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Research paper

The capacity to adapt: Documenting the relationship between stressors and probable depression, anxiety, and posttraumatic stress at two time points during the COVID-19 pandemic

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ABSTRACT

Background: Psychological adaptability, or the reduction of psychiatric symptoms in the context of ongoing stressors, is well-documented. The present study assessed relationships between COVID-19 related stressors and depression, anxiety, and post-traumatic stress (PTS) during April and July 2020.
Methods: Prevalence of, and changes in, symptom severity levels in April vs. July were measured with ANOVA F-tests. Logistic regressions were used to assess the odds of probable diagnosis.
Results: Symptom distributions skewed lower in July, as compared to April for all three diagnostic categories. From April to July, prevalence of probable anxiety and depression decreased across all levels of stress, prevalence of PTS increased for high stress, and decreased for medium and low stress levels. In July, only high stress related to higher odds of probable diagnoses, as compared to April when both medium and high stress did.
Limitations: Due to use of cross-sectional self-report data, the present findings could not establish causality between variables, and provide probable, rather than clinical, diagnoses.
Conclusion: Findings emphasize adaptability phenomena during COVID-19 and highlight the nuanced impact of ongoing stress.

1. Introduction

Psychological adaptability in the presence of large-scale disasters is well-documented (Makwana, 2019). Although psychiatric symptom levels and stressors both substantially increase during population-level crises, in the majority of people, psychological health recovers in the months after large-scale disasters (Brooks et al., 2020).

COVID-19 represents a different challenge to mental health. The global pandemic has proven to be an ongoing disaster, with stressors accumulating over time, particularly among persons who already had fewer assets and were more vulnerable before the pandemic's onset (Ettman et al., 2021; Rudenstine et al., 2020). COVID-19 related stressors have disproportionately affected low-income and often minority populations (Ambrose, 2020; Fortuna, 2020; Wilson et al., 2020) in the US. It is then not surprising that emerging data have shown that the prevalence of probable depression, anxiety and posttraumatic stress (PTS) is higher among under-resourced populations in the context of COVID-19 than in populations with a greater number of resources (US; Ettman et al., 2021; Rudenstine et al., 2020). Research internationally conducted across continents documented the role of health information on the relationship between perceptions of physical symptoms and mental health outcomes, specifically post-traumatic stress, broader stress, anxiety, and depression, during the pandemic (Wang, Chudzicka-Czupała, et al., 2021). Previous studies also explored the relationships between social location, physical health symptoms, rates of COVID-19, and mental health outcomes across various countries in Asia (Wang, Tee, et al., 2021). Additionally, COVID-19's unprecedented contagious spread impacted various forms of government lockdown, and psychological research documented the buffering impact of stringent lockdown measures on psychological distress (Lee et al., 2021b).

Research conducted during the ongoing pandemic has identified a variety of stressors associated with psychological health outcomes.

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Specifically, preliminary investigations into the psychological impact of infection itself, and long-COVID symptoms, have shown to be significantly associated with depression (Renaud-Charest et al., 2021). In addition, demographics such as student status, having a higher number of children, being a pregnant woman or a healthcare worker (Chew et al., 2020; Le et al., 2020; Nguyen et al., 2022; Wang et al., 2020a), as well as exposure to factors such as health information and discrimination (Tee et al., 2020; Wang, López-Núñez, et al., 2021), were found to be associated with psychological distress. Research also found that a loss of confidence in healthcare professionals (Wang, Fardin, et al., 2021), and having previously been a psychiatric patient (Hao et al., 2020) were significantly correlated with psychopathology during the pandemic.

However, further research that explores the shifting relationship between cumulative stress and mental health during COVID-19 is necessary to elucidate the mental health consequences of the pandemic over time. Prior research suggests that the mental health consequences of acute disaster related experiences differs from that of ongoing disaster stressors in the short- and long-term (Cerdá et al., 2013); how this applies to the COVID-19 moment remains unclear. Similarly, although we know that there are distinct courses and etiologies for differing psychiatric symptom outcomes (Friedman and Yehuda, 1995; Handwerger, 2009; Keane et al., 1997; Wanklyn et al., 2016) and that depression, anxiety, and PTSD have differences in prevalence, trajectory, and etiology after traumatic events (Gapen et al., 2011; Kar and Bastia, 2006), investigations of mental health in the context of COVID-19 have yet to examine the relationships between cumulative stress, or the quantity of stressors endorsed, and distinct symptom outcomes, particularly in low-income populations. One investigation, using a longitudinal analysis of changes in psychiatric symptomatology and stressors at two-time points during COVID-19, found that there was not a significant reduction in psychological distress in an urban Chinese population (Wang et al., 2020b). Relatedly, the present analyses explore potential shifts in psychological distress and pandemic-related stress exposure at two points during the pandemic, during an initial peak in cases and a subsequent drop in transmission rates, in an urban American population.

