

2023

## The Impact of COVID-19 Pandemic Experiences on College Drinking Via Mental Distress: Cross-Sectional Mediation Moderated by Race

Abby L. Braitman  
Old Dominion University, [abraitma@odu.edu](mailto:abraitma@odu.edu)

Rachel Ayala Guzman  
Old Dominion University, [rayal001@odu.edu](mailto:rayal001@odu.edu)

Megan Strowger  
Old Dominion University, [mstro006@odu.edu](mailto:mstro006@odu.edu)

Jennifer L. Shipley  
Old Dominion University, [jship002@odu.edu](mailto:jship002@odu.edu)

Douglas J. Glenn  
Old Dominion University, [djglenn@odu.edu](mailto:djglenn@odu.edu)

See this page for additional authors: [https://digitalcommons.odu.edu/psychology\\_fac\\_pubs](https://digitalcommons.odu.edu/psychology_fac_pubs)



Part of the [Educational Psychology Commons](#), [Emergency and Disaster Management Commons](#), and the [Health Psychology Commons](#)

---

### Original Publication Citation

Braitman, A. L., Ayala Guzman, R., Strowger, M., Shipley, J. L., Glenn, D. J., Junkin, E., Whiteside, A., & Lau-Barraco, C. (2023). The impact of the COVID-19 pandemic experiences on college drinking via mental distress: Cross-sectional mediation moderated by race. *Alcohol: Clinical & Experimental Research*, 47(12), 2313-2330. <https://doi.org/10.1111/acer.15200>







This Article is brought to you for free and open access by the Psychology at ODU Digital Commons. It has been accepted for inclusion in Psychology Faculty Publications by an authorized administrator of ODU Digital Commons. For more information, please contact [digitalcommons@odu.edu](mailto:digitalcommons@odu.edu).

---

**Authors**

Abby L. Braitman, Rachel Ayala Guzman, Megan Strowger, Jennifer L. Shipley, Douglas J. Glenn, Emily Junkin, Alina Whiteside, and Cathy Lau-Barraco

# The impact of the COVID-19 pandemic experiences on college drinking via mental distress: Cross-sectional mediation moderated by race

Abby L. Braitman<sup>1,2</sup>  | Rachel Ayala Guzman<sup>1</sup>  | Megan Strowger<sup>1</sup>  |  
Jennifer L. Shipley<sup>1</sup>  | Douglas J. Glenn<sup>1,2</sup> | Emily Junkin<sup>1,2</sup>  | Alina Whiteside<sup>3</sup> |  
Cathy Lau-Barraco<sup>1,2</sup> 

<sup>1</sup>Department of Psychology, Old Dominion University, Norfolk, Virginia, USA

<sup>2</sup>Virginia Consortium Program in Clinical Psychology, Norfolk, Virginia, USA

<sup>3</sup>Union College, Schenectady, New York, USA

## Correspondence

Abby L. Braitman, Department of Psychology, Old Dominion University, Norfolk, VA 23529, USA.  
Email: [abraitma@odu.edu](mailto:abraitma@odu.edu)

## Funding information

National Institute on Alcohol Abuse and Alcoholism, Grant/Award Number: K01 AA023849

## Abstract

**Background:** The COVID-19 pandemic has been linked to stress, anxiety, and depression among college students, with heightened distress tied to greater drinking for some individuals. Emerging research suggests that these associations may differ across race, but few studies use adequate samples to examine this, particularly among college students, an at-risk population for both heavy drinking and mental distress. Specifically, pandemic-related stressors and mental distress may be higher among Black students than White students. The current study examined: (1) whether mental distress cross-sectionally mediates the association between pandemic-specific stressors and drinking and (2) whether race (Black or White) moderates these associations. **Methods:** A cross-sectional online survey of 400 college drinkers (43% White, 28% Black) in fall 2020 assessed pandemic-related stressors (e.g., losing a job, contracting COVID-19, changed living situation), mental distress (stress, anxiety, depression), and drinking (past-month drinking, perceived changes since the start of the pandemic).

**Results:** Cross-sectional mediation models indicated that financial stressors and social distancing were linked to greater quantity and frequency of past-month drinking through greater mental distress. For perceived changes in drinking, only financial stressors were linked to drinking greater quantities and drinking more often (compared to pre-pandemic levels) via mental distress. Moderated mediation models among students identifying as White or Black revealed that changed living situation was a robust stressor across race. Financial stressors and social distancing were linked with greater distress only among White students, whereas essential worker status was a protective factor against distress only among Black students.

**Conclusions:** Select stressors were linked to increased drinking through greater mental distress, with differential risks across Black versus White students. Findings suggest campus administrators should focus on connecting students with resources (e.g., counseling centers and health promotion offices) during times of distress.

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2023 The Authors. *Alcohol: Clinical and Experimental Research* published by Wiley Periodicals LLC on behalf of Research Society on Alcohol.

## KEYWORDS

college drinking, COVID-19 pandemic, mental distress, racial disparities

## INTRODUCTION

Individuals across demographics have experienced negative impacts from the COVID-19 pandemic. These include significant increases in symptoms of depression, anxiety, and stress among multiple populations according to both cross-sectional (Acuff et al., 2022; Czeisler et al., 2020; López-Castro et al., 2021; Son et al., 2020; Wang et al., 2020) and longitudinal studies (Fruehwirth et al., 2021; Hoyt et al., 2021; Minhas et al., 2021; Romm et al., 2021; Zimmermann et al., 2021). College students in particular report many negative pandemic impacts (López-Castro et al., 2021), including increased rates of mental distress related to housing changes and shifts to virtual learning (Ding et al., 2023; Son et al., 2020; Wang et al., 2020). Alcohol consumption also has increased for many individuals, with a meta-analysis of 128 studies indicating that the greatest increases in drinking were linked to demographic differences, specific pandemic-related stressors, and mental health risk factors (Acuff et al., 2022). There are mixed findings for college drinking specifically (Coakley et al., 2021; Fruehwirth et al., 2021; Jackson et al., 2021; Kim et al., 2022; Ryerson et al., 2021; White et al., 2020). Furthermore, there is a dearth of research examining potential racial differences in certain pandemic-related stressors, mental distress, and drinking behaviors among college students, which is necessary to address existing health disparities. The current study examines how the COVID-19 pandemic stressors may be linked to changes in college drinking through mental distress, and if these associations are moderated by race.

### Pandemic-related impacts on college students

Many individuals experienced pandemic-related stressors, such as reduced income or other financial worries, personal or familial difficulties, social isolation, providing at-home care for others they normally would not need, and lack of social support. The cumulative impact of these experiences is linked to greater stress and more frequent drinking (Capasso et al., 2021; Oh et al., 2021; Whittaker & Kingston, 2022). For college students in particular, the change from campus life to social isolation in a virtual environment has been accompanied by numerous consequences (Kecojevi et al., 2020; Kim et al., 2022). During the pandemic, 60% of students met the criteria for one or more mental health problems (Lipson et al., 2022). Even when controlling for prior mental health status, college students moderate-to-severe depression increased from 21.5% to 31.7% and moderate-to-severe anxiety increased from 18.1% to 25.3% during the pandemic (Fruehwirth et al., 2021).

Research examining pandemic-related changes in college drinking is mixed. Students who moved back with their parents decreased their drinking levels (Hicks et al., 2022; Ryerson et al., 2021; White et al., 2020), whereas students who did not change housing increased their drinking frequency (White et al., 2020). Similarly, pre-pandemic heavy drinkers generally reduced their pandemic drinking but pre-pandemic non-heavy drinkers increased several indices of alcohol consumption (or remained stable; Jackson et al., 2021). Some research suggests that there was an increase in college drinking to cope with stress (Bollen et al., 2021; Coakley et al., 2021; Mohr et al., 2021). Due to mandatory campus closures, many students lost access to resources key to coping with stress (e.g., mental health services, recreation centers, student organizations; Kim et al., 2022).

### Race and the pandemic

Greater percentages of historically marginalized racial/ethnic groups in the U.S. are of lower socioeconomic status (SES; Kochhar & Cilluffo, 2017; Trammell et al., 2021), and these existing disparities may be exacerbated by pandemic-related challenges. Among college students specifically, Black college students reported more pandemic-related stressors than White students, including experiencing the death of a loved one due to COVID-19, reporting severe financial impact, reporting a severe concern about affording food, and engaging in more social distancing (Reyes-Portillo et al., 2022; Trammell et al., 2021). These findings suggest that the pandemic may exacerbate existing health disparities for historically marginalized college students. However, the literature examining racial differences in the effect of pandemic-related stressors on college student mental health is mixed.

Despite Black students experiencing greater pandemic-related social, economic, and academic burdens than White students (Reyes-Portillo et al., 2022; Trammell et al., 2021), they did not report increased depression or stress due to these burdens. For instance, although Black students were more likely to report severe financial and academic consequences, the pandemic impact on mental health did not differ across races (Reyes-Portillo et al., 2022). Two studies revealed Black students reported greater mental distress relative to White students (Freibott et al., 2022; Kim et al., 2022), whereas one study found White students reported more anxiety, psychosis, sleep problems, perceived stress, and alcohol misuse than did Black students (Charles et al., 2021). It is worth noting that many studies examining racial differences in pandemic-related experiences and mental distress lack diverse samples of college students (i.e., less than 10% identifying as Black; Freibott et al., 2022; Kim et al., 2022) and do not assess

links between pandemic-related stressors and mental distress. Research is needed using samples with sufficiently large percentages of Black and White students to further elucidate potential racial differences in pandemic impacts among college students. There may also be racial differences in specific health behaviors that have not been assessed in many of these studies, such as drinking, which is prevalent in college culture.

Although White college students typically report greater drinking than Black college students (Gardner et al., 2020; Paschall et al., 2005), Black individuals tend to report greater alcohol-related problems (Mulia & Zemore, 2012; Zemore et al., 2018). Black adults also report greater increases in pandemic drinking compared with White adults (Barbosa et al., 2021; Kerr et al., 2022), yet few studies have investigated how changes in alcohol use related to experiencing pandemic-related stressors may differ across race specifically among college students. More research is needed to investigate how pandemic-related stressors are associated with drinking behaviors, and specifically how race impacts these associations across Black versus White students.

## Current study

Numerous pandemic-related stressors have been linked to elevated stress, anxiety, and depression among college students. Elevated levels of distress have also been linked to increased drinking during the pandemic for some individuals. Although emerging research in this area has suggested that there may be differential impacts across Black versus White individuals, few studies use adequate samples to examine this, particularly among college drinkers. As such, the current cross-sectional examination had two aims: (1) examine how pandemic-specific stressors, mental distress, and pandemic college drinking (including perceived changes since before the pandemic) are associated, and in particular, if mental distress is a potential link for the association between stressors and drinking (i.e., cross-sectional mediation) and (2) explore if race (identifying as Black vs. White) moderates these associations. We hypothesized that pandemic-related stressors would be associated with elevated alcohol use through greater mental distress. We also expected the pathways would be especially impactful for Black college students. This is the first study to examine these associations together, particularly among college drinkers with adequate representation of Black students to support examinations across Black versus White students.

## MATERIALS AND METHODS

### Participants and procedure

Students were recruited via emailed student announcements and from the psychology research pool at a large public institution from October through December 2020. Eligible participants

were undergraduate students who were at least 18 years of age and consumed at least one alcoholic beverage in the past month. Participants completed an online survey in exchange for either raffle entry or research credit, yielding 452 eligible participants. After excluding those who failed two or more attention checks, 401 participants were included in the current examination (age  $Mdn = 21$  years, 74.8% Cisgender women; 43.3% White, 28.2% Black; more information included in Table 1).

