Psychosocial impact of COVID-19 among adults in the southeastern United States

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ABSTRACT

Limited research has explored the mental health impact of coronavirus disease 2019 (COVID-19) in the U.S., especially among Black and low-income Americans who are disproportionately affected by COVID-19. To address this gap in the literature, we investigated factors associated with depressive and anxiety symptoms during the pandemic. From October to December 2020, over 4400 participants in the Southern Community Cohort Study (SCCS) completed a survey about the impact of the pandemic. The SCCS primarily enrolled adults with low income in 12 southeastern states. We used polytomous unconditional logistic regression to investigate factors associated with depressive and anxiety symptoms. About 28% of respondents reported mild or moderate/severe depressive symptoms and 30% reported mild or moderate/severe anxiety symptoms. Respondents in fair/poor health had significantly higher odds of moderate/severe depression and anxiety than those in very good/excellent health (depression: odds ratio (OR) = 4.72 [95% confidence interval (CI): 3.57–6.23]; anxiety: OR = 4.77 [95%CI: 3.63–6.28]). Similarly, living alone was associated with higher odds of moderate/severe depression and anxiety (depression: OR = 1.74 [95%CI: 1.38–2.18]; anxiety: OR = 1.57 [95%CI: 1.27–1.95]). Individuals whose physical activity or vegetable/fruit consumption decreased since the start of the pandemic also had higher odds of moderate/severe depression and anxiety. Results overall suggest that individuals in fair/poor health, living alone, and/or experiencing decreased physical activity and vegetable/fruit consumption have higher risk of depressive and anxiety symptoms. Clinical and public health interventions are needed to support individuals experiencing depression and anxiety during the pandemic.

1. Introduction

Beginning in early 2020, the coronavirus disease 2019 (COVID-19) pandemic abruptly changed daily life for Americans as the disease overwhelmed health systems, closed schools, threatened job security, and claimed lives. In the U.S., Black and low-income communities have disproportionately experienced the devastating effects of the pandemic on morbidity and mortality (Adhikari et al., 2020; Laurencin and McClinton, 2020; Webb Hooper et al., 2020). Recent studies have reported higher COVID-19 infection and death rates in communities with

greater percentages of Black and low-income residents, likely resulting from the nation's historical and contemporary legacy of structural racism and inequity (Adhikari et al., 2020; Johnson-Agbakwu et al., 2020; Laurencin and McClinton, 2020; Millett et al., 2020; Webb Hooper et al., 2020; Yancy, 2020).

Although most existing research has focused on the physical health implications of COVID-19, previous studies emphasize that pandemics and associated events (e.g., quarantine, job loss) can adversely affect mental health (Brooks et al., 2020; Rogers et al., 2020). For many Americans, the COVID-19 pandemic has increased social isolation, fears

about becoming infected, and concerns about job loss—which are among a myriad of ways in which COVID-19 may impact mental health (Bhattacharjee and Acharya, 2020; Galea et al., 2020; Pfefferbaum and North, 2020). The psychosocial impact of this pandemic may be even greater among minoritized racial and ethnic groups and low-income communities who have been disproportionately impacted by COVID-19 (Adhikari et al., 2020; Laurencin and McClinton, 2020; Webb Hooper et al., 2020).

Limited research has highlighted the mental health impact of COVID-19 on populations globally (Czeisler et al., 2021; Pan et al., 2021; Rettie and Daniels, 2020; Santomauro et al., 2021; Vindegaard and Benros, 2020; Xiong et al., 2020). Evidence in the U.S. is accumulating to suggest high rates of stress, depression, and anxiety symptoms since the start of the pandemic (Holingue et al., 2020; McGinty et al., 2020; Park et al., 2020; Saha et al., 2020; Xiong et al., 2020). Yet, few studies have assessed the psychosocial impact of the pandemic among communities disproportionately affected by COVID-19 (e.g., Black and low-income Americans). Evidence prior to the pandemic suggests a significant relationship between poverty and depression and anxiety as people with low income are more likely than those with high income to develop mental health disorders (Ridley et al., 2020; Sareen et al., 2011). Individuals with low income often experience repeated stress and threats—such as an inability to afford rent, food, and other necessities—yet have insufficient resources to manage these threats (American Psychological Association (APA) Working Group on Stress and Health Disparities, 2017; Lazarus and Folkman, 1984). Exposure to these repeated stressors is hypothesized to increase the prevalence of depression and anxiety. The relationship between poverty and mental health disorders is exacerbated for low-income Black Americans who are disproportionately exposed to racism and racial discrimination, which increases stress and threat exposure while also making it harder to access resources needed to mitigate these stressors (American Psychological Association (APA) Working Group on Stress and Health Disparities, 2017). This disproportionate threat exposure potentially explains why Black Americans have reported greater psychological distress than White Americans in prior studies (Williams, 2018). More research is needed to understand how the COVID-19 pandemic may impact mental health outcomes among Black and low-income populations because the pandemic may compound already existing stressors (e.g., job loss and poverty) for these populations.

In terms of protective factors, prior research suggests that receiving social support may buffer the negative effects of stressors on mental health outcomes (Gariépy et al., 2018; Kawachi and Berkman, 2001; Williams, 2018). Receiving emotional support (e.g., compassion and empathy) and instrumental support (e.g., help with transportation and daily chores) may provide resources needed to address stressors and reduce depression and anxiety. Emerging studies also suggest that receiving social support may buffer the negative impacts of the COVID-19 pandemic on mental health (Li et al., 2021; Muller et al., 2020; Woon et al., 2021; Woon et al., 2020). For example, in some circumstances social support may buffer the association between worrying about COVID-19 and psychological health problems (Szkody et al., 2021). However, most research assessing the relationship between social support and mental health during the pandemic has not prioritized Black and low-income populations.

Indeed, despite urgent calls to disentangle factors contributing to the psychosocial impact of COVID-19 across diverse communities (DeSouza et al., 2021; Galea and Ettman, 2021; Holmes et al., 2020; Purtle, 2020), there remains a paucity of research to date. To address this knowledge gap, we investigated sociodemographic and COVID-19 pandemic related behavior change factors associated with symptoms of depression and anxiety among participants in the Southern Community Cohort Study (SCCS), a prospective cohort study that primarily enrolled low-income adults visiting community health centers in the southeastern U.S. We also assessed whether social support buffered the association between these factors and symptoms of depression and anxiety.

