

Gender Minority Mental Health in the U.S.: Results of a National Survey on College Campuses



Sarah Ketchen Lipson, PhD,¹ Julia Raifman, ScD,¹ Sara Abelson, MPH,² Sari L. Reisner, ScD^{3,4,5,6}

Introduction: The purpose of this study was to examine mental health status by gender identity among undergraduate and graduate students.

Methods: Data came from the 2015–2017 Healthy Minds Study, a mobile survey of randomly selected students (N=65,213 at 71 U.S. campuses, including 1,237 gender minority [GM] students); data were analyzed in 2018. Outcomes were symptoms of depression, anxiety, eating disorders, self-injury, and suicidality based on widely used, clinically validated screening instruments. Bivariable and multivariable analyses explored differences between GM and cisgender (non-GM) students as well as by assigned sex at birth.

Results: Across mental health measures, a significantly higher prevalence of symptoms was observed in GM students than cisgender students. Compared with 45% of cisgender students, 78% of GM students met the criteria for 1 or more of the aforementioned mental health outcomes. GM status was associated with 4.3 times higher odds of having at least 1 mental health problem (95% CI=3.61, 5.12).

Conclusions: Findings from this largest campus-based study of its kind using representative data with both gender identity and mental health measures underscore the importance of recognizing and addressing GM mental health burdens, such as by screening for mental health and providing gender-affirming services. There is broad urgency to identify protective factors and reduce mental health inequities for this vulnerable population.

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INTRODUCTION

Gender minority (GM) individuals have a gender identity or expression that differs from their assigned sex at birth or does not fit within the male–female binary. This term encompasses transgender, genderqueer, and gender nonconforming individuals, as well as those who have another self-identified gender.^{1,2}

With regard to mental health, GM adolescents and young adults represent an underserved and under-researched population.^{3,4} Large-scale data are critical for assessing the prevalence of mental health challenges and the magnitude of disparities faced by GM individuals. To date, there is a lack of nationally representative data that contain measures of gender identity alongside detailed information about mental health symptoms. The first representative data on GM disparities were

recently published: Using the Behavioral Risk Factor Surveillance System, researchers found that transgender people experienced a higher burden of emotional distress in the past 30 days relative to cisgender (non-GM) people.⁵ Though the sample included more than 2,000

From the ¹Department of Health Law Policy and Management, Boston University School of Public Health, Boston, Massachusetts; ²Department of Health Behavior and Health Education, University of Michigan School of Public Health, Ann Arbor, Michigan; ³Department of Pediatrics, Harvard Medical School, Boston, Massachusetts; ⁴Department of Pediatrics, Boston Children's Hospital, Boston, Massachusetts; ⁵Department of Epidemiology, Harvard T.H. Chan School of Public Health, Boston, Massachusetts; and ⁶The Fenway Institute, Boston, Massachusetts

Address correspondence to: Sarah Ketchen Lipson, PhD, 715 Albany Street, Boston University School of Public Health, Department of Health Law Policy and Management, Talbot Hall, Room 264W, Boston MA 02118. E-mail: sklipson@bu.edu.

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transgender respondents, the study did not measure specific mental health symptoms (only distress). Another recent study compared mental health diagnoses among transgender and cisgender college students, finding that transgender students were more likely to be diagnosed.⁶ In a study of high school students in California, researchers found that the prevalence of past-12-month self-reported suicidal ideation was nearly twice as high for transgender than for cisgender students.⁷

Analyses of nonrepresentative clinical data indicate that GM individuals experience large mental health disparities, including a disproportionate burden of depression, anxiety, and suicidality.^{8,9} A case–control study of electronic health records indicated that transgender Veterans Administration patients had more than 4 times the odds of a diagnosis for depression and other serious mental illnesses relative to cisgender Veterans Administration patients.¹⁰ Similar patterns were documented among transgender patients of a community health center in Boston, with a 2-fold to 3-fold increase in depression, anxiety, suicidality, and self-harm among transgender youth.¹¹ Though studies of clinical samples are important, there is also a need for research in nonclinical samples. Evidence suggests that many GM individuals do not access care or experience greater delays in accessing care than cisgender individuals,^{12,13} with healthcare stigma noted as a key barrier to GM service utilization.^{13,14} To understand the full scope of the issue, one needs to understand mental health prevalence rates in the general GM population, not just among those accessing care.

