


# Depressive and anxious symptoms among young adults in the COVID-19 pandemic: Results from monitoring the future

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## Funding information

National Center for Injury Prevention and Control; National Institute on Drug Abuse

## Abstract

**Purpose:** The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic is associated with worsening mental health among young adults, but further research is necessary to quantify the associations with depression and anxiety.

**Methods:** Using Monitoring the Future data ( $N = 1244$  young adults, modal age: 19, Fall 2020 supplement), we examined internalizing symptoms (Patient Health Questionnaire-8 and Generalized Anxiety Disorder Scale-7 separately), dividing the sample into those without clinically significant scores, significant scores but minimal pandemic-attributed symptoms, and significant scores with substantial pandemic-attributed symptoms. Logistic regression analyses linked demographic factors, pandemic-related experiences, and coping methods to symptom groups.

**Results:** Internalizing symptoms were highly prevalent, with many occurring among a majority at least several days over the past 2 weeks. Major changes in education, employment, and resource availability predicted elevated symptom risk (e.g., lacking a place to sleep or money for rent, gas, or food led to 4.43 [95% confidence interval: 2.59–7.55] times the risk of high depressive symptoms significantly attributed to the pandemic). High internalizing symptoms were linked to underutilization of healthy coping behaviors, substance use overutilization, and dietary changes. High depressive and anxious symptoms attributed to the pandemic were marked by high levels of taking breaks from the news/social media and contacting healthcare providers.

**Conclusions:** The pandemic's associations with young adults' depressive and anxious symptoms warrants urgent attention through improved mental health treatment infrastructure and stronger structural support.

## KEYWORDS

anxiety, coping, COVID-19, depression, epidemiology

## 1 | INTRODUCTION

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic is associated with worsening mental health among young adults, but further research is necessary to quantify the associations with depression and anxiety. Available evidence suggests that depressive and anxious symptoms increased among adults during the course of the pandemic, with the highest increases among adults

ages 18–29 (Vahratian et al., 2021). Depressive and anxious symptoms among young adults increased in the presence of educational, financial, and other pandemic-related stressors, (Kujawa et al., 2020) and meta-analytic estimates suggest that 34% and 32% of young adults have reported depressive and anxious symptoms, respectively, during the pandemic (Deng et al., 2021). However, the specific domains of depressive or anxious symptoms most directly affected by the pandemic are a gap in the literature that can inform

intervention efforts. Similarly, it remains unclear the extent to which highly prevalent depressive and anxious symptoms are primarily related to the pandemic, rather than symptoms that would arise regardless of the pandemic. Understanding the specific symptoms and individuals most directly affected by pandemic-related stressors provides important context for future mental health interventions.

The coronavirus disease 2019 (COVID-19) pandemic has disrupted young people's social, educational, and occupational practices, at times leading to isolation, remote learning and employment, and changes to work hours or compensation. Job insecurity in the pandemic predicts higher depression and anxiety symptoms among young adults in the United States, (Ganson et al., 2021) and pandemic-related academic disruptions and uncertainty can lead to psychological distress that results in young adults reducing or stopping their engagement with education (Clabaugh et al., 2021). These, along with other pandemic-related experiences, including economic hardship and resource scarcity, have worsened young adults' mental health, though further study is necessary to understand the full magnitude of their link with clinically significant levels of depressive or anxious symptoms. Additionally, while understanding the role of the COVID-19 pandemic for these symptoms is important, it is perhaps more crucial to identify and implement effective coping strategies against pandemic-related stressors. While some techniques, such as connecting socially with others (Waselewski et al., 2020) and maintaining a healthy diet, (Fullana et al., 2020) have been reported by young adults for improved mental wellbeing, other strategies, such as substance use to cope with pandemic-related stress, are potentially damaging and can lead to future substance use problems (Patrick et al., 2021). Furthermore, less is known about the extent to which coping behaviors vary between those with pandemic-related depressive and anxious symptoms and those with similar symptoms not attributed to the pandemic.

To understand the role of COVID-19 pandemic-related experiences in young adults' depressive and anxious symptoms, this study had the following aims: (1) Estimate the distribution of depressive and anxious symptoms in this population and determine the extent to which these symptoms are attributed by young adults to the COVID-19 pandemic; (2) disentangle the demographic risk profiles for depressive and anxious symptoms that are attributed to pandemic-related experiences versus not; (3) understand the extent to which specific pandemic-related experiences have elevated risk for depressive and anxious symptoms; and (4) link patterns of depressive and anxious symptoms to various coping behaviors to recognize potential areas for intervention.

## 2 | MATERIALS AND METHODS

Monitoring the Future (MTF), an ongoing study of adolescent beliefs and behaviors, (Miech et al., 2021) included a unique supplemental study in Fall 2020 that featured items relating to the COVID-19 pandemic (Patrick et al., 2021). The MTF Vaping Supplement

collected data between September and November 2020. Participants were recruited from Grade 12 students participating in the Spring 2019 MTF survey. Of 13,713 MTF participants in Grade 12, there were 7850 eligible for the Vaping Supplement. Ineligibility criteria included missing contact information or random selection into MTF's longitudinal study. Of eligible participants, 4358 were selected at random, oversampling those who reported vaping or other substance use. Of these participants, 1244 (28.5%) participated in a 1-year follow-up survey, which provides the data for these analyses. These participants ranged in age from 18 to 24, though the vast majority (93%) were 19 or 20. The Institutional Review Board of University of Michigan approved this study. This supplement's baseline survey captured a broad array of internalizing symptom items, as well as information on coping behaviors, educational trajectories, and economic outcomes related to the COVID-19 pandemic. This sample oversampled 12th grade students who vaped, but survey weights accounted for selection probabilities.