2. Methods

2.1. Study design and participants

The SCCS was established in 2002 to examine health disparities in chronic diseases. Nearly 86,000 English-speaking adults between the ages of 40 and 79 years and living in 12 southeastern states (AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV) were enrolled between March 2002 and September 2009. Approximately two-thirds of enrolled participants self-identified as Black. Additional study details are provided elsewhere (Signorello et al., 2010; Signorello et al., 2005). Recruitment was conducted primarily (86%) through community health centers, institutions which largely provide health care to low-income and uninsured persons. Approximately 14% of participants were recruited via an age-, sex-, and race-stratified random sample of the general population. The baseline questionnaire captured demographic information such as respondent date of birth, sex, and race/ethnicity (Southern Community Cohort Study, 2021). The SCCS was reviewed and approved by institutional review boards at Vanderbilt University and Meharry Medical College. All participants provided informed consent.

To assess the impact of the COVID-19 pandemic on SCCS participants, we developed a survey with questions on testing and infection, physical and emotional health status, COVID-19 behaviors and beliefs, and household impacts. The survey was fielded between October and December 2020. SCCS participants were notified about the survey via the annual mailed newsletter ($n = 56{,}690$), an e-newsletter sent electronically ($n = 18{,}748$), and via personalized email invitation ($n = 15{,}122$). Non-responders to the email invitation received up to two reminder emails. According to the American Association for Public Opinion Research, the response rate was 24.4% among participants emailed a direct survey invitation. Details comparing the demographic characteristics of participants who responded to the survey to those who did not respond are presented elsewhere (Ni et al., 2021). Participants were considered complete if they reached question 162 of 205 questions on the survey, with an overall 98.0% completion rate ($n = 4512$). Participants received a $10 incentive for completing the survey. The final COVID-19 survey is publicly available on the SCCS website (Southern Community Cohort Study, 2020).

2.2. General health status measurement

General health status was assessed via questionnaire. To measure self-rated health status, respondents were asked if, in general, they would say their health is excellent, very good, good, fair, or poor. Respondents were also asked if any of the following factors changed (increased, decreased, or stayed the same) since the start of the pandemic: household employment, household income, screen time (television or video, social media, telephone, or video calls), physical activity, smoking, vegetable/fruit consumption, and alcohol intake.

2.3. Measurement of depression and anxiety symptoms

Depression and anxiety symptoms were assessed using the Patient-Reported Outcomes Measurement Information System (PROMIS) item bank version 1.0 depression and anxiety short forms 4a. The depression scale was comprised of four items and asked respondents how often in the past seven days they felt worthless, helpless, depressed, and hopeless. The anxiety scale was also comprised of four items and assessed how often respondents felt fearful, found it hard to focus, were overwhelmed by worries, and felt uneasy in the prior seven days. Both scales used a 5-point Likert-type response scale ranging from never (1) to always (5) and had high internal consistency (Cronbach's alpha (α) = 0.91 for depression and α = 0.90 for anxiety). As some respondents skipped items, raw scale scores ranging from 4 to 20 were submitted to the HealthMeasures Scoring Service (Assessment Center Scoring Service, n. d.) to compute T-scores. For depression, T-scores of 41 to <55 were

classified as within normal limits, 55 to <60 as mild, 60 to <70 as moderate, and 70 to 79.3 as severe. For anxiety, T-scores of 40.3 to <55 were classified as within normal limits, 55 to <60 as mild, 60 to <70 as moderate, and 70 to 81.4 as severe. These validated cut-points were based on guidance from the HealthMeasures Scoring Service (Health-Measures, 2021). As few respondents reported severe depression or anxiety (<5%), the moderate and severe categories for these outcomes were combined. Respondents with more than one missing scale item were excluded from analyses, yielding a total of 4414 individuals with depression scale information and 4411 respondents with anxiety scale information for subsequent analyses.

2.4. Measurement of emotional and instrumental support

Emotional and instrumental support were measured using the PROMIS item bank version 1.0 short forms 4a. The emotional support scale contained four items and queried, for example, how often respondents had someone to listen when they needed to talk. The instrumental support scale was also comprised of four items and, among other items, asked respondents about the availability of tangible support when needed (e.g., if they were confined to bed). These scales used a 5-point Likert-type response scale ranging from never (1) to always (5) and had high internal consistency ($\alpha = 0.96$ for emotional support and $\alpha = 0.95$ for instrumental support). Raw scale scores ranging from 4 to 20 were submitted to the HealthMeasures Scoring Service (Assessment Center Scoring Service, n.d.) for the computation of T-scores. Based on guidance from the HealthMeasures Scoring Service, T-scores of 25.8 to <30 were classified as very low, 30 to <40 as low, 40 to <60 as average, and 60 to 62 as high emotional support. For instrumental support, T-scores of 29.4 to <30 were classified as very low, 30 to <40 as low, 40 to <60 as average, and 60 to 63.3 as high instrumental support (Health-Measures, 2021). For ease of interpretation and given the distribution of emotional and instrumental support scores, these variables were classified as not high vs high. Respondents with more than one missing scale item were excluded from analyses, yielding a total of 4395 individuals with emotional support information and 4371 respondents with instrumental support information for analysis.

2.5. Statistical analysis

Frequency distributions of sociodemographic and pandemic-related behavior change predictors were examined by depression and anxiety using chi-square statistics. Polytomous unconditional logistic regression models were used to estimate odds ratios (OR) and 95% confidence intervals (CI) for mild and moderate/severe depression and anxiety in relation to within normal limits (referent). Independent sociodemographic variables examined as predictors of depression and anxiety included age at COVID-19 survey, gender, race/ethnicity, educational attainment, household income, current employment, household structure, and general health status. Significance of predictors was determined utilizing two-sided tests with a 0.05 nominal significance level. Potential effect modification by emotional and instrumental support was examined for all predictors by adding two-way interaction terms to models and performing joint tests to assess statistical significance. Effect modification analyses assessed whether emotional and instrumental support modified the relationship between the predictors (i.e., sociodemographic characteristics and COVID-19 pandemic related behavior changes) and the outcomes (i.e., depressive and anxiety symptoms). All statistical analyses were performed using SAS software version 9.4 (SAS Institute Inc., Cary, NC).