For a multitude of reasons, population-level research on college campuses provides a unique opportunity to assess the magnitude of mental health inequities among GM adolescents and young adults. The traditional college years (ages 18–24) coincide with the age of onset for many lifetime mental illnesses¹⁵; approximately one third of students meet the criteria for a mental health problem¹⁶, and prevalence rates of depression, anxiety, and suicidality on campus have risen steadily in recent decades.^{17,18} At the same time, an increasing number of young people,⁵ and college students in particular,^{19,20} identify as transgender or report questioning their gender identity.

This study examines mental health outcomes in a randomly selected sample of more than 1,200 GM students on 71 U.S. campuses. This is one of the first nationally representative surveys of adolescents and young adults to include data on mental health and gender identity. Although at least 1 large-scale study examined diagnosed mental health conditions among transgender students,⁶ this study examines symptoms of depression, anxiety, eating disorders, self-injury, and suicidality among GM students relative to cisgender students at the

population level and uses validated screening tools to measure mental health outcomes. Findings have implications for research, practice, and policy.

METHODS

The Healthy Minds Study (HMS)²¹ is an annual, cross-sectional survey examining mental health among undergraduate and graduate students. This study analyzed 4 semesters of national data (Fall 2015, Spring 2016, Fall 2016, and Spring 2017).

HMS is a mobile survey, completed by students on computers or smartphones. Data were collected using Qualtrics survey platform. The study was approved by the IRBs on all participating campuses and covered by an NIH Certificate of Confidentiality.

At each campus with more than 4,000 students, a random sample of 4,000 degree-seeking students from the full population was recruited; at smaller institutions, all students were invited. The only exclusion criterion was that students had to be aged 18 years or older. Sample files, containing information for recruitment (names, e-mail addresses) and nonresponse analyses, were obtained from campus registrars. To incentivize participation, students were informed of their eligibility for 1 of 12 cash prizes totaling \$2,000 annually (2 \$500 and 10 \$100 gift cards); eligibility was not contingent on completing the survey. Upon clicking a personalized link in the recruitment e-mail, students were presented with an informed consent page and had to agree to the terms of participation before entering the survey. The overall response rate was 24.4%.

To adjust for potential differences between responders and nonresponders, the study team constructed sample probability weights. Administrative data were obtained from participating institutions, including male/female gender, race/ethnicity, academic level, and grade point average. These data were used to construct response weights, equal to 1 divided by the estimated probability of response, using a logistic regression to predict the likelihood of response associated with each variable. Thus, weights were larger for respondents with under-represented characteristics, ensuring that estimates were representative of the full population in terms of these known characteristics.

Study Sample

The sample included 65,213 students at 71 colleges and universities across the U.S. Overall, 98% identified as cisgender ($n=63,994$) and 2% as GM ($n=1,237$); 1.3% identified as trans masculine and 0.8% as trans feminine. The sample was roughly two-thirds white, and most were undergraduate students. Additional characteristics are presented in [Table 1](#).

Study sites were diverse across campus characteristics. Enrollments ranged from <5,000 students ($n=26$ campuses) to >20,000 ($n=18$ campuses). The represented institutional types ranged from community colleges ($n=6$ campuses) to doctoral-granting, research universities ($n=31$ campuses). There were 40 public and 31 private institutions. There was geographic diversity, with campuses in 8 of 9 Census regions. The only region not represented was the South Region, West South Central Division (Arkansas, Louisiana, Oklahoma, Texas). In terms of admissions selectivity, there was at least 1 school in each of the selectivity classifications, as determined by Barron's Profiles of American Colleges.²²

Table 1. Sample Characteristics of Study Population From 71 Campuses

Characteristics	All, % (N=65,231)	Cisgender, % (n=63,994)	GM, % (n=1,237)
Gender identity			
Cisgender			
All (n=63,994)	97.90	100.00	—
Cisgender female/cisgender woman (n=43,388)	55.51	56.70	—
Cisgender male/cisgender man (n=20,606)	42.39	43.30	—
Gender minority			
All (n=1,237)	2.10	—	100.00
Trans masculine (n=857)	1.32	—	63.12
Transgender FAB (n=222)	0.42	—	20.16
Genderqueer FAB (n=460)	0.66	—	31.50
Other self-identified gender FAB (n=175)	0.24	—	11.46
Trans feminine (n=380)	0.77	—	36.88
Transgender MAB (n=108)	0.17	—	8.03
Genderqueer MAB (n=138)	0.29	—	13.93
Other self-identified gender MAB (n=134)	0.31	—	14.92
Sexual orientation			
Straight/heterosexual (n=55,285)	84.43	85.79	20.54
Bisexual (n=4,428)	6.61	6.27	22.51
Gay/lesbian (n=2,289)	4.02	3.82	13.44
Questioning (n=1,659)	2.60	2.04	28.68
Other orientation (n=1,385)	2.06	1.80	14.19
Race/ethnicity			
Black/African American (n=2,841)	6.47	6.53	3.46
Latinx (n=1,785)	3.28	3.27	3.60
Asian/Asian American (n=7,650)	11.14	11.22	7.24
Arab/Arab American (n=645)	0.99	1.00	0.32
White (n=44,210)	65.02	65.05	63.55
Multiracial (n=6,892)	10.99	10.92	13.92
Other racial/ethnic identity (n=1,208)	2.12	2.00	7.91
Age			
18–22 years (n=42,123)	66.45	66.39	69.33
23–25 years (n=8,738)	12.28	12.27	12.67
26–30 years (n=7,645)	10.26	10.24	11.19
≥31 years (n=6,725)	11.01	11.10	6.81
Degree level			
Undergraduate (n=47,730)	78.37	78.29	81.96
Graduate student (n=17,501)	21.63	21.71	18.04
SES			
First-generation student (n=19,799)	34.46	34.48	33.60
Non–first-generation student (n=45,033)	65.54	65.52	66.40