This study sought to document the prevalence of probable depression, anxiety, and posttraumatic stress as well as the experience of COVID-19 related stressors in April and July 2020 among two samples of urban under-resourced individuals enrolled in at least one course at the largest US public university with the aim of understanding the relation between shifts in cumulative stress and symptom outcomes throughout the pandemic.

2. Methods

2.1. Population

Our data were collected at two time points. Our first sample was collected from April 8, 2020–May 2, 2020 and is comprised of 2295 adults, 18 years of age and older, who were enrolled in at least one course at the City University of New York (CUNY). Our second sample was collected from July 9, 2020–July 31, 2020, and is comprised of adults who were enrolled in at least one course at the same university system. Both of our two samples were predominantly low-income. The distribution of household income for our April sample was as follows: 31.1 % endorsed household incomes of $75,000 and over, 25.5 % of $45,000–$74,999, 24.3 % of $20,000–$44,999, and 19.0 % of $0–$19,999. The distribution of household income for our July sample was as follows: 26.7 % reported incomes of $75,000 and over, 22.6 % of $45,000–$74,999, 28.5 % of $20,000–$44,999, and 22.2 % reported incomes of $0–$19,999. Seventy percent of both samples reported household incomes below the New York City median income level (U.S. Census Bureau, 2020).

The gender breakdowns for the two samples were similar. In April, 71.7 % of participants were female, 27.0 % of participants were male, and 1.3 % reported another gender, including transgender and nonbinary. In July, 68.6 % of the sample was female, 29.5 % was male, and 1.9 % endorsed another gender, including transgender and nonbinary. Similarly, the ethnoracial group membership breakdowns were comparable for the two samples. In April, 24.3 % of participants were non-Latinx White, 12.3 % were non-Latinx Black, 20.0 % were non-Latinx Asian, 39.5 % were Latinx, and 3.8 % were other, including Native Hawaiian, other Pacific Islander, American Indian, Alaskan Native, or multiracial. In July, 21.7 % were non-Latinx White, 14.3 % were non-Latinx Black, 22.8 % were non-Latinx Asian, 37.0 % were Latinx, and 4.2 % were other including Native Hawaiian, other Pacific Islander, American Indian, Alaskan Native, or multiracial.

2.2. Procedure

Using Qualtrics, the Intersect lab at the City College of New York, City University of New York, sent out a self-report survey via email in April and July to all individuals enrolled in at least one course across six CUNY campuses that measured demographic information, COVID-19 related stressors, and psychiatric symptom endorsements. Participants consented by opening the URL to the survey in the email and completing the surveys; they were not financially compensated. The institutional review board at CUNY approved the study.

2.3. Measures

2.3.1. Demographics

As indicated in our participant demographic breakdown, we defined ethnoracial group membership as seven exclusive categories: non-Latinx white, non-Latinx Black, Latinx, non-Latinx Asian, and non-Latinx other, including American Indian or Alaska Native, and Native Hawaiian or Other Pacific Islander, and multiracial. Gender was defined with three variables: female, male, or other, including transgender and non-binary. Education was measured with three mutually exclusive categorical levels: high school graduate or general education diploma (GED) equivalent, some college, and college graduate or more. Marital status was measured with four mutually exclusive categorical levels: married; widowed, divorced, or separated; never married; and living with a partner. Household income was measured with four categories: $0- less than $20,000; $20,000- less than $45,000; $45,000-less than $75,000; and $75,000 and over. Household income and household debt were measured with two categories: $0-less than $5000 and $5000 and over. The mean age for our two samples was as follows: 25.80 for April, ranging from 18 to 77 years, 26.42 in July, ranging from 18 to 70. We measured health insurance coverage with three categories: private health insurance, public health insurance, and no health insurance coverage.

2.3.2. PHQ-9

In order to measure depressive symptoms, we used the Patient Health Questionnaire-9 (PHQ-9), a clinically validated assessment tool with a significant cutoff score of 10, and sensitivity and specificity scores of 88.0 % (Kroenke et al., 2001), The measure has established reliability with a test-retest correlation of 0.84 (Kroenke et al., 2001). Our two samples yielded similar Cronbach's α of 0.89 for April and 0.90 for July. The measure uses nine items with four level response scales: 0- not at all, 1- several days, 2- more than half the days, 3- nearly every day. Symptom severity levels were defined as: minimal: a total score of 0–4 on the PHQ-9, mild: a score of 5–9, moderate: a score of 10–14, moderately severe: a score of 15–19, and severe: a score >20 (Kroenke et al., 2001).

