# Symptoms of distress during the COVID-19 pandemic in the United States

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*Abstract: The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic in the United States can negatively impact physical and mental health. Participants were asked about psychosocial factors associated with experiencing symptoms of distress via surveys distributed on Social Media . Results showed that younger age, unemployment/losing wages/job, worse perceived general health (compared to excellent health) and recent smoking were consistently associated with increased odds of feelings of depression and anxiety. Further, females (aOR=1.96, 95% CI: 1.24, 3.11) was associated with increased odds of feelings of depression. Findings reinforce a call for widespread, targeted prevention and treatment interventions for particular groups.*

## INTRODUCTION

Coronavirus diseases 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). COVID-19 has proven to be not only a threat to an individual's physical health but also mental health. Since January 21, 2020, the United States has had more than 25 million confirmed and probable cases and over 420,000 deaths due to COVID-19 (CDC, 2021). The declaration of a global pandemic on March 11, 2020, by the World Health Organization (WHO), led officials in the United States to enact measures to combat the virus. Stay-at-home orders, a strategy that was implemented in order to slow the spread of the virus, began in late March with 9 states being under lockdown by March 23, 2020 (Mervosh et al., 2020). One month later, 42 states were under stay-at-home orders accounting for about 95% of the United States population (Mervosh et al., 2020).

Stay at home orders, which involve encouraging individuals not to leave their home for non-essential reasons, can result in feeling isolated and lonely. A large body of research has linked social isolation and loneliness to poor mental health including an increase of anxiety and depressive symptoms (Leigh-Hunt et al., 2017), increase substance use (Chou et al., 2011). Poor mental health and increased substance use among the U.S. adult population can be attributed to the compounding effect of the disruption of daily life, social isolation, unemployment, and worry of contracting the illness itself (Ettman et al., 2020). During late June, almost half of U.S. adults (40%) reported struggling with mental health and substance use after the COVID-19 epidemic was declared (Czeisler et al., 2020). One study found that the prevalence of depressive symptoms during the pandemic was three times higher compared to before the pandemic (Ettman et al., 2020). A study among college students concluded that higher levels of anxiety and depression were directly related to increased alcohol use over time (Lechner et al., 2020). Altogether, the COVID-19 pandemic can be seen as an event of collective trauma that has led to adaptive and maladaptive behaviors to protect against the virus, while also learning how to cope with COVID-19 related stressors. The aim of the present study is to characterize COVID-19 related symptoms of distress (including feelings of depression and anxiety) and to explore sociodemographic, psychosocial factors associated with experiencing symptoms of distress.

## METHODS

### Study participants and recruitment

We conducted an anonymous online survey that began August 15th, 2020 until September 15, 2020. Participants were recruited via Facebook and ResearchMatch. Specifically, advertisements for the study were shared on Facebook with a link to the survey. Interested participants were asked to click on the survey link to complete the survey. ResearchMatch is a online, national clinical research registry that 'matches'

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people who want to participate in clinical studies with researchers who are seeking volunteers. ResearchMatch has developed tools to filter potential eligible participants to participate in research studies. ResearchMatch provides standard notification language that is sent (via email) to all ResearchMatch volunteers who meet study eligibility criteria. Participants who were interested in participating in the study clicked on the link in the Facebook advertisement or ResearchMatch email and were screened for eligibility. Study eligibility included being 18 years of age or older, English speaking, residing in the United States, and providing completed responses to the survey questions. Before proceeding to complete the survey, each participant consented to participate in the study by providing a 'yes' response to the question "Do you agree to participate in this study?". Survey questionnaire was administered via Qualtrics. We used the Prevent Ballot Box Stuffing option when designing the survey in Qualtrics to detect and prevent duplicate responses. The Facebook ad reached 20,064 (i.e., the number of people who saw the ad at least once on Facebook). Of the 817 persons that clicked on the link within the ad to view the survey, 531 started completing the survey. Of the 1,322 prospective participants contacted via email on ResearchMatch, 64 indicated interest in participating in the survey. Of this 64, 58 began completing the survey. Of the 589 prospective participants that began the survey, 446 completed all responses. Therefore, of the 2,139 prospective participants that viewed the survey, 446 completed all responses representing an overall response rate of 22.9%. The survey was deemed exempt by the Institutional Review Board at Baylor University.