Note: Table values are weighted percentages. With nonresponse weights applied, some subgroups with smaller sample sizes represent larger weighted percentages (e.g., other self-identified gender FAB n=175 represents 0.24% of the weighted sample, and other self-identified gender MAB n=134 represents 0.31% of the weighted sample).

FAB, female assigned sex at birth; GM, gender minority; MAB, male assigned sex at birth.

Measures

The primary independent variable was gender identity. Categorizations were based on students' responses to 2 survey questions: (1) *What was your assigned sex at birth?* (response options: *female* and *male*) and (2) *What is your current gender identity?* (*female*, *male*, *trans female/trans woman*, *trans male/trans man*, *genderqueer/*

gender nonconforming, and *self-identify*). The 2-part measurement of gender identity was added to the HMS in Fall 2015. In this study, the main measure of gender identity had the following 2 categories, with subcategories in parentheses: (1) all cisgender students (cisgender females/cisgender women and cisgender males/cisgender men) and (2) all GM students (trans masculine and

Table 2. Mental Health Status by Gender Identity

Variable	Gender minority																							
	All cisgender				Cisgender female/cisgender woman				Cisgender male/cisgender man				All gender minority				Trans masculine				Trans feminine			
	%	OR (95% CI)	p-value	%	OR (95% CI)	p-value	%	OR (95% CI)	p-value	%	OR (95% CI)	p-value	%	OR (95% CI)	p-value	%	OR (95% CI)	p-value	%	OR (95% CI)	p-value			
Dep	28.44	0.30 (0.25, 0.35)	<0.001	31.64	1.33 (1.27, 1.39)	<0.001	24.25	0.66 (0.63, 0.70)	<0.001	57.83	3.45 (2.93, 4.07)	<0.001	63.51	4.35 (3.49, 5.42)	<0.001	48.11	2.28 (1.73, 3.00)	<0.001	48.11	2.28 (1.73, 3.00)	<0.001			
Anx	23.83	0.33 (0.28, 0.38)	<0.001	28.66	1.71 (1.62, 1.80)	<0.001	17.51	0.51 (0.48, 0.54)	<0.001	49.84	3.18 (2.70, 3.73)	<0.001	55.54	3.97 (3.27, 4.80)	<0.001	40.08	2.09 (1.58, 2.76)	<0.001	40.08	2.09 (1.58, 2.76)	<0.001			
ED	8.37	0.60 (0.49, 0.74)	<0.001	11.12	2.29 (2.10, 2.50)	<0.001	4.77	0.40 (0.36, 0.44)	<0.001	13.36	1.69 (1.37, 2.08)	<0.001	15.71	2.04 (1.62, 2.56)	<0.001	9.33	1.11 (0.68, 1.81)	0.67	9.33	1.11 (0.68, 1.81)	0.67			
NSSI	19.96	0.23 (0.19, 0.27)	<0.001	21.76	1.16 (1.10, 1.23)	<0.001	17.60	0.72 (0.68, 0.76)	<0.001	52.82	4.50 (3.82, 5.28)	<0.001	59.25	5.77 (4.66, 7.14)	<0.001	41.83	2.79 (2.09, 3.72)	<0.001	41.83	2.79 (2.09, 3.72)	<0.001			
SI	10.32	0.22 (0.19, 0.26)	<0.001	10.72	0.97 (0.91, 1.04)	0.46	9.79	0.83 (0.77, 0.89)	<0.001	34.85	4.65 (3.96, 5.47)	<0.001	39.03	5.48 (4.51, 6.66)	<0.001	27.70	3.20 (2.40, 4.27)	<0.001	27.70	3.20 (2.40, 4.27)	<0.001			
SP	3.99	0.21 (0.17, 0.25)	<0.001	4.23	0.98 (0.88, 1.09)	0.74	3.68	0.77 (0.69, 0.87)	<0.001	17.07	4.95 (4.08, 6.01)	<0.001	20.35	6.05 (4.84, 7.57)	<0.001	11.47	2.94 (2.02, 4.30)	<0.001	11.47	2.94 (2.02, 4.30)	<0.001			
SA	0.84	0.27 (0.18, 0.42)	<0.001	1.00	1.37 (1.08, 1.72)	0.01	0.62	0.58 (0.45, 0.74)	<0.001	3.05	3.74 (2.46, 5.69)	<0.001	3.42	4.14 (2.57, 6.68)	<0.001	2.43	2.84 (1.27, 6.38)	0.01	2.43	2.84 (1.27, 6.38)	0.01			
≥1	45.43	0.24 (0.20, 0.29)	<0.001	50.28	1.46 (1.40, 1.52)	<0.001	39.08	0.61 (0.58, 0.64)	<0.001	78.15	4.30 (3.61, 5.12)	<0.001	83.56	6.06 (4.81, 7.63)	<0.001	68.90	2.61 (1.98, 3.43)	<0.001	68.90	2.61 (1.98, 3.43)	<0.001			