3. Results

3.1. Respondent characteristics and descriptive statistics

Most respondents were female (66%), White (56%), age 65 years or older (59%), retired (64%), and lived with others (70%). Approximately 38% of participants identified as Black. About 46% of respondents held a college degree, and 19% had an annual household income of less than $15,000. Approximately 17% of respondents reported they were in fair/poor health. Most respondents indicated that since the start of the COVID-19 pandemic, their screen time, smoking, vegetable/fruit consumption, and alcohol intake stayed the same. Nearly one quarter of respondents reported that their income decreased (23%) and that their physical activity decreased (30%). Approximately 28% of respondents reported depressive symptoms (15% mild and 13% moderate/severe) and 30% reported symptoms of anxiety (16% mild and 14% moderate/severe). About 22% of participants had symptoms of both depression and anxiety (mild or moderate/severe). The scales measuring depressive and anxiety symptoms were strongly correlated ($r = 0.78$). Respondent characteristics are presented in Table 1. Supplemental Table 1 provides a crosstabulation of the depression and anxiety symptom severity categories.

3.2. Depressive symptoms

Table 2 presents adjusted ORs for the associations between sociodemographic characteristics, COVID-related behavior change, and mild and moderate/severe depression for participants with available data on this outcome ($N = 4414$). Compared to respondents younger than age 65, those who were age 65–74 and 75+ years had significantly lower odds of mild depression (age 65–74: OR = 0.80 [95%CI: 0.65–0.99]; age 75+: OR = 0.60 [95%CI: 0.44–0.80]). Similar findings were observed for those with moderate/severe depression. Respondents who identified as Black or were employed full-time had lower odds of mild depression than respondents who identified as White or were retired, respectively (Black individuals: OR = 0.64 [95%CI: 0.52–0.78]; employed full time: OR = 0.69 [95%CI: 0.53–0.89]). Men, Black individuals, and those employed full-time had lower odds of moderate/severe depression compared to women, White individuals, and retired persons, respectively. Respondents living alone had higher odds of mild and moderate/severe depression than those living with others (Table 2). Individuals with low household income ($15,000 or less) had about 70% greater odds of moderate/severe depression compared to those having a household income of $50,000 or greater (OR = 1.70 [95%CI: 1.21–2.39]). Fair/poor health status was associated with over 4-fold greater odds of moderate/severe depression (OR = 4.72 [95%CI: 3.57–6.23]) compared to very good/excellent health status. Respondents whose income, physical activity, and vegetable/fruit consumption decreased had higher odds of depression (mild and moderate/severe) compared to respondents whose income, activity levels, and vegetable/fruit consumption stayed the same since the pandemic began (Table 2). Furthermore, respondents whose alcohol intake increased had higher odds of presenting with mild and moderate/severe depression symptoms (Table 2).

3.3. Anxiety symptoms

The sample size for the anxiety outcome was $N = 4411$. Overall, similar trends were observed for anxiety. Compared to respondents younger than age 65, those age 65–74 and 75+ years had lower odds of moderate/severe anxiety (age 65–74: OR = 0.46 [95%CI: 0.37–0.57]; age 75+: OR = 0.41 [95%CI: 0.29–0.57]). Respondents who identified as male or Black were less likely to report mild or moderate/severe anxiety than those who identified as female or White, respectively (Table 3). Individuals living alone were more likely to report mild and moderate/severe anxiety than those living with others (Table 3). Respondents in good or fair/poor health had significantly higher odds of mild anxiety compared to respondents in very good/excellent health (good health: OR = 1.87 [95%CI: 1.53–2.28]; fair/poor health: OR = 2.94 [2.28–3.79]). Individuals in good or fair/poor health were also more likely to report moderate/severe anxiety (good health: OR = 2.29

Table 1

Descriptive Characteristics of Southern Community Cohort Study Respondents, 2020.