### 2.1 | Measures

#### 2.1.1 | Internalizing symptoms

Depressive symptoms were assessed with the Patient Health Questionnaire (PHQ-8) (Kroenke et al., 2009) and anxious symptoms were assessed with the Generalized Anxiety Disorder Scale (GAD-7) (Spitzer et al., 2006). These scales have been used to assess depression and anxiety in a wide variety of contexts, providing meaningful screening tools that capture core affective and behavioral symptoms in psychiatric settings (Johnson et al., 2019; Shin et al., 2019) and general population surveys alike (Arias-de la Torre et al., 2021; Kroenke et al., 2009; Löwe et al., 2008). Full items for each of these scales can be seen in Table SA1. These scales were structured similarly, with each asking "Over the past 2 weeks, how often have you been bothered by the following problems?" before reporting each symptom. Responses ranged from "not at all" (score of 0) to "several days" (1), "more than half the days" (2), and "nearly every day" (3). Each scale also generated a total score, adding the scores for every item together. The PHQ-8 scale exhibits strong sensitivity and specificity for major depression (88% for both metrics) (Kroenke et al., 2009) with a validated cutpoint of a total score  $\geq 10$  (out of 24). The GAD-7 had a sensitivity of 89% for diagnosing generalized anxiety disorder in the general population, and a specificity of 82% with a validated cutpoint of a total score  $\geq 10$  (out of 21) (Löwe et al., 2008). We queried the PHQ-8 (which excludes an item on suicidality) rather than the PHQ-9, as we were unable to conduct follow-up phone calls with people who indicate suicidality. This constituted a human subjects and liability concern, gathering that information without the ability to react to it in real time. Prior research has demonstrated the strong equivalency of the PHQ-8 and PHQ-9 in terms of scores, sensitivity, and specificity, suggesting minimal effect on our results (Wu et al., 2020).

Groups were divided further based on the extent to which their symptoms were attributed to the pandemic. For each PHQ-8 and GAD-7 item, respondents were asked "How much has COVID-19 influenced the following problems?" with response options of "No influence" (score of 0), "Somewhat" (1), "Very much (2), and "Completely" (3). These scores were summed for each scale to generate an index of symptom attribution to the COVID-19 pandemic. We used this index divides those with significantly high symptoms into two groups: those whose symptoms were more than somewhat attributed to the pandemic, and those whose symptoms were somewhat or not related attributed to the pandemic. This threshold for overall symptoms being "more than somewhat" attributed to the COVID pandemic was a COVID attribution index >8 for PHQ-8 and >7 for GAD-7. Ultimately, this resulted in three groups each for analyses of depressive and anxious symptoms: those without high symptoms, those with high symptoms more than somewhat attributed to the pandemic, and those with high symptoms *not* attributed to the pandemic more than somewhat. While some prior studies have implemented items examining attribution of life changes and mental health to the pandemic among young adults, (Haikal et al., 2021; Jardon & Choi, 2022) these have typically used a single item rather than a more comprehensive index relating to the attribution of specific symptoms to the pandemic.

### 2.1.2 | Demographic variables

Demographic variables were included to assess heterogeneity of depressive and anxious symptom group membership by sex, race/ethnicity, parental education, and urbanicity. These variables were also included as covariates in adjusted models. Responses were coded as male and female for sex. Race and ethnicity were pulled from two items: for ethnicity, people answered "Are you Hispanic or Latino/a?" with a yes or no. Then, for race, people selected all that applied of this list: Asian/South Asian, Native Hawaiian or Other Pacific Islander, Black or African American, American Indian or Alaskan Native, white, Arab/Middle Eastern/North African, or Other. These responses were then coded into the following groups: white, Hispanic/Latino, Black, Asian, and Other. Responses were coded as "college or more" and "some college or less" for the highest level of parental education. For urbanicity, responses were coded as rural, a small or medium city, a suburb of a small or medium city, a large or very large city, a suburb of a very large city, or "can't say"/mixed.

### 2.1.3 | Pandemic-related experiences

Respondents described the effect that the COVID-19 pandemic had on their education, employment, and other areas of their lives. We examined the educational effect of the pandemic with two items. First, respondents who were current students were asked "In Spring 2020, how (if at all) did your student status change because of the COVID-19 pandemic?" The outcome of interest was dropping classes

or experiencing any other major change to student status. The second educational item asked everyone "How (if at all), has the COVID-19 pandemic changed your student status or educational plans for Fall 2020?" Here, the outcome of interest was any major effect on educational plans defined by a change in course load (either reduced or increased), enrollment (dropping out, taking a gap term, or enrolling at a new school), or any other component of Fall 2020 educational plans. We examined employment with the item "Since March 2020, how has the COVID-19 pandemic affected your work?" before providing a list of potential effects that covered working remotely, changes to hours worked, loss of employment, issues with compensation or benefits, or difficulty arranging or affording child-care. Responses were condensed into "Any significant effect on employment since March 2020" versus "None." Additional COVID-related experiences were examined with the item "Have you experienced any of the following as a result of the COVID-19 pandemic?" Responses were dichotomized into "Lacked a place to sleep or money for rent, gas, or food due to COVID-19" versus "None of the above."

### 2.1.4 | Coping

Respondents were asked "To cope with social distancing and isolation, are you doing any of the following?" and then given a list of fourteen coping strategies, providing yes or no answers to each. These potential coping strategies included physical behaviors (e.g., taking care of your body, such as taking deep breaths, stretching, or meditating), social practices (e.g., connecting with others, including talking with people you trust about your concerns and how you are feeling), substance use (e.g., vaping more), and dietary behavior (e.g., eating more food than usual).

## 2.2 | Analyses

All analyses incorporated survey weights that addressed oversampling of those who vaped, as well as other elements of the complex survey design. Weights were calculated as the inverse of the probability of participation at follow-up based on covariates measured in 12th grade: birth-assigned sex, race/ethnicity, college plans, truancy, high school grades, number of parents in the home, religiosity, parental education, substance use, region, cohort, and sampling weight. Implementation of these weights, which account for nonresponse bias between Grade 12 and follow-up, allows for generalization back to the grade 12 MTF sample, which is nationally representative.