Note: Boldface indicates statistical significance ($p < 0.05$). Table values are weighted percentages and unadjusted ORs with 95% CIs in parentheses. Comparisons are between the specific gender identity and all other students (e.g., cisgender female/cisgender woman vs all other groups). Dep is ≥ 10 on the PHQ-9. Anx is ≥ 10 on the GAD-7. ED is ≥ 3 on the SCOFF. NSSI is any in the past year. NSSI survey options are as follows: Cut myself, Burned myself, Punched or banged myself, Scratched myself, Pulled my hair, Bit myself, Interfered with wound healing, Carved words or symbols into skin, Rubbed sharp objects into skin, Punched or banged an object to hurt myself, and Other. SI, SP, and SA are in the past year. ≥ 1 is 1 or more of the following: a positive screen for depression, positive screen for anxiety, positive screen for an eating disorder, past-year NSSI, or past-year suicidal ideation.

Anx, anxiety; Dep, depression; ED, eating disorder; GAD-7, Generalized Anxiety Disorder 7-item scale; NSSI, nonsuicidal self-injury; PHQ-9, Patient Health Questionnaire; SA, suicide attempt; SI, suicidal ideation; SP, suicide plan.

trans feminine). Trans masculine students are GM students with female assigned sex at birth (FAB), and trans feminine students are GM students with male assigned sex at birth (MAB). Genderqueer FAB and self-identified FAB students were included in GM FAB, whereas genderqueer MAB and self-identified MAB students were included in GM MAB.

A unique contribution of this study is the examination of mental health outcomes among specific GM identities (transgender, genderqueer, and self-identified gender) and by sex at birth (MAB or FAB). Appendix Table 1 (available online) provides complete definitions and classification details.

Analyses focused on the following 8 binary outcomes: (1) depression, (2) anxiety, (3) eating disorders, (4) nonsuicidal self-injury (NSSI), (5) suicidal ideation, (6) suicide plans, (7) suicide attempts, and (8) any mental health problem. Binary outcomes were used because most measures have been validated based on standard cut offs.

Symptoms of depression were examined using the 9-item Patient Health Questionnaire (PHQ-9).²³ Across settings and populations, the PHQ-9 has been validated as internally consistent and highly correlated with diagnosis.²⁴ The standard cut off of ≥ 10 was used.

Symptoms of anxiety were measured by the Generalized Anxiety Disorder 7-item (GAD-7) scale.²⁵ The standard cut off of ≥ 10 was used, which has been shown to have high sensitivity (89%) and specificity (82%).²⁵

Symptoms of eating disorders were assessed using the 5-item SCOFF screen.²⁶ Scores ranged from 0 to 5. A previous study of university students found a positive likelihood ratio of 6 when using ≥ 2 , compared with a positive likelihood ratio of 11 using ≥ 3 .²⁷ The present study used the more conservative threshold of ≥ 3 .

The following item was used to assess NSSI: *This question asks about ways you may have hurt yourself on purpose, without intending to kill yourself. In the past year, have you ever done any of the following intentionally?* Response options are listed in the tables.