Variable	Depression				Anxiety			
	Normal [a]	Mild [a]	Moderate/ severe [a]	P value	Normal [a]	Mild [a]	Moderate/ severe [a]	P value
Gender				<0.0001				<0.0001
Male	1188(37.1)	187(28.8)	137(24.2)		1187(38.7)	176(25.0)	148(23.1)	
Female	2011(62.9)	462(71.2)	429(75.8)		1881(61.3)	527(74.0)	492(76.9)	
Total	3199	649	566		3068	703	640	
Race/ethnicity				0.68				0.09
White, non-Hispanic	1774(55.5)	365(56.2)	316(55.8)		1747(56.9)	372(52.9)	332(51.9)	
Black, non-Hispanic	1230(38.4)	237(36.5)	210(37.1)		1129(36.8)	284(40.4)	262(40.9)	
Other/unknown	195(6.1)	47(7.2)	40(7.1)		192(6.3)	47(6.7)	46(7.2)	
Total	3199	649	566		3068	703	640	
Age at COVID-19 survey, y				<0.0001				<0.0001
<65	1211(37.9)	284(43.8)	323(57.1)		1114(36.3)	314(44.7)	385(60.2)	
65–74	1387(43.4)	276(42.5)	185(32.7)		1356(44.2)	302(43.0)	195(30.5)	
75+	601(18.8)	89(13.7)	58(10.2)		598(19.5)	87(12.4)	60(9.4)	
Total	3199	649	566		3068	703	640	
Household income, US$				<0.0001				<0.0001
<15,000	513(16.1)	139(21.5)	194(34.3)		498(16.3)	147(20.9)	199(31.1)	
15,000-49,000	1178(36.9)	262(40.4)	239(42.2)		1108(36.2)	299(42.6)	272(42.6)	
≥50,000	1503(47.1)	247(38.1)	133(23.5)		1458(47.6)	256(36.5)	168(26.3)	
Total	3194	648	566		3064	702	639	
Education				<0.0001				<0.0001
≤High school	636(20.3)	135(21.1)	182(32.6)		598(19.9)	155(22.4)	199(31.4)	
Some college/vocational	930(29.7)	209(32.7)	204(36.5)		884(29.5)	238(34.3)	218(34.4)	
≥College graduate	1565(50.0)	295(46.2)	173(30.9)		1518(50.6)	300(43.3)	216(34.1)	
Total	3131	639	559		3000	693	633	
Current employment				<0.0001				<0.0001
Work full time	788(24.6)	119(18.3)	95(16.8)		723(23.6)	145(20.6)	128(20.0)	
Work part time/unemployed	381(11.9)	99(15.3)	91(16.1)		352(11.5)	105(14.9)	115(18.0)	
Retired/homemaker	2030(63.5)	431(66.4)	380(67.1)		1993(65.0)	453(64.4)	397(62.0)	
Total	3199	649	566		3068	703	640	
Household living				<0.0001				<0.0001
Lives alone	835(26.2)	241(37.2)	234(41.6)		830(27.1)	231(32.9)	251(39.5)	
Lives with others	2355(73.8)	406(62.8)	329(58.4)		2228(72.9)	472(67.1)	385(60.5)	
Total	3190	647	563		3058	703	636	
General health status				<0.0001				<0.0001
Fair/poor	381(11.9)	152(23.4)	220(38.9)		369(12.0)	162(23.0)	224(35.0)	
Good	1121(35.0)	274(42.2)	210(37.1)		1044(34.0)	296(42.1)	261(40.8)	
Very good/excellent	1697(53.0)	223(34.4)	136(24.0)		1655(53.9)	245(34.9)	155(24.2)	
Total	3199	649	566		3068	703	640	
Anyone in household lost employment				0.001				<0.0001
No	2572(80.5)	505(77.8)	418(73.9)		2517(82.1)	523(74.5)	454(70.9)	
Yes	623(19.5)	144(22.2)	148(26.1)		548(17.9)	179(25.5)	186(29.1)	
Total	3195	649	566		3065	702	640	
Change in household income				<0.0001				<0.0001
Stayed the same	2343(73.3)	429(66.1)	320(56.7)		2262(73.8)	476(67.8)	352(55.2)	
Increased	217(6.8)	41(6.3)	35(6.2)		210(6.9)	45(6.4)	38(6.0)	
Decreased	637(19.9)	179(27.6)	209(37.1)		595(19.4)	181(25.8)	248(38.9)	
Total	3197	649	564		3067	702	638	
Change in screen time				<0.0001				<0.0001
Stayed the same	2638(82.5)	502(77.4)	417(73.7)		2051(66.9)	403(57.3)	325(50.8)	
Increased	546(17.1)	139(21.4)	138(24.4)		988(32.2)	284(40.4)	295(46.1)	
Decreased	15(0.5)	8(1.2)	11(1.9)		27(0.9)	16(2.3)	20(3.1)	
Total	3199	649	566		3053	702	638	
Change in physical activity				<0.0001				<0.0001
Stayed the same	1412(44.3)	245(37.9)	232(41.1)		1368(44.8)	289(41.2)	226(35.4)	
Increased	936(29.4)	161(24.9)	95(16.8)		892(29.2)	181(25.8)	122(19.1)	
Decreased	838(26.3)	240(37.2)	237(42.0)		793(26.0)	232(33.1)	290(45.5)	
Total	3186	646	564		3053	702	638	
Change in smoking				<0.0001				<0.0001
Stayed the same	3081(96.3)	604(93.1)	496(87.6)		2951(96.2)	657(93.5)	569(88.9)	
Increased	69(2.2)	30(4.6)	42(7.4)		63(2.1)	34(4.8)	45(7.0)	
Decreased	49(1.5)	15(2.3)	28(4.9)		54(1.8)	12(1.7)	26(4.1)	
Total	3199	649	566		3068	703	640	
Change in vegetable/fruit consumption				<0.0001				<0.0001
Stayed the same	2076(65.1)	375(58.0)	293(51.8)		2003(65.5)	425(60.6)	310(48.6)	
Increased	918(28.8)	185(28.6)	147(26.0)		871(28.5)	203(29.0)	178(27.9)	
Decreased	195(6.1)	87(13.4)	126(22.3)		186(6.1)	73(10.4)	150(23.5)	
Total	3189	647	566		3060	701	638	
Change in alcohol intake				<0.0001				<0.0001
Stayed the same	2508(78.9)	494(76.5)	395(70.2)		2423(79.5)	513(73.1)	455(71.7)	
Increased	301(9.5)	81(12.5)	93(16.5)		277(9.1)	103(14.7)	98(15.4)	
Decreased	369(11.6)	71(11.0)	75(13.3)		347(11.4)	86(12.3)	82(12.9)	
Total	3178	646	563		3047	702	635	
Emotional support				<0.0001				<0.0001

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Table 1 (*continued*)

Variable	Depression				Anxiety			
	Normal [a]	Mild [a]	Moderate/ severe [a]	P value	Normal [a]	Mild[a]	Moderate/ severe [a]	P value
Very low/low	195(6.1)	71(11.0)	155(27.5)		188(6.2)	82(11.8)	150(23.5)	
Average	1325(41.7)	398(61.9)	341(60.5)		1256(41.2)	418(60.0)	391(61.3)	
High	1657(52.2)	174(27.1)	68(12.1)		1602(52.6)	197(28.3)	97(15.2)	
Total	3177	643	564		3046	697	638	
Instrumental support				<0.0001				<0.0001
Very low/low	211(6.7)	95(14.8)	135(24.0)		215(7.1)	89(12.8)	140(22.0)	
Average	1120(35.5)	322(50.2)	322(57.2)		1039(34.3)	360(51.9)	363(57.1)	
High	1825(57.8)	224(34.9)	106(18.8)		1774(58.6)	245(35.3)	133(20.9)	
Total	3156	641	563		3028	694	636	

[a] Data are presented as number (percentage) of individuals.

[95%CI: 1.81–2.89]; fair/poor health: OR = 4.77 [95%CI: 3.63–6.28]). Higher odds of mild anxiety symptoms were associated with increased screen time (Table 3). Individuals who had someone in their household lose employment during the pandemic were more likely to report mild and moderate/severe anxiety symptoms (Table 3). Respondents whose household income, physical activity, or vegetable/fruit consumption decreased since the pandemic began were more likely to have moderate/ severe anxiety symptoms (Table 3). Greater alcohol intake was also associated with increased odds of moderate/severe anxiety (OR = 2.05 [95%CI: 1.54–2.74]). Individuals whose screen time increased or decreased were more likely to report moderate/severe anxiety (screen time increase: OR = 1.37 [95%CI: 1.08–1.73]; screen time decrease: OR = 3.79 [95%CI: 1.54–9.33]).