2.3.3. GAD-7

We measured anxiety symptoms with the Generalized Anxiety Disorder-7 (GAD-7), a clinically validated assessment tool with a similarly significant cutoff score of 10, and sensitivity and specificity scores of 89.0 % (Spitzer et al., 2006). The measure has a test-retest correlation of 0.83. Our two samples yielded similar Cronbach's α of 0.92 for April

and 0.93 for July. The measure uses seven items with a four point scale: 0- not at all, 1- several days, 2- more than half the days, 3- nearly every day. Anxiety symptom severity was defined as none (a total score of 0–4), mild (5–9), moderate (10–14), and severe (≥15).

2.3.4. PC-PTSD

To assess posttraumatic stress (PTS), we used the Primary Care posttraumatic stress disorder screener (PC-PTSD), a clinically validated tool with a cut-off score of 3 (Prins et al., 2003). The scale has a sensitivity score of 91 %, and a test-retest correlation of 0.83. The measure assesses PTSD symptom types such as: avoidance, nightmares, numbness, startle (Prins et al., 2003). The Cronbach's α for our April sample was 0.70 and for July was 0.73.

2.3.5. COVID-19 stressors

Based on previous research that measured post-trauma and disaster responses, 15 items were used to assess COVID-19 related stress, including items that prompted for financial hardship and mortality rates (Boardman et al., 2001; Galea et al., 2008; Ettman et al., 2021; Rudenstine et al., 2022). The stressors used were: event cancellation due to COVID-19, seeing family in person less, seeing friends in person less, travel restrictions, death of a close relative or friend due to COVID-19, family or relationship problems, challenges finding childcare, feeling alone, not being able to get food due to shortages, not being able to get supplies due to shortages, losing a job, a member of the household losing a job, having financial problems, working remotely (away from the office), and having difficulty paying rent. Three levels of stressor exposure, based on previously documented levels, were: 1–2 stressors for low, 3–4 for medium, and >5 for high (Ettman et al., 2021; Rudenstine et al., 2020).

2.4. Data analysis

We first computed descriptive statistics to assess demographic characteristics of the two samples. We computed the percentages of each demographic endorsement, and stressor level, by prevalence of probable depression, anxiety, and PTS, using validated clinical cutoff scores. We subsequently assessed the prevalence of symptom severity levels in April vs. July via frequencies and chi-square analyses. We also measured probable diagnosis prevalence by month and stressor level, and assessed the significance of symptom prevalence changes via ANOVA F-tests. We used logistic regression to assess the odds of probable diagnosis by demographic endorsement and stressor level in each sample, using exponentiated slopes.

3. Results

Table 1 presents the overall demographic breakdown of the April and July samples, and the estimated prevalence of probable depression, anxiety, and PTS. Individuals with higher stressor levels, as well as those that identified as female, Latinx, and with low individual incomes and savings endorsed higher levels of psychiatric symptoms across time period and diagnosis.

Table 2 presents chi-square analyses and frequency results, demonstrating that the prevalence of depressive and anxiety symptom levels, as well as clinical levels of PTS reduced from April to July 2020. As shown, endorsements of no depressive symptoms and mild symptoms increased over time, and moderate, moderately severe, and severe depressive symptoms decreased. Similarly, for anxiety symptoms, minimal levels increased, and mild, moderate, and severe endorsements of symptom levels decreased. For PTS, subclinical symptom prevalence levels increased and clinical symptom levels decreased.

Table 3 presents the prevalence of each probable diagnosis among those who endorsed each stress level between April and July. From April to July, prevalence of probable anxiety decreased from 20.1 % to 14.0 %, $F(1,232) = 9.64$, $p = .002$, among those who endorsed low stress, from 33.8 % to 23.1 %, $F(1,318) = 3.66$, $p = .057$, among those who endorsed medium stress, and from 50.7 % to 46.1 %, $F(1,519) = 8.33$, $p = .004$, among those who endorsed high stress. Similarly, prevalence of probable depression decreased from 26.9 % to 21.0 %, $F(1,232) = 10.96$, $p = .001$, among those with low stress levels, from 42.1 % to 30.7 %, $F(1,317) = 3.54$, $p = .061$, among those with medium stress levels, and from 61.9 % to 54.4 %, $F(1,521) = 3.91$, $p = .049$, among those with high stress levels. Unlike probable depression and anxiety, the prevalence of PTS increased from 44.5 % to 46.4 %, $F(1,518) = 5.31$, $p = .022$, among those who experienced high stress levels between April and July. PTS prevalence decreased from 14.8 % to 14.1 %, $F(1,231) = 14.35$, $p < .001$, among those with low stress levels and from 25.2 % to 24.5 %, $F(1,317) = 4.35$, $p = .038$, among those with medium stress levels.

