College students and COVID-19: Mental health and purpose formation

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ABSTRACT

Background: The COVID-19 pandemic is a disaster event associated with negative social, mental health, financial, and academic outcomes for college students. However, there is limited evidence to guide efforts to help support college students during the crisis. This study used a disaster conceptual model to evaluate the relationship between COVID-19 stressors and mental health and purpose in college students in the United States.

Methods: Cross-sectional data were collected from 251 undergraduates through an online survey between April and May 2020.

Results: Students were exposed to multiple COVID-19 stressors (M = 8.14, SD = 3.02). Overall, 53.0 percent reported moderate to severe levels of depression, 40.7 percent reported moderate to severe levels of anxiety, and 39.4 percent endorsed having a clear sense of purpose in life. A disaster conceptual model fit the data well ($\chi^2 [30] = 31.93, p = .37$, CFI = 0.995, RMSEA = 0.02, SRMR = 0.04). COVID-19 stressors were directly associated with depression and anxiety, and inversely associated with purpose. Perceived stress was an intervening variable in this relationship.

Conclusion: Findings highlight the relationship between COVID-19 disaster stressors and mental health and purpose outcomes and provide evidence which may help guide recovery efforts.

Key words: college, COVID-19, mental health, purpose

INTRODUCTION

The COVID-19 pandemic is a disaster event. Disasters are large-scale, potentially traumatic events that affect communities. COVID-19 poses risks to college students that extend beyond physical health. Disasters are associated with financial stress, disruption to social support networks, and psychological distress. These consequences are all risk factors for dropping out of college. Yet, to date, we have limited evidence to guide education continuity efforts for college students during COVID-19 and other disasters.

Ensuring that college students are able to complete their degrees during disasters has enormous economic and public health implications. Students who complete their degrees earn more, are healthier and happier, and have greater confidence. Therefore, supporting educational continuity is critical for substantially reducing risks and losses from disasters. However, there is a lack of empirical knowledge about the impacts of disasters on college students. This study addresses this critical gap in
the literature by collecting perishable data on college student responses to the COVID-19 disaster in the United States.

A large body of practice has recognized the significant impacts disasters have on institutions of higher education. This work highlights that colleges and universities serve as critical infrastructure, physical capital, and lifelines in disasters. For example, the Federal Emergency Management Agency (FEMA) started a pilot program called the Disaster Resilient Universities program in 2000. This program is now an active network of over 800 colleges and universities. Although extremely important, the program focuses on the emergency management of these institutions, rather than providing insight into how to support the recovery of college students after disasters.

In this study, we applied a disaster conceptual model to understanding college student responses to COVID-19. Disaster conceptual models posit that disaster exposure stressors are directly associated with youth outcomes. Exposure stressors refer to both actual and perceived life-threatening experiences that occur at the time of the disaster event. Intervening variables in this direct relationship are life stressors and perceived stress. We expanded on disaster conceptual models in two important ways.

First, we evaluated college student experiences in the context of COVID-19. Disaster conceptual models have not yet focused on a pandemic of this size and scale. Instead, conceptual models to date have examined youth responses to weather-related and geophysical disasters and man-made disasters such as war trauma. Given the scale and impact of the COVID-19 disaster, it is important to understand what stressors are reported by college students. This information will inform effective strategies for responding to college student needs during this pandemic and other disasters.

Second, this study extends disaster conceptual models through its focus on positive youth development—specifically, youth purpose. Purpose is defined as “a stable and generalized intention to accomplish something that is at once meaningful to the self and of consequence to the world beyond the self.”

Existing literature on disaster conceptual models tends to focus on negative youth outcomes such as distress. However, positive outcomes, such as college student purpose formation, are important to study for a number of reasons. First, adolescence and emerging adulthood are developmental stages during which young people form a cohesive identity, and youth purpose development parallels this identity development. Second, purpose during this developmental stage has been associated with hope, personal agency, and positive affect; greater satisfaction in life; goal directedness; and youth flourishing. Finally, studying the influence of disasters on purpose will build on research demonstrating that stress-related experiences can act as both a barrier to and a facilitator of purpose formation.