## Materials

### COVID-19 pandemic-related stressors

Questions about COVID-19 pandemic-related stressors were created by the researchers. The nine stressors were asked as yes/no and included: *financial stressors* ("Have you reduced hours at your job, reduced income, or other financial stressors due to COVID-19 restrictions put in place?"), *teleworking* ("In response to the pandemic, have you started teleworking, or teleworking more than you did before the pandemic? [NOTE: If you have always teleworked for your job and nothing changed in response to the pandemic, you would select NO as your response]"), *losing a job* ("Did you lose a job due to COVID-19 restrictions put in place?"), *being an essential worker* ("Are you working in an essential job that still puts you in proximity with others [for example, health care workers, police, fire, cleaning crew, clerk at grocery store or pharmacy, restaurant, etc.]?"), *taking care of someone in their household* ("Since the COVID-19 pandemic began in March, have you been taking care of someone, spending more hours than you usually would before the pandemic [for example, someone who caught COVID-19 and needed care, providing care for a child or other family member who would usually be at school or in another facility]?"), *social distancing* ("Are you practicing social distancing [that is, staying six feet apart in gatherings outside your household, wearing a mask in public places, etc.]?"), *having COVID-19 themselves* ("Did you test positive for COVID-19, or experience symptoms that led you to believe you have/had COVID-19?"), *someone in their household having COVID-19* ("Has anybody in your household tested positive for COVID-19, or experienced symptoms that led you to believe they have/had COVID-19?"), and *a change in their living situation* ("Is your current living situation different than it WOULD HAVE BEEN if there had NOT been a pandemic [for example, you are living at home even though you planned to live in a dorm, etc.]?").

### Stress

Past-month stress was assessed using the 7-item psychological vulnerability subscale of the Perceived Stress Scale—Revised (PSS-R; Wickrama et al., 2013). Participants responded to items (e.g., "How often have you felt nervous and stressed?") using a 5-point scale (Never [0] to Very Often [4]). Responses were summed to create a total score representing general stress ( $\alpha = 0.91$ ;  $\omega = 0.914$ ).

TABLE 1 Sample demographics and study variables.

Variables	n (%)
Gender	
Cisgender woman	299 (74.8%)
Cisgender man	82 (20.5%)
Non-binary	8 (2.0%)
Transgender man	2 (0.5%)
Transgender woman	1 (0.3%)
Other	8 (2.0%)
Race	
White	225 (43.3%)
Black	113 (28.2%)
Multiracial	35 (8.8%)
Asian	17 (4.3%)
Other	9 (2.3%)
Hispanic/Latinx (yes)	37 (9.3%)
Student status	
Full-time	339 (84.8%)
Part-time	60 (15.0%)
Class standing	
Freshman	91 (22.8%)
Sophomore	76 (19.0%)
Junior	98 (24.5%)
Senior	126 (31.5%)
Other	9 (2.3%)
Type of classes	
Online classes only	235 (58.8%)
In-person classes only	7 (1.8%)
Both	158 (39.5%)
Taking care of someone (yes)	110 (27.5%)
Losing a job (yes)	94 (23.5%)
Financial stressor (yes)	205 (51.2%)
Telework (yes)	79 (19.8%)
Essential worker (yes)	122 (30.5%)
Contracting COVID-19 (self) (yes)	53 (13.3%)
Contracting COVID-19 (household) (yes)	63 (15.8%)
Changed living situation (yes)	101 (25.3%)
Social distancing	
Yes, as much as my household and employment circumstances allow	221 (55.3%)
Mostly yes, but I've made exceptions for social reasons where I did not always follow guidelines	165 (41.3%)
Mostly no, but I have on occasion	13 (3.3%)
No, I am not doing this	1 (0.3%)
Changes in drinking quantity	
More than usual	106 (26.5%)
Less than usual	82 (20.5%)

TABLE 1 (Continued)

Variables	n (%)
About the same	212 (53.0%)
Changes in drinking frequency	
More often	137 (34.3%)
Less often	84 (21.0%)
About the same	179 (44.8%)
<b>M (SD)</b>	
Age (range 18–58; Mdn = 21 years)	23.23 (6.89)
Past-month typical week drinking quantity (range 0–62)	7.58 (7.87)
Past-month typical week drinking frequency (range 0–7)	2.66 (1.76)
Stress (range 0–28)	15.84 (6.73)
Anxiety (range 0–21)	8.72 (6.34)
Depression (range 0–27 [30 possible])	12.81 (6.98)

Note: Drinking quantity refers to total number of drinks consumed in a typical week. Drinking frequency refers to number of drinking days in a typical week.

## Anxiety

Symptoms of anxiety over the past month were assessed using the Generalized Anxiety Disorder 7 (GAD-7; Spitzer et al., 2006). Participants indicated how often they had been bothered by seven symptoms of anxiety (e.g., “Trouble relaxing”). Participants responded via a 4-point scale (0 = *Not at all* to 3 = *Nearly every day*). Responses were summed to reflect general anxiety symptoms ( $\alpha = 0.94$ ;  $\omega = 0.942$ ).

## Depression

The 10-item version of the Center for Epidemiological Studies Depression scale (CESD-10; Andresen et al., 1994) assessed symptoms of depression over the past month. Participants responded to items (e.g., “My sleep was restless”) using a 4-point scale ranging from *Rarely or None of the Time* (0) to *Most or All of the Time* (3). Responses were summed to reflect general depressive symptoms ( $\alpha = 0.87$ ;  $\omega = 0.884$ ).

## Typical alcohol use

The Daily Drinking Questionnaire (Collins et al., 1985) assessed typical alcohol use for the past month. Participants reported the number of standard alcoholic beverages consumed on each day of a typical week for the past month. Responses were used to calculate quantity (total number of standard drinks consumed for a typical week, calculated by summing the number of drinks reported for each typical day of the week) and frequency (number of drinking days per typical

week, calculated by summing the number of days where participants enter a value higher than zero).

## Changes in drinking quantity and frequency

The researchers created two questions to assess perceived changes in drinking quantity and frequency during the pandemic, similar to Graupensperger et al. (2021). Participants were asked if they were consuming more than usual, less than usual, or about the same amount of alcohol (i.e., quantity) as before the pandemic. Participants were also asked if they were drinking more often, less often, or about the same (i.e., frequency) than before the pandemic.

## Attention checks

Three items served as attention checks. These were items that directed participants to select particular responses (e.g., “Select ‘Some or a Little of the Time’ for your answer to this item.”), embedded within questionnaires. Selecting a response other than the one directed would indicate inattentiveness. Dropping participants who failed any attention checks at all would have resulted in dropping a significantly higher proportion of Black participants (37.7%),  $\chi^2(1)=24.50$ ,  $p<0.001$ , and a significantly lower proportion of White participants (17.8%),  $\chi^2(1)=19.86$ ,  $p<0.001$ , so consistent with recommendations (Braitman et al., 2022), we chose to exclude participants who failed two or more attention checks. Although this still excluded proportionately more Black (17.7%) than White (5.4%) participants, we felt it struck a better balance in retaining mostly attentive participants while minimizing systematic bias. Failing attention checks was not significantly associated with age or sex.

## Analysis approach

The study aims were assessed via (1) cross-sectional mediation models, and (2) moderated mediation models. The *a* paths included the nine pandemic-related stressors (financial stressors, social distancing, etc.) predicting a latent variable of mental distress (stress, anxiety, depression; the cross-sectional mediator), the *b* paths included the mental distress latent variable predicting alcohol outcomes (with separate models for past-month drinking versus self-reported changes in drinking), and *c'* paths included the direct associations from pandemic-related stressors to alcohol outcomes, controlling for mental distress. We refer to “mediation” and “indirect effects”, but acknowledge these are estimates of simultaneously occurring processes accounting for variance in the relation between the independent and dependent variable, and temporal precedence cannot be established using cross-sectional data. Similarly, we note statistical “prediction”, understanding that temporal precedence is not established and these paths represent concurrent associations. For parsimony, negligible correlations among pandemic stressor variables were constrained to zero, except two

stronger correlations (financial stressors with losing a job; contracting COVID-19 yourself with someone in your household contracting it). The cross-sectional mediation models were conducted with the full sample ( $N=400$ ). The moderated mediation models narrowed the sample to only non-Hispanic Black ( $n=113$ ; 28.2%) or non-Hispanic White ( $n=225$ ; 43.3%) students, narrowing the sample to  $N=338$ . Other races were excluded from the moderation examinations due to relatively low sample sizes. Race was examined as a moderator for both the *a* and *b* paths using a product approach (i.e., modeling the interaction between race and pandemic-related stressors predicting mental distress [moderating the *a* path], and the interaction between race and mental distress predicting alcohol outcomes [moderating the *b* path]). Race was coded as 0 = White, 1 = Black. Robust maximum likelihood estimation was used in Mplus (version 8; Muthén & Muthén, 1998-2019).

Significant moderation was followed up with simple effects within race obtained using the “model constraint” command. To avoid spurious findings, “indirect effects” (or estimates of simultaneously occurring processes accounting for variance in the relation between the independent and dependent variable) were only examined for significant *a* and *b* paths (Yzerbyt et al., 2018), using the simple effect if moderation for that path was significant. To assess the significance of the “indirect effects” at an alpha level of 0.05, 95% bias-corrected bootstrapped confidence intervals (BCCIs; based on 5000 replications) were used for the past-month drinking models (continuous outcomes; MacKinnon et al., 2004) and 95% Monte Carlo Confidence Intervals (MCCIs) were used for the perceived changes in drinking models (categorical outcomes; Selig & Preacher, 2009). Given documented, robust associations between sex and age with outcomes (Auerbach et al., 2018; Fish et al., 2017; Wilsnack et al., 2018), the models were repeated, controlling for these covariates.

## RESULTS

Measures of normality (i.e., histograms, skewness, kurtosis) and outliers (i.e., boxplots of interquartile ranges) were examined for all continuous variables; all were approximately normal with no extreme outliers. As seen in Table 1, about half the sample experienced pandemic-related financial stressors (e.g., reduced hours at work, reduced income), and roughly a quarter of the sample (21%–30%) reported losing a job, taking care of someone, teleworking, being an essential worker, or having a changed living situation related to the pandemic. Participants drank an average of 7.58 standard drinks in a typical week for the past month, averaging 2.66 drinking days. Approximately half the sample (53%) reported drinking the same quantity as before the pandemic. Participants were roughly equal across reporting drinking more than usual (27%) versus less than usual (21%). Less than half the sample reported drinking about the same frequency as before the pandemic (45%), with more people reporting drinking more often (34%) than less often (21%) compared to before the pandemic.

We also directly examined differences in reports of mental distress and alcohol use across Black versus White participants,



TABLE 2 Bivariate associations (t-tests and chi-squares) across pandemic-specific stressors, mental distress, and drinking.