Table 4 presents logistic regression results, and specifically the odds of probable diagnosis for each demographic endorsement and stressor level. Compared to the April sample, where reports of household savings less than $5000 were associated with increased odds of probable PTS, household savings were not significantly associated with the likelihood of each probable diagnosis in July. No household income bracket had been significantly associated with likelihood of probable diagnosis in April; however, household incomes for $0–$19,999 and $20,000–$44,999 were significantly associated with higher odds of probable anxiety in July. In April, endorsements of medium and high stressor levels were significantly associated with higher odds of all three probable diagnoses. In July, only high stressor levels were significantly associated with probable diagnostic outcomes.

4. Discussion

Using data collected from two samples of urban adults at two time points during the COVID-19 pandemic, this study documented four key findings. First, COVID-19 related stressors proved to be a significant risk factor for depression and anxiety symptoms, as well as for PTS, at both time points. This is consistent with prior work that has documented the relation between cumulative stressor levels and psychological distress (Myers et al., 2015; Wang et al., 2020b). Second, despite similarly high stressor levels, the prevalence of probable depression, probable anxiety, and PTS among the July 2020 sample was lower than the prevalence in April 2020. This finding suggests the presence of adaptability in the context of an ongoing pandemic, and differs from a study conducted with an urban Chinese population, whereby there was no clinically significant reduction in symptomatology at a second pandemic timepoint (Cerdá et al., 2013; Norris et al., 2009; Wang et al., 2020b). Third, reporting only a high level of COVID-19 stressors increased the risk of probable depression, probable anxiety, and PTS in July, whereas reporting both medium and high levels of stressors increased the odds of probable depression, probable anxiety, and PTS in April. These findings emphasize the particular and shifting relationship between the intensity of COVID-19 stressors and psychological distress. Fourth, our findings highlighted a different trajectory for PTS, as compared to probable depression and probable anxiety, in relation to specific COVID-19 related stressors.

In accordance with previous post-disaster research, this study documents the adaptability of an urban under-resourced population despite of high levels of ongoing COVID-19 related stressors. Stated differently, while COVID-19 related cumulative stressor levels on average were high in both April and July, the prevalence of probable depression and anxiety was lower among the July sample as compared to the April sample. There are several explanations for this result. One, the reduction in new COVID-19 cases documented in July as compared to April 2020 in NYC and the resultant loosening of public health restrictions (i.e., stay at home orders) may have resulted in some psychological relief (*COVID-19 Cases in New York City by Date 2021*, August 24, 2021; *New York City Is Expected to Open June 8, Cuomo Says - The New York Times*, May 29, 2020). Two, there is considerable literature documenting the capacity of individuals to adapt to new, even potentially traumatic and/or stressful,

Table 1
Demographic characteristics and prevalence of probable diagnoses.