We analyzed the weighted prevalence of those with each symptom over the past 2 weeks and then divided those with each symptom based on whether respondents reported that their symptom was more than somewhat pandemic-attributable. To examine the association between COVID-19 and depressive or anxious symptoms overall, we examined multinomial logistic

regressions for each category of symptoms separately in Stata, producing relative risk ratios (RRR). That is, for depressive and anxious symptoms, multinomial logistic regressions examined the outcome of membership in three groups: those without high symptoms, those with high symptoms more than somewhat attributed to the pandemic, and those with high symptoms *not* attributed to the pandemic more than somewhat. First, symptom outcomes were predicted by each demographic factor separately to examine group differences in depressive and anxious symptoms. Then, separate models linked pandemic-related experiences to these outcomes, adjusting for demographics. Lastly, a final group of models predicted these symptom group outcomes using coping behaviors, adjusting for demographics, to examine how coping practices were associated with symptom outcomes. Analyses used pairwise deletion, given minimal missingness (<10% overall for any given model).

### 3 | RESULTS

Sample characteristics for the 1244 young adults in this study are reported in Table 1. This sample was predominantly male sex assigned at birth (55.4%), white (57.2%), had a parent who completed

**TABLE 1** Sample characteristics (overall  $N = 1244$  young adults, ages: 17–22, MTF Supplement 2020)

Demographic characteristics (weighted %)	
Sex*	
Female	44.1
Male	55.4
Race/ethnicity*	
White	57.2
Hispanic/Latino	18.0
Black	7.9
Asian	5.4
Other	10.7
Parental education*	
College or more	55.2
Some college or less	39.8
Urbanicity*	
Rural	16.2
A small or medium city	22.8
A suburb of a small or medium city	18.7
A large or very large city	18.4
A suburb of a large or very large city	14.3
Can't say, mixed	8.4

(Continues)

**TABLE 1** (Continued)

Demographic characteristics (weighted %)	
Mental health characteristics (%)	
Clinically high depressive symptoms, PHQ-8 (score $\geq 10$ )	28.0
Clinically high anxiety symptoms, GAD-7 (score $\geq 10$ )	20.8
Coping strategies (%)	
Making time to relax	61.9
Connecting with others, including talking with people you trust about your concerns and how you are feeling	53.1
Taking breaks from watching, reading, or listening to news stories, including social media	52.6
Taking care of your body, such as taking deep breaths, stretching, or meditating	46.4
Engaging in healthy behaviors like trying to eat healthy, well-balanced meals, exercising regularly, getting plenty of sleep, or avoiding alcohol and drugs	45.1
Eating more food than usual	26.7
Eating less food than usual	19.7
Using cannabis or marijuana	15.4
Vaping more	8.5
Drinking more alcohol	7.8
Contacting a healthcare provider	5.4
Using prescription drugs (like valium, etc.)	0.9
Using non-prescription drugs	0.9
Smoking more cigarettes	0.8
Pandemic-related experiences (%)	
Dropping any classes or other change to student status in Spring 2020	18.7
Major change to student status and educational plans in Fall 2020	46.4
Lacked a place to sleep or money for rent, gas, or food due to COVID-19	22.5
Significant impact on employment since March 2020	70.3

Abbreviations: GAD-7, Generalized Anxiety Disorder Scale; MTF, Monitoring the Future; PHQ-8, Patient Health Questionnaire.

\*Demographic Factors may not add to 100% due to data missingness.

college (55.2%), and were most likely to be found in an urban setting compared with suburban or rural settings (41.2% in cities of any size).

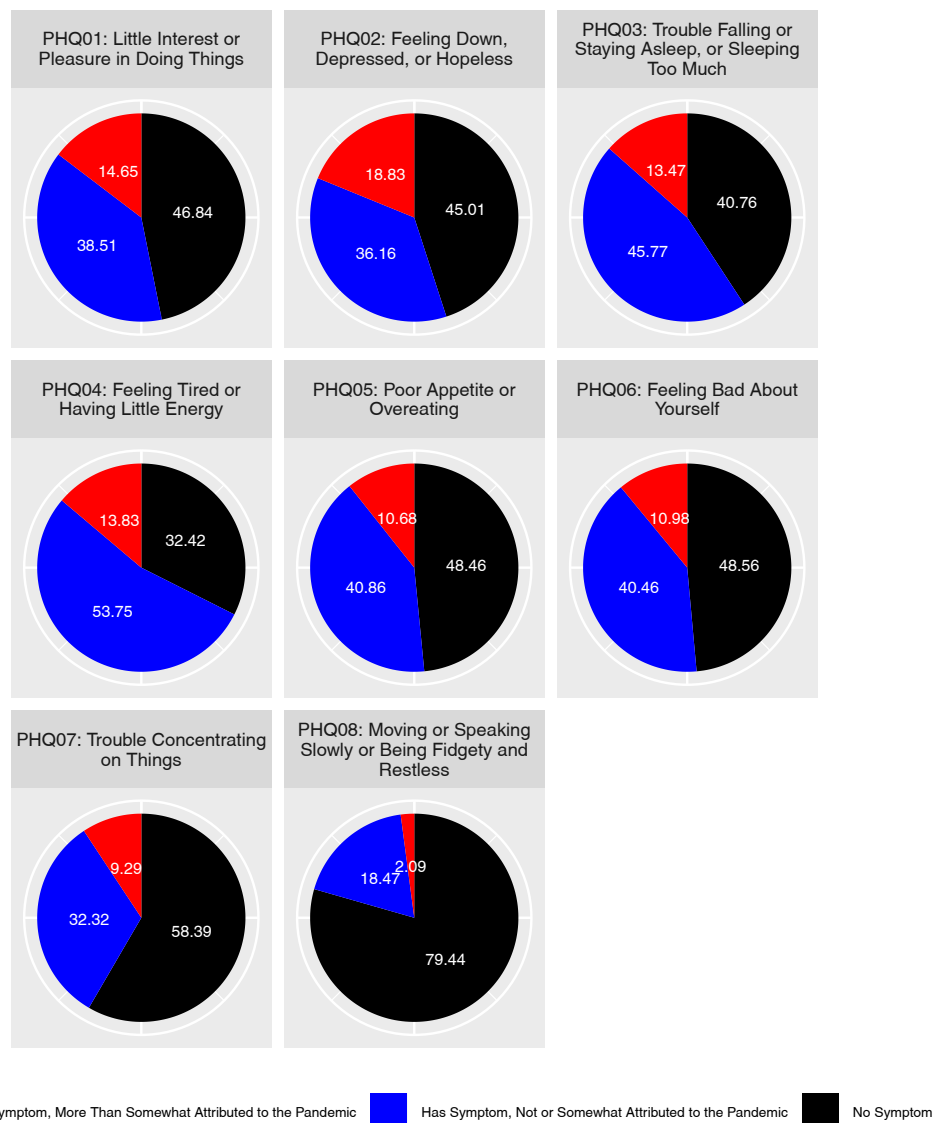
Depressive symptoms were highly prevalent in this sample (Figure 1), ranging from 20.6% prevalence in the past 2 weeks (moving or speaking slowly or being fidgety and restless) up to 67.6% (feeling tired or having little energy). Six out of eight symptoms were