Variable	Taking care of someone		Losing a job		Financial stressors		Teleworking
	Yes	No	Yes	No	Yes	No	Yes
<b>Race</b>							
<i>n</i> (%)							
Black	30 (26.8)	82 (73.2)	30 (26.8)	82 (73.2)	65 (57.5)	48 (42.5)	21 (25.6)
White	61 (27.2)	163 (72.8)	52 (24.0)	165 (76.0)	109 (49.1)	113 (50.9)	47 (28.5)
$\chi^2$ ( <i>p</i> )	0.01 (0.931)		0.32 (0.575)		2.13 (0.145)		0.23 (0.634)
<b>Stress</b>							
<i>M</i> ( <i>SD</i> )	17.19 (6.72)	15.36 (6.69)	16.67 (6.82)	15.49 (6.71)	16.77 (6.76)	14.04 (6.59)	15.52 (6.52)
<i>t</i> ( <i>p</i> )	2.43* (0.016)		1.47 (0.142)		2.86* (0.004)		0.05 (0.960)
<b>Depress.</b>							
<i>M</i> ( <i>SD</i> )	14.03 (7.18)	12.39 (6.85)	13.55 (7.38)	12.48 (6.75)	13.95 (7.07)	11.52 (6.69)	12.57 (6.57)
<i>t</i> ( <i>p</i> )	2.10* (0.036)		1.31 (0.193)		3.51* (<0.001)		0.13 (0.896)
<b>Anxiety</b>							
<i>M</i> ( <i>SD</i> )	10.16 (6.54)	8.23 (6.22)	9.04 (7.00)	8.57 (6.12)	9.52 (6.38)	7.79 (6.14)	8.35 (5.50)
<i>t</i> ( <i>p</i> )	2.71* (0.007)		0.59 (0.557)		2.74* (0.007)		-0.39 (0.696)
<b>Past-month quant.</b>							
<i>M</i> ( <i>SD</i> )	7.83 (8.79)	7.54 (7.54)	7.86 (6.71)	7.09 (7.50)	8.22 (7.99)	6.91 (7.73)	6.73 (6.86)
<i>t</i> ( <i>p</i> )	0.32 (0.750)		0.89 (0.374)		1.66 (0.098)		-0.49 (0.623)
<b>Past-month freq.</b>							
<i>M</i> ( <i>SD</i> )	2.86 (1.79)	2.58 (1.75)	2.89 (1.68)	2.51 (1.74)	2.87 (1.81)	2.44 (1.68)	2.74 (1.87)
<i>t</i> ( <i>p</i> )	1.41 (0.160)		1.87 (0.062)		2.45* (0.015)		1.38 (0.168)
<b>Change in quant.</b>							
<i>n</i> (%)							
More than usual	32 (30.8)	72 (69.2)	32 (32.3)	67 (67.7)	67 (63.8)	38 (36.2)	21 (31.3)
Less than usual	19 (23.2)	63 (76.8)	20 (25.0)	60 (75.0)	38 (46.3)	44 (53.7)	8 (13.3)
About the same	59 (28.1)	151 (71.9)	42 (20.2)	166 (79.8)	100 (47.8)	109 (52.2)	50 (30.1)
$\chi^2$ ( <i>p</i> )	12.34 (0.511)		5.40 (0.067)		8.35* (0.015)		7.15* (0.028)
<b>Change in freq.</b>							
<i>n</i> (%)							
More often	50 (37.0)	85 (63.0)	40 (31.0)	89 (69.0)	84 (62.2)	51 (37.8)	23 (25.8)
Less often	19 (22.6)	65 (77.4)	17 (20.7)	65 (79.3)	41 (49.4)	42 (50.6)	12 (18.5)
About the same	41 (23.2)	136 (76.8)	37 (21.0)	139 (79.0)	80 (44.9)	98 (55.1)	44 (31.7)
$\chi^2$ ( <i>p</i> )	8.76* (0.013)		4.75 (0.093)		9.42* (0.009)		4.00 (0.136)

Note: Depress. = depression, quant. = quantity, freq. = frequency. Although the majority of reporting in this table includes the full sample ( $N=400$ ), the comparisons across race were for Black versus White participants only ( $N=338$ ).

\* $p < 0.05$ .

finding no significant differences for reported levels of stress,  $t(333)=0.86$ ,  $p=0.393$ , anxiety,  $t(334)=0.54$ ,  $p=0.588$ , or depression,  $t(336)=1.14$ ,  $p=0.257$ . Black students reported drinking significantly lower quantities ( $M=5.80$ ,  $SD=6.05$ ) than White students ( $M=8.97$ ,  $SD=8.90$ ),  $t(306)=3.87$ ,  $p < 0.001$ , as well as less frequently (Black  $M=2.38$ ,  $SD=1.59$ ) than White students ( $M=2.97$ ,  $SD=1.85$ ),  $t(336)=2.89$ ,  $p=0.004$ . There were no significant associations between race and perceptions of pandemic-related changes in drinking quantity,  $\chi^2(2)=5.19$ ,  $p=0.075$ , or frequency,  $\chi^2(2)=2.29$ ,  $p=0.318$ .

## Bivariate associations

A series of t-tests and chi-square analyses examined associations between pandemic-related stressors and race (Black vs. White), mental distress, and drinking. As seen in Table 2, higher proportions of Black students reported experiencing a changed living situation related to the pandemic compared to White students. Participants who were taking care of others during the pandemic and those who experienced financial stressors reported significantly more perceived stress, depressive symptoms, and general anxiety than students who did not experience

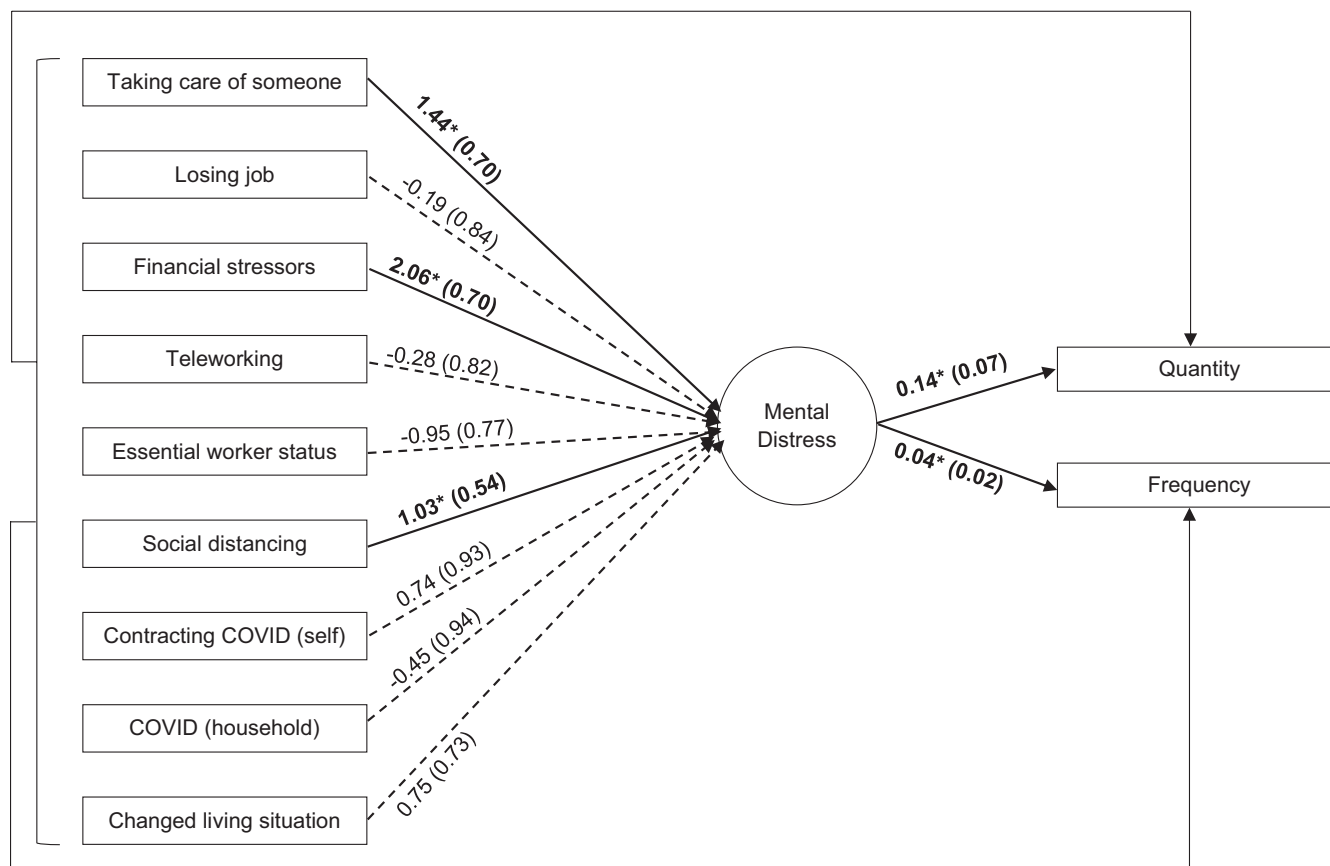


No	Essential worker status		Household COVID-19		Self COVID-19		Changed living situation	
	Yes	No	Yes	No	Yes	No	Yes	No
61 (74.4)	39 (47.6)	43 (52.4)	16 (14.2)	97 (85.8)	15 (13.3)	98 (86.7)	36 (31.9)	77 (68.1)
118 (71.5)	68 (41.2)	97 (58.8)	35 (15.6)	190 (84.4)	30 (13.3)	195 (86.7)	45 (20.0)	180 (80.0)
	0.90 (0.343)		0.11 (0.735)		0.00 (0.988)		5.81* (0.016)	
15.47 (6.80)	14.96 (6.67)	15.86 (6.74)	16.06 (6.97)	15.80 (6.69)	16.72 (6.53)	15.70 (6.76)	16.66 (6.83)	15.57 (6.68)
	-1.14 (0.256)		0.29 (0.774)		1.02 (0.308)		1.40 (0.163)	
12.45 (6.83)	11.93 (6.81)	12.88 (6.70)	13.25 (6.61)	12.73 (7.06)	13.17 (6.44)	12.76 (7.07)	13.45 (6.80)	12.60 (7.04)
	-1.20 (0.232)		0.55 (0.585)		0.40 (0.690)		1.05 (0.293)	
8.65 (6.34)	8.46 (6.47)	8.65 (5.87)	8.94 (6.55)	8.68 (6.31)	9.57 (6.08)	8.59 (6.38)	9.11 (6.58)	8.59 (6.27)
	-0.26 (0.795)		0.29 (0.775)		1.04 (0.299)		0.70 (0.482)	
7.22 (7.74)	7.39 (8.02)	6.87 (7.13)	8.29 (7.79)	7.45 (7.89)	9.36 (8.35)	7.31 (7.77)	7.22 (7.56)	7.70 (7.99)
	0.59 (0.558)		0.78 (0.438)		1.77 (0.077)		-0.53 (0.594)	
2.43 (1.69)	2.65 (1.72)	2.41 (1.76)	2.60 (1.82)	2.67 (1.75)	2.94 (1.71)	2.61 (1.77)	2.39 (1.46)	2.75 (1.84)
	1.14 (0.255)		-0.26 (0.793)		1.27 (0.203)		-2.01* (0.046)	
46 (68.7)	29 (43.3)	38 (56.7)	16 (15.1)	90 (84.9)	20 (18.9)	86 (81.1)	21 (19.8)	85 (80.2)
52 (86.7)	27 (45.0)	33 (55.0)	12 (14.6)	70 (85.4)	6(7.3)	76 (92.7)	29 (35.4)	53 (64.6)
116 (69.9)	66 (39.8)	100 (60.2)	35 (16.5)	177 (83.5)	27 (12.7)	185 (87.3)	51 (24.1)	161 (75.9)
	0.60 (0.743)		0.20 (0.903)		5.47 (0.065)		6.27* (0.044)	
66 (74.2)	33 (37.1)	56 (62.9)	23 (16.8)	114 (83.2)	19 (13.9)	118 (86.1)	34 (24.8)	103 (75.2)
53 (81.5)	29 (44.6)	36 (55.4)	11 (13.1)	73 (86.9)	8 (9.5)	76 (90.5)	30 (35.7)	54 (64.3)
95 (68.3)	60 (43.2)	79 (56.8)	29 (16.2)	150 (83.8)	26 (14.5)	153 (85.5)	37 (20.7)	142 (79.3)
	1.13 (0.568)		0.59 (0.746)		1.31 (0.519)		6.88* (0.032)	

those stressors. Students who experienced financial stressors, compared to those who did not, drank more often in the past month and were more likely to endorse drinking more frequently and in greater quantities during the pandemic than they usually did. Participants who started teleworking were more likely to increase their drinking quantity during the pandemic than those who did not. Experiencing a changed living situation was linked to less frequent past-month drinking and a greater likelihood of drinking less frequently and in lower quantities than before the pandemic. Finally, taking care of someone was linked to a greater likelihood of drinking more often.