The aims of this study are (1) to describe the impact of the COVID-19 disaster on college students and (2) to identify potential mechanisms that may have indirect effects on the relationship between COVID-19 stressors and college student outcomes, testing a disaster conceptual model. Based on disaster conceptual models, we hypothesized that COVID-19 stressors would be directly associated with negative mental health outcomes and inversely associated with purpose. We expected that life stressors and perceived stress would be potential intervening mechanisms in these relationships. We controlled for age, gender, year in college, race/ethnicity, status as a first-generation college student, and status as a Pell Grant recipient because of past literature indicating associations between these characteristics and college student outcomes.

**METHODS**

**Participants**

This study consisted of a subsample ($n = 251$) of undergraduate students from a larger study ($n = 315$) of undergraduates, faculty, and academic advisors in the United States and their experiences during the COVID-19 disaster.

Participants in the study sample (age range: 18–29 years, 84.3 percent female) represented a variety of identities and backgrounds. Of the students who reported their race/ethnicity ($n = 248$), 63.7 percent...
self-identified as non-Hispanic White, 9.7 percent as Black or African American, 10.1 percent as Asian, 8.9 percent as Hispanic or Latinx, 6.0 percent as multi-racial, and 1.6 percent as other. In addition, 23.7 percent of undergraduates in the sample identified as first-generation college students and 32.6 percent were recipients of Pell Grants. Students from colleges across the United States participated in the study (34.4 percent Southern, 34.8 percent Eastern, 18.8 percent Midwestern, 11.6 percent Western, and less than 1.0 percent Hawaii). A large majority of students (94.4 percent) attended 4-year colleges and approximately half (52.4 percent) attended private institutions. International students comprised 3.6 percent and out-of-state students comprised 44.0 percent of the study sample.

Procedures
The study protocol received approval from the Institutional Review Board of Boston College (PIs: Betty Lai, PhD & Belle Liang, PhD). Survey data were collected between April and May 2020 and managed through the secure, web-based software platform Research Electronic Data Capture (REDCap) hosted at Boston College. All participants indicated their consent to participate in the study via an electronic consent form at the start of the survey. Survey participants were recruited through convenience and snowball sampling methods. Recruitment outreach consisted of emails, web posts, and social media posts. Eligible participants were undergraduate students over the age of 18 enrolled in a college or university in the United States that ceased in-person classes due to the COVID-19 outbreak. Undergraduate students affiliated with Boston College were excluded from the study due to potential conflicts of interest. Participants who completed the survey were eligible to enter a raffle for one of five $40 gift cards.

A total of 274 college students completed the online REDCap survey. Of those, 18 students were excluded from the sample because they were graduate students (n = 17) or did not indicate their school role (n = 1). Students above the age of 29 (n = 5) were also excluded from the sample in order to focus the study on emerging adults. Students were included in the sample if they completed at least the demographic questionnaire and the COVID-19 stressors and experiences measure. Our final study sample included a total of 251 students. Study data and analysis codes are currently not openly available since longitudinal data collection is still underway.

Measures
Participants provided self-reported data on demographics, COVID-19 stressors, life stressors, perceived stress, depression, anxiety, and purpose. Internal consistency was not calculated for measures that are formative indicators, eg, COVID-19 stressors, life stressors, as it is inappropriate to do so.\textsuperscript{36,37}

Demographic questionnaire: A demographic questionnaire was developed for this study. It consisted of Yes/No, multiple choice, and free response items that assessed participant age, gender identity, race, ethnicity, primary language, countries of birth and residence, school characteristics, and COVID-19 exposure. Additional items included year in college, student-role-related characteristics, field of study, and effects of COVID-19 on the college experience.

