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Disparities in eating disorder symptoms and mental healthcare engagement prior to and following the onset of the COVID-19 pandemic: Findings from a national study of US college students

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Abstract

Objective: Early COVID-19 eating disorders (EDs) research used regionally restricted samples with little sociodemographic diversity. The present study aimed to address these research gaps by examining whether pandemic-related changes in ED symptoms and mental healthcare prevalence differed for historically marginalized groups within a national sample of US college students.

Method: Participants included 242,906 US college students ($M_{age} = 23.45$, $SD = 7.04$; $M_{BMI} = 25.28$, $SD = 5.91$) who completed the repeated cross-sectional multi-institute Healthy Minds Study between January 2019 and May 2021. Moderated logistic regressions examined whether pandemic-related changes in individuals' likelihoods of exhibiting current probable ED, reporting lifetime ED diagnoses, and—among individuals with current probable ED—mental healthcare engagement differed for diverse gender, sexual, and racial/ethnic identity groups, and by body mass index (BMI) and financial stress.

Results: There were increases of 5% and 12% in individuals' likelihoods of exhibiting current probable ED and symptomatic individuals' mental healthcare engagement, respectively, pre- to post-COVID-19 onset, but no pandemic-related changes in lifetime ED diagnosis prevalence. There were also important variations in these time-trends for different marginalized groups. For example, individuals identifying as genderqueer/gender nonconforming and lesbian exhibited increasing ED symptoms pre- to post-COVID-19 onset, and individuals with current probable ED and higher BMIs were increasingly likely to receive mental healthcare. Associations between financial stress, and the ED and mental healthcare outcomes did not change over time.

Discussion: These findings provide insight into groups of US college students that experienced disproportionate ED burden during the pandemic at the population level, and directions for research and interventions that warrant consideration.

KEYWORDS
disordered eating, eating disorders, mental health, young adults

> **Public Significance**
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> In a national sample of US college students, there were small yet significant increases in probable eating disorders and mental healthcare prevalence from before to during COVID-19. Individuals identifying as genderqueer/gender nonconforming and lesbian exhibited particularly notable increases in eating disorder symptoms over time, and symptomatic individuals with larger bodies exhibited increasing treatment engagement over time. These findings provide insight into marginalized groups that have experienced disproportionate eating disorders burden during COVID-19.

A growing literature indicates that stressors related to the COVID-19 pandemic are associated with eating disorder (ED) symptoms and associated risk-factors (Linardon et al., 2022; Phillipou et al., 2020; Termorshuizen et al., 2020). Indeed, initial reports indicated that wide-spread fears of COVID-19 contagion heightened individuals' stress and anxiety (Salari et al., 2020), and these affective experiences have been independently linked to greater ED symptoms (Fairweather-Schmidt & Wade, 2020). These early trends were compounded by decreased social support stemming from quarantine and social distancing guidelines (Brooks et al., 2020), which is a well-established correlate of ED pathology (Leonidas & Dos Santos, 2014). As society transitions into a post-COVID-19 onset period that is expected to endure, it is important for ED research to broaden its scope to address limitations of initial work in this area.

1 | EATING DISORDER SYMPTOM DISPARITIES DURING COVID-19

There is currently a large body of valuable research documenting COVID-19-related changes in the prevalence of ED that was produced in a short timeframe (Linardon et al., 2022). However, there are several research gaps that warrant attention to expand upon this timely initial work. Most COVID-related ED research has generally: (1) used regionally restricted samples with little sociodemographic diversity (Linardon et al., 2022); and (2) only examined differences in individuals' retrospectively reported pre-COVID-19 ED symptoms relative to their symptoms at the time of assessment using cross-sectional methods (Cecchetto et al., 2021; Keel et al., 2020; Phillipou et al., 2020; Robertson et al., 2021; Robinson et al., 2021; Scarmozzino & Visioli, 2020; Schlegl et al., 2020) or included small samples in longitudinal studies with short follow-up durations (Castellini et al., 2020; Keel et al., 2020). Although this literature suggests incidence rates of probable ED and ED severity increased following the onset of the pandemic, findings vary widely across studies (Linardon et al., 2022). Specifically, in some studies with community-based and college samples in Italy, Australia, the United Kingdom, and the United States, significant increases in individuals' cognitive, behavioral, and global ED symptoms were identified during COVID-19 when compared to pre-COVID-19 timeframes (Kim et al., 2022) and via retrospective recall during post-COVID-19 onset assessments (Cecchetto et al., 2021; Keel et al., 2020; Phillipou et al., 2020;

Robinson et al., 2021; Scarmozzino & Visioli, 2020). Yet, in other studies with community-based and college samples in Lithuania, Italy, and the United States, no differences were identified in individuals' cognitive, behavioral, or global ED symptoms pre- versus post-COVID-19 onset (Baceviciene & Jankauskiene, 2021; Christensen et al., 2021; Meda et al., 2021) or via post-COVID onset retrospective recall (Breiner et al., 2021).

Several methodological and sample-related factors may account for differences in these findings, including unexplored variations in pandemic-related ED symptom changes that likely emerged for different sociodemographic groups. The impact of the COVID-19 pandemic on ED in the United States undoubtedly occurred in different ways for different groups (Linardon et al., 2022), and individuals with historically marginalized gender, sexual, and racial/ethnic identities, individuals living in larger bodies, and individuals with greater financial stress likely experienced disproportionate ED burden during this transition. This hypothesis is consistent with Minority Stress Theory (Brooks, 1981; Meyer, 2003), which posits that macro-level environmental circumstances like the COVID-19 pandemic have a disproportionately negative impact on marginalized groups due to the upstream influences of structural systems of power and oppression (e.g., structural racism). Such negative environmental circumstances (e.g., COVID-19) for marginalized groups are believed to increase individuals' exposure to a variety of general (e.g., loss of a loved one), distal (e.g., stigma, discrimination), and proximal (e.g., rejection expectations, self-stigma) stressors and, in turn, promote poor mental health (Hatzenbuehler, 2009; Meyer, 2003).