### Latent variable explorations

Given the very strong correlations among the mental distress variables (*r*s from 0.78 to 0.79), we explored using an overall mental distress variable rather than focusing on the individual constructs. A confirmatory factor analysis was examined for a latent variable of mental distress, with scores for stress, anxiety, and depression as indicators. Fit could not be examined as the model was fully saturated, but standardized loadings were strong for stress ( $\lambda=0.885$  [95% CI 0.86, 0.92]), anxiety ( $\lambda=0.889$ , [95% CI 0.86, 0.93]), and depression



**FIGURE 1** Mental distress as a mediator between pandemic stressors and drinking. Unstandardized parameter estimates are provided with standard errors in parentheses. Significant findings are indicated with asterisks, bold text, and solid lines for path coefficients.

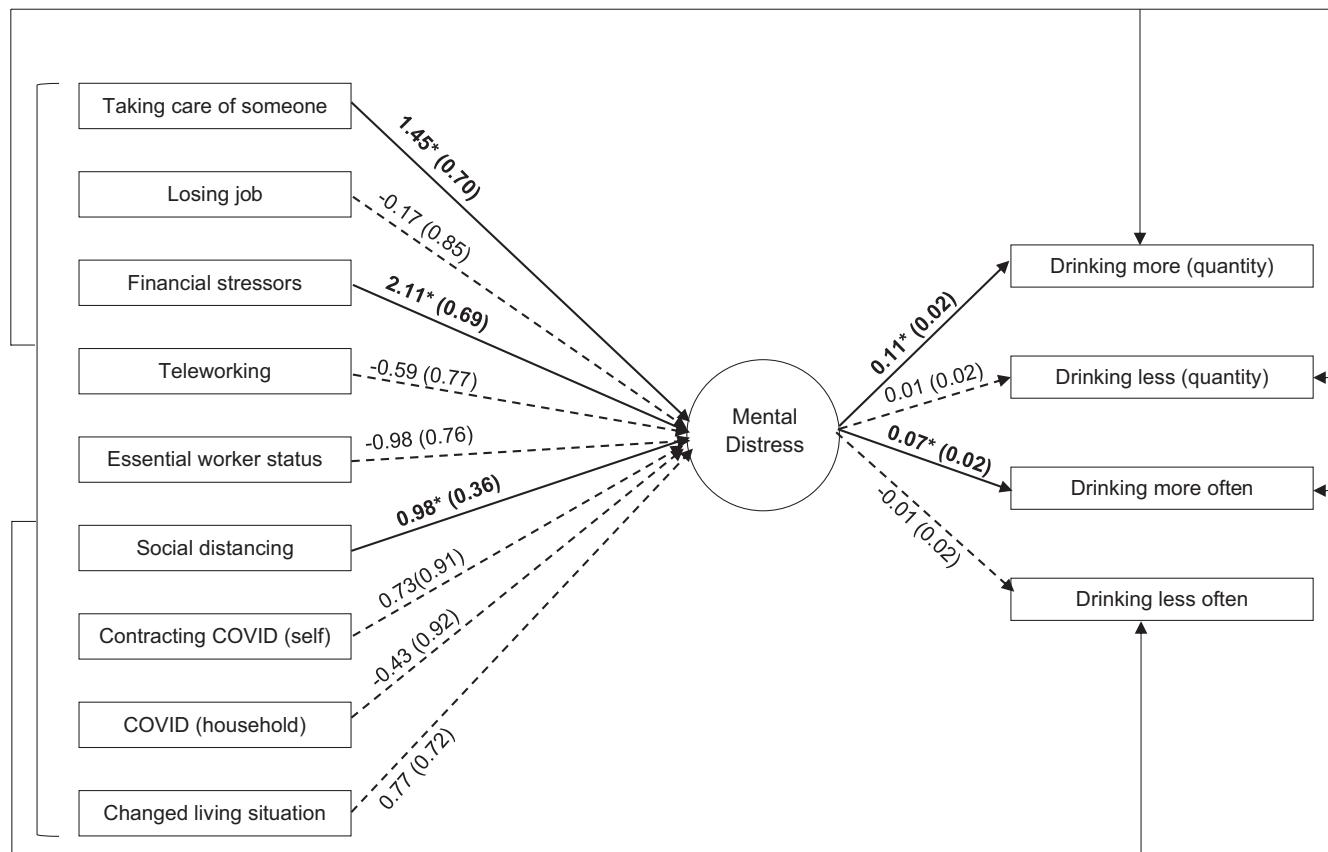
( $\lambda=0.880$  [95% CI 0.86, 0.92]). Thus, mental distress was treated as a latent variable in subsequent examinations. Given the weak correlations among pandemic stressor items ( $r$ s from  $-0.004$  to  $0.43$ ), these were left as individual variables.

### Cross-sectional mediation models

As seen in **Figure 1** (past month drinking), in the models using the full sample, taking care of someone, financial stressors, and social distancing were cross-sectionally and positively associated with mental distress, controlling for other pandemic-related stressors. In addition, those reporting greater mental distress reported drinking greater quantities of alcohol and drinking more frequently. These aligned with significant cross-sectional “indirect effects” through mental distress for taking care of someone on quantity ( $B=0.20$ , 95% BCCI 0.005, 0.625) and frequency ( $B=0.05$ , 95% BCCI 0.004, 0.158), financial stressors on quantity ( $B=0.35$ , 95% BCCI 0.066, 0.865) and frequency ( $B=0.07$ , 95% BCCI 0.015, 0.172), as well as for social distancing effects on quantity ( $B=0.20$ , 95% BCCI 0.027, 0.556) and frequency ( $B=0.04$ , 95% BCCI 0.007, 0.112). Although direct effects are indicated in the figures, not all values are listed for clarity of the figure; there were significant cross-sectional effects on drinking quantity for only social distancing,  $B=-2.74$  ( $SE=0.82$ ),  $p=0.001$ ,

with those engaging in social distancing drinking less, controlling for mental distress. There were direct effects on drinking frequency only for changed living situations,  $B=-0.38$  ( $SE=0.18$ ),  $p=0.031$ .

As seen in **Figure 2** (perceived changes in drinking), taking care of someone, experiencing pandemic-related financial stressors, and social distancing was associated with greater mental distress, controlling for other pandemic-related stressors. In turn, reporting greater mental distress was associated with a stronger likelihood of endorsing drinking greater quantities (compared to about the same) and endorsing drinking more often (compared to about the same). These aligned with significant “indirect effects” through mental health symptoms for taking care of someone on increased quantity ( $B=0.11$ , 95% MCCI 0.005, 0.240) and increased frequency ( $B=0.16$ , 95% MCCI 0.008, 0.342), financial stressors on increased quantity ( $B=0.16$ , 95% MCCI 0.040, 0.316) and increased frequency ( $B=0.2$ , 95% MCCI 0.074, 0.439), and social distancing on increased quantity ( $B=0.72$ , 95% MCCI 0.014, 0.154) and increased frequency ( $B=0.11$ , 95% MCCI 0.029, 0.205). Although direct effects are indicated in the figures, not all values are listed for clarity of the figure; controlling for mental distress, there were significant effects on less frequent drinking from changed living situation,  $B=0.69$  ( $SE=0.30$ ),  $p=0.020$ , such that a changed living situation was linked to a greater likelihood of endorsing drinking less often. There was also a significant effect on drinking lower quantities from teleworking,  $B=-1.11$



**FIGURE 2** Mental distress as a mediator between pandemic stressors and perceived changes in pandemic drinking. Unstandardized parameter estimates are provided with standard errors in parentheses. Significant findings are indicated with asterisks, bold text, and solid lines for path coefficients.

(SE=0.51),  $p=0.030$ , such that teleworking was linked to a lower likelihood of endorsing drinking lower quantities. No other direct effects were significant, controlling for mental distress. The pattern of significance was the same for models that included covariates (i.e., age and sex) except for social distancing (available upon request).

**Moderated mediation**

Narrowing the sample to only students who identified as Black or White, race was explored as a moderator of both the *a* and *b* paths (i.e., how pandemic-related stressors impact mental distress, and how mental distress is associated with both past-month drinking [first model] or perceived changes in drinking during the pandemic [second model]). The patterns of findings were similar for models that did not include covariates (seen in Tables 3 and 4) as well as models that did include covariates (i.e., age and sex). The differences between the models with and without covariates are highlighted below.

**Past month drinking**

In a model without covariates included (see Table 3), race was found to significantly moderate the associations between several

pandemic stressors and mental distress including financial stressors, essential worker status, social distancing, and contracting COVID-19 (self), controlling for other stressors. Although financial stressors were positively linked to greater mental distress among White students, the simple slope for Black students indicated this association was not significant. Similarly, engaging in social distancing was linked to greater mental distress among White students (overall effect), but not Black students (simple slope). Conversely, although essential worker status was not linked to mental distress for White students, this link was a significant protective factor for Black students, with a negative association with mental distress. Although contracting COVID-19 (self) was not linked to mental distress for White students, it was associated with greater mental distress among Black students. There was also a significant main effect, where Black students reported more general mental distress. There was no significant moderation for the *b* paths (mental distress predicting past-month drinking outcomes), nor were the main effects significant. Mental distress was not significantly associated with past-month drinking. Significant direct effects (*c'* paths of pandemic stressors predicting past month drinking outcomes, controlling for mental distress) were observed for social distancing linked to lower drinking quantity, and changed living situation linked to lower drinking frequency.

In a model with covariates included (i.e., age and sex), similar patterns of findings were observed, with mostly the same significant

TABLE 3 Mental distress mediating pandemic stressors and past-month drinking: interactions with race.