3.4. Effect modification by emotional or instrumental support

There was no evidence of effect modification of any predictor of depression by emotional or instrumental support (selected results shown in Supplemental Table 2). However, there was evidence of effect modification for race/ethnicity as a predictor of anxiety by emotional support (Table 4). Among those without high emotional support, Black individuals had lower odds of moderate/severe anxiety compared to White individuals (OR = 0.54 [95%CI: 0.42–0.70]). Yet, the odds of moderate/severe anxiety were not statistically different between Black and White individuals among those with high emotional support (OR = 0.85 [95%CI: 0.51–1.41]). Additionally, interaction results between instrumental support and household living as a predictor of anxiety were statistically significant (Table 4). Living alone was associated with an increased risk of moderate/severe anxiety among those without high instrumental support (OR = 1.27 [95%CI: 0.98–1.63]) but showed no association among those with high instrumental support (OR = 0.58 [95%CI: 0.30–1.14]).

4. Discussion

During the COVID-19 pandemic, we administered a survey exploring factors associated with symptoms of depression and anxiety among a diverse cohort of adults largely enrolled from community health centers in the southeastern U.S. Nearly three out of ten respondents reported mild or moderate/severe depressive symptoms, and about 30% reported mild or moderate/severe anxiety symptoms. Nearly a quarter of respondents reported that their income decreased since the pandemic began, and decreased income was associated with higher odds of presenting with moderate/severe depressive and anxiety symptoms. As research explores the long-term physical health impacts of COVID-19 infection, efforts should also consider long-term effects of the pandemic on mental health across diverse populations.

Unfortunately, lower-income Americans have experienced a disproportionate burden of financial insecurity during the pandemic, which may increase depression and anxiety (Pew Research Center, 2020). A recent study reported that the association between job/income loss and depression and anxiety varied across U.S. states during the pandemic,

but residing in a state with supportive policies (e.g., Medicaid expansion) weakened this association (Donnelly and Farina, 2021). This finding is of particular relevance for working-age SCCS participants given that this cohort was recruited from a U.S. region where many states have not adopted supportive policies like Medicaid expansion (Kaiser Family Foundation, 2021). Future work is needed to identify effective mental health interventions that support Americans who are living in states with fewer supportive policies and experiencing financial strain.

Public awareness of racial health disparities has also grown during the pandemic as studies consistently report disproportionate COVID-19 harms in Black communities (Millett et al., 2020; Yancy, 2020). We observed that when compared to White respondents, Black respondents had lower odds of mild and moderate/severe depression and anxiety symptoms. These results mirror the larger literature highlighting a paradox whereby minoritized racial and ethnic populations report fewer mental health problems than White populations despite their exposure to racism and greater adversity (Himle et al., 2009; McGuire and Miranda, 2008; Williams et al., 2007). Scholars have posited various explanations for this paradox, such as increased resilience within Black communities and measurement issues because widely used measures and diagnostic criteria may not equitably assess depression/anxiety symptoms across diverse communities (Adams et al., 2019; Alang, 2018; Alang, 2016; Riehm et al., 2021). Importantly, when Black Americans are diagnosed with mental health conditions, they are often untreated and more debilitating (Bailey et al., 2019; Williams et al., 2007). Racial disparities in mental health outcomes warrant attention in future studies. In particular, scholars should aim to address structural causes of depression and anxiety among diverse communities (e.g., racism, financial strain), which may have been exacerbated during the pandemic (Pew Research Center, 2020; Phelan and Link, 2015; Williams, 2018; Williams and Williams-Morris, 2000).

Evidence is also accumulating to suggest that greater social media exposure during the pandemic is associated with mental health problems, including anxiety (Gao et al., 2020; Xiong et al., 2020). Concordant with these data, we observed that respondents whose screen time increased (e.g., time spent on social media) had higher odds of moderate/severe anxiety. Interestingly, decreases in screen time were also associated with higher odds of moderate/severe anxiety. These results highlight a potentially complex relationship between screen time and mental health. Increased screen time may heighten exposure to distressing news (e.g., COVID-19 death rates), thereby increasing anxiety symptoms (Xiong et al., 2020). Alternatively, individuals may decrease their screen time to cope with anxiety. More research is needed to disentangle the relationship between screen time and mental health conditions.

Beyond social media exposure and screen time, health behaviors were also associated with depression and anxiety symptoms. Individuals whose physical activity or vegetable/fruit consumption decreased since the pandemic began had higher odds of moderate/severe depression and anxiety. These results mirror the larger literature noting the association between health promoting behaviors and mental health (Głąbska et al.,

Table 2

Association between Sociodemographic and COVID-related Factors and Depression Symptoms, Southern Community Cohort Study, 2020