A single question measured suicidal ideation: *In the past year, did you ever seriously think about attempting suicide?* Students who answered *yes* were asked about suicide plans (*In the past year, did you make a plan for attempting suicide?*) and attempts (*In the past year, did you attempt suicide?*). Finally, the team created a variable of 1 or more mental health problems, defined as a positive PHQ-9, GAD-7, or SCOFF screen, or past-year NSSI or suicidal ideation.

The following were included as covariates in multivariable analyses: (1) sexual orientation, (2) race/ethnicity, (3) age, (4) degree level, and (5) SES based on parental education (first-generation [neither parent received a bachelor's degree] versus non-first-generation student). For sexual orientation, the survey item was: *How would you describe your sexual orientation?* Students selected 1 of 5 options: *straight (heterosexual), bisexual, gay or lesbian, questioning, and other.*

Statistical Analysis

Bivariable and multivariable analyses were intended to elucidate variations in mental health by gender identity. The following are reported for each mental health outcome: weighted percentages, unadjusted ORs, and 95% CIs for each of the main gender

Table 3. Mental Health Status of Transgender, Genderqueer, and Self-Identified Gender by Assigned Sex at Birth

Variable	Transgender (all) (n=330)			Transgender FAB			Transgender MAB			Genderqueer (all) (n=598)			Genderqueer FAB			Genderqueer MAB			Other self-identified gender (all) (n=309)			Other self-identified gender FAB			Other self-identified gender MAB		
	%	OR (95% CI)	p-value	%	OR (95% CI)	p-value	%	OR (95% CI)	p-value	%	OR (95% CI)	p-value	%	OR (95% CI)	p-value	%	OR (95% CI)	p-value	%	OR (95% CI)	p-value	%	OR (95% CI)	p-value	%	OR (95% CI)	p-value
Dep	48.56	2.32 (1.66, 3.24)	<0.001	48.38	2.30 (1.49, 3.53)	<0.001	49.02	2.35 (1.48, 3.75)	<0.001	65.69	4.76 (3.83, 5.90)	<0.001	73.24	6.78 (5.26, 8.74)	<0.001	48.61	2.32 (1.54, 3.48)	<0.001	54.21	2.91 (2.11, 4.00)	<0.001	63.39	4.24 (2.90, 6.21)	<0.001	47.15	2.18 (1.32, 3.63)	0.003
Anx	48.12	2.90 (2.05, 4.10)	<0.001	50.74	3.22 (2.08, 4.97)	<0.001	41.55	2.21 (1.36, 3.58)	0.001	54.90	3.84 (3.12, 4.72)	<0.001	61.38	5.00 (3.94, 6.34)	<0.001	40.24	2.09 (1.37, 3.20)	0.001	42.96	2.35 (1.71, 3.24)	<0.001	47.94	2.87 (1.98, 4.14)	<0.001	39.13	2.00 (1.22, 3.27)	0.006
ED	13.17	1.64 (1.10, 2.46)	0.02	14.25	1.80 (1.13, 2.86)	0.01	10.48	1.26 (0.53, 3.02)	0.60	14.43	1.83 (1.35, 2.49)	<0.001	16.33	2.12 (1.58, 2.85)	<0.001	10.15	1.22 (0.49, 3.06)	0.67	11.70	1.43 (0.97, 2.13)	0.07	16.60	2.15 (1.33, 3.49)	0.002	7.94	0.93 (0.49, 1.77)	0.83
NSSI	40.77	2.66 (1.93, 3.69)	<0.001	41.33	2.72 (1.80, 4.11)	<0.001	39.38	2.50 (1.55, 4.02)	<0.001	59.18	5.70 (4.57, 7.10)	<0.001	66.03	7.61 (5.79, 9.98)	<0.001	43.70	2.99 (1.99, 4.50)	<0.001	54.75	4.70 (3.43, 6.45)	<0.001	72.13	10.02 (6.85, 14.64)	<0.001	41.40	2.73 (1.58, 4.70)	<0.001
SI	30.57	3.67 (2.63, 5.12)	<0.001	33.99	4.28 (2.83, 6.48)	<0.001	22.00	2.33 (1.35, 4.01)	0.002	37.26	5.02 (4.06, 6.21)	<0.001	39.15	5.40 (4.23, 6.90)	<0.001	32.99	4.08 (2.69, 6.19)	<0.001	35.28	4.55 (3.29, 6.30)	<0.001	47.57	7.54 (5.20, 10.92)	<0.001	25.83	2.88 (1.70, 4.89)	<0.001
SP	18.42	5.18 (3.54, 7.58)	<0.001	21.02	6.08 (3.88, 9.53)	<0.001	11.90	3.04 (1.43, 6.47)	0.004	18.45	5.25 (4.09, 6.75)	<0.001	19.94	5.73 (4.35, 7.57)	<0.001	15.07	4.01 (2.32, 6.94)	<0.001	13.27	3.48 (2.30, 5.25)	<0.001	20.28	5.77 (3.52, 9.46)	<0.001	7.88	1.93 (0.97, 3.84)	0.06
SA	3.71	4.42 (2.14, 9.13)	<0.001	4.49	5.38 (2.46, 11.78)	<0.001	1.78	2.04 (0.28, 14.70)	0.48	2.89	3.42 (1.87, 6.26)	<0.001	2.08	2.42 (1.19, 4.90)	0.01	4.71	5.63 (2.12, 14.94)	0.001	2.63	3.08 (1.30, 7.28)	0.01	5.20	6.24 (2.42, 16.08)	<0.001	0.66	0.75 (0.10, 5.43)	0.78
≥1	71.23	2.91 (2.11, 4.01)	<0.001	73.59	3.27 (2.18, 4.91)	<0.001	65.30	2.20 (1.36, 3.56)	0.001	84.04	6.24 (4.71, 8.27)	<0.001	88.67	9.25 (6.42, 13.31)	<0.001	73.59	3.27 (2.08, 5.13)	<0.001	75.41	3.60 (2.57, 5.07)	<0.001	87.04	7.88 (4.93, 12.60)	<0.001	66.47	2.32 (1.44, 3.73)	0.001