Consistent with these theoretical tenets, historically marginalized groups based on gender, sexual, and racial/ethnic identity, higher BMI, and greater financial stress have been disproportionately impacted by the pandemic (Khanijahani, 2021; Ruiz et al., 2020), particularly individuals of Asian descent who have reported an increase in discrimination (Ruiz et al., 2020) and individuals with low socioeconomic status for whom pre-existing societal inequalities have been exacerbated (Khanijahani, 2021). COVID-related sociocultural trends have also been associated with increases in ED symptoms, such as social media posts warning individuals about gaining the "quarantine-15" and weight stigmatizing messages placing a fatphobic lens on non-causal evidence linking higher body weight to increased COVID-related morbidity (Pearl, 2020). Yet, how the prevalence of ED symptoms may have changed pre- to post-pandemic onset at the population-level and among groups with historic ED disparities remains unknown and warrants assessment via large-scale research.

Given that individuals with transgender and gender diverse, sexual minority, and racial/ethnic minority identities, and those living in larger bodies, generally exhibit greater ED-risk than cisgender, heterosexual, White, and smaller-bodied people, respectively (Kamody et al., 2020; Romano et al., 2022; Udo & Grilo, 2018), it is particularly important to explore whether and how these ED-related disparities changed since the pandemic began. Further, studying these processes among college student young adults in the United States can provide important insight into a group with elevated ED-risk (Romano et al., 2022; Udo & Grilo, 2018) that may warrant tailored interventions, as the changes students experienced during the pandemic (e.g., unexpected transition to online education) occurred during a developmentally sensitive period.

2 | MENTAL HEALTHCARE DURING COVID-19

The implications of the COVID-19 pandemic on ED-related mental healthcare are unclear. Available evidence generally identified an increase in demand for ED treatment throughout the pandemic (Linardon et al., 2022). However, rates of treatment-seeking for ED have historically been low, with estimates from population-based samples suggesting only 18%–36% of symptomatic individuals seek and receive care (Kessler et al., 2013; Romano et al., 2022). Historic barriers to care that existed before the pandemic likely remain, yet have not been thoroughly assessed from pre- to post-COVID-19 onset (Linardon et al., 2022). This evidence is especially needed for individuals with elevated ED symptoms belonging to marginalized groups that exhibit low ED help-seeking rates, on average, such as Black, Asian, and Hispanic/Latinx individuals and cisgender men (Bohrer et al., 2017; Cachelin & Striegel-Moore, 2006; Romano et al., 2022). Recent evidence from a national sample of US college students also indicated that fewer transgender or gender diverse individuals with probable ED received mental health services from 2013 to 2020 (Romano et al., 2022). Consequently, it is important to determine whether the onset of COVID-19 altered this trajectory among transgender or gender diverse individuals in particular, and among other diverse marginalized populations that have not been assessed in this context.

3 | STUDY PURPOSE

The present study used the largest national sample of US college students that has been assessed in research on COVID-19 and ED to examine three aims. Aim 1 examined month-by-month trajectories in the population prevalence of current probable ED and self-reported lifetime ED diagnoses over the 15-months following COVID-19 onset (i.e., March 2020). Aim 2 examined whether the prevalence of current probable ED, reporting lifetime ED, and (among individuals with probable ED) mental healthcare engagement differed during pre- versus post-COVID-19 onset time periods. Aim 3 examined whether changes

in prevalence estimates for these ED symptoms and mental healthcare outcomes varied across individuals with marginalized gender, sexual, and racial/ethnic identities, higher BMIs, and greater financial stress. These findings can provide insight into groups that have experienced disproportionate ED burden during the pandemic at the population-level, and directions for future research and service delivery that warrant consideration.

4 | METHOD

4.1 | Participants and procedures

Participants were a national sample of US college students who completed the repeated cross-sectional multi-institute Healthy Minds Study (Healthy Minds Network [HMS], 2020) between January 2019 and May 2021. Institutional Review Board approval was obtained from all participating institutions, and procedures were performed in accordance with the ethical standards in the 1964 Declaration of Helsinki and its amendments. Random samples of 4000 degree-seeking students were obtained from the full student populations at institutions with at least 4000 students; at smaller institutions, all students were recruited. After electronically providing informed consent, participants completed an online survey.

5 | MEASURES

5.1 | Sociodemographic characteristics

Participants endorsed their gender, sexual, and racial/ethnic identities. For gender identity, categories included: (1) cisgender women (*referent*); (2) cisgender men; (3) transgender men; (4) transgender women; (5) genderqueer/gender nonconforming; (6) other/multiple gender identities. For sexual identity, categories included: (1) heterosexual (*referent*); (2) lesbian; (3) gay; (4) bisexual; (5) queer; (6) questioning; (7) other/multiple sexual identities. For racial/ethnic identity, categories included: (1) White (*referent*); (2) Black/African American; (3) American Indian/Alaskan Native; (4) Asian/Asian American; (5) Hispanic/Latinx; (6) Native Hawaiian/Pacific Islander; (7) Middle Eastern/Arab/Arab American; (8) Other/Multiple Racial/Ethnic identities. Participants also provided self-reported height and weight data, which were used to compute BMI.

5.2 | Financial stress

Participants' current and childhood financial stress were assessed via two items: "How would you describe your financial situation… right now?" and "…while growing up?" Responses to both items were rated on a 5-point response scale ranging from *never stressful* to *always stressful*. Higher scores reflect greater current and childhood financial stress.

5.3 | Eating disorder symptoms

The 5-item SCOFF questionnaire (Morgan et al., 1999) assessed participants' current ED symptoms. Participants indicated whether the assessed items apply (1) or do not apply (0) to them. In line with recommended procedures (Morgan et al., 1999), a binary variable was computed that captured whether participants exhibited *current probable ED* via summed scores ≥2 (coded as 1) or lower ED symptoms (coded as 0). The SCOFF has exhibited good sensitivity and specificity as a screening tool for identifying ED among young adults (Morgan et al., 1999).

Participants also responded to the item, "Have you ever been diagnosed with any of the following conditions by a health professional (e.g., primary care doctor, psychiatrist, psychologist, etc.)?" Those who endorsed "eating disorder (e.g., anorexia nervosa, bulimia nervosa)" were classified as reporting a *lifetime ED diagnosis*.