Path	B	p	95% CI
<i>a</i> paths (predicting mental distress)			
Taking care of someone → MD	1.506	0.106	-0.318, 3.315
Losing job → MD	-2.68	0.261	-7.352, 2.521
Financial stressors → MD	<b>3.11**</b>	<b>0.001</b>	<b>1.314, 4.900</b>
Teleworking → MD	-1.29	0.201	-3.260, 0.684
Essential worker status → MD	-0.20	0.837	-2.076, 1.682
Social distancing → MD	<b>1.75*</b>	<b>0.009</b>	<b>0.431, 3.075</b>
Contracting COVID-19 (self) → MD	-0.22	0.848	-2.525, 1.328
Contracting COVID-19 (household) → MD	-1.26	0.341	-3.841, 2.076
Changed living situation → MD	1.65	0.101	-0.323, 3.620
Black identity → MD	<b>8.59*</b>	<b>0.013</b>	<b>1.839, 15.332</b>
Black*Taking care of someone → MD	-0.89	0.581	-4.050, 2.271
Black*Losing job → MD	6.98	0.300	-6.225, 20.192
Black*Financial stressors → MD	<b>-3.68*</b>	<b>0.016</b>	<b>-6.680, -0.683</b>
SIMPLE: Black financial stressors → MD	-0.57	0.638	-2.966, 1.818
Black*Teleworking → MD	2.74	0.171	-1.182, 6.654
Black*Essential worker status → MD	<b>-4.01*</b>	<b>0.016</b>	<b>-7.253, -0.762</b>
SIMPLE: Black essential worker status → MD	<b>-4.21*</b>	<b>0.002</b>	<b>-6.888, -1.521</b>
Black*Social distancing → MD	<b>-2.57*</b>	<b>0.037</b>	<b>-4.992, -0.141</b>
SIMPLE: Black social distancing → MD	-0.81	0.040	-2.851, 1.225
Black*Contracting COVID-19 (self) → MD	<b>4.01*</b>	0.040	<b>0.187, 7.840</b>
SIMPLE: Black contracting COVID-19 (self) → MD	<b>3.79*</b>	<b>0.015</b>	<b>0.074, 6.836</b>
Black*Contracting COVID-19 (household) → MD	-0.14	0.946	-4.314, 4.027
Black*Changed living situation → MD	-0.23	0.887	-3.346, 2.894
<i>b</i> paths (predicting past month drinking)			
<i>Outcome: Quantity</i>			
MD	0.14	0.212	-0.086, 0.388
Black identity	-2.56	0.323	-7.624, 2.512
Black*MD	-0.17	0.300	-0.502, 0.155
<i>Outcome: Frequency</i>			
MD	0.03	0.231	-0.019, 0.079
Black identity	-0.50	0.163	-1.205, 0.203
Black*MD	-0.02	0.566	-0.100, 0.055
<i>c'</i> paths (stressors predicting past month drinking, controlling for MD)			
<i>Outcome: Quantity</i>			
Taking care of someone	0.12	0.915	-2.131, 2.377
Losing job	-0.27	0.843	-2.891, 2.361
Financial stressors	1.30	0.258	-0.950, 3.550
Teleworking	-1.62	0.474	-6.064, 2.820
Essential worker status	0.06	0.961	-2.323, 2.433
Social distancing	<b>-3.31*</b>	<b>&lt;0.001</b>	<b>-5.035, -1.579</b>
Contracting COVID-19 (self)	2.45	0.056	-0.062, 4.956
Contracting COVID-19 (household)	-0.10	0.936	-2.510, 2.313
Changed living situation	-0.65	0.518	-2.633, 1.328

TABLE 3 (Continued)

Path	B	p	95% CI
<i>Outcome: Frequency</i>			
Taking care of someone	0.23	0.350	-0.249, 0.703
Losing job	0.15	0.590	-0.383, 0.674
Financial stressors	0.33	0.134	-0.102, 0.768
Teleworking	0.10	0.921	-1.830, 2.025
Essential worker status	0.24	0.359	-0.271, 0.748
Social distancing	-0.27	0.124	-0.618, 0.075
Contracting COVID-19 (self)	0.54	0.075	-0.053, 1.123
Contracting COVID-19 (household)	-0.32	0.362	-0.948, 0.315
Changed living situation	<b>-0.43*</b>	<b>0.041</b>	<b>-0.844, -0.018</b>

Note: Mental distress was defined as symptoms of general stress, anxiety, and depression. For this analysis, because of comparisons across race for Black versus White participants only, the analytic sample was narrowed to N=338. Bolded values are significant, \* $p < 0.05$ , \*\* $p < 0.001$ .

Abbreviation: MD, mental distress.

moderators, main effects, and simple effects for the *a* and *b* paths. Unlike the original model, the interaction between Black identity and financial stressors is no longer significant in the model controlling for sex and age.

### Perceived changes in drinking

In a model without covariates included (see Table 4), race was found to significantly moderate the associations between three pandemic stressors and mental distress, including financial stressors, essential worker status, and contracting COVID-19 (self), controlling for other stressors. Although financial stressors were positively linked to greater mental distress among White students (overall effect), the simple slope for Black students indicated this association was not significant (simple slope). Conversely, although essential worker status was not linked to mental distress for White students, this link was a significant protective factor for Black students, with a negative association with mental distress. Although contracting COVID-19 (self) is not linked to mental distress for White students, the simple slope indicates a significant, positive link for Black students. The significant main effect of race was also observed in this model, where Black students reported more symptoms of stress, anxiety, and depression.

There was no significant moderation for the *b* paths (mental distress predicting changes in drinking). Several main effects were observed, with greater mental distress predicting a greater likelihood of endorsing increased drinking quantity and frequency during the pandemic. Controlling for mental distress and other stressors, few significant direct effects were observed. Teleworking was associated with a lower likelihood of drinking less often. Changed living situations were linked with a lower likelihood of increased quantity; teleworking and contracting COVID-19 were both linked with a lower likelihood of decreased quantity.

Given that the individual paths were not moderated by race, “indirect effects” were examined for the overall sample for the

impact of social distancing on changes in drinking through mental distress. Significant “indirect effects” were observed for social distancing to drinking more often,  $B = 0.16$ , 95% MCCI [0.014, 0.364], and drinking greater quantities,  $B = 0.14$ , 95% MCCI [0.012, 0.341] via mental distress. Given the differential effects for financial stressors, essential worker status, and contracting COVID-19 across races, these “indirect effects” were examined using the simple slopes for White versus Black students, only when significant (Yzerbyt et al., 2018). For White individuals, mental distress significantly mediated the association between financial stressors and drinking more often,  $B = 0.44$ , 95% MCCI [0.129, 0.854], as well as drinking greater quantities,  $B = 0.394$ , 95% MCCI [0.102, 0.777]. For Black individuals, mental distress significantly mediated the association between essential worker status and drinking more often,  $B = -0.58$ , 95% MCCI [-1.20, -0.131], but not drinking greater quantities,  $B = -0.15$ , 95% MCCI [-0.633, 0.206]. Similarly, it mediated the association between contracting COVID-19 (self) and drinking more often,  $B = 0.49$ , 95% MCCI [0.054, 1.155], but not drinking greater quantities,  $B = 0.13$ , 95% MCCI [-0.166, 0.590].

In a model with sex and age included as covariates, similar patterns of findings were observed, with the same significant moderators, main effects, and simple effects for the *a* and *b* paths with a few exceptions. For *c'* paths, changed living situation was associated with decreased frequency,  $B = 0.76$ ,  $p = 0.045$ , rather than a lower likelihood of increased quantity,  $B = -0.62$ ,  $p = 0.097$ . A newly significant association was observed between contracting COVID (self) and increased drinking quantity,  $B = 0.83$ ,  $p = 0.049$ , controlling for mental distress.

Results were similar for “indirect effects” controlling for sex and age. As with the original model, social distancing was significantly linked to drinking more often,  $B = 0.24$ , 95% MCCI [0.014, 0.527], and drinking greater quantities,  $B = 0.24$ , 95% MCCI [0.010, 0.543], via mental distress. Mental distress significantly mediated the association between financial stressors and drinking more often,  $B = 0.38$ , 95% MCCI [0.087, 0.792], as well as drinking greater

TABLE 4 Mental distress mediating pandemic stressors and perceived changes in drinking: interactions with race.

Path	B	p	95% CI	OR
<i>a</i> paths (predicting mental distress)				
Taking care of someone → MD	1.55	0.101	-0.304, 3.399	-
Losing job → MD	9.13	0.100	-1.745, 20.010	-
Financial stressors → MD	<b>3.18*</b>	<b>0.001</b>	<b>1.361, 4.992</b>	-
Teleworking → MD	-1.85	0.060	-3.776, 0.077	-
Essential worker status → MD	-0.18	0.854	-2.151, 1.783	-
Social distancing → MD	<b>1.16*</b>	<b>0.026</b>	<b>0.139, 2.176</b>	-
Contracting COVID-19 (self) → MD	-0.36	0.771	-2.768, 2.052	-
Contracting COVID-19 (household) → MD	-1.21	0.381	-3.916, 1.495	-
Changed living situation → MD	1.44	0.149	-0.515, 3.398	-
Black identity → MD	<b>7.10*</b>	<b>0.031</b>	<b>0.642, 13.562</b>	-
Black*Taking care of someone → MD	-0.11	0.742	-3.697, 2.632	-
Black*Losing job → MD	1.39	0.142	-21.217, 3.036	-
Black*Financial stressors → MD	<b>-3.78*</b>	<b>0.022</b>	<b>-6.603, -0.522</b>	-
<i>Simple</i> : Black financial stressors → MD	-0.39	0.756	-2.819, 2.048	-
Black*Teleworking → MD	1.80	0.287	-1.881, 6.366	-
Black*Essential worker status → MD	<b>-4.17*</b>	<b>0.012</b>	<b>-7.673, -0.946</b>	-
<i>Simple</i> : Black essential worker status → MD	<b>-4.49*</b>	<b>0.001</b>	<b>-7.266, -1.721</b>	-
Black*Social distancing → MD	-2.15	0.087	-4.289, 0.290	-
Black*Contracting COVID-19 (self) → MD	<b>4.16*</b>	<b>0.035</b>	<b>0.295, 8.023</b>	-
<i>Simple</i> : Black contracting COVID (self) → MD	<b>3.80*</b>	<b>0.014</b>	<b>0.756, 6.846</b>	-
Black*Contracting COVID-19 (household) → MD	-0.81	0.984	-4.225, 4.315	-
Black*Changed living situation → MD	-0.12	0.886	-3.242, 3.002	-
<i>b</i> paths (predicting changes in drinking)				
<i>Outcome: Increase in frequency</i>				
MD	<b>0.14**</b>	<b>&lt;0.001</b>	<b>0.062, 0.211</b>	<b>1.15</b>
Black identity	0.37	0.382	-0.462, 1.205	1.45
Black*MD	-0.01	0.892	-0.123, 0.107	0.99
<i>Outcome: Decrease in frequency</i>				
MD	-0.05	0.277	-0.128, 0.037	0.96
Black identity	-0.01	0.982	-0.901, 0.880	0.99
Black*MD	0.12	0.076	-0.013, 0.255	1.13
<i>Outcome: Increase in quantity</i>				
MD	<b>0.12*</b>	<b>0.002</b>	<b>0.044, 0.201</b>	<b>1.13</b>
Black identity	0.66	0.157	-0.254, 1.579	1.94
Black*MD	-0.09	0.127	-0.203, 0.025	0.92
<i>Outcome: Decrease in quantity</i>				
MD	-0.02	0.573	-0.102, 0.057	10.98
Black identity	0.65	0.120	-0.168, 1.459	1.91
Black*MD	0.03	0.619	-0.091, 0.152	1.03
<i>c'</i> paths (stressors predicting changes in drinking, controlling for MD)				
<i>Outcome: Increase in frequency</i>				
Taking care of someone	0.52	0.097	-0.095, 1.139	1.69

