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Adolescent health brief

Sexual Assault and Co-Occurrence of Mental Health Outcomes Among Cisgender Female, Cisgender Male, and Gender Minority U.S. College Students

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A B S T R A C T

Purpose: The aim of this study was to examine the co-occurrence of mental health (depression, anxiety, nonsuicidal self-injury, and suicide ideation) and substance use outcomes among cisgender female, cisgender male, and gender minority college students exposed to sexual assault (SA).
Methods: Data were drawn from a 2018 U.S. national survey of college student well-being (N = 50,438). Inverse propensity-weighted three-step latent class analysis was used to examine co-occurrence of outcomes while adjusting for 31 potential confounders of the relation between SA and outcome classes.
Results: Four latent classes were identified for cisgender female and male participants and two for gender minority participants, reflecting a range from low to high risk of co-occurring outcomes. SA was associated with significantly and substantially increased odds (odds ratio: 2.03–3.64) of membership to the highest-risk outcome class compared with the lowest-risk class across gender identity subgroups.
Conclusions: SA in the college setting is associated with substantially increased odds of co-occurring depression, anxiety, nonsuicidal self-injury, and suicide ideation, regardless of gender identity.

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IMPLICATIONS AND CONTRIBUTION

This study advances understanding of co-occurring risks associated with sexual assault exposure among U.S. college students and provides insight into the prevalence and impact of sexual assault among young adults identifying as cisgender female and male as well as gender minority.

Sexual assault (SA) among college and university ("college") students constitutes an issue of major public concern, with random sample or U.S. national survey studies finding that up to 44% of cisgender female, 8% of cisgender male, and 20% of transgender college students experience some form of SA [1,2]. Outcomes associated with SA among college students include depression and anxiety, substance use, and suicidality [3–5]. Importantly, many studies examining these outcomes in the college setting have been carried out among cisgender students (i.e., individuals whose gender identity corresponds to their birth sex) or with gender identity measures that limit representation of minority gender identities, and there have been comparatively few studies among transgender and genderqueer/gender-nonconforming students. Methodologically, prior studies

assessing the relation of SA with mental and behavioral health outcomes have typically done so while regression adjusting for a set of potential confounders (e.g., age, race/ethnicity, education level, and fraternity/sorority membership). In these cases, the number of confounders is often limited; moreover, regression model goodness-of-fit tests do not allow for examining the degree to which systematic differences between exposure groups have been eliminated [6]. In addition, although it has been common in the existing literature to examine bivariate relations between SA and an outcome, such an approach provides limited insight into patterns of co-occurrence of mental and behavioral outcomes among SA victims in the college setting. Knowledge of the impact of SA across multiple indicators of college student well-being while adjusting for numerous sources of confounding would be valuable for prevention and policy-making efforts, and would more fully characterize the behavioral and mental health of victims of SA in the college setting.

The present study attempts to address these limitations and needs by using data derived from a large, U.S. national survey study of college student health and well-being (N = 50,438) and by implementing inverse propensity-weighted three-step latent class analysis (LCA) to examine co-occurrence of mental health and substance use outcomes while adjusting for potential confounders of the relation between SA and outcomes among cisgender female, cisgender male, and gender minority student subgroups.

Methods

Data were drawn from the 2017—2018 Healthy Minds Study, an annual survey administered to college students throughout the U.S. [7]. Participants endorsed the item, "What is your gender identity?", with one of the following response options: male, female, trans male/trans man, trans female/trans woman, genderqueer/gender nonconforming, or self-identify (with open text field). Of participants completing a mental health questionnaire module, 34,007 identified as cisgender female, 14,908 as cisgender male, and 1,523 as gender minority (transgender female/woman = 50; transgender male/man = 221; genderqueer/gender nonconforming = 903; self-identified gender minority identity = 349). Mean age in each subgroup was 23.1 (standard deviation [SD] = 6.3), 23.8 (SD = 6.6), and 21.5 (SD = 5.0), respectively. Across subgroups, 66.2%—77.5% of participants identified as white. Most participants maintained a full-time enrollment status (90.2%—94.5%) and were enrolled in bachelor's degree programs (60.7%—82.7%). Forty-one respondents did not provide gender identity information and were not included in the previously described subgroups. This study was exempt from institutional review board oversight as a secondary analysis of deidentified data, and responses were collected with informed consent from all participants during the original survey administration.

Measures

SA was measured using an item assessing the occurrence of unwanted sexual contact, including touching or penetration, in the prior 12 months [7]. Outcome variables were defined as follows: depression (above moderate cutoff score of 10 on the Patient Health Questionnaire-9 [8]), anxiety (above moderate cutoff score of 10 on the Generalized Anxiety Disorder-7 scale [9]), nonsuicidal self-injury (endorsement of any form of

nonsuicidal self-injury [e.g., cutting or burning] in the prior year), suicide ideation (endorsement of the item, "In the past year, did you ever seriously think about attempting suicide?"), and substance use (past 30-day use of cocaine, heroin, methamphetamines, or ecstasy, as well as nonmethamphetamine stimulants [e.g., Adderall] or opioid pain relievers without a prescription or more than prescribed). All outcome variables were binary.