5.4 | Current counseling or therapy

Participants endorsed whether they were currently receiving counseling or therapy for mental health concerns (0 = *no*, 1 = *yes*). Analyses

TABLE 1 Participant characteristics

	All participants (N = 242,906) M (SD) or n (%)	Pre-COVID-19 pandemic onset (n = 97,945) M (SD) or n (%)	Post-COVID-19 pandemic onset (n = 144,961) M (SD) or n (%)
Gender identity			
Cisgender women	165,421 (68.17%)	66,310 (67.76%)	99,111 (68.45%)
Cisgender men	69,985 (28.84%)	29,390 (30.03%)	40,595 (28.04%)
Transgender men	529 (0.22%)	286 (0.29%)	243 (0.17%)
Transgender women	254 (0.10%)	140 (0.14%)	114 (0.08%)
Genderqueer/gender nonconforming	3762 (1.55%)	1159 (1.18%)	2603 (1.80%)
Other or multiple gender identities	2695 (1.11%)	574 (0.59%)	2121 (1.46%)
Sexual orientation			
Heterosexual	187,655 (77.89%)	77,664 (79.88%)	109,991 (76.54%)
Lesbian	3724 (1.55%)	1384 (1.42%)	2340 (1.63%)
Gay	4199 (1.74%)	1656 (1.70%)	2543 (1.77%)
Bisexual	23,184 (9.62%)	8461 (8.70%)	14,723 (10.24%)
Queer	3906 (1.62%)	1308 (1.35%)	2598 (1.81%)
Questioning	3965 (1.65%)	1378 (1.42%)	2587 (1.80%)
Other or multiple sexual orientations	14,302 (5.94%)	5373 (5.53%)	8929 (6.21%)
Racial/ethnic identity			
White	150,445 (62.07%)	64,107 (65.58%)	86,338 (59.70%)
Black or African American	18,664 (7.70%)	5589 (5.72%)	13,075 (9.04%)
American Indian or Alaskan Native	637 (0.26%)	292 (0.30%)	345 (0.24%)
Asian or Asian American	26,993 (11.14%)	10,001 (10.23%)	16,992 (11.75%)
Hispanic or Latinx	17,152 (7.08%)	6622 (6.77%)	10,530 (7.28%)
Native Hawaiian or Pacific Islander	309 (0.13%)	101 (0.10%)	208 (0.14%)
Middle eastern, Arab, or Arab American	3355 (1.38%)	1308 (1.34%)	2047 (1.42%)
Other or Multiple Racial/Ethnic identities	24,812 (10.24%)	9733 (9.96%)	15,079 (10.43%)
Body mass index	25.28 (5.91)	25.30 (5.93)	25.17 (5.81)
Current financial stress	3.17 (1.11)	3.20 (1.10)	3.15 (1.12)
Childhood financial stress	2.77 (1.21)	2.71 (1.21)	2.82 (1.21)
Current probable eating disorder (via SCOFF ≥ 2)	63,114 (27.66%)	23,303 (26.78%)	39,811 (28.21%)
Lifetime eating disorder diagnosis	9139 (3.76%)	3549 (3.62%)	5590 (3.86%)
Current counseling or therapy[a]	11,817 (20.59%)	4066 (18.95%)	7751 (21.57%)

Note: Responses to the current and childhood financial stress items were rated on a 5-point response scale ranging from 1 = *never stressful* to 5 = *always stressful*.

[a]Among individuals who exhibited current probable eating disorders (via SCOFF ≥ 2) only.

using this variable only included participants with current probable ED (SCOFF ≥ 2).

5.5 | Statistical analyses

The participation rate for the included waves of the HMS ranged from 13% to 16%. To adjust for participant non-response and ensure data from the assessed participants are fully representative of the student populations from which they were drawn, all analyses were adjusted using participant non-response weights. Use of these weights permits model estimates from the present analyses to be generalizable to the broader population of US college students in terms of known characteristics.

March 13, 2020 was used to signify the start of the COVID-19 pandemic, as this was when the US federal government declared that COVID-19 was a national emergency and when most COVID-related shutdowns began in the United States, including within colleges and universities (Centers for Disease Control and Prevention [CDC], 2022). To address Aim 1, polynomial logistic regressions were run to examine month-by-month prevalence trajectories for current probable ED statuses and lifetime ED diagnoses during the 15-months following COVID-19 onset. These models included post-COVID onset month as a predictor of the ED outcomes. Linear, quadratic, and cubic time trends were assessed to identify the best fitting temporal trajectories. To address Aim 2, logistic regressions were run to examine (in separate models) whether the prevalence of current probable ED, reporting lifetime ED diagnoses, and—among individuals with current probable ED—current receipt of counseling or therapy differed during pre- versus post-COVID onset timeframes. To address Aim 3, moderated logistic regressions were run to evaluate (in separate models) whether prevalence estimates for these three ED symptom and mental healthcare outcomes varied for different marginalized groups from pre- to post-COVID onset. All moderated regressions included sociodemographic covariates (predictors), pre- (0) versus post-COVID onset (1) time (moderator), and sociodemographic covariates × time

interactions. Continuous covariates were centered before interaction terms were created. The overall pattern of results did not change after controlling for depression and anxiety; consequently, models without comorbid psychopathology are presented for parsimony.

6 | RESULTS

Participant characteristics are presented in Table 1. Participants were 242,906 US college students. Overall, participants were 23.45 ($SD = 7.04$) years old on average and had a mean BMI of 25.28 ($SD = 5.91$). Over two-thirds of participants were cisgender women ($n = 165,421$; 68.17%), heterosexual ($n = 187,655$, 77.89%), and White ($n = 150,445$, 62.07%). Overall, 27.66% ($n = 63,114$) of participants exhibited current probable ED (SCOFF ≥ 2) and 3.76% ($n = 9139$) reported lifetime ED diagnoses. Among individuals with current probable ED, 20.59% ($n = 11,817$) were currently receiving counseling or therapy.