	Total				Probable Anxiety				Probable Depression				Probable PTS			
	April		July		April		July		April		July		April		July	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Total	2925	–	1073	–	951	–	226	–	1177	–	282	–	794	–	230	–
Age																
18 to 24	1468	62.84	431	58.80	620	65.75	154	68.44	814	70.35	188	67.38	480	61.38	143	62.72
25 to 34	559	23.93	185	25.24	231	24.50	53	23.56	247	21.35	63	22.58	211	26.98	54	23.68
35 to 44	176	7.53	62	8.46	61	6.47	12	5.33	58	5.01	18	6.45	59	7.54	19	8.33
45 to 54	87	3.72	34	4.64	20	2.12	4	1.78	25	2.16	7	2.51	22	2.81	7	3.07
55 to 64	37	1.58	18	2.46	10	1.06	2	0.89	13	1.12	3	1.08	9	1.15	5	2.19
65 or older	9	0.39	3	0.41	1	0.11	0	0.00	0	0.00	0	0.00	1	0.13		
Gender																
Male	634	26.99	217	29.52	208	22.01	50	22.42	277	23.82	64	22.86	177	22.46	46	20.26
Female	1685	71.73	504	68.57	717	75.87	166	74.44	862	74.12	207	73.93	598	75.89	177	77.97
Other (including transgender and non-binary)	30	1.28	14	1.90	20	2.12	7	3.14	24	2.06	9	3.21	13	1.65	4	1.76
Race - ACS																
Non-Latinx White	570	24.34	160	21.74	243	25.71	58	26.01	264	22.72	54	19.29	178	22.62	53	23.35
Non-Latinx Black	288	12.30	105	14.27	102	10.79	17	7.62	122	10.50	29	10.36	86	10.93	26	11.45
Non-Latinx Asian	469	20.03	168	22.83	166	17.57	53	23.77	240	20.65	70	25.00	135	17.15	49	21.59
Latinx	925	39.50	272	36.96	387	40.95	85	38.12	488	42.00	115	41.07	350	44.47	92	40.53
Other	90	3.84	31	4.21	47	4.97	10	4.48	48	4.13	12	4.29	38	4.83	7	3.08
Education																
High school diploma/GED	526	22.47	207	28.16	197	20.91	67	30.04	280	24.08	75	26.79	153	19.39	59	25.99
Some college	1171	50.02	305	41.50	519	55.10	89	39.91	621	53.40	126	45.00	425	53.87	101	44.49
College graduate or above	644	27.51	223	30.34	226	23.99	67	30.04	262	22.53	79	28.21	211	26.74	67	29.52
Marital status																
Married	282	12.12	105	14.71	101	10.74	15	6.79	107	9.26	21	7.61	93	11.88	31	13.78
Widowed, divorced, or separated	72	3.10	27	3.78	24	2.55	6	2.71	34	2.94	8	2.90	33	4.21	7	3.11
Never married	1804	77.56	523	73.25	749	79.68	181	81.90	943	81.57	229	82.97	592	75.61	171	76.00
Living with partner	168	7.22	59	8.26	66	7.02	19	8.60	72	6.23	18	6.52	65	8.30	16	7.11
Personal income																
$0 to less than $20,000	1465	73.10	409	69.44	628	74.85	155	75.61	796	77.89	189	77.78	503	72.69	145	73.60
$20,000 to less than $45,000	289	14.42	98	16.64	134	15.97	31	15.12	149	14.58	37	15.23	113	16.33	30	15.23
$45,000 to less than $75,000	174	8.68	52	8.83	58	6.91	12	5.85	60	5.87	11	4.53	59	8.53	14	7.11
$75,000 and over	76	3.79	30	5.09	19	2.26	7	3.41	17	1.66	6	2.47	17	2.46	8	4.06
Personal savings																
$0 to less than $5000	1364	74.78	402	74.72	616	79.69	146	76.84	743	80.76	179	80.63	492	77.48	137	76.54
$5000 and over	460	25.22	136	25.28	157	20.31	44	23.16	177	19.24	43	19.37	143	22.52	42	23.46
Personal debt																
$0 to less than $5000	1244	66.24	388	69.53	486	62.87	136	70.10	621	66.13	168	73.36	388	61.10	131	71.58
$5000 and over	634	33.76	170	30.47	287	37.13	58	29.90	318	33.87	61	26.64	247	38.90	52	28.42
Household income																
$0 to less than $20,000	405	19.83	136	22.15	177	20.85	52	24.53	219	21.28	66	26.09	161	22.84	51	24.88
$20,000 to less than $45,000	507	24.83	175	28.50	209	24.62	52	24.53	274	26.63	74	29.25	177	25.11	56	27.32
$45,000 to less than $75,000	507	24.83	139	22.64	227	26.74	49	23.11	265	25.75	52	20.55	182	25.82	43	20.98
$75,000 and over	623	30.51	164	26.71	236	27.80	59	27.83	271	25.75	61	24.11	185	26.24	55	26.83
Household savings																
$0 to less than $5000	855	43.71	252	43.22	389	47.21	91	45.27	463	46.72	111	45.68	347	50.51	86	44.56
$5000 and over	1101	56.29	331	56.78	435	52.79	110	54.73	528	53.28	132	54.32	340	49.49	107	55.44
Household debt																
$0 to less than $5000	838	46.97	252	43.22	313	41.68	91	50.00	398	43.83	108	51.18	248	40.33	89	51.74
$5000 and over	946	53.03	331	56.78	438	58.32	91	50.00	510	56.17	103	48.82	367	59.67	83	48.26
Health insurance																
Private health insurance	1308	56.89	384	54.55	500	53.82	121	55.00	596	52.14	133	48.90	405	55.98	116	51.56