### Measures

Most of the demographic and substance use questions used in the survey were adapted from national surveys particularly the National Survey on Drug Use and Health (Center for Behavioral Health Statistics and Quality. & (2019)., 2019). COVID-19 related questions were adapted from several data collection tools compiled by the NIH Public Health Emergency and Disaster Research Response Program (NIH Public Health Emergency and Disaster Research Response (DR2), 2021).

### Outcome

Participants were asked to indicate the extent to which they agree or disagree with a list of psychosocial and behavioral factors since the outbreak of the COVID-19 pandemic. Specifically, participants were asked, "Since the outbreak of the COVID-19 pandemic … (1) I have experienced feelings of sadness or depression" (2) "I feel negative and/or anxious about the future" Response options were on a four-point Likert ranging from strongly agree to strongly disagree.
Demographics. Participants self-reported their age, gender, race/ethnicity, completed education, marital status, employment status (including whether they lost wages or their employment due to the COVID-19 pandemic), and health insurance status.

*COVID-19 screening and exposure.* Participants were asked the following questions about COVID-19 testing, exposure, and diagnosis: (1) *"Have you been tested for COVID-19 (SARS-CoV-2)?"*, (2) Among those with a 'yes' to the question above were asked, *"What was the result of your COVID-19 test (i.e. SARS-CoV2)?"* and (3) *"Has a member of your family/household tested positive for COVID-19 (SARS-CoV-2)?"*.

*Health status.* Participants were asked about the overall health with the following question, *"Would you say your health, in general, is excellent, very good, good, fair or poor?"*. We categorized responses as excellent/very good, good or fair/poor. Participants were also asked the following question about preexisting conditions "Has a doctor, nurse, or another health professional ever told you that you had any of the following conditions?". Response options ranged from respiratory (e.g. COPD, chronic bronchitis, Asthma, etc.), cardiovascular (e.g. stroke, congestive heart failure, heart attack, etc.) metabolic (e.g. diabetes), and cancer (e.g. lung, bladder cancers, leukemia, etc.). We created a binary variable (yes/no) if participants indicated affirmatively having any preexisting health condition.

*Substance use behaviors.* Participants were asked the following questions about their substance use behaviors: *In the past month:* (1) *"Have you smoked any cigarettes?"* (2) *"Have you, even once, had a drink of any type of alcoholic beverage?"* (3) *"Have you used cannabis or marijuana?"* Among those who responded with a 'yes' to any of the above questions, further questions asked how the COVID-19 pandemic may have changed their substance use behaviors. Specifically, participants were asked …*since the outbreak of COVID-19, has any of the following happened to you …* and response options included, *smoked/drank/used more than usual, smoked/drank/used less than usual, tried to stop smoking/drinking/using.*

### Data analysis

We used frequencies and percentages to describe the sociodemographic characteristics, COVID-19 screening and exposure, Substance use behaviors, and behavioral and psychosocial factors of the sample. The primary outcome for this analysis (1) Since the outbreak of the COVID-19 pandemic feelings of sadness or depression, and (2) Since the outbreak of the COVID-19 pandemic negative and/or anxious about the future. We operationalized each of the symptoms of distress into a binary variable (1=Agree/strongly agree and 0=Disagree/strongly disagree). We used separate bivariable logistic regression models to determine the relationships between sociodemographic and substance use behaviors with each psychosocial outcome. Next, we constructed a multivariable logistic regression model by including variables statistically significant at the bivariable level (using a

p-value level of <0.10 as the cut-off point) into the multivariable model. We calculated unadjusted and adjusted odds ratios and 95% confidence intervals. All statistical analysis was conducted using SAS version 9.4 SAS Institute Inc., Cary, North Carolina, USA).