Dummy variables were created for gender identity, year in college, first-generation college status, membership in a minoritized racial/ethnic group, and Pell Grant recipient status. A dummy code for gender identity compared females/marginalized gender as the identified group to males as the reference group. Students who identified as transgender (n = 1) or who responded that their gender identity was not listed (n = 1) were coded with the female/marginalized gender identity group. Descriptive analyses compared students using a gender binary, ie, male and female; however, the two students who did not identify with these groups were included in the structural equation model with the female/marginalized gender group. A dummy code for year in college compared seniors as the identified group to freshmen, sophomores, and juniors. A dummy code for first-generation college status consisted of first-generation college students as the identified group. A dummy code for race/ethnicity compared students of a minoritized racial/ethnic group (African American or Black, Asian, Hispanic or Latinx,
multiracial, or other) as the identified group to White students. A dummy code for Pell Grants consisted of Pell Grant recipients as the identified group.

**COVID-19 stressors:** A measure developed by Dr. Nicole Errett at the University of Washington was used to assess COVID-19 stressors. The measure evaluates the level of concern associated with 14 COVID-19-related stressors using a 3-point response scale, ie, 0 = “not concerned,” 1 = “somewhat concerned,” and 2 = “very concerned.” The measure asks about concerns related to the impact of COVID-19, such as getting sick, family member’s job loss, and not being able to pay bills. For the purposes of this study, COVID-19 stressors were marked as “present” when participants indicated concern, ie, “1” or “2”. The total and average number of stressors were calculated.

**Life stressors:** Life stressors that occurred in the past month were assessed with the *Life Events Scale for Students* (LESS). This measure consists of 31 Yes/No items indicating whether or not a life event occurred. Events included the death of a close family member or friend, change in financial status, trouble with parents, and change in living conditions, among others. For the purposes of this study, the LESS was used to measure the number of non-COVID life stressors that occurred within the past month. Items marked as “Yes” were summed to provide the total number of non-COVID stressors, with a potential score range of 0–31.

**Perceived stress:** The *Perceived Stress Scale* (PSS) was used to assess participants’ perceived stress. The PSS consists of 10 items that are used to compute a total perceived stress severity score. Participants responded using a 5-point scale, ie, 0 = “never,” 1 = “almost never,” 2 = “sometimes,” 3 = “fairly often,” and 4 = “very often”. Four of the 10 items were reverse-coded when computing the total score. The PSS total score ranges from 0 to 40, with higher scores indicating more perceived stress. PSS total scores can be categorized into low (0–13), moderate (14–26), and high (27–40) levels of stress. The PSS has demonstrated good internal consistency (.84–.86) and adequate test–retest reliability (.55–.85). In this study, the PSS items were found to have good internal consistency (α = .81).

**Depression:** The *Patient Health Questionnaire-8* (PHQ-8) was used to assess depression. The PHQ-8 consists of eight items that are used to assess depression symptoms experienced in the past 2 weeks and one item that assesses the impact of the endorsed symptoms on the person’s life. The eight items that comprise the total depression severity score utilize a 4-point response scale, ie, 0 = “not at all,” 1 = “several days,” 2 = “more than half the days,” and 3 = “nearly every day”. The item used to assess the impact of symptoms on the person’s life utilizes a different 4-point response scale (1 = “not difficult at all,” 2 = “somewhat difficult,” 3 = “very difficult,” and 4 = “extremely difficult”). The PHQ-8 total score ranges from 0 to 24 and indicates whether depression symptoms are minimal (0–4), mild (5–9), moderate (10–14), moderately severe (15–19), or severe (20–24). A total score of 10 or higher is associated with moderate to severe symptoms of depression and was used as the cutoff score in this study. The PHQ-8 has demonstrated excellent internal consistency (α = 0.88). The PHQ-8 also demonstrated excellent internal consistency in this study (α = .87).