(*continued on next page*)

Table 1 (*continued*)

	Total				Probable Anxiety				Probable Depression				Probable PTS			
	April		July		April		July		April		July		April		July	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Public health insurance	844	36.71	261	37.07	343	36.92	76	34.55	442	32.20	113	41.54	293	37.71	88	39.11
No health care insurance	147	6.39	59	8.38	86	9.26	23	10.45	105	9.19	26	9.56	79	6.31	21	9.33
Stressor score																
Low	468	16.23	222	22.72	73	7.68	22	9.78	98	8.34	33	11.74	54	6.84	22	9.61
Medium	882	30.58	335	34.29	251	26.42	56	24.89	313	26.64	74	26.33	187	23.67	59	59.00
High	1534	53.19	420	42.99	626	65.89	147	65.33	764	65.02	174	61.92	549	69.49	148	64.63

Note: Probable depression calculated using the Patient Health Questionnaire-9 (PHQ-9) with a clinical cutoff score of 10. Probable anxiety calculated using the Generalized Anxiety Disorder-7 (GAD-7) with a clinical cutoff score of 10. Probable PTS is calculated using the Primary Care-Post-Traumautic Stress Disorder (PC-PTSD) with a cutoff score of 3. Thirteen COVID-19 related stressors were assessed. Stressor scores were categorized as low (1–2), medium (3–4), and high (≥5) exposure to COVID-19-induced stressors.

Table 2
Prevalence of mental health outcomes and stressor severity in April vs. July.

	April (%)	July (%)	*p*-value
Depression symptom level			<0.001
None	19.7	29.4	
Mild	30.5	32.4	
Moderate	22.4	18.0	
Moderately severe	15.9	12.2	
Severe	11.4	8.0	
Anxiety symptom level			<0.001
Minimal	27.4	38.5	
Mild	32.3	30.8	
Moderate	20.4	16.3	
Severe	19.9	14.4	
PTS symptom level			<0.001
Subclinical level	66.4	68.7	
Clinical level	33.6	31.3	

Note: Depression categories calculated using the Patient Health Questionnaire-9 (PHQ-9): none (0–4), mild (5–9), moderate (10–14), moderately severe (15–19), and severe (≥20). Anxiety categories calculated using the Generalized Anxiety Disorder-7 (GAD-7): minimal (0–4), mild (5–9), moderate (10–14), and severe (15–21).

Table 3
Diagnostic symptom prevalence by stress level.

Probable diagnosis	Low stress		Medium stress		High stress	
	April (%)	July (%)	April (%)	July (%)	April (%)	July (%)
Depression	26.9	21.0	42.1	30.7	61.9	54.4
Anxiety	20.1	14.0	33.8	23.1	50.7	46.1
Post-traumatic stress	14.8	14.1	25.2	24.5	44.5	46.4

Note: Probable depression calculated using the Patient Health Questionnaire-9 (PHQ-9) with a clinical cutoff score of 10. Probable anxiety calculated using the Generalized Anxiety Disorder-7 (GAD-7) with a clinical cutoff score of 10. Probable PTS is calculated using the Primary Care-Post-Traumautic Stress Disorder (PC-PTSD) with a cutoff score of 3. Thirteen COVID-19 related stressors were assessed. Stressor scores were categorized as low (1–2), medium (3–4), and high (≥5) exposure to COVID-19-induced stressors.

life circumstances (Birmes et al., 2009; Rudenstine & Galea, 2011; Uruk et al., 2007). Our use of the term adapt versus resilience is intentional and worth explaining. Resilient trajectories of health in the post-disaster context typically refer to individuals who display initial psychological distress in the aftermath of a potentially traumatic event followed a return to a baseline level of functioning (Abramson et al., 2015; Brooks et al., 2015; Gruebner et al., 2015). Adaptability, on the other hand, refers to an individual's capacity to adapt in the context of ongoing stressors/potentially traumatic events (PTE). For example, an individual may experience a brief period of psychological distress when exposed to a persistent/ongoing PTE or chronic stressor, and subsequently acclimate while the stressor/PTE persists (Besser et al., 2020; Cameron and Schoenfeld, 2018; Goldberg et al., 2020). In this vein, the surge in psychiatric symptoms in the face of a new stressor subsides as the stressor becomes familiar (Cicchetti and Rogosch, 2009; Diamond et al., 2013). Last, the timing of the second survey may also reflect changed conditions that people were living under; with warmer weather in July 2020 and lower COVID case counts, people were able to interact safely outside and could potentially access social networks that were inaccessible in April 2020. This speaks to the context-specific nature of psychiatric disorders. Nevertheless, these data suggest that while the broader context may have shifted, the stressor levels among the samples were stable. Importantly, this is not to presume that the challenges posed by COVID-19 related stressors become less burdensome, rather it demonstrates that as individuals renormalize to such ongoing stress, these challenges are less likely to contribute to psychopathological outcomes.