## RESULTS

### Sample Characteristics

The study sample was comprised of (N=446) adults living in the United States. The median age of the sample was 60 years old (interquartile range=47, 67), with most being female (61%), white (86%), obtained a college degree or higher (54%), married or living together (64%), and employed (57%, Table 1). Over two-thirds of the sample had a history of a chronic condition (69.3%). Majority reported that they experienced feelings of sadness or depression (64.5%) and felt negative and/or anxious about the future (65.0%). Thirteen percent, 56%, and 13% reported smoking, alcohol, and marijuana use in the past 30 days respectively (Table 1).

### Factors associated with symptoms of distress

Table 2 displays results from the multivariable logistic regression models of factors associated with reporting symptoms of distress. Female respondents (compared to males) had significantly increased odds of experiencing all psychosocial outcomes compared to males. Also, there was a pattern of respondents with greater educational attainment to have increased odds of depression and anxiety symptoms. Respondents who were employed had significant increased odds of reporting symptoms of depression compared to those who were not employed (Table 2). Females had significantly increased odds of experiencing feelings of sadness or depression (aOR=1.96, 95% CI: 1.24, 3.11) compared to males. Respondents who responded that they had been tested for COVID-19 had significant increased odds of experiencing trouble concentrating (adjusted odds ratio (aOR) = 2.27, 95% confidence interval (CI): 1.32, 3.93) compared to those who had not tested. Respondents who indicated that they lost their job or wages due to COVID-19 had significantly increased odds of experiencing depression (aOR=2.47, 95% CI: 1.27, 4.77) and anxiety (aOR=3.02, 95% CI:1.48, 6.16) symptoms compared to those who did not (Table 2). There was a pattern indicating that respondents with good or fair/poor health (compared to those reporting excellent/very good health) reported increased odds of depression, anxiety symptoms, and trouble concentrating. Respondents who reported smoking in the past 30 days had reduced odds of reporting anxiety symptoms and trouble concentrating.

## DISCUSSION

In this sample of adults in the United States recruited online, COVID-19 related distress was common, with over two-thirds reporting depression and anxiety symptoms due to the COVID-19 pandemic. Younger age, identifying as a female, and higher educational status were consistently associated with increased odds of feelings of depression and anxiety.

Symptoms of distress particularly depression and anxiety symptoms are notable sequelae of traumatic events (Garfin, 2020) such as the COVID-19 pandemic. Elevated depression and anxiety symptoms increase the risk of poor physical and well-being outcomes. Studies have revealed that depression has been linked with heart disease (Carney & Freedland, 2017; Jani et al., 2016), insomnia (Peterson et al., 2008; Vargas & Perlis, 2020), inflammation (Beurel et al., 2020), and suicide (Chesney et al., 2014). Additionally, comorbid factors associated with depression and anxiety (e.g., substance use disorders) also increase the risk of poor physical and well-being outcomes. Specifically, elevated depression and anxiety symptoms are associated with alcohol (McHugh & Weiss, 2019), cannabis (Hanna et al., 2017; Kedzior & Laeber, 2014; Volkow et al., 2014), and illicit drug use disorders (Turner et al., 2018). Substance use disorders are associated with poor physical and well-being outcomes. The COVID-19 outbreak has now entered its ninth month in the U.S. and no efficacious vaccine has been approved. Further, the COVID-19 lockdowns in some states have resulted in an economic downturn. The reality is that symptoms of distress particularly depression and anxiety are likely going to be chronic, with an increase in their prevalence. Thus, additional resources and support to provide mental health treatment and prevention will be sorely needed now and post-COVID-19.