**Anxiety:** The *Generalized Anxiety Disorder Screener-7* (GAD-7) was used to assess anxiety symptoms. The GAD-7 consists of seven items. Participants responded to each item using a 4-point response scale, ie, 0 = “not at all,” 1 = “several days,” 2 = “more than half the days,” and 3 = “nearly every day”. Responses are summed to compute a total anxiety severity score. The GAD-7 total score ranges from 0 to 21 and indicates whether anxiety symptoms are minimal (0–4), mild (5–9), moderate (10–14), or severe (15–21). A total GAD-7 score of 10 or higher is associated with moderate to severe anxiety symptoms. For the purposes of this study, a score of 10 or higher was used as the cutoff score to indicate whether a student was experiencing moderate to severe anxiety. The GAD-7 has demonstrated excellent internal consistency (α = .92) and good test–retest reliability (α = .83). The GAD-7 also demonstrated good internal consistency in this study (α = .89).
Purpose: The Claremont Purpose Scale (CPS) was used to assess purpose. This scale consists of 12 items, across three domains: meaningfulness, eg, “How well do you understand what gives your life meaning?”, goal orientation, eg, “How much effort are you putting into making your goals a reality?”, and beyond-the-self orientation, eg, “How often do you hope to leave the world better than you found it?” Each of the 12 items has a unique 5-point response scale matching the wording of each question. The CPS total score ranges from 0 to 64, with higher scores indicating a greater sense of purpose. The CPS has demonstrated excellent internal consistency in previous studies ($\alpha = .92–.94$) and demonstrated good internal consistency in this study ($\alpha = .86$).

Statistical approach
Aim 1: Describe the impact of the COVID-19 disaster on college students: To address Aim 1, analyses were conducted with IBM SPSS Statistics (Version 26) software; t-tests were used to compare study variables by gender and by minoritized ethnic/racial identity status. Pearson correlation coefficients were also computed to assess potential relationships between participant demographics, COVID-19 stressors, life stressors, perceived stress, and mental health outcomes, ie, depression, anxiety, and purpose.

Aim 2: Identify potential intervening variables in the relationship between COVID-19 stressors and college student outcomes, testing a disaster conceptual model: We applied a disaster conceptual model in order to evaluate college student experiences in the COVID-19 crisis against the disaster literature. A disaster conceptual model was evaluated using structural equation modeling in Mplus Version 8.1. All hypothesis tests used an alpha level of .05, and maximum likelihood estimation was used to estimate missing data. We used cross-sectional data in this study. Our models are not able to explicitly test causality, and we therefore do not use the term mediation in this study. However, the concepts in our model have some temporal distinction. COVID-19 stressors were queried as being related to the initial COVID-19 event, while life stressors and perceived stress were anchored to experiences within the last month.

RESULTS
Students ($n = 251$) were an average of 20.57 years old (SD = 2.08). Descriptive statistics for all study variables are reported in Table 1. Pearson correlation coefficients for all study variables are reported in Table 2. A significantly larger proportion of female students were seniors in college (92.5 percent) compared to males (7.5 percent; $\chi^2(1) = 4.79$, $p = .03$). A significantly larger proportion of students reporting minoritized ethnic/racial identities also identified as first-generation college students, compared to White students (59.3 percent vs. 40.7 percent; $\chi^2(1) = 17.53$, $p < .001$). In addition, a larger proportion of students reporting minoritized ethnic/racial identities also identified as Pell Grant recipients, compared to White students (60.0 percent vs. 40.0 percent; $\chi^2(1) = 29.59$, $p < .001$).

Aim 1: Impact of the COVID-19 disaster on college students
COVID-19 stressors: Students reported an average of 8.14 (SD = 3.02) COVID-19-related stressors. As shown in Table 3, the most frequently endorsed stressors included the fear of an at-risk family member getting sick (94.0 percent), concerns about family members being socially isolated (78.9 percent), and getting sick themselves (78.9 percent). Students from minoritized ethnic/racial groups reported significantly higher numbers of COVID-19-related stressors (M = 9.07, SD = 3.02) compared to White students (M = 7.59, SD = 2.92; $t(246) = -3.79$, $p < .001$).