prevalent in a majority of respondents (little interest or pleasure in things, feeling down/depressed/hopeless, sleep issues, feeling tired, poor appetite or overeating, and feeling bad about yourself). Dividing those with symptoms based on whether the symptoms were attributed more than somewhat to the pandemic, results showed that pandemic-attributed depressive symptoms were most common for little interest/pleasure in things (14.7% of respondents had this symptom attributed more than somewhat to the pandemic) and feeling down, depressed, or hopeless (18.8% had this symptom attributed more than somewhat to the pandemic).

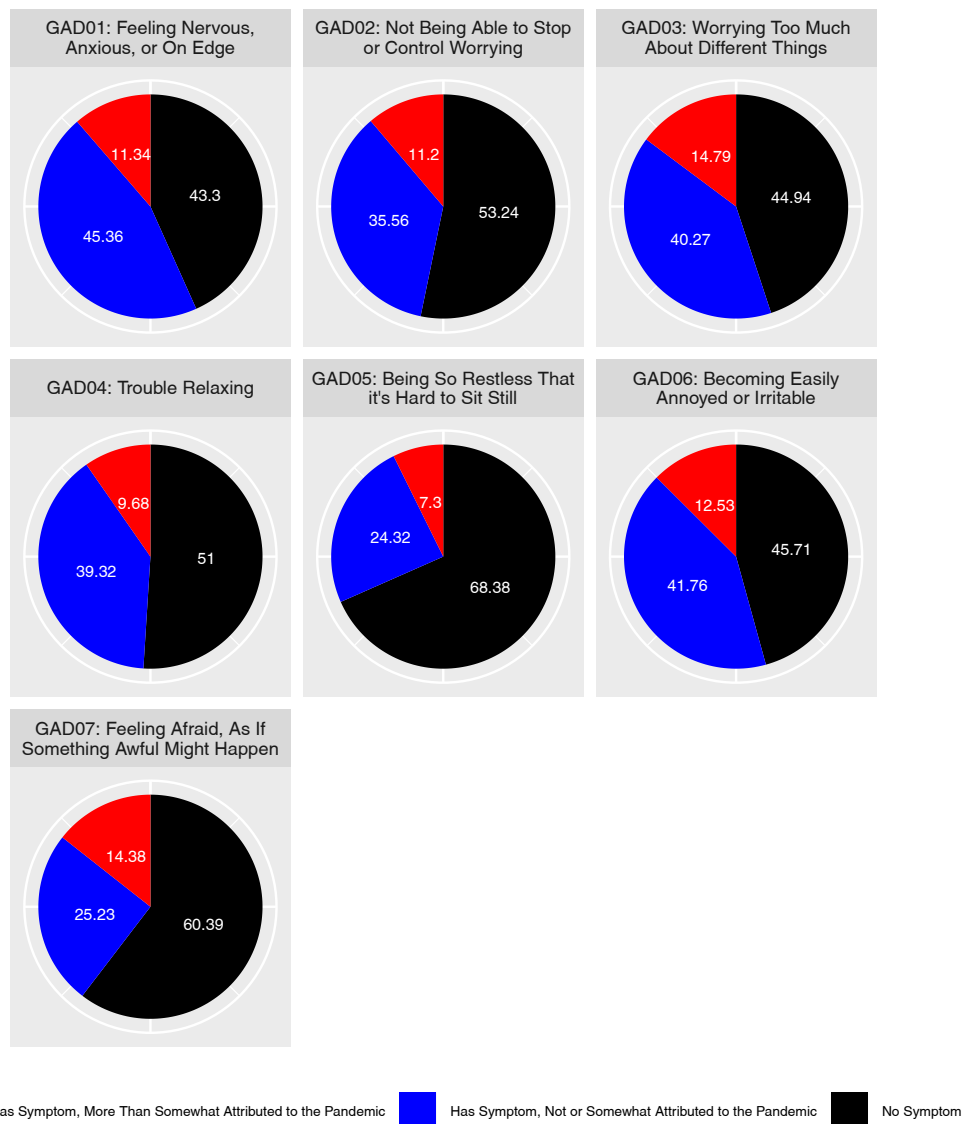
Anxious symptoms were also highly prevalent (Figure 2), ranging from 31.6% of respondents (being so restless that it's hard to sit still) to 56.7% (feeling nervous, anxious, or on edge). Pandemic-attributed anxious symptoms were most common for worrying too much about different things (14.8% had this symptom attributed more than somewhat to the pandemic) and feeling afraid, as if something awful might happen (14.4% had this symptom more than somewhat due to