Characteristic	Normal % of sample	Mild depression % of sample	Adjusted OR[a]	95% CI	P value	Moderate/severe depression % of sample	Adjusted OR[a]	95% CI	P value
Age at COVID-19 survey, y									
<65	27.4	6.4	1.0	Ref		7.3	1.0	Ref	
65–74	31.4	6.3	0.80	0.65–0.99	0.038	4.2	0.54	0.43–0.68	<0.0001
75+	13.6	2.0	0.60	0.44–0.80	0.001	1.3	0.45	0.32–0.63	<0.0001
Gender									
Female	45.6	10.5	1.0	Ref		9.7	1.0	Ref	
Male	26.9	4.2	0.80	0.65–0.97	0.027	3.1	0.74	0.59–0.93	0.011
Race/ethnicity									
White, non-Hispanic	40.2	8.3	1.0	Ref		7.2	1.0	Ref	
Black, non-Hispanic	27.9	5.4	0.64	0.52–0.78	<0.0001	4.8	0.46	0.36–0.58	<0.0001
Other/unknown	4.4	1.1	1.07	0.72–1.57	0.749	0.9	0.97	0.63–1.50	0.903
Education									
≤High school	14.7	3.1	0.80	0.62–1.05	0.110	4.2	1.16	0.87–1.54	0.315
Some college/vocational	21.5	4.8	0.92	0.74–1.15	0.450	4.7	1.12	0.87–1.45	0.373
≥College graduate	36.2	6.8	1.0	Ref		4.0	1.0	Ref	
Household income, US$									
<15,000	11.6	3.2	1.06	0.78–1.44	0.734	4.4	1.70	1.21–2.39	0.002
15,000-49,999	26.7	5.9	1.06	0.84–1.33	0.610	5.4	1.48	1.12–1.94	0.005
≥50,000	34.1	5.6	1.0	Ref		3.0	1.0	Ref	
Current employment									
Retired/homemaker	46.0	9.8	1.0	Ref		8.6	1.0	Ref	
Work full time	17.9	2.7	0.69	0.53–0.89	0.004	2.2	0.63	0.47–0.85	0.003
Work part time/unemployed	8.6	2.2	1.05	0.80–1.39	0.724	2.1	0.88	0.64–1.20	0.408
Household living									
Lives with others	53.5	9.2	1.0	Ref		7.5	1.0	Ref	
Lives alone	19.0	5.5	1.58	1.29–1.93	<0.0001	5.3	1.74	1.38–2.18	<0.0001
General health status									
Very good/excellent	38.4	5.1	1.0	Ref		3.1	1.0	Ref	
Good	25.4	6.2	1.87	1.52–2.30	<0.0001	4.8	1.94	1.51–2.48	<0.0001
Fair/poor	8.6	3.4	2.79	2.15–3.63	<0.0001	5.0	4.72	3.57–6.23	<0.0001
Anyone in household lost employment									
No	58.3	11.5	1.0	Ref		9.5	1.0	Ref	
Yes	14.1	3.3	1.06	0.81–1.39	0.663	3.4	1.15	0.86–1.54	0.336
Change in household income									
Decreased	14.4	4.1	1.31	1.02–1.68	0.034	4.7	1.89	1.46–2.46	<0.0001
Stayed the same	53.1	9.7	1.0	Ref		7.3	1.0	Ref	
Increased	4.9	0.9	1.12	0.78–1.61	0.539	0.8	1.13	0.74–1.72	0.574
Change in screen time									
Decreased	0.3	0.2	2.10	0.84–5.22	0.112	0.3	2.27	0.93–5.52	0.070
Stayed the same	59.8	11.4	1.0	Ref		9.5	1.0	Ref	
Increased	12.4	3.2	1.09	0.87–1.38	0.449	3.1	1.16	0.90–1.49	0.257
Change in physical activity									
Decreased	19.1	5.5	1.42	1.15–1.76	0.001	5.4	1.32	1.05–1.67	0.019
Stayed the same	32.1	5.6	1.0	Ref		5.3	1.0	Ref	
Increased	21.3	3.7	1.05	0.83–1.32	0.700	2.2	0.75	0.57–1.00	0.049
Change in smoking									
Decreased	1.1	0.3	1.11	0.59–2.08	0.752	0.6	1.65	0.96–2.85	0.072
Stayed the same	69.8	13.7	1.0	Ref		11.2	1.0	Ref	
Increased	1.6	0.7	1.47	0.92–2.35	0.104	1.0	1.59	1.01–2.50	0.047
Change in vegetable/fruit consumption									
Decreased	4.4	2.0	1.65	1.22–2.23	0.001	2.9	2.12	1.57–2.85	<0.0001
Stayed the same	47.2	8.5	1.0	Ref		6.7	1.0	Ref	
Increased	20.9	4.2	1.10	0.89–1.36	0.378	3.3	1.11	0.87–1.42	0.404
Change in alcohol intake									
Decreased	8.4	1.6	0.89	0.66–1.18	0.409	1.7	1.12	0.83–1.52	0.465
Stayed the same	57.2	11.3	1.0	Ref		9.0	1.0	Ref	
Increased	6.9	1.8	1.44	1.09–1.90	0.011	2.1	2.47	1.84–3.30	<0.0001

[a] Odds ratios from polytomous unconditional logistic regression models adjusted for all other factors listed in the table.

2020; McDowell et al., 2019). This finding is of particular relevance in our study given that rates of physical activity and vegetable/fruit consumption are already lowest in the southern U.S.—the region where study participants were recruited (Centers for Disease Control and Prevention, 2022; Lee et al., 2022). Accordingly, decreased physical activity and vegetable/fruit consumption may exacerbate existing regional disparities in health outcomes as physical inactivity and low vegetable/fruit consumption increase chronic disease risk (Oates et al., 2017; Parcha et al., 2021). Novel interventions are needed to address barriers to physical activity and vegetable/fruit consumption, such as limited access to walkable sidewalks and healthy foods.

Decades of prior research suggest that self-rated health status is a valid predictor of mortality across populations (Idler and Benyamini, 1997; Jylha, 2009; Schnittker and Bacak, 2014). Within the SCCS, self-rated health status was a strong predictor of depression and anxiety symptoms during the COVID-19 pandemic. Our results add to evidence in this field and suggest that self-rated health status is a strong predictor of mental health outcomes (Ambresin et al., 2014; Thielke et al., 2010). Future efforts are needed to identify and support the mental health needs of individuals with fair/poor self-rated health status.