Life stressors: The number of life stressors endorsed by students ranged from 0 to 22. The most frequently endorsed life stressors included a change in social activities (72.1 percent), changes in sleeping habits (71.1 percent), changes in eating habits (60.8 percent), a change in living conditions (55.9 percent), and an increased workload at school (55.4 percent). No significant differences in the mean number of life stressors were found when comparing by gender or minoritized ethnic/racial identity.
### Table 1. Proportion, n (percent), and means and standard deviations of study variables by gender and ethnicity/race

<table>
<thead>
<tr>
<th>Variables (possible scores)</th>
<th>Females (n = 209)</th>
<th>Males (n = 39)</th>
<th>Total (n = 248)(^a)</th>
<th>Minoritized ethnic/racial group (n = 90)</th>
<th>Non-Hispanic White (n = 158)</th>
<th>Total (n = 248)(^b)</th>
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<tbody>
<tr>
<td></td>
<td>n (percent)</td>
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<tr>
<td>Senior</td>
<td>62 (92.5)</td>
<td>5 (7.5)</td>
<td>67 (27.1)(^*)</td>
<td>25 (37.9)</td>
<td>41 (62.1)</td>
<td>66 (26.7)</td>
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<tr>
<td>First-generation college</td>
<td>45 (77.6)</td>
<td>13 (22.4)</td>
<td>58 (23.5)</td>
<td>35 (59.3)</td>
<td>24 (40.7)</td>
<td>59 (23.9)(^***)</td>
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<tr>
<td>Pell Grant recipient</td>
<td>62 (84.9)</td>
<td>11 (15.1)</td>
<td>73 (29.4)</td>
<td>45 (60.0)</td>
<td>30 (40.0)</td>
<td>75 (32.8)(^***)</td>
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<tr>
<td>Age</td>
<td>20.56 (1.90)</td>
<td>20.78 (2.90)</td>
<td>20.59 (2.10)</td>
<td>20.44 (2.06)</td>
<td>20.66 (2.13)</td>
<td>20.58 (2.10)</td>
</tr>
<tr>
<td>COVID-19 stressors (0–14)</td>
<td>8.22 (2.92)</td>
<td>7.49 (3.48)</td>
<td>8.10 (3.02)</td>
<td>9.07 (3.02)</td>
<td>7.59 (2.92)</td>
<td>8.13 (3.03)(^**)</td>
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<td>Life stressors (0–31)</td>
<td>7.12 (3.75)</td>
<td>6.73 (4.95)</td>
<td>7.06 (3.94)</td>
<td>7.21 (4.74)</td>
<td>7.00 (3.48)</td>
<td>7.07 (3.94)</td>
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<tr>
<td>Perceived stress (0–40)</td>
<td>23.72 (6.48)</td>
<td>18.71 (7.42)</td>
<td>22.91 (6.87)(^***)</td>
<td>22.99 (6.76)</td>
<td>22.88 (6.96)</td>
<td>22.92 (6.87)</td>
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<td>Depression (0–24)</td>
<td>10.55 (5.62)</td>
<td>8.23 (5.93)</td>
<td>10.17 (5.72)(^*)</td>
<td>10.66 (5.50)</td>
<td>9.96 (5.82)</td>
<td>10.21 (5.70)</td>
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<td>Anxiety (0–21)</td>
<td>9.32 (5.19)</td>
<td>6.43 (4.83)</td>
<td>8.84 (5.25)(^**)</td>
<td>8.85 (5.09)</td>
<td>8.87 (5.31)</td>
<td>8.86 (5.22)</td>
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<tr>
<td>Purpose (0–64)</td>
<td>31.85 (7.11)</td>
<td>32.28 (8.09)</td>
<td>31.92 (7.25)</td>
<td>31.21 (8.12)</td>
<td>32.26 (7.68)</td>
<td>31.90 (7.27)</td>
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</tbody>
</table>

\(^a\) n = 248 respondents indicated their gender identity, including n = 1 student who identified as transgender, and n = 1 student who responded that an option for their gender identity was “not listed.” Descriptive analyses by gender compared those who identified as female or male.