the pandemic). Clinically high depressive symptoms were evident among 28.0% of respondents, while clinically high anxiety symptoms were seen among 20.8%. Relative to meta-analytic estimates in this population, studies using the PHQ-9 with the appropriate threshold for clinically high depression had an average prevalence of 28%, which matches our estimate precisely (Deng et al., 2021). While the meta-analytic estimate for GAD-7 studies predicting prevalence of anxiety still produced a relatively higher estimate (32% vs our estimate of 20.8%), several included studies featured an estimate in the low twenties, suggesting that our results fall within the natural heterogeneity of studies on this topic (Deng et al., 2021).

Table 2 shows results for multinomial regressions predicting the three membership groups (those without high symptoms, those with high symptoms more than somewhat attributed to the pandemic, and those with high symptoms *not* attributed to the pandemic more than somewhat) by demographic factors of sex, race/ethnicity, parental education, and urbanicity. For sex, the risk of depressive and anxious



**FIGURE 1** Depressive symptoms and pandemic attribution (with weighted percentages). PHQ, Patient Health Questionnaire



**FIGURE 2** Anxiety symptoms and pandemic attribution (with weighted percentages). GAD, Generalized Anxiety Disorder Scale

symptoms, either primarily attributed to the pandemic or not, was higher for female respondents (e.g., RRR for high depressive symptoms more than somewhat attributed to the pandemic (female vs. male): 1.74 [95% confidence interval [CI]: 1.08–2.82]). For race and ethnicity, risk of membership in either high symptom group was particularly elevated for respondents in the “Other” group (e.g., American Indian, Alaskan Native, Pacific Islander, and Middle Eastern respondents) compared to Black peers who had the lowest rates of significant depressive or anxious symptoms. Depressive and anxious symptoms were also elevated for white, Hispanic/Latino, and Asian respondents compared to Black respondents. For urbanicity, the risk of depressive and anxious symptoms, either attributed to the pandemic or not, was consistently highest in the “Can’t say”/mixed group.

The risk profile for high internalizing symptoms attributed to the pandemic across sex, race/ethnicity, and urbanicity was similar to the risk profile for high internalizing symptoms without major pandemic

attribution. However, for parental education, there was evidence of heterogeneous risk profiles for depressive symptoms. Risk of depressive symptoms that were not/minimally COVID-attributed was lower for those with higher parental education (RRR [College or more vs. some college or less]: 0.67 [95% CI: 0.45–0.98]). Risk for depressive symptoms that were highly COVID-related, however, was higher for those with higher parental education.

Table 3 demonstrates the amplified risk of depressive and anxious symptoms due to major shifts in education, employment, and other economic effects of the pandemic. Changes to student status and educational plans in both Spring 2020 and Fall 2020 were each associated with elevated risk for depressive and anxious symptoms, especially clinically high symptoms attributed more than somewhat to the pandemic. For instance, dropping classes or other major change to student status in Spring 2020 was linked to a demographic-adjusted RRR of 2.57 (95% CI: 1.37–4.81) for depressive symptoms attributed more than somewhat to the pandemic. The RRR was even

**TABLE 2** Depressive and anxious symptom group membership predicted by demographic factors, model sample size range: 1146–1189

Relative risk ratios for depressive symptom group membership (ref = Not clinically high PHQ score) predicted by demographic factors			
Demographic	Group	Clinically high symptoms not/only somewhat attributed to the pandemic RRR (95% CI)	Clinically high symptoms more than somewhat attributed to the pandemic RRR (95% CI)
Sex	Female (vs. male)	1.35 (0.92–1.99)	<b>1.74 (1.08–2.82)</b>
Race/ethnicity	white (vs. Black)	2.30 (0.95–5.54)	1.96 (0.71–5.42)
	Hispanic/Latino (vs. Black)	2.16 (0.85–5.50)	1.17 (0.38–3.67)
	Asian (vs. Black)	1.75 (0.58–5.27)	1.41 (0.34–5.92)
	Other (vs. Black)	<b>2.86 (1.06–7.74)</b>	<b>3.47 (1.02–11.82)</b>
Parental education	College or more (vs. some college or less)	<b>0.67 (0.45–0.98)</b>	1.25 (0.77–2.04)
Urbanicity	A small or medium city (vs. rural)	0.99 (0.56–1.73)	0.79 (0.39–1.61)
	A suburb of a small or medium city (vs. rural)	0.67 (0.37–1.21)	0.90 (0.42–1.90)
	A large or very large city (vs. rural)	0.69 (0.37–1.27)	0.61 (0.30–1.26)
	A suburb of a large or very large city (vs. rural)	0.74 (0.35–1.57)	0.46 (0.20–1.08)
	Can't say, mixed (vs. rural)	1.68 (0.71–3.96)	1.46 (0.48–4.41)
Relative risk ratios for anxious symptom group membership (ref = Not clinically high GAD score) predicted by demographic factors			
Demographic	Group	Clinically high symptoms not/only somewhat attributed to the pandemic RRR (95% CI)	Clinically high symptoms more than somewhat attributed to the pandemic RRR (95% CI)
Sex	Female (vs. male)	<b>2.11 (1.33–3.33)</b>	<b>2.03 (1.16–3.55)</b>
Race/ethnicity	white (vs. Black)	1.97 (0.72–5.38)	<b>3.66 (1.22–11.03)</b>
	Hispanic/Latino (vs. Black)	1.51 (0.50–4.59)	2.63 (0.82–8.45)
	Asian (vs. Black)	0.87 (0.23–3.32)	2.96 (0.76–11.59)
	Other (vs. Black)	1.83 (0.55–6.05)	<b>4.72 (1.31–16.95)</b>
Parental education	College or more (vs. some college or less)	0.91 (0.58–1.43)	0.87 (0.52–1.48)
Urbanicity	A small or medium city (vs. rural)	1.18 (0.59–2.34)	1.43 (0.67–3.03)
	A suburb of a small or medium city (vs. rural)	1.19 (0.59–2.41)	1.41 (0.58–3.44)
	A large or very large city (vs. rural)	0.66 (0.32–1.38)	0.95 (0.44–2.05)
	A suburb of a large or very large city (vs. rural)	0.90 (0.37–2.14)	0.97 (0.33–2.85)
	Can't say, mixed (vs. rural)	1.23 (0.53–2.87)	1.77 (0.58–5.43)

