drinking	481 (58.8)	185 (50.7)	296 (65.5)	**0.001**
Alcohol-related harm reduction strategy use (past 12-month)[a,b]				
Alternate non-alcoholic with alcoholic beverages	259 (31.7)	114 (31.2)	144 (31.9)	0.887
Avoid drinking games	235 (28.7)	122 (33.4)	112 (24.8)	**0.002**
Choose not to drink alcohol	185 (22.6)	95 (26.0)	90 (19.9)	**0.046**
Determine, in advance, not to exceed a set number of drinks	332 (40.6)	163 (44.7)	168 (37.2)	0.062
Eat before and/or during drinking	387 (47.3)	178 (48.8)	208 (46.0)	0.300
Have a friend let you know when you've had enough	656 (80.2)	297 (81.4)	358 (79.2)	0.299
Keep track of how many drinks you were having	473 (57.8)	220 (60.3)	252 (55.8)	0.188
Pace your drinks to 1 or fewer per hour	210 (25.7)	113 (31.0)	96 (21.2)	**0.007**
Stay with the same group of friends the entire time you were drinking	674 (82.4)	309 (84.7)	364 (80.5)	0.139
Stick with only one kind of alcohol when drinking	353 (43.2)	174 (47.7)	178 (39.4)	**0.032**
Use a designated driver	683 (83.5)	309 (84.7)	373 (82.5)	0.186
Other substance use behaviors (past 30-day)[c]				
Tobacco	396 (42.5)	164 (37.4)	232 (47.2)	**0.011**
Marijuana	505 (54.2)	201 (45.8)	303 (61.6)	**<0.001**
Prescriptions drugs	172 (18.5)	57 (13.0)	114 (23.2)	**<0.001**
Other drugs (e.g. cocaine, methamphetamine)	96 (10.3)	29 (6.6)	66 (13.4)	**<0.001**

Notes: P-values listed for Wald log-linear chi-square differences in proportion accounting for clustered data and comparing SV pre-college only to SV prior to and during college groups.

[a] Among students reporting SV prior to college and past 12-month alcohol use (n=817)

[b] Proportion of students who reported using the strategy "Always" or "Most of the time" in the past 12 months

[c] Among all students reporting SV prior to college (n=931)

Table 4.

Generalized linear mixed model (GLMM) associations with experiencing sexual violence (SV) revictimization **during** college

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
			aOR (95% CI)			
Type(s) of *pre-college* SV[a]						
Attempted unwanted sex	**1.59 (1.17-2.16)**					1.36 (0.98-1.88)
Unwanted penetration (with finger, object)	**1.63 (1.14-2.34)**					**1.51 (1.04-2.19)**
Perpetrator behavior used to facilitate sexual violence *pre-college*						
overwhelm you with arguments about sex or continually pressure you for sex		**1.59 (1.18-2.15)**				**1.46 (1.06-2.01)**
take advantage of you when you were incapacitated (e.g., by drugs or alcohol) and unable to object or consent		**1.68 (1.18-2.41)**				1.24 (0.85-1.83)
Pre-college SV perpetrator(s)[a]						
Stranger			**1.94 (1.18-3.17)**			**2.03 (1.22-3.40)**
Friend			**1.39 (1.03-1.87)**			1.23 (0.89-1.68)
Casual acquaintance or hookup			1.40 (0.96-2.06)			1.26 (0.84-1.87)
Alcohol-use						
Past 30-day binge drinking				**1.52 (1.07-2.15)**		**1.86 (1.36-2.54)**
Alcohol-related harm reduction strategy use (past 12-month)						
Avoid drinking games				0.77 (0.54-1.11)		
Choose not to drink alcohol				1.06 (0.71-1.57)		
Pace your drinks to 1 or fewer per hour				0.76 (0.51-1.13)		
Stick with only one kind of alcohol when drinking				0.81 (0.59-1.12)		
Other substance use behaviors (past 30-day)						
Tobacco					1.13 (0.80-1.61)	

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
				aOR (95% CI)		
Marijuana					1.22 (0.86-1.74)	
Prescriptions drugs					1.23 (0.79-1.91)	
Other drugs (e.g. cocaine, methamphetamine)					1.37 (0.78-2.39)	

Notes: All models adjusted for race, gender, year in school, and current residence. *n*=795, (students who reported SV prior to college, past 12-month alcohol use, and had complete data for all model variables). Domain specific model included items associated at p<0.05 in bivariate analysis (See Tables 2–3).

[a]Teacher/professor not included in GLMM due to low frequency of reporting (See Table 2)