Note: Boldface indicates statistical significance ($p < 0.05$). Table values are weighted percentages and unadjusted ORs with 95% CIs in parentheses. Comparisons are between the specific gender identity and all other students (e.g., transgender FAB vs all other groups that are not transgender FAB, including cisgender students). Dep is ≥ 10 on the PHQ-9. Anx is ≥ 10 on the GAD-7. ED is ≥ 3 on the SCOFF. NSSI is any in the past year. NSSI survey options are as follows: Cut myself, Burned myself, Punched or banged myself, Scratched myself, Pulled my hair, Bit myself, Interfered with wound healing, Carved words or symbols into skin, Rubbed sharp objects into skin, Punched or banged an object to hurt myself, and Other. SI, SP, and SA are in the past year. ≥ 1 is 1 or more of the following: a positive screen for depression, positive screen for anxiety, positive screen for an eating disorder, past-year NSSI, or past-year suicidal ideation. Anx, anxiety; Dep, depression; ED, eating disorder; FAB, female assigned sex at birth; GAD-7, Generalized Anxiety Disorder 7-item scale; MAB, male assigned sex at birth; NSSI, nonsuicidal self-injury; PHQ-9, Patient Health Questionnaire; SA, suicide attempt; SI, suicidal ideation; SP, suicide plan.

Table 4. Multivariable Correlates of Mental Health Status by Gender Identity (Logistic Regression Models)

Variable	Dep		Anx		ED		NSSI		SI		SP		SA		≥1 problem	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value										
Gender identity																
Cisgender female/ cisgender woman	1.36 (1.30, 1.44)	<0.001	1.82 (1.72, 1.93)	<0.001	2.52 (2.29, 2.77)	<0.001	1.21 (1.14, 1.28)	<0.001	1.00 (0.93, 1.08)	0.99	1.03 (0.91, 1.16)	0.61	1.48 (1.14, 1.93)	0.004	1.52 (1.45, 1.59)	<0.001
Cisgender male/ cisgender man (ref)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Trans masculine	2.79 (2.28, 3.42)	<0.001	3.52 (2.77, 4.45)	<0.001	2.69 (2.09, 3.45)	<0.001	2.94 (2.40, 3.60)	<0.001	2.58 (2.10, 3.18)	<0.001	2.89 (2.25, 3.72)	<0.001	2.31 (1.36, 3.91)	0.002	3.85 (2.90, 5.10)	<0.001
Trans feminine	1.62 (1.22, 2.15)	0.001	1.97 (1.44, 2.69)	<0.001	1.55 (0.91, 2.65)	0.11	1.64 (1.24, 2.16)	<0.001	1.81 (1.33, 2.46)	<0.001	1.76 (1.18, 2.64)	0.006	2.04 (0.90, 4.62)	0.09	1.92 (1.44, 2.56)	<0.001
Constant	0.14 (0.12, 0.15)	<0.001	0.11 (0.09, 0.12)	<0.001	0.03 (0.02, 0.03)	<0.001	0.07 (0.06, 0.08)	<0.001	0.04 (0.04, 0.05)	<0.001	0.01 (0.01, 0.02)	<0.001	0.001 (0.001, 0.002)	<0.001	0.27 (0.24, 0.29)	<0.001
N	64,832		64,832		64,832		64,832		64,832		64,832		64,832		64,832	