TABLE 4 (Continued)

Path	B	p	95% CI	OR
Losing job	0.14	0.708	-0.576, 0.848	1.15
Financial stressors	0.28	0.391	-0.357, 0.911	1.32
Teleworking	-0.29	0.469	-1.056, 0.486	0.75
Essential worker status	0.22	0.437	-0.332, 0.767	1.24
Social distancing	-0.01	0.958	-0.487, 0.461	0.99
Contracting COVID-19 (self)	-0.26	0.548	-1.096, 0.582	0.77
Contracting COVID-19 (household)	0.21	0.620	-0.618, 1.036	1.23
Changed living situation	0.07	0.842	-0.586, 0.718	1.07
<i>Outcome: Decrease in frequency</i>				
Taking care of someone	-0.10	0.805	-0.877, 0.680	0.91
Losing job	0.06	0.893	-0.775, 0.890	1.06
Financial stressors	0.12	0.758	-0.620, 0.852	1.12
Teleworking	<b>-1.47*</b>	<b>0.015</b>	<b>-2.643, -0.290</b>	<b>0.23</b>
Essential worker status	0.37	0.251	-0.262, 1.001	1.45
Social distancing	0.31	0.271	-0.243, 0.864	1.36
Contracting COVID-19 (self)	-1.02	0.060	-2.080, 0.041	0.36
Contracting COVID-19 (household)	0.01	0.982	-1.032, 1.056	1.01
Changed living situation	0.66	0.070	-0.053, 1.378	1.94
<i>Outcome: Increase in quantity</i>				
Taking care of someone	-0.03	0.937	-0.667, 0.615	0.98
Losing job	0.51	0.169	-0.215, 1.228	1.66
Financial stressors	-0.02	0.950	-0.667, 0.626	0.98
Teleworking	0.15	0.693	-0.600, 0.902	1.16
Essential worker status	0.33	0.254	-0.238, 0.902	1.39
Social distancing	0.06	0.835	-0.476, 0.589	1.06
Contracting COVID-19 (self)	0.72	0.073	-0.067, 1.508	2.06
Contracting COVID-19 (household)	-0.45	0.327	-1.335, 0.445	0.64
Changed living situation	<b>-0.77*</b>	<b>0.034</b>	<b>-1.478, -0.058</b>	<b>0.47</b>
<i>Outcome: Decrease in quantity</i>				
Taking care of someone	-0.45	0.269	-1.243, 0.346	0.64
Losing job	0.56	0.199	-0.293, 1.411	1.75
Financial stressors	-0.52	0.164	-1.258, 0.213	0.59
Teleworking	<b>-1.62*</b>	<b>0.013</b>	<b>-2.901, -0.336</b>	<b>0.20</b>
Essential worker status	0.34	0.284	-0.278, 0.949	1.40
Social distancing	0.21	0.419	-0.301, 0.723	1.24
Contracting COVID-19 (self)	<b>-1.44*</b>	<b>0.041</b>	<b>-2.821, -0.060</b>	<b>0.24</b>
Contracting COVID-19 (household)	0.38	0.476	-0.668, 1.143	1.47
Changed living situation	0.34	0.357	-0.387, 1.072	1.41

Note: Mental distress was defined as symptoms of general stress, anxiety, and depression. For perceived changes in drinking, staying the same served as the category of reference, so odds ratios reflect odds of drinking more or less, respectively, compared to staying the same. For this analysis, because of comparisons across race for Black versus White participants only, the analytic sample was narrowed to N=338. Bolded values are significant, \*p<0.05, \*\*p<0.001.

Abbreviation: MD, mental distress; OR, odd ratio.

quantities, B=0.38, 95% MCCI [0.080, 0.796], for White students. As with the original model, for Black students, mental distress significantly mediated the association between essential worker status

and drinking more often, B=-0.55, 95% MCCI [-1.142, -0.114], but not drinking greater quantities, B=-0.14, 95% MCCI [-0.584, 0.214]. Similarly, mental distress mediated the association between



contracting COVID (self) and drinking more often,  $B=0.46$ , 95% MCCI [0.030, 1.109], but not drinking greater quantities,  $B=0.11$ , 95% MCCI [-0.167, 0.560].

## DISCUSSION

Given elevated stress, anxiety, and depression among college students during the COVID-19 pandemic, as well as unique stressors triggered by the pandemic, the current examination assessed if mental distress mediated the association between pandemic-related stressors and college drinking (both past-month and perceived changes during the pandemic), as well as if race (Black vs. White) moderated these associations. Although this study relied on cross-sectional data and we could not examine these associations prospectively, we hypothesized a model where pandemic-related stressors related to mental distress, which in turn led to alcohol outcomes. The hypothesized model was created based on both prior research and theory as reviewed in the Introduction; moreover, emerging research supports that specific pandemic-related stressors (e.g., job loss and financial difficulties) are prospectively associated with college drinking, with person-level factors moderating these relationships (Graupensperger et al., 2023). However, it is possible for associations in the current cross-sectional data that hypothesized directionality may be reversed for any significant associations. For example, although the models suggest social distancing may lead to greater mental distress, which may lead to greater drinking, it is equally plausible that individuals with greater stress, anxiety, and depression engaged in greater social distancing, or that drinking more heavily led to greater stress, anxiety, and depression.

In the overall mediation models with the full sample, pandemic-related financial stressors and social distancing were both linked to greater quantity and frequency of past-month drinking through greater mental distress (i.e., stress, anxiety, depression). For perceived changes in drinking, only financial stressors were linked to perceptions of drinking greater quantities and drinking more often (compared to pre-pandemic levels) via mental distress. The moderated mediation models among students identifying as White or Black revealed that social distancing was a robust stressor across races, but other stressors had differential impacts. Financial stressors were linked with mental distress among White students, whereas contracting COVID-19 was a unique stressor among Black students. Essential worker status was a protective factor among Black students.

The stronger links between select stressors and mental distress among White students could potentially be attributed to the pandemic being the first time many White students experienced major and enduring stressors, whereas Black students may already have a history of coping with various societal adversities. This is underscored by the findings from Trammell et al. (2021) that, although racial minority individuals may be shouldering greater burdens during the pandemic, they did not report experiencing increased depression or stress due to these burdens. Racial differences in coping have

been documented, with common strategies used by Black Americans including avoidance and distraction from activating emotion, engaging in spiritual or religious activities, using spiritual objects, and connecting with others, leading to greater resilience (Daly et al., 1995; Utsey et al., 2007). In the current study, it may be that Black students have a broader range of coping mechanisms for preventing mental distress, or that the particular coping mechanisms used by Black students may have promoted resilience, protecting against mental health struggles, and in turn, alcohol use. In addition, given that rates of both drinking and heavy drinking are lower among Black American adults than White American adults (SAMHSA, 2020), it may be that Black college students are not seeing alcohol use modeled in the home. In particular, if they moved back home during campus closures, they might not be seeing alcohol used as a mechanism of coping with pandemic stressors.

Unfortunately, we did not assess income, SES, history of adversity, resilience, or coping strategies in the current sample to confirm this interpretation. However, there is support in the literature for the idea that Black students generally may have more experience with persistent stressors. A recent report using data from over 15,000 matriculating high school seniors found that the rate for Black students in the lowest SES quintile is over twice the rate of White students (27.8% vs. 10.6%), whereas there is a much lower rate of Black students (8.8%) in the highest SES quintile than White students (28.7%; Reber & Smith, 2023); these rates suggest that for many Black students, the pandemic may not be the first time they experienced persistent financial or social class stressors. In addition, prior research has documented greater exposure to early-life household and community-based adversity among Black Americans compared to White Americans (Mersky et al., 2013; Wade et al., 2016), suggesting a stronger history of adversity among Black college students, and that Black Americans have developed strong coping skills in reaction to racism-related stressors throughout their lifetime (see Jacob et al., 2023 for a review).

Essential worker status served as a protective factor for Black students but not White students. Although originally conceptualized as a stressor (i.e., putting the student at greater risk for contracting COVID-19, potentially causing greater worry and anxiety), it may be that essential worker status could be an indicator of job stability as well as preventing social isolation and loneliness. The link between social distancing and greater mental distress among White students was also not anticipated. We viewed social distancing as a potential protective factor against COVID risk and associated anxiety and worry. However, this may be linked with more social isolation. College students reported being in contact with their friends significantly less during the pandemic (López-Castro et al., 2021). This social isolation may be driving the link to worse mental distress.

The above interpretations about findings regarding differences across races assume assessments used in the current study functioned similarly across race. An alternative explanation could be that the findings are artifacts of students interpreting and responding to the measures differently across race (i.e., lack of measurement

invariance across race). Historically, psychological measures have been designed by mostly White scientists and validated within predominantly White samples. However, the current study used common measures of mental distress, and the literature has documented support for measurement invariance across race for these particular instruments. The PSS-R (assessing stress) has support for measurement invariance across Black and White races and across genders among college students in South Africa (Makhubela, 2022) as well as across Hispanic American participants who utilized Spanish versus English language (Baik et al., 2019). The GAD-7 (assessing anxiety) has demonstrated measurement invariance across White versus non-White college students, as well as across gender (Sriken et al., 2022). The CESD-10 (assessing depression) has demonstrated measurement invariance across gender, with no item-discrimination biases across race (Mohebbi et al., 2018). Although these examinations share some commonality with the current sample (e.g., U.S. college students, or comparing Black vs. White respondents), none of them compared specifically Black versus White college drinkers, thus measurement invariance in the current sample cannot be assured. However, taken together, these previous examinations suggest true differences across race may be driving the current findings, rather than measurement-based artifacts.

Many students in the current study experienced pandemic-related stressors, with about half reporting pandemic-specific financial stressors, and about a quarter reporting several others. In addition, 96% of students reported engaging in social distancing most of the time. Students have clearly been affected by pandemic-specific stressors, and some are turning to increased alcohol use. More students need to access the mental health services and health promotion programs available to them. These services are often free through campus services such as counseling centers. Although the number of students accessing care through college counseling centers is increasing over time (from 6.6% in 2007 to 11.8% in 2017; Lipson et al., 2019), the majority of students suffering from symptomatology are not accessing care. Moreover, racial differences have been observed in accessing services, with significantly lower rates of past-year treatment among Asian, Black, and Latinx students compared to White students (Lipson et al., 2022). Efforts need to be made to connect students with available resources and to reduce discrepancies in accessing care. Campus administrators should consider regular messaging to remind students about available services and supporting outreach programming among college counseling centers.

## Limitations and future directions

The current study had several limitations, including the use of cross-sectional, self-report data. Causation cannot be inferred, nor temporal precedence established, among pandemic-related stressors, mental distress, and drinking. Although the terms “mediation” and “indirect effects” were used in the Results and Discussion, these were really estimates of simultaneously occurring processes

accounting for variance in the relation between the independent and dependent variable. In particular, changes in drinking compared to before the pandemic were retrospective perceptions and may not be accurate. Future research should include prospective reporting over time to establish temporal order as well as facilitate more accurate reports that may be less susceptible to recall bias.