6.1 | Pandemic-related changes in eating disorder symptoms and mental healthcare

Month-by-month ED symptom trajectories over the 15-months following COVID-19 onset were examined to address Aim 1 and are depicted in Figure 1. Non-linear quadratic functions best characterized the month-by-month trajectories of prevalence estimates for participants' current probable ED statuses (months $OR = 0.980$, 95% $CI_{OR} = 0.962, 0.998$; months^2 $OR = 1.002$, 95%$CI_{OR} = 1.001, 1.003$) and lifetime ED diagnoses (months $OR = 0.986$, 95%$CI_{OR} = 0.946, 1.028$; months^2 $OR = 1.003$, 95%$CI_{OR} = 1.001, 1.006$). Cubic functions were not significant. As shown in Figure 1, current probable ED and lifetime ED diagnosis prevalence initially decreased between the pandemic onset in March 2020 through May–June 2020, followed by relatively steady increases during Fall 2020 through March 2021.
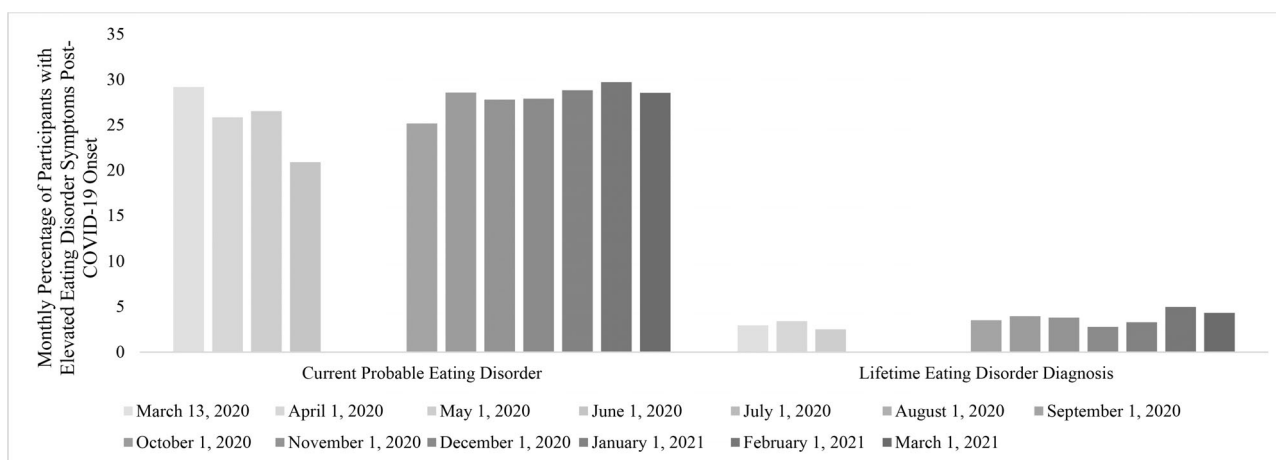

FIGURE 1 Monthly percentage of participants who exhibited current probable eating disorders and reported lifetime eating disorder diagnoses following the onset of the COVID-19 pandemic. No participants completed the Healthy Minds Study during July or August 2020.

TABLE 2   Changes in eating disorder symptom disparities from pre- to post-COVID-19 onset

	Current probable eating disorder					Lifetime eating disorder diagnosis				
		95% CI					95% CI			
	b (SE)	LL	UL	OR	Model R^2	b (SE)	LL	UL	OR	Model R^2
Gender identity (Ref = cisgender women)					0.04					0.24
Cisgender men	−0.72 (0.03)	−0.77	−0.66	0.49		−2.02 (0.11)	−2.22	−1.81	0.13	
Transgender men	0.38 (0.17)	0.04	0.71	1.46		0.84 (0.25)	0.35	1.33	2.31	
Transgender women	0.14 (0.28)	−0.40	0.68	1.15		0.41 (0.50)	−0.56	1.38	1.51	
Genderqueer/gender nonconforming	0.15 (0.09)	−0.02	0.33	1.17		0.80 (0.14)	0.54	1.07	2.23	
Other or multiple gender identities	−0.02 (0.13)	−0.28	0.25	0.99		0.59 (0.19)	0.22	0.96	1.80	
Pre vs. post	0.03 (0.02)	−0.001	0.07	1.03		0.004 (0.03)	−0.06	0.07	1.00	
Men × pre vs. post	−0.02 (0.04)	−0.09	0.06	0.99		0.03 (0.14)	−0.24	0.30	1.03	
Transgender men × pre vs. post	−0.10 (0.27)	−0.63	0.44	0.91		0.35 (0.45)	−0.54	1.24	1.42	
Transgender women × pre vs. post	−0.38 (0.38)	−1.13	0.37	0.68		−0.99 (0.81)	−2.58	0.60	0.37	
Genderqueer/gender nonconforming × pre vs. post	0.23 (0.11)	0.02	0.44	1.25		0.000 (0.16)	−0.32	0.31	1.00	
Other or multiple gender identities × pre vs. post	0.17 (0.15)	−0.13	0.47	1.19		0.03 (0.22)	−0.40	0.45	1.03	
Sexual orientation (Ref = heterosexual)					0.02					0.07
Lesbian	0.27 (0.11)	0.06	0.48	1.30		1.17 (0.15)	0.87	1.46	3.21	
Gay	0.35 (0.09)	0.19	0.52	1.42		0.05 (0.19)	−0.32	0.42	1.05	
Bisexual	0.65 (0.04)	0.58	0.73	1.92		1.35 (0.06)	1.23	1.48	3.87	
Queer	0.62 (0.08)	0.46	0.79	1.87		1.53 (0.14)	1.27	1.80	4.64	
Questioning	0.66 (0.10)	0.47	0.86	1.94		0.89 (0.21)	0.49	1.29	2.44	
Other or multiple sexual orientations	0.47 (0.05)	0.37	0.56	1.59		1.14 (0.08)	0.98	1.30	3.12	
Pre vs. post	0.02 (0.02)	−0.02	0.05	1.02		−0.02 (0.04)	−0.10	0.06	0.98	
Lesbian × pre vs. post	0.31 (0.13)	0.06	0.56	1.37		0.20 (0.19)	−0.17	0.58	1.22	
Gay × pre vs. post	0.05 (0.11)	−0.16	0.27	1.05		0.23 (0.25)	−0.26	0.71	1.25	
Bisexual × pre vs. post	0.04 (0.05)	−0.05	0.13	1.04		0.002 (0.08)	−0.16	0.16	1.00	
Queer × pre vs. post	0.11 (0.10)	−0.09	0.31	1.12		0.31 (0.16)	−0.01	0.62	1.36	
Questioning × pre vs. post	−0.01 (0.12)	−0.24	0.22	0.99		−0.07 (0.26)	−0.57	0.44	0.94	
Other or multiple sexual orientations * pre vs. post	0.06 (0.06)	−0.07	0.18	1.06		0.001 (0.10)	−0.20	0.20	1.00	
Racial/ethnic identity (Ref = White)					0.01					0.10
Black or African American	−0.31 (0.06)	−0.42	−0.19	0.74		−1.77 (0.20)	−2.15	−1.39	0.17	
American Indian or Alaskan Native	0.38 (0.24)	−0.10	0.85	1.46		−0.90 (0.56)	−2.00	0.21	0.41	
Asian or Asian American	0.19 (0.04)	0.11	0.28	1.21		−0.95 (0.12)	−1.19	−0.70	0.39	
Hispanic or Latinx	0.22 (0.05)	0.13	0.31	1.25		−0.65 (0.12)	−0.88	−0.41	0.53	
Native Hawaiian or Pacific Islander	0.90 (0.33)	0.26	1.55	2.47		−0.49 (0.72)	−1.90	0.91	0.61	