Note: Boldface indicates statistical significance ($p < 0.05$). Table values are ORs with 95% CIs in parentheses. Dep is ≥ 10 on the PHQ-9. Anx is ≥ 10 on the GAD-7. ED is ≥ 3 on the SCOFF. NSSI is any in the past year. NSSI survey options are as follows: Cut myself, Burned myself, Punched or banged myself, Scratched myself, Pulled my hair, Bit myself, Interfered with wound healing, Carved words or symbols into skin, Rubbed sharp objects into skin, Punched or banged an object to hurt myself, and Other. SI, SP, and SA are in the past year. ≥ 1 problem is 1 or more of the following: a positive screen for depression, positive screen for anxiety, positive screen for an eating disorder, past-year NSSI, or past-year suicidal ideation. Models also control for sexual orientation, race/ethnicity, age, degree level, and SES.

Anx, anxiety; Dep, depression; ED, eating disorder; GAD-7, Generalized Anxiety Disorder 7-item scale; NSSI, nonsuicidal self-injury; PHQ-9, Patient Health Questionnaire; SA, suicide attempt; SI, suicidal ideation; SP, suicide plan.

identity categories; for subcategories; and for transgender, genderqueer, and self-identified gender by assigned sex at birth. For each outcome, a logistic regression was also estimated controlling for the aforementioned covariates. ORs and 95% CIs were reported for cisgender female students/cisgender women, trans masculine, and trans feminine relative to the reference group of cisgender male students/cisgender men. Differences noted in the Results section are significant at $p < 0.001$. As a sensitivity analysis, logistic regressions were estimated with campus fixed effects (dummy variables for each campus); results remained similar in magnitude and direction. Analyses were conducted in 2018 and 2019 using Stata, version 14.2 and weighted using the described sample weights.

RESULTS

Across all mental health measures, GM students had a significantly higher prevalence than cisgender students (Table 2). Compared with 45% of cisgender students, 78% of GM students met the criteria for 1 or more mental health problems. More than half of GM students screened positive for depression (58%) and reported NSSI (53%), whereas 28% of cisgender students screened positive for depression and 20% reported NSSI. More than one third of GM students reported seriously thinking about suicide in the past year relative to 1 in 10 cisgender students. In an unadjusted logistic regression model, GM status was associated with 4.3 -times higher odds of meeting the criteria for 1 or more mental health problems (95% CI=3.61, 5.12). Trans masculine students had 6.1 times higher odds of screening positive for 1 or more mental health problems (95% CI=4.81, 7.63).

Looking at mental health outcomes among GM students by assigned sex at birth, nearly 90% of both genderqueer FAB and other self-identified gender FAB students met criteria for 1 or more mental health problems (Table 3). Genderqueer students had a higher prevalence of 7 of 8 mental health outcomes than transgender students and students of other self-identified gender, the 1 exception being that the highest rate of suicide attempts was among transgender students. In unadjusted logistic regressions, transgender FAB had 3.3 times higher odds (95% CI=2.18, 4.91), genderqueer FAB had 9.3 times higher odds (95% CI=6.42, 13.31), and other self-identified FAB students had 7.9 times higher odds (95% CI=4.93, 12.60) of screening positive for 1 or more mental health problems.

Controlling for sexual orientation, race/ethnicity, age, degree, and SES, and relative to cisgender males/cisgender men, trans masculine students had 3.9 times higher odds (95% CI=2.90, 5.10) and trans feminine students 1.9-times higher odds (95% CI=1.44, 2.56) of meeting the criteria for 1 or more mental health problems (Table 4). Past-year NSSI and suicidality were especially

high; trans masculine students had 2.9 times higher odds (95% CI=2.40, 3.60) and trans feminine students had 1.6 times higher odds (95% CI=1.24, 2.16) of NSSI. Trans masculine students had 2.6 times higher odds (95% CI=2.10, 3.18), and trans feminine students had 1.8 times higher odds (95% CI=1.33, 2.46) of suicidal ideation.

DISCUSSION

This is the largest study of its kind focused on mental health among GM college students, and one of the first known population-level studies using representative data with measures of both gender identity and mental health symptoms in any setting. Findings from more than 1,200 GM students on 71 campuses offer compelling evidence of mental health inequities. The proportion of GM students screening positive for depression, anxiety, and eating disorders, and reporting NSSI are more than twice that of cisgender students. Rates of suicidal ideation, plans, and attempts are 3–4 times higher. Though there have been no prior campus-based studies powered to detect these differences, the overall finding that GM students experience a disproportionate mental health burden is consistent with extant research.⁵

This is also one of the only known studies to examine mental health for specific GM identities and by assigned sex at birth. In this study, trans masculine students (GM students assigned a female sex at birth) and genderqueer students are particularly vulnerable groups.