Our analyses also indicates that women and those who lost their jobs/wages because of COVID-19 had increased odds of depression and anxiety symptoms. This is consistent with national trends in which women are disproportionately impacted by COVID-19 in the U.S. for various reasons that are unique to their marginalized status. Women accounted for a higher percentage of job loss in the U.S. compared to men (Mahajan et al., 2020). The factors driving the disproportionate impact of COVID-19 on women include that jobs held by women are vulnerable to the COVID-19 crisis, holding 1 in 3 essential jobs (Robertson & Gebeloff, 2020), and bearing a disproportionate responsibility of caregiving following state lockdowns (Women, Caregiving, and COVID-19 | CDC Women's Health, 2020). More so, our study findings revealed that those who lost their jobs/wages because of COVID-19 had increased odds of depression and anxiety symptoms. This finding is consistent with data showing associations between unemployment and significant depression among adults in the United States (McGee, 2015). The COVID-19 induced economic downturn and the conseuqnt loss of millions of jobs and reduced wages is likely to worsen the mental health burden in the U.S.

**Table 1. Characteristics of the study sample (N=446)**

| Characteristics | n (%) |
|---|---|
| **Median age (IQR)** | 60 (47, 67) |
| **Sex** | |
| Male | 170 (38.6) |
| Female | 270 (61.4) |
| **Race/ethnicity** | |
| White | 359 (86.3) |
| Non-white | 30 (7.21) |
| Other | 27 (6.5) |
| **Education** | |
| High school diploma/GED | 73 (16.7) |
| Some college/Assoc Degree | 125 (28.6) |
| College degree | 113 (25.9) |
| Grad degree or higher | 126 (28.8) |
| **Marital Status** | |
| Single | 78 (17.8) |
| Married/living together | 282 (64.4) |
| Divorced, separated, widowed | 78 (17.8) |
| **Employed** | 235 (57.7) |
| Lost job or wages due to COVID-19 | 113 (26.0) |
| Health Insurance | 402 (92.0) |
| **Overall Health** | |
| Excellent/very good | 206 (46.8) |
| Good | 153 (34.8) |
| Fair/poor | 81 (18.4) |
| **History of chronic condition** | 309 (69.3) |
| Median BMI (IQR) | 28.5 (24.3, 32.9) |
| Tested for COVID-19 | 101 (23.2) |
| Family member has COVID-19/tested positive for COVID-19 | 75 (17.4) |
| Experienced feelings of sadness or depression | 283 (64.5) |
| Feel negative and/or anxious about the future | 284 (65.0) |
| Experienced changes in sleep | 226 (51.7) |
| Had trouble concentrating | 170 (38.8) |
| Fear how the COVID-19 pandemic will impact my medical care | 197 (45.1) |
| Have experienced financial difficulties | 148 (33.7) |
| Had trouble taking my medications as prescribed by my doctor | 38 (8.7) |
| **Past 30 days Smoking** | 56 (12.9) |
| Smoked more | 21 (39.6) |
| Smoked less | 10 (19.6) |

**Table 1. Characteristics of the study sample (N=446) Cont.**

| Characteristics | n (%) |
|---|---|
| Worried about smoking because of risk of COVID-19 | 24 (45.3) |
| **Past 30 days Alcohol** | 185 (56.8) |
| Drank more | 59 (32.8) |
| Drank less | 23 (13.5) |
| **Past 30 days Marijuana** | 57 (13.2) |
| Used more marijuana | 14 (20.9) |
| Used less marijuana | 6 (9.7) |

Taken together, intervention and prevention efforts for depression and anxiety would benefit from extending economic support more broadly in the population but also targeted at women.