TABLE 2 (Continued)

| | Current probable eating disorder | | | | | Lifetime eating disorder diagnosis | | | | |
	b (SE)	95% CI LL	UL	OR	Model R^2	b (SE)	95% CI LL	UL	OR	Model R^2
Middle Eastern, Arab, or Arab American	**0.34 (0.10)**	**0.16**	**0.53**	**1.41**		−0.39 (0.30)	−0.97	0.19	0.68	
Other or Multiple Racial/Ethnic identities	**0.16 (0.04)**	**0.07**	**0.24**	**1.17**		−0.01 (0.08)	−0.16	0.14	0.99	
Pre vs. post	**0.07 (0.02)**	**0.03**	**0.10**	**1.07**		**0.09 (0.04)**	**0.02**	**0.16**	**1.10**	
Black or African American × pre vs. post	−0.04 (0.07)	−0.17	0.10	0.96		−0.18 (0.24)	−0.64	0.29	0.84	
American Indian or Alaskan Native × pre vs. post	−0.07 (0.30)	−0.65	0.51	0.93		0.35 (0.65)	−0.93	1.62	1.42	
Asian or Asian American × pre vs. post	−0.07 (0.05)	−0.17	0.03	0.94		0.07 (0.16)	−0.24	0.38	1.07	
Hispanic or Latinx × pre vs. post	0.06 (0.06)	−0.06	0.18	1.06		−0.02 (0.15)	−0.31	0.27	0.98	
Native Hawaiian or Pacific Islander × pre vs. post	−0.27 (0.40)	−1.04	0.51	0.77		−1.12 (0.91)	−2.90	0.67	0.33	
Middle Eastern, Arab, or Arab American × pre vs. post	−0.22 (0.12)	−0.46	0.02	0.80		**−0.75 (0.37)**	**−1.47**	**−0.02**	**0.47**	
Other or Multiple Racial/Ethnic identities × pre vs. post	−0.02 (0.05)	−0.12	0.08	0.98		−0.01 (0.10)	−0.20	0.19	1.00	
Body mass index	**0.05 (0.002)**	**0.05**	**0.06**	**1.06**	0.04	**−0.02 (0.01)**	**−0.03**	**−0.004**	**0.99**	0.004
Pre vs. post	0.03 (0.03)	−0.03	0.09	1.03		**−0.20 (0.07)**	**−0.34**	**−0.06**	**0.82**	
BMI × pre vs. post	0.003 (0.01)	−0.01	0.01	1.00		0.02 (0.02)	−0.02	0.05	1.02	
Current financial stress	**0.30 (0.01)**	**0.28**	**0.32**	**1.35**	0.04	**0.23 (0.02)**	**0.19**	**0.28**	**1.26**	0.02
Pre vs. post	**0.06 (0.02)**	**0.03**	**0.09**	**1.06**		0.05 (0.03)	−0.01	0.11	1.05	
Current financial stress × pre vs. post	0.03 (0.01)	−0.003	0.05	1.03		0.03 (0.03)	−0.03	0.09	1.03	
Childhood financial stress	**0.19 (0.01)**	**0.17**	**0.21**	**1.20**	0.02	**0.11 (0.02)**	**0.07**	**0.15**	**1.12**	0.01
Pre vs. post	0.03 (0.02)	−0.002	0.06	1.02		0.03 (0.03)	−0.03	0.09	1.03	
Childhood financial stress × pre vs. post	0.03 (0.01)	0.000	0.05	1.03		0.02 (0.03)	−0.03	0.07	1.02	

Note: Pre vs. post = pre- vs. post-COVID-19 onset; bold text was used to represent significant effects (defined as 95% CIs for unstandardized parameter estimates that did not include 0).

Aim 2 examined whether the prevalence of ED symptoms and mental healthcare outcomes differed pre- versus post-COVID onset. Participants' odds of exhibiting current probable ED increased by 5% ($OR = 1.05$, 95%$CI_{OR} = 1.02$, 1.08) from pre- to post-COVID onset. Further, among individuals with current probable EDs, participants' odds of currently engaging in counseling/therapy increased by 12% from pre- to post-COVID onset ($OR = 1.12$, 95%$CI_{OR} = 1.04$, 1.19). In contrast, participants' odds of reporting lifetime ED diagnoses did not change over time ($OR = 1.05$, 95%$CI_{OR} = 0.98$, 1.11).

6.2 | COVID-19 changes in eating disorder symptom disparities

Addressing Aim 3, Table 2 presents results of moderated logistic regressions that examined whether prevalence estimates for the ED symptom outcomes varied across different sociodemographic groups from pre- to post-COVID onset. Pre- versus post-COVID-19 time period moderated associations between participants' gender and sexual identities, and odds of exhibiting current probable ED (but not lifetime ED diagnoses). Simple slopes for the gender identity finding indicated that genderqueer/gender nonconforming individuals were significantly more likely to exhibit current probable ED than cisgender women post-COVID onset (simple slope: $b = 0.38$, $SE = 0.06$, $p < .001$; $OR = 1.46$), but not pre-COVID onset (simple slope: $b = 0.15$, $SE = 0.09$, $p = .085$; $OR = 1.17$), reflecting a significant increase in current probable ED prevalence for genderqueer/gender nonconforming individuals over time. Transgender men also had greater odds ($OR = 1.46$), and cisgender men lower odds ($OR = 0.49$), of exhibiting current probable ED than cisgender women; however, these differences did not change pre- to post-COVID onset. Simple slopes for the sexual identity finding showed that lesbian individuals