Findings demonstrate an urgent need to address GM student mental health. Gender-affirming and transgender-competent systems are needed to screen for and provide mental health services. According to minority stress theory,¹ GMs may be exposed to unique stressors (e.g., family rejection or transphobia), which may increase mental health risk. Therapeutic treatments that have shown efficacy with young people in general, such as cognitive behavioral therapy,²⁸ must therefore target biopsychosocial determinants for all youth as well as factors that uniquely influence GMs.

Findings also underscore the importance of campuses prioritizing the needs of GM students through policies and programs. Research has demonstrated positive effects of inclusive policies for GM student well-being, specifically nondiscrimination policies inclusive of gender identity (versus only sexual orientation), gender-neutral bathrooms, and policies allowing students to change their name in campus records.²⁹ A 2016 study using the National Transgender Discrimination Survey found that being denied access to gender-appropriate bathrooms or housing was associated with suicidality.³⁰ Given the evidence of mental health inequities and the positive impacts of supportive policies,³¹ there is an

urgent need to understand and shape current policies under consideration to protect GM mental health. More generally, there is a need for continued research examining how school-level and macro-social policies (including at the state level) may perpetuate the inequities revealed in this study.

Longitudinal data are needed to follow GM students throughout college, examining mental health alongside determinants at individual, institutional, and societal levels. Research is also needed to explore the intersectionality of GM identity with other identities in today's diverse college student populations, such as being a racial/ethnic or religious minority. GM people of color face additional discrimination, which has implications for mental health. In data from the 2015 U.S. Transgender Survey, which was conducted among a large convenience sample, the highest reports of discrimination were by black GM respondents.¹³

Limitations

As noted, this is the largest known study on mental health symptoms in the GM college student population. The generalizability of findings is strengthened by the multisite nature of the HMS and random sampling at the student level. In addition to these strengths, there are several limitations to consider. First, although mental health outcomes were measured with validated screens,^{23–26} it is important to remember that these assessments do not represent clinical diagnoses. Second, the cross-sectional data cannot account for changes in mental health over time, and this study cannot infer causes of GM disparities. Third, campuses elected to participate in the HMS; though the institutional sample is large and diverse, it is not random. Survey weights do not account for probability of school selection. Fourth, data from campus registrars on gender identity were binary (male/female), meaning that GM students may not have their gender accurately reflected (i.e., there is no way of knowing what portion of administrative data reflects sex assigned at birth versus a forced selection of a binary current identity). Fifth, the response rate was 24%; this is typical for online surveys,³² but it clearly raises the potential of non-response bias. The researchers applied nonresponse weights along known characteristics of the full population, but there may be differences between responders and nonresponders on unobserved characteristics. One question is whether students with mental health concerns may be more or less likely to respond. To address this, the HMS team previously conducted a follow-up survey sent to roughly 500 randomly selected initial nonresponders; 55% responded and results showed, relative to the main sample, lower rates of depression, suggesting potential overestimations of the prevalence of mental

health problems.³² Sixth, these data may not represent the broader GM adolescent and young adult population in the U.S., particularly given that transgender individuals are less likely to attend college than cisgender individuals.³³ Seventh, this study did not account for campus policies that may uniquely affect GM students (e.g., gender-neutral bathrooms/housing or inclusive antidiscrimination policies).^{29–31} Future research with HMS and other large-scale data sets should examine GM mental health on campuses with and without such policies. Finally, gender diversity is complex. Research necessitates consideration using standardized measures; the categorization of respondents was in no way implemented to undermine students' gender identity or to privilege their assigned sex at birth.

CONCLUSIONS

This national study offers compelling evidence of mental health inequities among GM students compared with cisgender students, with 2–4 times higher prevalence of depression, anxiety, eating disorders, self-injury, and suicidality. Findings underscore the importance of institutions addressing the needs of GM students, increasing capacity to deliver mental health services responsive to the lived realities GM students face, and a broader urgency to shape the evidence base for clinical care and social policies that protect GM adolescents and young adults in this country.

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SKL designed the study and acquired, analyzed, and interpreted data. JR contributed to the analyses. JR, SA, and SLR contributed to interpretation and critically revised the manuscript for important intellectual content. All authors approved the manuscript.

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SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at <https://doi.org/10.1016/j.amepre.2019.04.025>.

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