Abbreviations: CI, confidence interval; GAD-7, Generalized Anxiety Disorder Scale; PHQ-8, Patient Health Questionnaire; RRR, relative risk ratios.

\*Bolding signifies  $p < .05$ .

higher for those who experienced resource scarcity due to the pandemic, such as lacking a place to sleep or money for rent, gas, or food elevated risk of internalizing symptoms (aRRR for high depressive symptoms attributed more than somewhat to the

pandemic: 4.43 [95% CI: 2.59–7.55]). While these experiences posed a particularly major risk for anxious and depressive symptoms among young adults, these outcomes were also elevated among those who experienced more general changes to employment, such as shifts in

**TABLE 3** Associations (aRRR\* and 95% CI's) for pandemic-related experiences predicting depressive and anxious symptom group membership, model sample size range: 975\*\*–1142

Associations (aRRR and 95% CI's) for pandemic-related experiences predicting depressive symptom group membership (ref = not clinically high PHQ score)		
Pandemic-related experience	Clinically high symptoms not/only somewhat attributed to the pandemic aRRR (95% CI)	Clinically high symptoms more than somewhat attributed to the pandemic aRRR (95% CI)
Dropping any classes or other change to student status in Spring 2020	<b>1.88 (1.00–3.51)</b>	<b>2.57 (1.37–4.81)</b>
Major change to student status and educational plans in Fall 2020	1.39 (0.94–2.06)	<b>1.82 (1.14–2.89)</b>
Lacked a place to sleep or money for rent, gas, or food due to COVID-19	<b>1.74 (1.11–2.73)</b>	<b>4.43 (2.59–7.55)</b>
Significant impact on employment since March 2020	0.97 (0.64–1.46)	<b>2.02 (1.15–3.52)</b>
Associations (aRRR and 95% CI's) for pandemic-related experiences predicting anxious symptom group membership (ref = not clinically high GAD score)		
Pandemic-related experience	Clinically high symptoms not/only somewhat attributed to the pandemic aRRR (95% CI)	Clinically high symptoms more than somewhat attributed to the pandemic aRRR (95% CI)
Dropping any classes or other change to student status in Spring 2020	2.07 (0.95–4.50)	1.97 (0.98–3.99)
Major change to student status and educational plans in Fall 2020	1.26 (0.80–2.00)	<b>1.81 (1.07–3.07)</b>
Lacked a place to sleep or money for rent, gas, or food due to COVID-19	<b>1.85 (1.11–3.10)</b>	<b>3.31 (1.92–5.71)</b>
Significant impact on employment since March 2020	1.50 (0.88–2.53)	<b>2.24 (1.27–3.94)</b>

Abbreviations: aRRR, adjusted relative risk ratios; CI, confidence interval; GAD-7, Generalized Anxiety Disorder Scale; PHQ-8, Patient Health Questionnaire.

\*Adjusted for sex, race/ethnicity, parental education, and urbanicity; Bolding signifies  $p < .05$ .

\*\*Sample size for spring 2020 educational change models significantly reduced due to questionnaire structure, item was only asked to current students.

hours worked or compensation (aRRR for high anxious symptoms attributed more than somewhat to the pandemic due to major effect on employment since March 2020: 2.24 [95% CI: 1.27–3.94]).

Table 4 shows the associations between the utilization of coping practices and internalizing symptom outcomes. Notably, many forms of healthy coping rooted in physical or social behaviors were linked to a reduced risk of high symptoms (e.g., aRRR for “Taking care of your body, such as taking deep breaths, stretching, or meditating” predicting high depressive symptoms more than somewhat attributed to the pandemic: 0.57 [95% CI: 0.36–0.92]). Meanwhile, coping methods rooted in substance use and dietary changes were typically linked to higher symptoms, especially for high symptoms more than somewhat attributed to the pandemic (e.g., aRRR for “Vaping more” predicting high anxious symptoms more than somewhat attributed to the pandemic: 4.76 [95% CI: 2.08–10.93]).

While the link between coping strategies and internalizing symptoms was typically similar regardless of whether symptoms were primarily attributed to the pandemic, there were two notable coping strategies with heterogenous links to depressive symptoms based on whether those symptoms were pandemic-attributed. Taking

breaks from watching, reading, or listening to news stories, including social media was associated with mildly decreased risk of depressive symptoms not attributed to the pandemic (aRRR for high depressive symptoms = 0.88 [95% CI: 0.59–1.31]), but increased the risk for depressive symptoms attributed to the pandemic (aRRR for high depressive symptoms more than somewhat attributed to the pandemic: 1.60 [95% CI: 1.00–2.57]). A similar dynamic occurred for the coping mechanism of contacting a healthcare provider. For anxious symptoms, contacting a healthcare provider was strongly linked to anxious symptoms attributed more than somewhat to the pandemic (aRRR = 2.14 [95% CI: 1.03–4.47]) but not for anxious symptoms not/somewhat attributed to the pandemic (aRRR = 1.03 [95% CI: 0.47–2.28]).