\(^b\) n = 248 students provided information regarding their ethnic or racial identity.

\(^*p < .05; \,**p < .01; \,***p < .001.\)
### Table 2. Correlations among study variables

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<tr>
<th>Variables</th>
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<td>4. First-generation college</td>
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<td>6. Pell Grant recipient</td>
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<td>8. Life stressors</td>
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<td>9. Perceived stress</td>
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<td>10. Depression</td>
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<td>11. Anxiety</td>
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<td>12. Purpose</td>
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*p < .05; **p < .01; ***p < .001.
Perceived stress: The majority of students (91.8 percent) reported moderate to high levels of perceived stress. Levels of perceived stress differed significantly by gender, with females (M = 23.72, SD = 6.48) reporting significantly higher rates of perceived stress compared to males (M = 18.71, SD = 7.42; t(215) = -4.09, p < .001).

Anxiety and depression: Over half of participants (53.0 percent) reported moderate to severe symptoms of depression (scores of 10 or above on the PHQ-8) and 40.7 percent reported symptoms of moderate to severe anxiety (scores of 10 or above on the GAD-7). Females, when compared to males, reported significantly more severe anxiety symptoms (M = 6.43, SD = 4.83; t(210) = -3.05, p = .003) and symptoms of depression (M = 10.55, SD = 5.62 vs. M = 8.23, SD = 5.93; t(211) = -2.21, p = .03).

Purpose: Less than half (39.4 percent) of the students responded that they felt “quite clear” or “extremely clear” about their sense of purpose in life, and 68.5 percent reported that they were putting in “quite a bit” or a “tremendous” amount of effort toward making their goals a reality. Females, when compared to males, reported significantly less confidence that they have “discovered a satisfying purpose” for their lives (M = 1.92, SD = 1.10 vs. M = 2.53, SD = 1.07; t(204) = 2.89, p = .004). Additionally, females, when compared to males, found themselves more frequently “hoping that [they] will make a meaningful contribution to the broader world” (M = 3.11, SD = 0.93 vs. M = 2.71, SD = 1.10; t(203) = -2.15, p = .03) and hoping that “the work that [they do] positively influences others” (M = 3.32, SD = 0.89 vs. M = 2.94, SD = 1.05, t(204) = -2.18, p = .03).

Aim 2: Relationship between COVID-19 stressors and college student outcomes

Our hypothesized disaster conceptual model (Figure 1) fit the data well ($\chi^2$(30) = 31.93, p = .37, CFI = 0.995, RMSEA = 0.02, SRMR = 0.04) and explained 46.8 percent of the variance in depression symptoms, 49.8 percent of the variance in anxiety symptoms, and 4.8 percent of the variance in purpose.

Indirect effects: As hypothesized, perceived stress was a significant intervening variable between COVID-19 stressors and depression symptoms.