TABLE 3 Changes in mental healthcare disparities from pre- to post-COVID-19 onset among individuals with current probable eating disorders

| | Current counseling or therapy | | | | |
| | | 95% CI | | | |
	b (SE)	LL	UL	OR	Model R^2
Gender identity (Ref = cisgender women)					0.03
Cisgender men	−0.57 (0.08)	−0.73	−0.42	0.56	
Transgender men	0.95 (0.27)	0.42	1.48	2.59	
Transgender women	1.04 (0.51)	0.05	2.04	2.84	
Genderqueer/gender nonconforming	0.89 (0.16)	0.58	1.20	2.44	
Other or multiple gender identities	0.86 (0.24)	0.38	1.33	2.35	
Pre vs. post	0.09 (0.04)	0.02	0.16	1.09	
Men × pre vs. post	−0.01 (0.10)	−0.20	0.19	1.00	
Transgender men × pre vs. post	−0.10 (0.39)	−0.87	0.67	0.91	
Transgender women * pre vs. post	−0.20 (0.67)	−1.52	1.12	0.82	
Genderqueer/gender nonconforming × pre vs. post	0.06 (0.19)	−0.31	0.43	1.06	
Other or multiple gender identities × pre vs. post	−0.06 (0.27)	−0.58	0.46	0.94	
Sexual orientation (Ref = heterosexual)					0.05
Lesbian	1.13 (0.17)	0.81	1.46	3.10	
Gay	0.45 (0.18)	0.10	0.80	1.57	
Bisexual	0.82 (0.08)	0.67	0.97	2.27	
Queer	1.15 (0.15)	0.86	1.44	3.17	
Questioning	0.76 (0.16)	0.44	1.07	2.13	
Other or multiple sexual orientations	0.87 (0.09)	0.69	1.04	2.38	
Pre vs. post	0.06 (0.05)	−0.03	0.15	1.06	
Lesbian × pre vs. post	0.13 (0.22)	−0.29	0.55	1.14	
Gay × pre vs. post	0.22 (0.23)	−0.22	0.67	1.25	
Bisexual × pre vs. post	−0.01 (0.09)	−0.19	0.17	0.99	
Queer × pre vs. post	0.12 (0.18)	−0.23	0.48	1.13	
Questioning × pre vs. post	−0.16 (0.20)	−0.55	0.24	0.86	
Other or multiple sexual orientations × pre vs. post	0.07 (0.11)	−0.15	0.28	1.07	
Racial/ethnic identity (ref = White)					0.04
Black or African American	−0.68 (0.16)	−0.98	−0.37	0.51	
American Indian or Alaskan Native	−0.61 (0.47)	−1.52	0.31	0.55	
Asian, Asian American, Native Hawaiian, or Pacific Islander[a]	−0.85 (0.12)	−1.09	−0.62	0.43	
Hispanic or Latinx	−0.87 (0.11)	−1.09	−0.65	0.42	
Middle Eastern, Arab, or Arab American	−0.64 (0.30)	−1.23	−0.05	0.53	
Other or Multiple Racial/Ethnic identities	−0.08 (0.11)	−0.29	0.13	0.92	
Pre vs. post	0.13 (0.04)	0.05	0.21	1.14	
Black or African American × pre vs. post	−0.04 (0.18)	−0.39	0.32	0.96	
American Indian or Alaskan Native × pre vs. post	−0.10 (0.57)	−1.23	1.02	0.90	
Asian, Asian American, Native Hawaiian, or Pacific Islander × pre vs. post	0.03 (0.14)	−0.24	0.31	1.03	
Hispanic or Latinx × pre vs. post	0.10 (0.14)	−0.16	0.37	1.11	
Middle Eastern, Arab, or Arab American × pre vs. post	−0.02 (0.37)	−0.75	0.70	0.98	
Other or Multiple Racial/Ethnic identities × pre vs. post	−0.05 (0.13)	−0.29	0.20	0.95	
Body mass index	−0.001 (0.004)	−0.01	0.01	1.00	0.004

TABLE 3 (Continued)

| | Current counseling or therapy | | | | |
| | | 95% CI | | | |
	b (SE)	LL	UL	OR	Model R^2
Pre vs. post	**−0.30 (0.07)**	**−0.43**	**−0.16**	**0.75**	
BMI × pre vs. post	**0.03 (0.01)**	**0.004**	**0.05**	**1.03**	
Current financial stress	0.03 (0.02)	−0.02	0.07	1.03	0.001
Pre vs. post	**0.11 (0.03)**	**0.04**	**0.18**	**1.12**	
Current financial stress × pre vs. post	−0.01 (0.03)	−0.06	0.05	1.00	
Childhood financial stress	−0.003 (0.02)	−0.05	0.04	1.00	0.001
Pre vs. post	**0.11 (0.03)**	**0.04**	**0.18**	**1.12**	
Childhood financial stress × pre vs. post	−0.01 (0.03)	−0.06	0.04	0.99	

Note: Pre vs. post = pre- versus post-COVID-19 onset; bold text was used to represent significant effects (defined as 95% CIs for unstandardized parameter estimates that did not include 0); all models included individuals who exhibited current probable eating disorders (via SCOFF ≥ 2) only.
[a]Asian or Asian American and Native Hawaiian or Pacific Islander were combined into one group, due to low cell counts for the latter.

had greater odds of exhibiting current probable ED than heterosexual individuals pre-COVID onset (simple slope; $b = 0.27$, $SE = 0.11$, $p = .013$; $OR = 1.30$) and the magnitude of this difference significantly increased post-COVID onset (simple slope: $b = 0.58$, $SE = 0.07$, $p < .001$; $OR = 1.78$). Although participants identifying as gay, bisexual, queer, questioning, and individuals with other/multiple sexual identities also had higher odds of exhibiting current probable ED than heterosexual individuals ($ORs = 1.42–1.94$), the magnitude of these differences did not change over time.

Racial/ethnic identity differences were identified for participants' odds of reporting lifetime ED diagnoses (but not current probable ED) from pre- to post-COVID onset. Specifically, Middle Eastern/Arab/Arab American individuals were significantly less likely to report lifetime ED diagnoses than White individuals post-COVID onset (simple slope: $b = -1.13$, $SE = 0.22$, $p < .001$; $OR = 0.32$), but not pre-COVID onset (simple slope; $b = -0.39$, $SE = 0.30$, $p = .191$; $OR = 0.68$), reflecting a significant decrease in reported lifetime ED diagnosis prevalence for Middle Eastern/Arab/Arab American individuals over time. Black/African American, Asian/Asian American, and Hispanic/Latinx individuals also had lower odds of reporting lifetime ED diagnoses than White individuals ($ORs = 0.17–0.53$), yet these associations did not change over time. As shown in Table 2, although pandemic-related temporal moderation effects were non-significant, the opposite pattern emerged for the current probable ED outcome, wherein nearly all racial/ethnic minority groups experienced higher current probable ED prevalence than White individuals both pre- and post-COVID-19 onset ($ORs = 1.17–2.47$).