## 4 | DISCUSSION

In the current SARS-CoV-2 pandemic, young adults have experienced high levels of depressive and anxious symptoms, and a portion of these symptoms could be attributed to the effects of the pandemic



**TABLE 4** Associations (aRRR\* and 95% CI's) for coping behaviors predicting depressive and anxious symptom group membership, model sample size range: 1126–1127

Associations (aRRR and 95% CI's) for coping behaviors predicting depressive symptom group membership (ref = not clinically high PHQ score)		
Coping behavior	Clinically high symptoms not/only somewhat attributed to the pandemic aRRR (95% CI)	Clinically high symptoms more than somewhat attributed to the pandemic aRRR (95% CI)
Taking breaks from watching, reading, or listening to news stories, including social media	0.88 (0.59–1.31)	<b>1.60 (1.00–2.57)</b>
Taking care of your body, such as taking deep breaths, stretching, or meditating	0.71 (0.47–1.06)	<b>0.57 (0.36–0.92)</b>
Engaging in healthy behaviors like trying to eat healthy, well-balanced meals, exercising regularly, getting plenty of sleep, or avoiding alcohol and drugs	<b>0.60 (0.40–0.89)</b>	0.76 (0.46–1.26)
Making time to relax	<b>0.55 (0.37–0.82)</b>	0.94 (0.58–1.52)
Connecting with others, including talking with people you trust about your concerns and how you are feeling	0.69 (0.46–1.03)	0.80 (0.50–1.29)
Contacting a healthcare provider	0.62 (0.24–1.62)	<b>2.89 (1.39–6.00)</b>
Smoking more cigarettes	0.34 (0.04–2.84)	0.91 (0.15–5.51)
Vaping more	<b>2.92 (1.41–6.09)</b>	<b>4.36 (2.09–9.12)</b>
Drinking more alcohol	1.02 (0.55–1.89)	<b>3.15 (1.60–6.22)</b>
Using prescription drugs (like valium, etc.)	2.98 (0.72–12.39)	<b>5.72 (1.66–19.68)</b>
Using non-prescription drugs	0.29 (0.03–2.85)	4.06 (0.92–17.97)
Using cannabis or marijuana	<b>2.43 (1.36–4.33)</b>	<b>4.00 (2.26–7.08)</b>
Eating more food than usual	<b>1.87 (1.23–2.85)</b>	<b>3.55 (2.20–5.75)</b>
Eating less food than usual	<b>2.35 (1.50–3.68)</b>	<b>3.29 (1.98–5.45)</b>
Associations (aRRR and 95% CI's) for coping behaviors predicting anxiety symptom group membership (ref = not clinically high GAD score)		
Coping behavior	Clinically high symptoms not/only somewhat attributed to the pandemic aRRR (95% CI)	Clinically high symptoms more than somewhat attributed to the pandemic aRRR (95% CI)
Taking breaks from watching, reading, or listening to news stories, including social media	1.34 (0.86–2.10)	<b>2.40 (1.45–3.97)</b>
Taking care of your body, such as taking deep breaths, stretching, or meditating	1.04 (0.66–1.66)	0.78 (0.45–1.34)
Engaging in healthy behaviors like trying to eat healthy, well-balanced meals, exercising regularly, getting plenty of sleep, or avoiding alcohol and drugs	0.73 (0.46–1.14)	0.88 (0.53–1.45)
Making time to relax	0.66 (0.42–1.04)	0.91 (0.54–1.52)
Connecting with others, including talking with people you trust about your concerns and how you are feeling	0.67 (0.42–1.07)	1.01 (0.61–1.70)
Contacting a healthcare provider	1.03 (0.47–2.28)	<b>2.14 (1.03–4.47)</b>
Smoking more cigarettes	0.60 (0.08–4.61)	0.87 (0.15–5.13)
Vaping more	<b>3.35 (1.51–7.44)</b>	<b>4.76 (2.08–10.93)</b>
Drinking more alcohol	1.36 (0.69–2.69)	<b>3.19 (1.61–6.30)</b>
Using prescription drugs (like valium, etc.)	0.60 (0.07–5.32)	3.27 (0.93–11.47)
Using non-prescription drugs	0.56 (0.07–4.75)	2.58 (0.40–16.73)
Using cannabis or marijuana	1.93 (1.00–3.75)	<b>5.24 (2.81–9.79)</b>

TABLE 4 (Continued)

Associations (aRRR and 95% CI's) for coping behaviors predicting anxiety symptom group membership (ref = not clinically high GAD score)		
Coping behavior	Clinically high symptoms not/only somewhat attributed to the pandemic aRRR (95% CI)	Clinically high symptoms more than somewhat attributed to the pandemic aRRR (95% CI)
Eating more food than usual	<b>2.21 (1.36–3.59)</b>	<b>2.27 (1.37–3.76)</b>
Eating less food than usual	1.41 (0.87–2.28)	<b>2.55 (1.43–4.57)</b>

Abbreviations: aRRR, adjusted relative risk ratios; CI, confidence interval; GAD-7, Generalized Anxiety Disorder Scale; PHQ-8, Patient Health Questionnaire.

\*Adjusted for sex, race/ethnicity, parental education, and urbanicity; Bolding signifies  $p < .05$ .