The capacity to adapt is important to highlight given the marginalization experienced by lower-income urban populations and the compounded stressors experienced by low-SES populations during COVID-19 (Lee et al., 2021a; Rudenstine et al., 2020). This capacity to adapt is apparent in research outside of the disaster context. Low-SES populations have been found to experience higher levels of daily stressors and potentially traumatic events as compared to high-SES populations, however they have not been found to have significantly higher levels of diagnostic symptoms, which may indicate the presence of adaptability phenomena within low-SES communities (Camacho-Rivera et al., 2015; Choi and Jun, 2009; Eby, 2004; Kysar-Moon, 2020; Santiago et al., 2016). Understanding the etiology/determinants of adaptability in the context of chronic stress is important to our understanding of mental health and will inform prevention and intervention efforts. There is a growing body of literature that aims to understand what factors contribute to an individual's capacity to adapt (Park et al., 2015; Rodin et al., 2017; Rudenstine and Espinosa, 2018). For example, an individual's ability to metabolize and verbalize their emotional experience of a PTE/stressor has been shown to be more indicative of their mental health consequences than the experience of the PTE/stressor itself (Iida, 2016; Knowles and O'Connor, 2015; McFarland and Alvaro, 2000; Rudenstine and Espinosa, 2018). Yet, at the same time, over-relying on adaptability narratives runs the risk of dismissing the short- and long-term effect of chronic stressors that disproportionately affect vulnerable/under resourced populations. Accounting for both human adaptability, while highlighting the continuous distress experienced by many, is important for accurate understandings of the specific relationship between COVID-19 and psychological health, and the ways this relationship progressively shifts.

Fewer stressors overall were significantly associated with a probable diagnosis for PTS, as compared with probable diagnoses for depression and anxiety. Much of the etiological research regarding PTS highlights the role of fear and the presence of a distinctly debilitating event as a

Table 4
Weighted odds of probable depression, anxiety, and PTS endorsement by resources.

Resources	April			July		
	Depression OR (95 % CI)	Anxiety OR (95 % CI)	PTS (95 % CI)	Depression OR (95 % CI)	Anxiety OR (95 % CI)	PTS (95 % CI)
Education						
High school graduate/GED	1.0 (0.7–1.4)	0.8 (0.6–1.1)	0.7* (0.5–0.9)	0.7 (0.4–1.2)	0.9 (0.51–1.5)	0.70 (0.4–1.2)
Some college	1.03 (0.8–1.3)	1.1 (0.8–1.4)	0.8 (0.6–1.0)	1.9 (0.1–27.7)	0.30 (0.02–4.2)	2.48 (0.2–31.2)
College graduate or more	–	–	–	–	–	–
Marital status						
Married	1.1 (0.7–1.8)	1.0 (0.7–1.6)	0.9 (0.6–1.4)	1.2 (0.3–4.6)	3.6 (0.73–17.4)	1.4 (0.4–5.2)
Widowed, divorced or separated	1.7 (0.9–3.2)	0.8 (0.4–1.6)	1.3 (0.7–2.4)	1.1 (0.2–1.2)	0.9 (0.2–5.2)	1.25 (0.3–6.3)
Never married	1.3 (0.9–1.9)	1.0 (0.7–1.5)	0.9 (0.6–1.3)	2.1 (0.7–5.8)	0.8 (0.3–2.2)	1.8 (0.6–5.0)
Living with partner	–	–	–	–	–	–
Household income						
$0 to $19,999	1.0 (0.7–1.3)	0.8 (0.6–1.2)	1.0 (0.7–1.4)	0.9 (0.4–1.8)	2.2** (1.1–4.7)	1.2 (0.6–1.5)
$20,000 to $44,999	1.0 (0.8–1.4)	0.8 (0.6–1.1)	0.9 (0.7–1.2)	0.8 (0.4–1.6)	2.0** (1.0–4.0)	1.0 (0.5–2.0)
$45,000 to $74,999	1.2 (0.9–1.6)	1.1 (0.8–1.4)	1.1 (0.9–1.5)	0.5 (0.3–1.1)	1.8 (0.8–3.8)	0.9 (0.4–1.9)
$75,000 and over	–	–	–	–	–	–
Household savings						
Less than $5000	1.1 (0.9–1.4)	1.2 (1.0–1.5)	1.4** (1.1–1.7)	1.0 (0.6–1.7)	0.8 (0.5–1.3)	0.8 (0.5–1.4)
$5000+	–	–	–	–	–	–
COVID stressors						
Low	–	–	–	–		–
Medium	2.5*** (1.8–3.6)	2.6*** (1.8–3.9)	2.1** (1.4–3.3)	1.37 (0.7–1.3)	1.6 (0.8–3.3)	1.8 (0.8–3.9)
High	4.7*** (3.5–6.5)	4.7*** (3.3–6.6)	5.0*** (3.4–7.2)	4.6*** (2.5–8.5)	5.1*** (2.6–10.0)	5.2*** (2.6–10.4)