### Table 3. Frequency of COVID-19 stressors experienced

<table>
<thead>
<tr>
<th>COVID-19 stressors</th>
<th>Somewhat or very concerned n (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>An at-risk family member getting sick</td>
<td>235 (94.0)</td>
</tr>
<tr>
<td>My family members being socially isolated</td>
<td>198 (78.9)</td>
</tr>
<tr>
<td>Getting sick myself</td>
<td>198 (78.9)</td>
</tr>
<tr>
<td>Being socially isolated myself</td>
<td>177 (70.5)</td>
</tr>
<tr>
<td>Not being able to work</td>
<td>174 (69.6)</td>
</tr>
<tr>
<td>Family member not being able to pay bills</td>
<td>173 (68.9)</td>
</tr>
<tr>
<td>Family member’s job loss</td>
<td>172 (68.5)</td>
</tr>
<tr>
<td>Not being able to access healthcare for emergent conditions other than COVID-19</td>
<td>149 (59.4)</td>
</tr>
<tr>
<td>Not being able to pay my bills</td>
<td>136 (54.4)</td>
</tr>
<tr>
<td>Not being able to receive healthcare if I get sick with COVID-19</td>
<td>134 (53.8)</td>
</tr>
<tr>
<td>Not being able to access healthcare for chronic conditions other than COVID-19</td>
<td>110 (44.0)</td>
</tr>
<tr>
<td>Inability to pay student loans</td>
<td>107 (42.8)</td>
</tr>
<tr>
<td>Inability to retire on time</td>
<td>29 (11.6)</td>
</tr>
<tr>
<td>Other(^a)</td>
<td>50 (61.0)</td>
</tr>
</tbody>
</table>

\(^a\) Only n = 82 respondents answered this question.
(\(b = 0.42\), SE = .08, \(p < .001\)), anxiety symptoms (\(b = 0.39\), SE = .08, \(p < .001\)), and purpose (\(b = -0.20\), SE = .07, \(p = .008\)). Contrary to our hypotheses, life stressors was not a significant intervening variable for the paths between COVID-19 stressors and depression (\(b = .05\), SE = .03, \(p = .07\)), anxiety symptoms (\(b = 0.03\), SE = .02, \(p = .12\)), or purpose (\(b = -0.01\), SE = .03, \(p = .68\)).

**DISCUSSION**

This study assessed the impact of the COVID-19 disaster on the mental health and purpose of college students in the United States. Students reported numerous COVID-19-related and general life stressors. Students also reported high levels of perceived stress, depression, and anxiety symptoms. Students belonging to minoritized racial/ethnic groups reported significantly more COVID-19-related stressors compared to White students, and females reported more anxiety and depression symptoms than males. COVID-19 stressors were significantly related to student outcomes. Unlike life stressors, perceived stress emerged as an intervening variable in the relationship between COVID-19 stressors and depression, anxiety, and purpose. Each of these findings is discussed in detail in the following paragraphs.

Our findings are consistent with emerging research on the COVID-19 disaster and college students worldwide. To date, research on COVID-19 and college students indicates that students are reporting increased sedentary activity, economic hardship, work-related losses, delayed graduation, and fears that they will earn less money in the future.\(^49,50\) The students surveyed in this study also reported many COVID-19-related stressors and life stressors.

In this study, the rates of reported depression and anxiety were relatively high. More than half of the sample (53.0 percent) reported moderate to...
severe depression, and more than a third of the sample (40.7 percent) reported moderate to severe anxiety. These rates of depression and anxiety are higher than those reported in studies of college students exposed to other disasters, including wildfires (23.4 percent depression and 18.7 percent anxiety)\(^\text{51}\) and hurricanes (29.4 percent depression and 23.5 percent anxiety for displaced students).\(^\text{52}\) However, the rates of depression and anxiety in this sample are consistent with emerging data from the COVID-19 disaster, which have indicated that college students are reporting increases in depression, anxiety, and loneliness.\(^\text{49,50,53-55}\) For example, a recent study evaluating mental health among emerging adults (18–30 years) found that 43.3 percent reported high levels of depression as measured by the PHQ-8 (utilizing a cutoff score of 10) and 45.4 percent reported high levels of anxiety as measured by the GAD-7 (utilizing a cutoff score of 10).\(^\text{56}\)