The sample also was majority cisgender women (75% overall; 74% [ $n=166$ ] of White participants were cisgender women and 81% of Black [ $n=91$ ] participants were cisgender women), potentially limiting generalization. In addition, the moderation examinations across race were limited to only students who identify as Black or White. The imbalanced gender representation combined with narrowing the sample to only individuals who identified only as Black or only as White left relatively small samples for some identity intersections in the moderated mediation models (i.e., only 51 White cisgender men [23% of White participants] and only 17 Black cisgender men [15% of Black participants], with only a handful of individuals who endorsed gender identities other than cisgender). In addition to replicating these examinations with samples with larger representations of men and other gender identities, future research should examine these associations among other marginalized racial groups. Moreover, the current sample included many part-time students (16%) and a number of older students (age  $M=23.23$ ,  $max=58$ ). The current sample reflected heterogeneity in these important metrics and is representative of the host institution, as well as national rates (approximately 38% of students enrolled are part-time and 33% are over age 24; U.S. Department of Education, 2022). However, this research should be replicated at other types of institutions with more traditional students.

Another limitation was that the current examination focused on stressors directly related to the COVID-19 pandemic. However, during this time (the last few months of 2020), there was also substantial societal unrest related to the murder of George Floyd and legal repercussions for the police officers involved (Associated Press, 2022), as well as push back against the Black Lives Matter movement and the rise of activity by extremist groups (Cornish, 2020). These may have been additional stressors impacting the lives of college students during this time, including mental distress and drinking, especially among Black students.

In addition, many consider the COVID-19 pandemic to be phasing out. Many campuses are easing restrictions and requirements for masking, testing, and quarantine guidelines (Nadworny, 2022). However, this may be a false sense of reduced risk, as many individuals infected with the latest variants may not be aware they are infected (Joung et al., 2022). The public health emergency declaration was extended through May 2023, and many governmental changes related to the pandemic remain in place beyond its expiration (e.g., availability of related vaccines, telehealth flexibility; U.S. Department of Health and Human Services, 2023). The COVID-19 pandemic is ongoing and may transition to a long-term endemic stage. Moreover, another global health crisis may come sooner than many expect, with spillovers of infectious diseases from animals to people steadily increasing over time (Center for Global

Development, 2021). The current findings also have the potential to generalize to other persistent stressors that require similar restrictions, such as natural disasters (e.g., hurricanes, floods, earthquakes, winter storms, wildfires).

## CONCLUSION

Prior research has revealed elevated levels of stress, anxiety, and depression among college students during the COVID-19 pandemic, as well as unique stressors triggered by the pandemic. Moreover, many students have increased their drinking during the pandemic, whereas others have decreased. Many racial disparities have also been exacerbated by the pandemic. Using the full sample, the current study revealed mental distress (i.e., stress, anxiety, depression) as a mediator between select pandemic-related stressors (financial stressors and social distancing) and drinking (greater quantity and frequency of past month drinking). For perceived changes in drinking, only financial stressors were linked to perceptions of drinking greater quantities and drinking more often (compared to pre-pandemic levels) via mental distress. Narrowing the sample to only students who identify as Black or White, moderated mediation models revealed that changed living situation was a robust stressor across race, but other stressors had differential impacts across race. Financial stressors and social distancing were linked with greater stress, anxiety, and depression among only White students, whereas essential worker status was a protective factor only among Black students. Findings suggest campus administrators may want to focus efforts on connecting students with available supportive resources (e.g., counseling centers and health promotion offices).

## ACKNOWLEDGMENTS

The project described was supported by the National Institute on Alcohol Abuse and Alcoholism award K01 AA023849 (PI: Braitman). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute on Alcohol Abuse and Alcoholism.

## CONFLICT OF INTEREST STATEMENT

All the authors declare that they have no conflict of interest.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## ORCID

Abby L. Braitman  <https://orcid.org/0000-0003-2259-1094>

Rachel Ayala Guzman  <https://orcid.org/0000-0001-6433-7313>

Megan Strowger  <https://orcid.org/0000-0002-8476-5099>

Jennifer L. Shipley  <https://orcid.org/0000-0002-5203-4486>

Emily Junkin  <https://orcid.org/0000-0002-2420-5559>

Cathy Lau-Barraco  <https://orcid.org/0000-0002-2072-5477>

## REFERENCES

- Acuff, S.F., Strickland, J.C., Tucker, J.A. & Murphy, J.G. (2022) Changes in alcohol use during COVID-19 and associations with contextual and individual difference variables: a systematic review and meta-analysis. *Psychology of Addictive Behaviors*, 36(1), 1–19.
- Andresen, E.M., Malmgren, J.A., Carter, W.B. & Patrick, D.L. (1994) Screening for depression in well older adults: evaluation of a short form of the CES-D. *American Journal of Preventive Medicine*, 10(2), 77–84.
- Associated Press. (2022) A former Minneapolis officer is sentenced to 3 years for aiding George Floyd's death. [NPR website]. Available from: <https://www.npr.org/2022/09/21/1124247012/george-floyd-thomas-lane-sentenced-three-years-minneapolis-police> [Accessed 17th February 2023].
- Auerbach, R.P., Mortier, P., Bruffaerts, R., Alonso, J., Benjet, C., Cuijpers, P. et al. (2018) WHO world mental health surveys international college student project: prevalence and distribution of mental disorders. *Journal of Abnormal Psychology*, 127(7), 623–638.
- Baik, S.H., Fox, R.S., Mills, S.D., Roesch, S.C., Sadler, G.R., Klonoff, E.A. et al. (2019) Reliability and validity of the perceived stress Scale-10 in Hispanic Americans with English or Spanish language preference. *Journal of Health Psychology*, 24(5), 628–639.
- Barbosa, C., Cowell, A.J. & Dowd, W.N. (2021) Alcohol consumption in response to the COVID-19 pandemic in the United States. *Journal of Addiction Medicine*, 4, 341–344.
- Bollen, Z., Pabst, A., Creupelandt, C., Fontesse, S., Lannoy, S., Pinon, N. et al. (2021) Prior drinking motives predict alcohol consumption during the COVID-19 lockdown: a cross-sectional online survey among Belgian college students. *Addictive Behaviors*, 115, 106772.
- Braitman, A.L., Strowger, M., Shipley, J.L., Ortman, J., MacIntyre, R.I. & Bauer, E.A. (2022) Data quality and study compliance among college students across 2 recruitment sources: two study investigations. *JMIR Formative Research*, 6(12), e39488.
- Capasso, A., Jones, A.M., Ali, S.H., Foreman, J., Tozan, Y. & DiClemente, R.J. (2021) Increased alcohol use during the COVID-19 pandemic: the effect of mental health and age in a cross-sectional sample of social media users in the US. *Preventive Medicine*, 145, 106422.
- Center for Global Development. (2021) The next pandemic could come soon and be deadlier. [CGD website]. Available from: <https://www.cgdev.org/blog/the-next-pandemic-could-come-soon-and-be-deadlier> [Accessed 17th February 2023].
- Charles, N.E., Strong, S.J., Burns, L.C., Bullerjahn, M.R. & Serafine, K.M. (2021) Increased mood disorder symptoms, perceived stress, and alcohol use among college students during the COVID-19 pandemic. *Psychiatry Research*, 296, 113706.
- Coakley, K.E., Lardier, D.T., Holladay, K.R., Amorim, F.T., Mechler, H. & Zuhl, M.N. (2021) Mental health severity is associated with increases in alcohol consumption in young adult students during the COVID-19 pandemic. *Alcoholism Treatment Quarterly*, 39(3), 328–341.
- Collins, R.L., Parks, G.A. & Marlatt, G.A. (1985) Social determinants of alcohol consumption: the effects of social interaction and model status on the self-administration of alcohol. *Journal of Consulting and Clinical Psychology*, 53(2), 189–200.
- Cornish, A. (2020) Extremism researcher on prevalence of militia groups in the pandemic. [NPR website]. Available from: <https://www.npr.org/2020/10/09/922375785/extremism-researcher-on-prevalence-of-militia-groups-in-the-pandemic> [Accessed 17th February 2023].
- Czeisler, M.É., Lane, R.I., Petrosky, E., Wiley, J.F., Christensen, A., Njai, R. et al. (2020) Mental health, substance use, and suicidal ideation during the COVID-19 pandemic—United States, June 24–30, 2020. *Morbidity and Mortality Weekly Report*, 69(32), 1049–1057.
- Daly, A., Jennings, J., Beckett, J.O. & Leashore, B.R. (1995) Effective coping strategies of African Americans. *Social Work*, 40, 240–248.