Note: Models Controlled For Demographic Characteristics (Gender, Age, Race, Ethnicity).
CI = Confidence Interval. ***$p < .001$.
Note: Probable depression calculated using the Patient Health Questionnaire-9 (PHQ-9) with a clinical cutoff score of 10. Probable anxiety calculated using the Generalized Anxiety Disorder-7 (GAD-7) with a clinical cutoff score of 10. Probable PTS was assessed with the Primary Care-Post-Traumautic Stress Disorder (PC-PTSD) with a cutoff score of 3. Thirteen COVID-19 related stressors were assessed. Stressor scores were categorized as low (1–2), medium (3–4), and high (≥5) exposure to COVID-19-induced stressors.
Notes: *$p < .001$.

central component for developing subsequent symptoms (Amstadter et al., 2009; Keane et al., 1997). Therefore the specific stressors experienced, such as COVID-19 related loss and grief, may be more indicative of probable PTS as compared to depression and anxiety (Gootzeit and Markon, 2011; Hibberd et al., 2010; Zisook et al., 1998). The differentiation of PTS from depression and anxiety is supported by previous research into the distinct neurobiological effects of PTS (Akiki et al., 2017; Barbano et al., 2019; Lanius and Olff, 2017; Sherin and Nemeroff, 2011).

The above findings emphasize the need for interventions that can best mitigate the associated psychological suffering of pandemic-induced stressor exposure. Therapeutic interventions that are most accessible during the COVID-19 pandemic, such as various forms of teletherapy, are necessary to implement on a wider scale (Pierce et al., 2021). Models that have proven cost-effective and psychologically efficacious include internet-administered cognitive-behavioral therapy (CBT) techniques, as well as short-term psychodynamic psychotherapy conducted with a virtual platform (Abbass et al., 2020; Ho and Adcock, 2017; Ho et al., 2020b; Soh et al., 2020; Zhang and Ho, 2017).

Our study has various limitations that are worth noting. Our sample was predominantly female and low-income, and our data were collected at two specific time points in the pandemic, limiting the generalizability of our findings to other populations and time periods. Our use of cross-sectional data limits our ability to rule out reverse causal relationships, as well as to establish causality between our variables. Third, diagnosis can only be made via interview with a clinician, therefore our results rely on probable levels of clinical diagnosis (Ho et al., 2020a; Husain, Tang, et al., 2020; Husain, Yu, et al., 2020).

Notwithstanding these limitations, our findings highlight the importance of adaptability in the context of ongoing stress. A dichotomy exists during ongoing population-level crises between those whose psychiatric symptoms decline over time and those who experience persistent psychiatric symptoms. The ability for many lower-income adults to report a reduction of depression and anxiety symptoms by acclimating to new and high levels of stress, speaks to an ability to persevere in the face of crisis (Cameron and Schoenfeld, 2018; Zhang et al., 2021). Such an ability can be understood as indicative of the nuances of the psychological effects of ongoing stress. Ongoing PTEs do not affect all individuals and all psychopathology similarly, and efforts made to identify how people adapt and what might prevent others from doing so, can be used to aid and improve our understanding of psychological health and recovery efforts.

CRediT authorship contribution statement

Conceptualization: S. Rudenstine, S. Galea, and C. Ettman; Methodology: S. Rudenstine, T. Schulder, and K.J. Bhatt; Formal Analysis: K.J. Bhatt and K. McNeal; Investigation: S. Rudenstine, T. Schulder, K.J.Bhatt and K. McNeal; Writing—Original Draft and Preparation: S. Rudenstine, T. Schulder, K.J.Bhatt and K. McNeal; Writing—Review and Editing: C. Ettman and S. Galea.

Conflict of interest

The authors have no conflicts of interest to report.

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