Furthermore, we found that students belonging to minoritized ethnic/racial groups reported experiencing a significantly greater number of COVID-19 stressors compared to White students. This aligns with existing disaster research, which indicates that individuals from minoritized groups are disproportionately disadvantaged by disasters both in terms of levels of exposure to disaster-related stressors and recovery.\(^\text{57-61}\) For example, a 2010 study revealed disparities in recovery patterns after exposure to Hurricane Katrina in New Orleans, which were linked to pre-existing social vulnerabilities related to factors such as racism and poverty.\(^\text{62}\) Furthermore, recent reports demonstrate that communities of color, particularly Latinx communities, have experienced disproportionate rates of COVID-19 infection due to structural inequalities that increase their rates of exposure to the virus.\(^\text{63}\)

Our finding that perceived stress is an intervening variable in the relationship between COVID-19 stressors and purpose aligns with findings that show an association between the increased severity of mental health distress and reduced meaning in life.\(^\text{64}\) This finding is consistent with qualitative findings demonstrating that life stressors can serve as both a barrier to and a facilitator of purpose formation, depending on how the stressors are perceived.\(^\text{30}\) For example, when students perceived stressors as overwhelming or insurmountable, these stressors served as a barrier to reaching goals. However, when stressors were associated with a strong desire to overcome one's circumstances, stressors served as a motivator.\(^\text{30}\) Our findings suggested possible gender differences which have not been consistently demonstrated or examined within other college samples.\(^\text{47,65,66}\)

Perceived stress was found to be an intervening variable in the relationship between COVID-19 stressors and student outcomes. This finding was robust and applied to both mental health and purpose outcomes. At the same time, life stressors did not emerge as an intervening variable in the relationship between COVID-19 stressors and student outcomes. These findings suggest that it is the perception of stress, rather than the presence of stressors, that influences student outcomes. This conclusion is in line with research that advocates for scholars to focus on how youth's evaluations and appraisals of stress are associated with different stress responses.\(^\text{67,70}\) Future research should investigate the environmental, cognitive, and social factors that may have contributed to student evaluations of COVID-19-related stressors.\(^\text{71}\)

**LIMITATIONS**

Several limitations should be considered when evaluating this study. First, since our data are cross-sectional, causal determinations could not be made. However, it is of note that responses reflect perishable data on student experiences in the midst of the ongoing disaster. Findings represent critical data for colleges and universities in their response to student needs in the current disaster. Second, our sample was a convenience sample, thus results may not be representative of all college students in the United States. However, a major strength of this study is its inclusion of a large percentage of first-generation college students and Pell Grant recipients. Third, the study relied on self-reported data, which introduce potential errors from inaccurate participant reporting. Future studies could be strengthened by including administrative data from institutions of higher education, eg, grade point average and student enrollment.
CONCLUSION

This study offers timely, perishable data on the needs of college students in the United States who continue to be affected by the COVID-19 disaster. Findings highlight the relationship between COVID-19 disaster exposure stressors and mental health and purpose outcomes, and provide evidence which may help guide recovery efforts for college students in the aftermath of the COVID-19 disaster. For example, findings suggest that colleges and universities should prioritize investment in remote counseling services for students who may be experiencing depression and anxiety. Additionally, colleges and universities should consider how to prioritize the mental health of students as they cope with the long-term impacts of the COVID-19 disaster on their personal, academic, and professional lives. These lessons can be further generalized to other disasters, providing useful information beyond the COVID-19 disaster.

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Ethical approval: The study protocol received approval from the Institutional Review Board of Boston College. The study procedures performed were in accordance with ethical standards of the institution and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Data availability: The analysis code and materials used in this study are currently not openly available. They are available upon request to the corresponding author. The raw data contained in this manuscript are not yet publicly available as longitudinal data collection is still underway. Upon completion of data collection, the analysis code and materials used for this manuscript and any subsequent publications will be made available and accessible. Author contributions: BSL and BL contributed to the study conception and design. Material preparation, data collection, and analyses were performed by BSL, BH, ARN, CAC, and SSA. All authors contributed to writing the first draft of the manuscript, commented on previous versions of the manuscript, and read and approved the final manuscript.

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