Our study found that over half of participants reported alcohol use in the past 30 days, with about 13% reporting smoking and cannabis use within the past 30 days. Further, among those who used alcohol and smoked, a third reported drinking more and about 39% reported smoking more. In the bivariable analysis, drinking and smoking more were significantly correlated with experiencing depression and anxiety symptoms. Prior studies have reported increases in alcohol (Pollard et al., 2020) and smoking behaviors (Maloney, 2020) as well as drug use during the COVID-19 pandemic (Czeisler et al., 2020). The psychological distress associated with the COVID-19 pandemic, lockdowns, and economic decline may steer individuals to increase their use of substances as a coping mechanism. However, it is noteworthy that individuals with substance use disorders are at an increased risk of COVID-19 and its adverse outcomes including hospitalizations and deaths (Wang et al., 2020).

While our study has several strengths in establishing the association between mental health symptoms and substance use, in addition to revealing gender disparities in COVID-19 diagnoses and outcomes, there are few limitations related to the study design. Our sample was generally older (median age=60 years), less racially/ethnically diverse (7% non-white), and more educated (over 50% with a college degree) than the general U.S. population. Further, because of the modest response rate, generalizability of findings is limited, i.e., the findings observed in our study may be different from what might be observable in the general U.S. population. Second, depression and anxiety were assessed using a single question and those do not indicate clinically relevant elevated depression and anxiety symptoms. Third, our data were obtained via self, therefore encourage future research in this area to use multiple sources of data such as clinical diagnosis and medical charts.

**CONCLUSION**

Data from this sample of adults in the U.S. indicate that two in three individuals have experienced depressive and anxiety symptoms since the outbreak of the COVID-19 pandemic. The data also indicated a correlation between depression and anxiety symptoms and increased use of tobacco products and increased alcohol use. The study also highlights the gender disparity in women's exposure and diagnoses of COVID-19, which was associated with higher depressive and anxiety symptoms. Given that the effects of the COVID-19 pandemic might be prolonged, there is an urgent need for prevention and treatment interventions for symptoms of distress, together with phased economic relief broadly in the population but also among targeted groups.

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**Table 2. Characteristics associated with symptoms of distress**

| | Feelings of sadness or depression | | | Negative and/or anxious about the future | | |
|---|---|---|---|---|---|---|
| | OR 95% CI | p-value | AOR 95% CI | OR 95% CI | p-value | AOR 95% CI |
| **Age** | 0.96 (0.95, 0.98) | <0.01 | 0.97 (0.95, 0.99) | 0.95 (0.94, 0.97) | <0.01 | 0.96 (0.94, 0.98) |
| **Sex** | | <0.01 | | | <0.01 | |
| Male | Ref | | Ref | | | Ref |
| Female | 2.46 (1.64, 3.67) | | 1.96 (1.24, 3.11) | 2.06 (1.37, 3.08) | | 1.50 (0.94, 2.41) |
| **Race/ethnicity** | | 0.38 | | | 0.70 | |
| White | Ref | | | Ref | | |
| Non-white | 1.46 (0.63, 3.37) | | | 1.26 (0.56, 2.84) | | |
| Other | 0.66 (0.30, 1.46) | | | 0.78 (0.35, 1.75) | | |
| **Education** | | 0.012 | | | 0.02 | |
| High school diploma/GED | Ref | | | | | |
| Some college/Assoc Degree | 2.15 (1.19, 3.87) | | | 1.93 (1.06, 3.51) | | |
| College degree | 2.63 (1.43, 4.86) | | | 2.54 (1.36, 4.75) | | |
| Grad degree or higher | 2.22 (1.23, 4.02) | | | 1.44 (0.80, 2.60) | | |
| **Marital Status** | | 0.19 | | | 0.02 | |
| Single | Ref | | | Ref | | |
| Married/living together | 0.71 (0.41, 1.23) | | | 0.48 (0.26, 0.86) | | |
| Divorced, separated, widowed | 0.54 (0.28, 1.04) | | | 0.40 (0.20, 0.80) | | |
| **Employment status** | | <0.01 | | | <0.01 | |
| Employed | Ref | | Ref | Ref | | Ref |
| Lost job/wages | 3.78 (2.12, 6.74) | | 3.50 (1.91, 6.39) | 4.48 (2.44, 8.21) | | 3.92 (2.07, 7.44) |
| Not employed | 1.42 (0.89, 2.29) | | 1.81 (1.05, 3.11) | 1.37 (0.83, 2.13) | | 1.66 (0.97, 3.60) |
| **Health Insurance (vs. No)** | 1.65 (0.75, 3.62) | 0.21 | | 2.68 (1.09, 6.63) | 0.03 | |
| **Overall Health (vs. Excellent/very good)** | | 0.07 | | | 0.03 | |
| Excellent | Ref | | | | | |
| Good | 1.69 (1.07, 2.63) | | 1.86 (1.11, 3.12) | 1.72 (1.10, 2.69) | | 1.99 (1.18, 3.36) |
| Fair/poor | 1.22 (0.71, 2.07) | | 1.06 (0.57, 1.95) | 1.68 (0.97, 2.92) | | 1.86 (0.97, 3.75) |
| **History of chronic condition (vs. No)** | 0.99 (0.64, 1.52) | 0.96 | | 1.10 (0.72, 1.69) | 0.64 | |
| **Median BMI (per unit BMI)** | 1.00 (0.97, 1.03) | 0.70 | | 1.00 (0.97, 1.04) | 0.62 | |
| **Tested for COVID-19 (vs. No)** | 1.11 (0.69, 1.77) | 0.68 | | 1.19 (0.74, 1.91) | 0.48 | |
| **Family member has COVID-19/tested positive for COVID-19 (vs. No)** | 1.08 (0.64, 1.83) | 0.78 | | 2.44 (1.33, 4.47) | <0.01 | 1.97 (0.97, 3.75) |