Individuals with greater current and childhood financial stress and higher BMIs generally exhibited higher odds of exhibiting current probable ED ($ORs = 1.06–1.35$) and reporting lifetime ED diagnoses ($ORs = 1.12–1.26$, but 0.99 for BMI) than those with lower financial stress and BMIs, respectively. However, the magnitude of these differences did not change pre- versus post-COVID onset.

6.3 | COVID-19 changes in mental healthcare disparities

Addressing Aim 3, Table 3 presents results of moderated logistic regressions that examined whether estimates for current mental healthcare engagement varied for different sociodemographic groups pre- to post-COVID onset. These models only included participants with current probable ED (SCOFF ≥ 2).

Pre- versus post-COVID onset time moderated the association between participants' BMIs and current counseling/therapy engagement. Simple slopes indicated that individuals with current probable ED and higher BMIs were significantly more likely to report that they were currently receiving counseling/therapy than those with lower BMIs post-COVID onset (simple slope: $b = 0.02$, $SE = 0.01$, $p = .016$; $OR = 1.03$), but not pre-COVID onset (simple slope; $b = -0.001$, $SE = 0.004$, $p = .730$; $OR = 1.00$), reflecting a small but significant increase in counseling/therapy among symptomatic larger-bodied individuals over time. Individuals with current probable ED who identified with the assessed gender ($ORs = 2.35–2.84$) and sexual ($ORs = 1.57–3.17$) minority identities also had greater odds, and individuals who identified with most racial/ethnic minority identities had lower odds ($ORs = 0.42–0.53$), of reporting current mental healthcare than cisgender women, heterosexual, and White individuals, respectively. However, these associations did not change over time. Finally, childhood and current financial stress were not associated with mental healthcare engagement pre- or post-COVID onset among individuals with current probable ED.

7 | DISCUSSION

The COVID-19 pandemic has significantly altered the lives of individuals across the globe, including US college students and young adults who commonly exhibit ED symptoms (Romano et al., 2022; Udo & Grilo, 2018). To extend early pandemic-related ED research that was

generally limited to regionally restricted samples with little sociodemographic diversity (Linardon et al., 2022), the present study examined pandemic-related changes in ED symptoms and mental healthcare prevalence at the population-level among a national sample of US college students and across historically marginalized groups within this population. Results identified increases of 5% and 12% (respectively) in individuals' likelihoods of exhibiting current probable ED and symptomatic individuals' (with current probable ED) current mental healthcare from pre- to post-COVID onset, but no pandemic-related changes in reported lifetime ED diagnosis prevalence. Although the temporal changes in current probable ED and mental healthcare prevalence that emerged among all participants were relatively small in magnitude, there were important variations in these time-trends for different marginalized groups. For example, individuals who identified as genderqueer/gender nonconforming and lesbian exhibited disproportionate increases in ED symptoms from pre- to post-COVID onset compared to cisgender women and heterosexual individuals, respectively. Further, individuals with current probable ED and higher BMIs were also increasingly likely to report current mental healthcare over time. Collectively, these findings provide important information on (1) population-level changes in pandemic-related ED impacts and (2) directions for future research and service delivery that warrant consideration to ensure groups of US college students that have experienced disproportionate ED burden during COVID-19 are aptly understood, identified, and treated.

7.1 | Eating disorder symptoms and mental healthcare during COVID-19

Findings of a small yet significant 5% increase in US college students' likelihood of exhibiting current probable ED over time, but no change in their reported lifetime ED diagnoses, add to a growing body of inconsistent research that has examined pandemic-related ED symptom changes among community-based and college samples (Linardon et al., 2022). For example, some prior research with US college students indicated that participants were 54% more likely to exhibit probable binge-eating-spectrum (but not restrictive-spectrum) ED from pre- to post-COVID-19 onset (Kim et al., 2022) and large effects were found for retrospectively reported increases in weight, shape, and eating concerns (Keel et al., 2020). However, other studies with college students in the United States and Lithuania did not identify significant changes in participants' body satisfaction, global ED symptoms, or probable binge-eating- or restrictive-spectrum ED (Baceviciene & Jankauskiene, 2021; Christensen et al., 2021). To adequately contextualize how the present findings add to this mixed literature, it will be important for future research to probe sources of variation that may account for these between-study differences. As more research is published, such work might capitalize upon opportunities to use meta-analysis/meta-regression to examine whether differences in pandemic-related ED symptom change findings within the literature stem from methodological and sample-related factors.

The notably larger and significant increase of 12% in symptomatic individuals' (SCOFF ≥ 2) current mental healthcare engagement from pre- to post-COVID onset aligns with a more consistent body of research that has considered pandemic-related changes in ED treatment seeking and use (Linardon et al., 2022). For example, consistent with the present findings, prior research with US samples identified significant increases in rates of ED-related mental healthcare engagement from pre- to post-COVID-19 onset (Lin et al., 2021; Taquet et al., 2022). Notably, one study that examined the electronic health records of 5.2 million US youth and young adults specifically identified a 15% increase in the incidence of ED diagnoses during COVID-19 (2020) compared to the previous year (Taquet et al., 2022), an increase that is comparable in magnitude to the present mental healthcare finding. This is encouraging, as it suggests more US college students and individuals in the community with ED symptoms are seeking mental healthcare during COVID-19.

Comparing the observed pandemic-related increase in help-seeking among individuals with elevated ED symptoms with the broader increase in current probable ED prevalence has important implications that warrant further consideration. Specifically, when considered together, these findings provide some insight into whether the observed pandemic-related increase in help-seeking was due to (1) an actual increase in help-seeking for US college students at the population-level versus (2) sustained low ED help-seeking rates that have historically been identified (Kessler et al., 2013; Romano et al., 2022) but evidence that more people are now experiencing at-risk ED symptoms (Linardon et al., 2022). Given that the 5% increase in individuals' likelihood of exhibiting current probable ED was small in magnitude, it appears as though the comparably larger 12% increase in symptomatic individuals' mental healthcare engagement over the pandemic onset transition reflects an actual increase in help-seeking prevalence. It will be important for future large-scale research to examine whether this trend continues as new phases of the pandemic unfold.