Analytic approach

LCA was used to examine the co-occurrence of outcomes by estimating multivariate classes of all outcomes from response data. SA exposure status was incorporated as a predictor of participant membership to outcome classes using a three-step estimation approach to prevent the predictor from problematically influencing the formation of classes. Estimation of separate models for cisgender female, cisgender male, and gender minority participants was planned a priori, and gender minority identities were pooled to ensure adequate sample size for model estimation. To control for the influence of potential confounders of the relation between SA and outcome classes, a method proposed by Butera et al. [10] for incorporating inverse propensity weights into LCA was implemented. In this procedure, stabilized inverse propensity weights are calculated from propensity scores and specified as weights in the LCA model. Compared with regression adjustment, this approach allows for the formal evaluation of the degree to which included confounders address systematic differences between groups (through inspection of balance diagnostics). Propensity scores were estimated using generalized boosted regression, which uses a regression tree algorithm to allow for interactions among, and higher order forms of, included confounders, and limits issues of multicollinearity and power loss that may occur if included confounders are correlated [10,11]. Thirty-one variables that could potentially confound an observed relation between SA and outcome classes or that may be related to unmeasured confounders were used to estimate propensity scores [1,2,4,6,10].

Table 1
Latent class model fit information

	Number of classes	BIC	LRT (*p* value)
Cisgender female	1	155986.0	—
	2	137391.6	.000
	3	136499.4	.000
	4	**136228.8**	**.000**
	5	136280.7	.214
	6	136341.8	—
Cisgender male	1	61426.6	—
	2	54280.3	.000
	3	53998.6	.000
	4	**53879.0**	**.000**
	5	53934.4	.685
	6	53990.0	—
Gender minority	1	8845.1	—
	2	**8120.7**	**.000**
	3	8139.4	.178
	4	8163.1	—
	5	8205.9	—
	6	8249.0	—

Boldface Bayesian information criterion (BIC) value is the lowest value for each subgroup; lower BIC values suggest a model is more likely to be the true model among models estimated. Corrected Vuong-Lo-Mendell-Rubin likelihood ratio test (LRT). *p* values <.05 indicate a model fits significantly better than a model with one fewer class; *p* values >.05 suggest a model does not fit significantly better than a model with one fewer class (i.e., the prior model is better fitting).

Table 2

Latent classes of depression, anxiety, nonsuicidal self-injury, suicide ideation, and substance use among cisgender female, cisgender male, and gender minority participants (N = 50,438): U.S., 2017−2018

	Cisgender female (n = 34,007)				Cisgender male (n = 14,908)				Gender minority (n = 1,523)	
	Low risk	Intermediate risk:		High risk: depression, anxiety, NSSI, moderate ideation	Low risk	Intermediate risk:		High risk: depression, anxiety, NSSI, moderate ideation	Low risk	High risk: depression, anxiety, NSSI, moderate ideation
		Moderate[a] depression, NSSI	Depression, anxiety			Moderate NSSI	Depression, moderate anxiety			
Depression										
1 (no)	**.929**	.459	.249	.060	**1.000**	**.961**	.000	.012	**.792**	.045
2 (yes)	.071	**.541**	**.751**	**.940**	.000	.039	**1.000**	**.988**	.208	**.955**
Anxiety										
1 (no)	**.950**	**1.000**	.170	.032	**.950**	**.861**	.487	.257	**.875**	.209
2 (yes)	.050	.000	**.830**	**.968**	.050	.139	**.513**	**.743**	.125	**.791**
NSSI										
1 (no)	**.930**	.391	**.761**	.252	**.973**	.481	**.839**	.190	**.659**	.224
2 (yes)	.070	**.609**	.239	**.748**	.027	**.519**	.161	**.810**	.341	**.776**
Ideation										
1 (no)	**.986**	**.580**	**.930**	.352	**.990**	**.788**	**.869**	.412	**.859**	.468
2 (yes)	.014	.420	.070	**.648**	.010	.212	.131	**.588**	.141	**.532**
Substance use[b]										
1 (no)	**.981**	**.921**	**.966**	**.917**	**.967**	**.908**	**.944**	**.844**	**.933**	**.930**
2 (yes)	.019	.079	.034	.083	.033	.092	.056	.156	.067	.070
n[c] (%)	21,372 (62.8)	2,025 (6.0)	8,098 (23.8)	2,512 (7.4)	9,583 (64.3)	1,374 (9.2)	2,827 (19.0)	1,125 (7.5)	536 (35.2)	987 (64.8)
OR (95% CI)	REF	2.854 **(2.37−3.44)**	1.346 **(1.16−1.57)**	2.865 **(2.49−3.30)**	REF	3.938 **(2.49−6.39)**	1.753 **(1.19−2.59)**	3.640 **(2.46−5.39)**	REF	2.031 **(1.28−3.23)**

Item response probabilities in boldface are those greater than .50. Confidence intervals (CIs) in boldface indicate statistical significance at α = .05.