**Table 2. Characteristics associated with symptoms of distress Cont.**

| | Feelings of sadness or depression | | | Negative and/or anxious about the future | | |
|---|---|---|---|---|---|---|
| | **OR 95% CI** | **p-value** | **AOR 95% CI** | **OR 95% CI** | **p-value** | **AOR 95% CI** |
| **Have experienced financial difficulties (vs. No)** | 3.15 (1.97, 5.03) | <0.01 | | 2.72 (1.72, 4.30) | <0.01 | |
| **Past 30 days Smoking (vs. No)** | 0.61 (0.34, 1.07) | 0.08 | 0.49 (0.26, 0.93) | 0.54 (0.31, 0.95) | 0.03 | 0.48 (0.25, 0.92) |
| **Smoked more (vs. No)** | 3.21 (0.99, 10.42) | 0.05 | | 3.65 (1.12, 11.90) | 0.03 | |
| **Smoked less (vs. No)** | 3.81 (0.72, 20.16) | 0.12 | | 1.43 (0.35, 5.83) | 0.62 | |
| **Past 30 days Alcohol Use (vs. No)** | 1.04 (0.65, 1.66) | 0.86 | | 0.89 (0.56, 1.43) | 0.64 | |
| **Drank more (vs. No)** | 5.41 (2.27, 12.89) | <0.01 | | 4.62 (2.02, 10.59) | <0.01 | |
| **Drank less (vs. No)** | 0.91 (0.36, 2.29) | 0.84 | | 1.52 (0.57, 4.10) | 0.41 | |
| **Past 30 days Marijuana (vs. No)** | 2.05 (1.07, 3.94) | 0.03 | | 1.85 (0.96, 3.56) | 0.07 | |
| **Used more marijuana (vs. No)** | 4.67 (0.56, 39.02) | 0.16 | | 2.27 (0.45, 11.45) | 0.32 | |
| **Used less marijuana (vs. No)** | 1.36 (0.15, 12.80) | 0.79 | | 1.51 (0.16, 14.12) | 0.72 | |

Note= OR=odds ratio, AOR=Adjusted odds ratio

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