Although several factors were associated with greater depressive and anxiety symptoms among SCCS participants, we also found evidence for

Table 3

Association between Sociodemographic and COVID-related Factors and Anxiety Symptoms, Southern Community Cohort Study, 2020

Characteristic	Normal	Mild anxiety				Moderate/severe anxiety			
	% of sample	% of sample	Adjusted OR[a]	95% CI	P value	% of sample	Adjusted OR[a]	95% CI	P value
Age at COVID-19 survey, y									
<65	25.3	7.1	1.0	Ref		8.7	1.0	Ref	
65–74	30.7	6.9	0.80	0.66–0.99	0.035	4.4	0.46	0.37–0.57	<0.0001
75+	13.6	2.0	0.59	0.44–0.80	0.001	1.4	0.41	0.29–0.57	<0.0001
Gender									
Female	42.6	12.0	1.0	Ref		11.2	1.0	Ref	
Male	26.9	4.0	0.61	0.50–0.75	<0.0001	3.4	0.65	0.51–0.81	0.0001
Race/ethnicity									
White, non-Hispanic	39.6	8.4	1.0	Ref		7.5	1.0	Ref	
Black, non-Hispanic	25.6	6.4	0.78	0.64–0.95	0.014	5.9	0.59	0.48–0.74	<0.0001
Other/unknown	4.4	1.1	1.21	0.83–1.76	0.323	1.0	1.06	0.70–1.61	0.780
Education									
≤High school	13.8	3.6	0.93	0.72–1.20	0.569	4.6	1.19	0.90–1.56	0.219
Some college/vocational	20.4	5.5	0.98	0.80–1.22	0.884	5.0	0.99	0.78–1.27	0.944
≥College graduate	35.1	6.9	1.0	Ref		5.0	1.0	Ref	
Household income, US$									
<15,000	11.3	3.3	1.01	0.75–1.37	0.933	4.5	1.29	0.93–1.78	0.131
15,000-49,999	25.2	6.8	1.14	0.91–1.42	0.253	6.2	1.28	0.99–1.66	0.058
≥50,000	33.1	5.8	1.0	Ref		3.8	1.0	Ref	
Current employment									
Retired/homemaker	45.2	10.3	1.0	Ref		9.0	1.0	Ref	
Work full time	16.4	3.3	0.80	0.62–1.02	0.072	2.9	0.83	0.63–1.09	0.182
Work part time/unemployed	8.0	2.4	1.07	0.82–1.41	0.624	2.6	1.15	0.86–1.53	0.363
Household									
Lives with others	50.7	10.7	1.0	Ref		8.8	1.0	Ref	
Lives alone	18.9	5.3	1.24	1.02–1.51	0.035	5.7	1.57	1.27–1.95	<0.0001
General health status									
Very good/excellent	37.5	5.6	1.0	Ref		3.5	1.0	Ref	
Good	23.7	6.7	1.87	1.53–2.28	<0.0001	5.9	2.29	1.81–2.89	<0.0001
Fair/poor	8.4	3.7	2.94	2.28–3.79	<0.0001	5.1	4.77	3.63–6.28	<0.0001
Anyone in household lost employment									
No	57.1	11.9	1.0	Ref		10.3	1.0	Ref	
Yes	12.4	4.1	1.52	1.18–1.96	0.001	4.2	1.33	1.02–1.75	0.038
Change in household income									
Decreased	13.5	4.1	1.02	0.80–1.30	0.899	5.6	1.71	1.33–2.20	<0.0001
Stayed the same	51.3	10.8	1.0	Ref		8.0	1.0	Ref	
Increased	4.8	1.0	0.97	0.68–1.39	0.878	0.9	1.09	0.73–1.63	0.668
Change in screen time									
Decreased	0.6	0.4	3.66	1.46–9.17	0.006	0.5	3.79	1.54–9.33	0.004
Stayed the same	46.5	9.1	1.0	Ref		7.4	1.0	Ref	
Increased	22.4	6.4	1.25	1.00–1.56	0.049	6.7	1.37	1.08–1.73	0.009
Change in physical activity									
Decreased	18.1	5.3	1.20	0.97–1.48	0.091	6.6	1.75	1.39–2.19	<0.0001
Stayed the same	31.1	6.6	1.0	Ref		5.1	1.0	Ref	
Increased	20.3	4.1	1.01	0.81–1.27	0.903	2.8	1.02	0.78–1.33	0.877
Change in smoking									
Decreased	1.2	0.3	0.65	0.33–1.28	0.215	0.6	1.12	0.65–1.95	0.678
Stayed the same	66.9	14.9	1.0	Ref		12.9	1.0	Ref	
Increased	1.4	0.8	1.61	1.03–2.52	0.038	1.0	1.58	1.00–2.48	0.048
Change in vegetable/fruit consumption									
Decreased	4.2	1.7	1.24	0.91–1.70	0.180	3.4	2.25	1.69–2.99	<0.0001
Stayed the same	45.5	9.7	1.0	Ref		7.1	1.0	Ref	
Increased	19.8	4.6	1.01	0.82–1.24	0.938	4.1	1.18	0.93–1.48	0.169
Change in alcohol intake									
Decreased	7.9	2.0	1.12	0.85–1.47	0.414	1.9	1.05	0.78–1.41	0.759
Stayed the same	55.3	11.7	1.0	Ref		10.4	1.0	Ref	
Increased	6.3	2.4	1.86	1.43–2.42	<0.0001	2.2	2.05	1.54–2.74	<0.0001

[a] Odds ratios from polytomous unconditional logistic regression models adjusted for all other factors listed in the table.

the buffering role of social support. For example, having high instrumental support appeared to weaken the positive association between living alone and moderate/severe anxiety. For individuals living alone, social support may be especially critical given a potential reliance on their social networks to navigate challenges arising from the pandemic, such as worry about the need for in-home care if they are diagnosed with COVID-19. Although prior research largely supports the buffering role of social support, studies have also yielded mixed results, with studies reporting conflicting evidence about specific situations in which social support provides positive benefits (Gleason et al., 2008; Maisel and Gable, 2009; Wang et al., 2018). For example, a recent study found that

social support buffered the relationship between COVID-19 worry and poor psychological health only when days in self-isolation were lower and worry about COVID-19 was higher (Szkody et al., 2021). In our study, we found evidence of effect modification by emotional and instrumental support for anxiety symptoms but not depressive symptoms. Similarly, evidence from a recent meta-analysis suggests that the relationship between social support and depression is not always straightforward and may only be statistically significant in certain situations (Gariépy et al., 2018). For example, the association between social support and depression can vary across the lifespan and fluctuate depending on who provides the support (e.g., a spouse or friend). We did

Table 4

Association between Sociodemographic and COVID-related Factors and Anxiety Symptoms, Stratified by Emotional and Instrumental Support, Southern Community Cohort Study, 2020