NSSI = nonsuicidal self-injury; OR = odds ratio for class membership by sexual assault exposure status. REF = reference class.

[a] *Moderate* refers to item response probabilities between .50 and .70, indicating outcome endorsement is moderately, but not highly, likely in a respective class.

[b] Substance use includes use of cocaine, heroin, methamphetamines, or ecstasy, as well as nonmethamphetamine stimulants (e.g., Adderall) or opioid pain relievers without a prescription or more than prescribed.

[c] Approximate class counts and proportions derived from posterior probabilities of class membership.

These included participants' demographic characteristics (participants' age, race/ethnicity, gender and sexual identities, relationship status, academic level, and socioeconomic status), residency and social involvement (on- or off-campus residency, fraternities/sororities membership, military service, and athletics and religious involvement), and mental health history (prior diagnoses of depression, anxiety, or psychosis, or personality, bipolar, trauma/stress, eating, or substance use disorders). Before LCA model estimation, inverse propensity weights were multiplied by survey weights available in the data to incorporate the sampling strategy used for data collection. Propensity scores were estimated using the *twang* package for R (version 3.6.0; R Foundation for Statistical Computing, Vienna, Austria), and LCA with inverse propensity weighting was carried out in M*plus* (version 8.3; Muthén & Muthén, Los Angeles, CA).

Results

SA was reported by 13.2% of cisgender female, 3.7% of cisgender male, and 18% of gender minority participants. Among outcomes, moderate-to-severe depression was reported by 34% of cisgender female participants, 27% of cisgender male participants, and 68% of gender minority participants. Moderate-to-severe anxiety was indicated by 31% of cisgender females, 20% of cisgender males, and 55% of gender minority individuals. Past-year nonsuicidal self-injury was reported by 21% of cisgender females, 17% of cisgender males, and 62% of gender minority persons, while past-year suicide ideation was indicated by 12%, 10%, and 39% of participants in each subgroup, respectively. Finally, substance use exclusive of alcohol or marijuana was endorsed by 3% of cisgender females, 5% of cisgender males, and 7% of gender minority participants.

Following propensity score estimation, absolute standardized mean differences between SA exposure groups on all included confounders was less than .2, indicative of balance on confounders across groups [10]. LCA model fit information (Table 1) suggested that models with four outcome classes were best fitting for cisgender female and male participants and with two classes for gender minority participants. In all subgroups, a low-risk class was identified in which participants had low probabilities of endorsing each outcome, as was a high-risk class, which reflected moderate to high probabilities of co-occurring depression, anxiety, nonsuicidal self-injury, and suicide ideation (Table 2). In cisgender female and male subgroups, intermediate-risk classes were also identified, and in all subgroups and classes, there was low probability of endorsing substance use (exclusive of alcohol or marijuana). Finally, participants reporting past-year SA were significantly more likely to belong to higher risk outcome classes than to low-risk classes, compared with participants who were not exposed to SA. SA among cisgender female participants was associated with a 2.9-fold increase in odds of membership to the highest risk class, 95% CI (2.49—3.30); a 3.6-fold increase in odds of membership to the highest risk class among cisgender male participants, 95% CI (2.46—5.39); and a 2.0-fold increase in odds of membership to the highest risk class for gender minority participants, 95% CI (1.28—3.23). In cisgender female and male subgroups, SA was similarly associated with greater odds of membership to intermediate-risk classes compared with low-risk classes (Table 2).

Discussion

SA is prevalent in the college setting and impacts young adult mental and behavioral health and social well-being. Building on prior studies that have examined bivariate associations between SA and depression, anxiety, nonsuicidal self-injury, suicidality, and substance use, the present study examined the co-occurrence of these outcomes among SA-exposed and nonexposed college students in a large, gender-diverse U.S. national sample while accounting for numerous potential confounders. The findings indicate that with the exception of substance use, college students who experienced past-year SA had substantially higher odds of co-occurring depression, anxiety, nonsuicidal self-injury, and suicide ideation. Despite the consistency of high-risk outcome class characteristics across gender identity subgroups, however, the magnitude of odds of class membership differed by subgroup, with cisgender males having the greatest odds of membership to a high-risk class. One explanation for this finding is that cisgender males who experience SA may resist seeking out social or institutional supports that could reduce the socioemotional impact of SA. Additionally, the analysis used in this study limited the ability to examine potentially differential impacts of SA among specific gender minorities (i.e., transgender men, transgender women, and genderqueer/gender nonconforming individuals); future research should investigate whether such differences occur. Finally, although the causal effect of SA exposure could not be examined given the use of cross-sectional data, the findings of this study lend insight into how the impact of SA may extend to multiple domains of college student well-being regardless of gender identity and underline the need for comprehensive mental and behavioral health supports to be provided to SA victims in the college setting.

Funding Sources

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