- Ding, Q., Ward, M.D., Edwards, N., Wu, E.A., Kersey, S. & Funk, M. (2023) A mixed-methods approach to understand university students' perceived impact of returning to class during COVID-19 on their mental and general health. *PLoS One*, 18(1), e0279813.
- Fish, J.N., Pollitt, A.M., Schulenberg, J.E. & Russell, S.T. (2017) Alcohol use from adolescence through early adulthood: an assessment of measurement invariance by age and gender. *Addiction*, 112(8), 1495–1507.
- Freibott, C.E., Stein, M.D. & Lipson, S.K. (2022) The influence of race, sexual orientation and gender identity on mental health, substance use, and academic persistence during the COVID-19 pandemic: A cross-sectional study from a national sample of college students in the healthy minds study. *Drug and Alcohol Dependence Reports*, 3, 100060.
- Fruehwirth, J.C., Biswas, S. & Perreira, K.M. (2021) The Covid-19 pandemic and mental health of first-year college students: examining the effect of Covid-19 stressors using longitudinal data. *PLoS One*, 16(3), e0247999.
- Gardner, S.K., Robertson, A.A., Tatch, A. & Walker, C.S. (2020) Racial differences in college-student drinking. *Journal of Ethnicity in Substance Abuse*, 19(1), 28–43.
- Graupensperger, S., Jaffe, A.E., Fleming, C.N., Kilmer, J.R., Lee, C.M. & Larimer, M.E. (2021) Changes in college student alcohol use during the COVID-19 pandemic: are perceived drinking norms still relevant? *Emerging Adulthood*, 9(5), 531–540.
- Graupensperger, S., Walukevich-Dienst, K., Patrick, M.E. & Lee, C.M. (2023) The protective role of perceived control on associations between job loss, financial difficulties, and substance use among young adults early in the COVID-19 pandemic. *Prevention Science*, 24, 1239–1248.
- Hicks, T.A., Chartier, K.G., Buckley, T.D., Reese, D., The Spit for Science Working Group, Vassileva, J. et al. (2022) Divergent changes: abstinence and higher-frequency substance use increase among racial/ethnic minority young adults during the COVID-19 global pandemic. *The American Journal of Drug and Alcohol Abuse*, 48(1), 88–99.
- Hoyt, L.T., Cohen, A.K., Dull, B., Castro, E.M. & Yazdani, N. (2021) "Constant stress has become the new normal": stress and anxiety inequalities among US college students in the time of COVID-19. *The Journal of Adolescent Health*, 68(2), 270–276.
- Jackson, K.M., Merrill, J.E., Stevens, A.K., Hayes, K.L. & White, H.R. (2021) Changes in alcohol use and drinking context due to the COVID-19 pandemic: a multimethod study of college student drinkers. *Alcoholism, Clinical and Experimental Research*, 45(4), 752–764.
- Jacob, G., Faber, S.C., Faber, N., Bartlett, A., Ouimet, A.J. & Williams, M.T. (2023) A systematic review of black people coping with racism: approaches, analysis, and empowerment. *Perspectives on Psychological Science*, 18(2), 392–415.
- Joung, S.Y., Ebinger, J.E., Sun, N., Liu, Y., Wu, M., Tang, A.B. et al. (2022) Awareness of SARS-CoV-2 omicron variant infection among adults with recent COVID-19 Seropositivity. *JAMA Network Open*, 5(8), e2227241.
- Kecojevi, A., Basch, C.H., Sullivan, M. & Davi, N.K. (2020) The impact of the COVID-19 epidemic on mental health of undergraduate students in New Jersey, cross-sectional study. *PLoS One*, 15(9), e0239696.
- Kerr, W.C., Ye, Y., Martinez, P., Karriker-Jaffe, K.J., Patterson, D., Greenfield, T.K. et al. (2022) Longitudinal assessment of drinking changes during the pandemic: the 2021 COVID-19 follow-up study to the 2019 to 2020 National Alcohol Survey. *Alcoholism, Clinical and Experimental Research*, 46(6), 1050–1061.
- Kim, H., Rackoff, G.N., Fitzsimmons-Craft, E.E., Shin, K.E., Zainal, N.H., Schwob, J.T. et al. (2022) College mental health before and during the COVID-19 pandemic: results from a nationwide survey. *Cognitive Therapy and Research*, 46(1), 1–10.
- Kochhar, R. & Cilluffo, A. (2017) How wealth inequality has changed in the US since the Great Recession, by race, ethnicity and income. [Pew Research Center website]. Available from: <https://www.pewresearch.org/fact-tank/2017/11/01/how-wealth-inequality-has-changed-in-the-u-s-since-the-great-recession-by-race-ethnicity-and-income/> [Accessed 17th February 2023].
- Lipson, S.K., Lattie, E.G. & Eisenberg, D. (2019) Increased rates of mental health service utilization by US college students: 10-year population-level trends (2007–2017). *Psychiatric Services*, 70(1), 60–63.
- Lipson, S.K., Zhou, S., Abelson, S., Heinze, J., Jirsa, M., Morigney, J. et al. (2022) Trends in college student mental health and help-seeking by race/ethnicity: findings from the national healthy minds study, 2013–2021. *Journal of Affective Disorders*, 306, 138–147.
- López-Castro, T., Brandt, L., Anthonipillai, N.J., Espinosa, A. & Melara, R. (2021) Experiences, impacts and mental health functioning during a COVID-19 outbreak and lockdown: data from a diverse new York City sample of college students. *PLoS One*, 16(4), e0249768.
- MacKinnon, D.P., Lockwood, C.M. & Williams, J. (2004) Confidence limits for the indirect effect: distribution of the product and resampling methods. *Multivariate Behavioral Research*, 39, 99–128.
- Makhubela, M. (2022) Assessing psychological stress in south African university students: measurement validity of the perceived stress scale (PSS-10) in diverse populations. *Current Psychology*, 41(5), 2802–2809.
- Mersky, J., Topitzes, J. & Reynolds, A. (2013) Impacts of adverse childhood experiences on health, mental health and substance abuse in early adulthood: a cohort study of an urban minority sample in the US. *Child Abuse and Neglect*, 37, 917–925.
- Minhas, M., Belisario, K., González-Roz, A., Halladay, J., Murphy, J.G. & MacKillop, J. (2021) COVID-19 impacts on drinking and mental health in emerging adults: longitudinal changes and moderation by economic disruption and sex. *Alcoholism, Clinical and Experimental Research*, 45(7), 1448–1457.
- Mohebbi, M., Nguyen, V., McNeil, J.J., Woods, R.L., Nelson, M.R., Shah, R.C. et al. (2018) Psychometric properties of a short form of the Center for Epidemiologic Studies Depression (CES-D-10) scale for screening depressive symptoms in healthy community dwelling older adults. *General Hospital Psychiatry*, 51, 118–125.
- Mohr, C.D., Umamoto, S.K., Rounds, T.W., Bouleh, P. & Arpin, S.N. (2021) Drinking to cope in the COVID-19 era: an investigation among college students. *Journal of Studies on Alcohol and Drugs*, 82(2), 178–187.
- Mulia, N. & Zemore, S.E. (2012) Social adversity, stress, and alcohol problems: are racial/ethnic minorities and the poor more vulnerable? *Journal of Studies on Alcohol and Drugs*, 73(4), 570–580.
- Muthén, L.K. & Muthén, B.O. (1998-2019) *Mplus user's guide [computer program]*, 8th edition. Los Angeles, CA: Muthén & Muthén.
- Nadworny, E. (2022) Colleges ease COVID-19 restrictions as fall semester begins for millions of students. [NPR website]. Available from: <https://www.npr.org/2022/08/16/1117588455/colleges-ease-covid-19-restrictions-as-fall-semester-begins> [Accessed 17th February 2023].
- Oh, H., Leventhal, A.M., Tam, C.C., Rajkumar, R., Zhou, S. & Clapp, J.D. (2021) Stressors experienced during the COVID-19 pandemic and substance use among US college students. *Drug and Alcohol Dependence Reports*, 1, 100005.
- Paschall, M.J., Bersamin, M. & Flewelling, R.L. (2005) Racial/ethnic differences in the association between college attendance and heavy alcohol use: a national study. *Journal of Studies on Alcohol*, 66(2), 266–274.
- Reber, S. & Smith, E. (2023) College enrollment disparities: Understanding the role of academic preparation. [Brookings Institution website] <https://www.brookings.edu/research/college-enrollment-disparities/>
- Reyes-Portillo, J.A., Masia Warner, C., Kline, E.A., Bixter, M.T., Chu, B.C., Miranda, R. et al. (2022) The psychological, academic, and economic impact of COVID-19 on college students in the epicenter of the pandemic. *Emerging Adulthood*, 10(2), 478–490.



- Romm, K.F., Patterson, B., Wysota, C.N., Wang, Y. & Berg, C.J. (2021) Predictors of negative psychosocial and health behavior impact of COVID-19 among young adults. *Health Education Research*, 36(4), 385–397.
- Ryerson, N.C., Wilson, O.W., Pena, A., Duffy, M. & Bopp, M. (2021) What happens when the party moves home? The effect of the COVID-19 pandemic on US college student alcohol consumption as a function of legal drinking status using longitudinal data. *Translational Behavioral Medicine*, 11(3), 772–774.
- SAMHSA, Center for Behavioral Statistics and Quality. (2020) 2019 National Survey on Drug Use and Health (NSDUH) Table 6.21B—Types of Illicit Drug, Tobacco Product, and Alcohol Use in Past Month among Persons Aged 18 to 22, by College Enrollment Status and Gender: Percentages, 2018 and 2019. [SAMSHA website]. Available from: <https://www.samhsa.gov/data/sites/default/files/reports/rpt29394/NSDUHDetailedTabs2019/NSDUHDetTabsSec6t6pe2019.htm#tab6-21b> [Accessed 17th February 2023]
- Selig, J.P. & Preacher, K.J. (2009) Monte Carlo method for assessing mediation: An interactive tool for creating confidence intervals for indirect effects [computer program]. Available from <http://quantpsy.org/>
- Son, C., Hegde, S., Smith, A., Wang, X. & Sasangohar, F. (2020) Effects of COVID-19 on college students' mental health in the United States: interview survey study. *Journal of Medical Internet Research*, 22(9), e21279.
- Spitzer, R.L., Kroenke, K., Williams, J.B.W. & Löwe, B. (2006) A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of Internal Medicine*, 166(10), 1092–1097.
- Sriken, J., Johnsen, S.T., Smith, H., Sherman, M.F. & Erford, B.T. (2022) Testing the factorial validity and measurement invariance of college student scores on the generalized anxiety disorder (GAD-7) scale across gender and race. *Measurement Evaluation in Counseling Development*, 55(1), 1–16.
- Trammell, J.P., Joseph, N.T. & Harriger, J.A. (2021) Racial and ethnic minority disparities in COVID-19 related health, health beliefs and behaviors, and well-being among students. *Journal of American College Health*, 71(1), 242–248.
- U.S. Department of Education, National Center for Education Statistics. (2022) Digest of Education Statistics 2021, table 303.40, table 303.70.
- U.S. Department of Health and Human Services. (2023) Fact Sheet: End of the COVID-19 Public Health Emergency. [HHS website]. Available from: <https://www.hhs.gov/about/news/2023/05/09/fact-sheet-end-of-the-covid-19-public-health-emergency.html> [Accessed 7th July 2023].
- Utsey, S.O., Bolden, M.A., Lanier, Y. & Williams, O., III. (2007) Examining the role of culture-specific coping as a predictor of resilient outcomes in African Americans from high-risk urban communities. *Journal of Black Psychology*, 33(1), 75–93.
- Wade, R.J., Cronholm, P.F., Fein, J.A., Forke, C.M., Davis, M.B., Harkins-Schwarz, M. et al. (2016) Household and community-level adverse childhood experiences and adult health outcomes in a diverse urban population. *Child Abuse and Neglect*, 52, 135–145.
- Wang, X., Hegde, S., Son, C., Keller, B., Smith, A. & Sasangohar, F. (2020) Investigating mental health of US college students during the COVID-19 pandemic: cross-sectional survey study. *Journal of Medical Internet Research*, 22(9), e22817.
- White, H.R., Stevens, A.K., Hayes, K. & Jackson, K.M. (2020) Changes in alcohol consumption among college students due to COVID-19: effects of campus closure and residential change. *Journal of Studies on Alcohol and Drugs*, 81(6), 725–730.
- Whittaker, F. & Kingston, S. (2022) Stress, social support, and substance use in the COVID-19 pandemic. *Translational Issues in Psychological Science*, 8(3), 389–405.
- Wickrama, K.A.S., Ralston, P.A., O'Neal, C.W., Ilich, J.Z., Harris, C.M., Coccia, C. et al. (2013) Linking life dissatisfaction to health behaviors of older African Americans through psychological competency and vulnerability. *Research on Aging*, 35(5), 591–611.
- Wilsnack, R.W., Wilsnack, S.C., Gmel, G. & Kantor, L.W. (2018) Gender differences in binge drinking: prevalence, predictors, and consequences. *Alcohol Research: Current Reviews*, 39(1), 57–76.
- Yzerbyt, V., Muller, D., Batailler, C. & Judd, C.M. (2018) New recommendations for testing indirect effects in mediational models: the need to report and test component paths. *Journal of Personality and Social Psychology*, 115(6), 929–943.
- Zemore, S.E., Karriker-Jaff, K.J., Mulia, N., Kerr, W.C., Ehlers, C.L., Cook, W.K. et al. (2018) The future of research on alcohol-related disparities across U.S. racial/ethnic groups: a plan of attack. *Journal of Studies on Alcohol and Drugs*, 79(1), 7–21.
- Zimmermann, M., Bledsoe, C. & Papa, A. (2021) Initial impact of the COVID-19 pandemic on college student mental health: a longitudinal examination of risk and protective factors. *Psychiatry Research*, 305, 114254.

**How to cite this article:** Braitman, A.L., Ayala Guzman, R., Strowger, M., Shipley, J.L., Glenn, D.J., Junkin, E. et al. (2023) The impact of the COVID-19 pandemic experiences on college drinking via mental distress: Cross-sectional mediation moderated by race. *Alcohol: Clinical and Experimental Research*, 47, 2313–2330. Available from: <https://doi.org/10.1111/acer.15200>