7.2 | Eating disorder symptom and mental healthcare disparities during COVID-19

Although the changes in current probable ED and mental healthcare prevalence that emerged among all participants were small in magnitude, there were important variations in these time-trends for different marginalized groups. In particular, lesbian and genderqueer/gender nonconforming students exhibited increasing ED symptoms from pre- to post-COVID-19 onset. Lesbian students were 78% more likely than their heterosexual peers to exhibit current probable ED post-COVID onset (vs. 30% pre-COVID) and genderqueer/gender nonconforming students were 46% more likely than cisgender women to exhibit current probable ED post-COVID onset (vs. 17% pre-COVID). This suggests factors related to the pandemic may have contributed to increasing ED symptom burden among these groups. In line with Minority Stress Theory (Brooks, 1981; Meyer, 2003), it is possible that the pandemic was a negative environmental circumstance that

disproportionately increased lesbian and genderqueer/gender noncon-forming students' exposure to general stressors (e.g., loss of loved ones) as well as minority-specific distal (e.g., stigma, discrimination) and proxi-mal (e.g., rejection expectations, self-stigma) stressors that, in turn, pro-moted poor mental health (Hatzenbuehler, 2009; Meyer, 2003). It will be helpful for future research to directly examine risk and protective fac-tors that can explain why individuals belonging to these two marginal-ized groups experienced increasing ED symptoms, while others did not.

It warrants mention that only one prior study examined whether pandemic-related changes in ED symptoms varied across marginalized groups with identities that extend beyond historic binaries (e.g., White vs. non-White, heterosexual vs. sexual minority). In this prior study with US college students, gender, sexual, and racial identity did not moderate pre- to post-COVID onset changes in individuals' risks of exhibiting probable binge-eating-spectrum or restrictive-spectrum ED (Kim et al., 2022). In this prior study, study authors grouped participants with different marginalized gender (transgender, gender non-conforming, and self-identified gender in one group) and sexual identities (lesbian, gay, bisexual, queer, questioning, and self-identified sexual identity in one group), likely due to low cell counts. This grouping might account for dif-ferences between these prior null gender and sexual identity findings rel-ative to the increases in ED symptoms among lesbian and genderqueer/gender nonconforming students found in the present study. In contrast, Kim et al. (2022) separately examined ED symptom changes across mul-tiple diverse racial identity groups. The lack of race differences in pandemic-related ED symptom changes that were replicated in both studies may consequently reflect a consistent (null) trend.

The broader 12% increase in current mental healthcare preva-lence among individuals with current probable ED that emerged among all participants exhibited minimal variations across sociodemo-graphic groups. As an exception, individuals with current probable ED who were living in larger bodies were 3% more likely to report current mental healthcare than their smaller-bodied counterparts post-COVID onset, reflecting a small yet significant increase in mental healthcare for symptomatic individuals with higher BMIs over time. The very small magnitude of this moderation effect makes the implications of this change unclear. Future research is needed to gauge whether and how this finding manifested in real-world care settings, and whether symptomatic larger-bodied individuals continue to seek treatment as the pandemic continues.

7.3 | Strengths, limitations, and future directions

The present study includes multiple strengths, including the use of the largest national sample of US college students that has been assessed in the pandemic-related ED literature. All analyses were also weighted based on known student characteristics to make the results generaliz-able to the population of US college students at the participating uni-versities, which provides a more comprehensive assessment of how ED symptoms and mental healthcare have changed at the population-level since the pandemic began. Another strength of the present study is that it is the largest study to examine COVID-19 changes in ED

symptoms and mental healthcare across multiple marginalized groups with understudied sexual, gender, and racial/ethnic identities that had not previously been examined in this context.

Despite these strengths, certain limitations warrant mention, such as the survey response rates (13%–16%). However, these rates were adjusted for using participant nonresponse weights that account for known differences between responders and nonresponders. Second, the SCOFF is a validated ED screening measure among young adults (Botella et al., 2013; Kutz et al., 2020), but is not a diagnostic assess-ment. Similarly, participants' lifetime ED diagnoses were self-reported. Future research is needed to examine how the identified findings align with confirmed ED diagnoses. Third, the present study examined dif-ferences in pre- to post-COVID onset changes in ED symptoms and mental healthcare across marginalized groups. Future research may complement this work by examining how social experiences and structures that create marginalizing environments (e.g., racism, fatpho-bia, etc.) contribute to these associations. Fourth, students' sociocul-tural identities were examined separately. Future research may extend this work by examining how students' intersectional identities impact the associations of interest. Fifth, it will be helpful for future research to examine whether these findings extend to other important groups, including emerging adults in the community.

The pandemic was global stressor for individuals around the word. However, college students experienced many unique and unex-pected changes in their daily lives that others did not. Month-by-month trajectories showed that students' ED symptom prevalence was high during the initial onset of COVID-19 in March 2020, when students initially experienced unanticipated campus closures and tran-sitioned to virtual learning environments. Prevalence estimates then decreased from March 2020 through May–June 2020, when students generally returned home to familiar (although not always positive) environments. ED symptom prevalence estimates then increased in Fall 2020 through March 2021, when students were transitioning back to in-person or hybrid learning (CDC, 2022) and were likely bal-ancing pandemic-related stressors (e.g., coping with loss, compliance with safety guidelines, fears of contracting COVID) and normative stressors that students experience during college (e.g., high workload, identity formation). These trends provide insight that can be used in future crisis response efforts by attesting to times following global cri-ses when students may need additional support. It will be important for future large-scale research to continue to monitor trends in ED symptom prevalence as new phases of the pandemic unfold.

8 | CONCLUSIONS

The present study identified small yet significant increases of 5% and 12% (respectively) in US college students' likelihoods of exhibiting current probable ED and symptomatic individuals' mental healthcare engagement from before to during COVID-19, but no pandemic-related changes in lifetime ED diagnoses. These changes varied in important ways for different marginalized groups. Collectively, these findings provide important population-level data attesting to the

impact of the pandemic on ED symptoms and mental healthcare, and directions for research and service delivery that warrant consideration to ensure groups of US college students who exhibit disproportionate ED burden are aptly understood, identified, and treated.

AUTHOR CONTRIBUTIONS

Kelly A. Romano: Conceptualization; formal analysis; writing – original draft; writing – review and editing. **Sarah Ketchen Lipson:** Conceptualization; methodology; writing – review and editing. **Ariel Beccia:** Writing – review and editing. **Paula A. Quatromoni:** Writing – review and editing. **Jose Murgueitio:** Writing – review and editing.

CONFLICT OF INTEREST

The authors have no conflicts of interest to disclose.

DATA AVAILABILITY STATEMENT

The present data is available from https://healthymindsnetwork.org/research/data-for-researchers/ and code will be made available upon reasonable request.

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