Characteristic	Normal	Mild anxiety				Moderate/severe anxiety			
	% of sample	% of sample	Adjusted OR[a]	95% CI	*P* value	% of sample	Adjusted OR[a]	95% CI	*P* value
Not high emotional support									
Race/ethnicity[b]									
White, non-Hispanic	30.8	10.6	1.0	Ref		11.3	1.0	Ref	
Black. Non-Hispanic	23.3	8.5	0.75	0.59–0.96	0.020	8.9	0.54	0.42–0.70	<0.0001
Other/unknown	4.0	1.0	0.68	0.41–1.14	0.145	1.6	0.85	0.53–1.38	0.518
Household living[c]									
Lives with others	38.9	12.5	1.0	Ref		12.6	1.0	Ref	
Lives alone	19.2	7.6	1.18	0.93–1.50	0.184	9.1	1.40	1.09–1.80	0.008
High emotional support									
Race/ethnicity									
White, non-Hispanic	51.2	5.6	1.0	Ref		2.6	1.0	Ref	
Black, non-Hispanic	28.5	3.6	0.81	0.56–1.18	0.268	2.2	0.85	0.51–1.41	0.522
Other/unknown	4.8	1.2	2.82	1.61–4.94	0.0003	0.3	1.27	0.47–3.45	0.635
Household living									
Lives with others	66.3	8.3	1.0	Ref		3.8	1.0	Ref	
Lives alone	18.2	2.2	0.96	0.64–1.43	0.826	1.3	1.11	0.64–1.91	0.713
Not high instrumental support									
Race/ethnicity[d]									
White, non-Hispanic	27.9	9.7	1.0	Ref		11.2	1.0	Ref	
Black, non-Hispanic	24.9	9.3	0.80	0.62–1.04	0.091	9.5	0.57	0.44–0.74	<0.0001
Other/unknown	4.0	1.4	1.03	0.64–1.68	0.896	2.0	1.21	0.76–1.93	0.421
Household living[e]									
Lives with others	31.7	11.1	1.0	Ref		11.9	1.0	Ref	
Lives alone	25.2	9.3	1.14	0.89–1.45	0.305	10.8	1.27	0.98–1.63	0.069
High instrumental support									
Race/ethnicity									
White, non-Hispanic	51.8	7.2	1.0	Ref		3.8	1.0	Ref	
Black, non-Hispanic	26.0	3.4	0.70	0.50–0.99	0.042	2.4	0.71	0.46–1.10	0.121
Other/unknown	4.7	0.7	1.46	0.79–2.69	0.230	0.05	0.16	0.02–1.18	0.072
Household living									
Lives with others	70.1	10.4	1.0	Ref		5.6	1.0	Ref	
Lives alone	12.3	1.0	0.55	0.34–0.91	0.020	0.6	0.58	0.30–1.14	0.112

[a] ORs from polytomous unconditional logistic regression models adjusted for all other factors listed in Tables 2–3.
[b] *P* value for interaction between race/ethnicity and emotional support for anxiety symptoms = 0.008.
[c] *P* value for interaction between household living and emotional support for anxiety symptoms = 0.27.
[d] *P* value for interaction between race/ethnicity and instrumental support for anxiety symptoms = 0.12.
[e] *P* value for interaction between household living and instrumental support for anxiety symptoms = 0.002.

not measure the source of social support, but it is possible that SCCS participants received social support from sources less likely to buffer against depression. Additionally, the relationship between social support and depression is less clear for Black and low-income Americans because research in this field has not prioritized these populations. It is possible that receiving social support from someone who does not understand the stressors associated with experiencing racism or poverty may not produce a buffering effect among Black and low-income populations. However, future research is needed to test this hypothesis and investigate the association between social support and mental health outcomes among diverse populations.

4.1. Study limitations and strengths

We acknowledge our study has limitations. First, our exposure and outcome variables were measured cross-sectionally, which limits our ability to distinguish causality. Second, the overall response rate for this survey was relatively low, suggesting that individuals most impacted by the pandemic may have been unable or unwilling to respond. The SCCS initially recruited adults between the ages of 40 and 79 years, which only allows generalization to older populations. A key strength of this paper is the use of depression and anxiety scales from the PROMIS item bank as PROMIS measures have been widely validated in numerous populations (Kroenke et al., 2021; Pilkonis et al., 2011; Schalet et al.,

2016). However, in our study and in other research, the depression and anxiety scales were strongly correlated and many participants with depressive symptoms also reported anxiety symptoms (Beuke et al., 2003; Jacobson and Newman, 2014; Pilkonis et al., 2011). This finding mirrors previous research indicating that depression and anxiety are highly comorbid with each other but also suggests that future work is needed to ensure that quantitative scales adequately measure symptoms of these two distinct disorders (Kalin, 2020). Another strength is the inclusion of a racially diverse sample, which included lower-income Americans and allowed us to assess predictors of depressive and anxiety symptoms within a population disproportionally impacted by COVID-19 and underrepresented in mental health research.

5. Conclusions

To our knowledge, this study is the first to examine psychosocial aspects of the COVID-19 pandemic in a large, racially diverse population comprised of low-income individuals from the southeastern U.S. We found that adults in fair/poor health, living alone, and who are experiencing reduced health-promoting behaviors are at greater risk of mental health challenges in the pandemic; however, social support may buffer some of these negative impacts. Accordingly, clinical and public health interventions are needed to support individuals experiencing depression and anxiety during the pandemic. It may be particularly

important for clinicians to screen patients in fair/poor health and/or living alone for depression and anxiety and connect patients to sources of support (e.g., social services and family support programs) as appropriate.

CRediT authorship contribution statement

Jennifer Richmond: Conceptualization, Writing – original draft, Writing – review & editing, Visualization. **Maureen Sanderson:** Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing, Visualization. **Martha J. Shrubsole:** Conceptualization, Investigation, Writing – review & editing, Project administration. **Andreana N. Holowatyj:** Conceptualization, Writing – original draft, Writing – review & editing. **David G. Schlundt:** Conceptualization, Methodology, Formal analysis, Writing – review & editing, Supervision. **Melinda C. Aldrich:** Conceptualization, Writing – review & editing, Supervision.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available to qualified researchers upon request from the Southern Community Cohort Study website at https://ors.southerncommunitystudy.org/

Appendix A. Supplementary material

Supplementary material for this article can be found online at https://doi.org/10.1016/j.ypmed.2022.107191.

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