(e.g., educational, financial, housing-related). Risk of these symptoms was overall higher for female (vs. male) respondents, and for white, Hispanic/Latino, Asian, or "Other" race/ethnicity (vs. Black) respondents. Pandemic-related depressive symptoms specifically were slightly elevated for those with high parental education, while the opposite was true for depressive symptoms not attributed to the pandemic more than somewhat. Depressive and anxious symptoms, particularly when pandemic-attributable, were strongly predicted by significant changes to educational plans or practices, employment, or resource availability due to the pandemic. Healthy physical or social coping mechanisms were linked to reduced risk of these symptoms, while substance use and dietary changes were linked to elevated risk. Taking breaks from the news and contacting healthcare professionals were common coping behaviors highly prevalent among those whose depressive and anxious symptoms were mainly due to the pandemic. Ultimately, these findings reflect the need for urgent, major structural and social changes to improve the mental health of young adults in the pandemic.

Still, most people with each depressive or anxious symptom in this study reported that they were minimally attributable to the pandemic. These substantial symptoms unrelated to the pandemic reflect consistently increasing pre-pandemic trends in depressive and anxious symptoms (Goodwin et al., 2020; Keyes et al., 2019). However, adverse pandemic-related experiences were linked to elevated risk for clinically high depressive and anxious symptoms, regardless of whether young adults attributed their symptoms primarily to the pandemic. Thus, benefits of pandemic-related interventions and structural changes to address pandemic-related stressors may benefit all young people with clinically high depressive and anxious symptoms.

The expansion of accessible, affordable, equitable mental healthcare with remote telehealth options that address pandemic-related stressors would be useful, alleviating psychological distress for any number of young adults (Pfender, 2020). Additionally, interventions are needed to support productive coping methods and address maladaptive coping approaches that are consequences of the pandemic. Based on the coping mechanism results of our analyses, public health professionals should work towards the

promotion of physical wellness and social connection for those distressed by the pandemic, while still emphasizing the value of social distancing and protective measures. As pandemic-related clinically high depressive and anxious symptoms were linked to higher rates of contacting healthcare providers and taking breaks from the news, there may also be an unmet need for succinct, fact-based, readily accessible information on pandemic-related news and recommendations. Additionally, just as healthy coping behaviors should be promoted, we should also monitor elevated substance use and disrupted eating patterns which, in this study, were associated with elevated depressive and anxious symptoms, pandemic-related or not. Public health organizations should boost visibility for accessible resources to address those behaviors, such as text or video-based therapies or guided treatment plans from a connected, collaborative network of informed clinicians (Johns et al., 2019; Oesterle et al., 2020).

The suggestions described above would help young adults to healthily cope with the pandemic, but our results also highlight that young adults who report struggling with pandemic-related effects, like not having a place to sleep or money to buy gas or food, have a greater risk for depressive and anxious symptoms. Therefore, there is also a need for stronger structural support to address the socioeconomic and educational effects of COVID. Given the associations between educational changes and clinically high depressive and anxious symptoms, further research should examine whether the widespread implementation of specific policies, such as flexibility of coursework and grading, support for effective remote learning, and school-based support for mental health counseling, would have mental health benefits (Halliburton et al., 2021; Lederer et al., 2020). To address the harmful effects of employment/income shifts and resource scarcity, it is likely worthwhile to examine the potential benefits of increased governmental economic stimulus sent directly to citizens, as well as expansion of insurance coverage, unemployment benefits, housing support, and employment opportunities (Cuellar et al., 2020; Kim, 2021; Masand et al., 2021; Woolhandler & Himmelstein, 2020). These economic resources are vital for the improvement of young adults' mental health, though notably young people with higher parental education, a proxy for socioeconomic status, had higher pandemic-related depressive symptoms. Further research

should examine this interplay of diverse socioeconomic metrics and depressive and anxious symptoms.

This study had several strengths, including the use of thorough, validated measures for depressive and anxious symptoms. In addition to these scales, the measures of pandemic-related educational, employment, economic experiences, and coping were thorough, covering a broad array of potential experiences and behaviors. Still, as with any study, there were limitations. This measure of pandemic attribution for each symptom was self-reported, and the true extent to which a depressive or anxious symptom is due primarily to the pandemic may not align with a respondent's perception. Future research may include a clinician interview or more thorough questions that examine participant history, which may influence the perception of the extent to which symptoms were truly attributable to the pandemic. We were also unable to examine mental health treatment in this sample, which may impact the relationship between pandemic-related stressors and internalizing symptom outcomes. Given the cross-sectional nature of these data, we were unable to disentangle the directionality of associations or the durations of symptoms. These results do not necessarily apply to other age groups or countries, as pandemic-related experiences likely differ substantially. Additionally, people who reported substance use at baseline were oversampled, though survey weighting accounted for this oversampling and adjusted results accordingly.

## 5 | CONCLUSION

The COVID-19 pandemic added to the already substantial depressive and anxious symptoms of young adults. This psychiatric harm warrants urgent interventions that not only support effective coping practices but provide tangible socioeconomic resources.

### ACKNOWLEDGEMENTS

Data collection and manuscript preparation were supported by research grants from the National Institute on Drug Abuse: R01DA001411, R01DA016575, and R01DA048853; additional funding was provided by National Center for Injury Prevention and Control grant R49-CE003094. The study sponsors had no role in the study design, collection, analysis, or interpretation of the data, writing of the manuscript, or the decision to submit the paper for publication. The content is solely the responsibility of the authors and does not necessarily represent the official views of the study sponsor.

### CONFLICTS OF INTEREST

The authors declare no conflicts of interest. Study sponsors had no role in the study design, data collection, analysis or interpretation, report writing, or the decision to submit this manuscript for publication.

### DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study. Deidentified Monitoring the Future data are publicly available for download.

### ETHICS STATEMENT

Monitoring the Future is approved by the IRB of University of Michigan.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**How to cite this article:** Kreski, N. T., Keyes, K. M., Parks, M. J., & Patrick, M. E. (2022). Depressive and anxious symptoms among young adults in the COVID-19 pandemic: Results from monitoring the future. *Depression and Anxiety*, 39, 536-547. <https://doi.org/10.1002/da.23273>