



Increased Self-Reported Mental Health Problems Among Asian-Americans During the COVID-19 Pandemic in the United States: Evidence from a Nationally Representative Database

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Abstract

Background To investigate changes in mental health outcomes among racial groups between 2019 and 2020.

Methods A retrospective cohort study was conducted using the third through fourth quarters of 2019–2020 longitudinal data from the National Health Interview Survey. Self-reports of diagnosed depression and anxiety disorder were key outcomes. We calculated the percentage of depression and anxiety disorder across baseline sample characteristics. Discrete-time hazard models stratified by race/ethnicity were conducted, with hazard ratios (HRs), 95% confidence intervals (CIs), and *p*-values reported.

Results Of a total 10,415 individuals, 16.3 and 14.1% reported that they were diagnosed with depression and anxiety disorder in 2019, respectively. In the multivariable model, only Asian-Americans experienced a significant increase in the probability of receiving a diagnosis of depression by 104% between 2019 and 2020 (HR 2.04, 95%CI 1.19–3.52; *p*=0.010). Also, Asian-Americans had a 97% (HR 1.97, 95%CI 1.23–3.15; *p*=0.005) greater probability of being diagnosed with anxiety disorder in 2020 than in the previous year, while Hispanics and Whites had a relatively moderate increase of 40% (HR 1.40, 95%CI 1.01–1.76; *p*=0.040) and 11% (HR 1.11, 95%CI 1.03–1.20; *p*=0.007), respectively.

Conclusions Asian-Americans experienced a disproportionate increase in mental health conditions during the COVID-19 pandemic. Discriminatory behaviors against Asian-Americans may be important contributors. The study findings suggest the need for serious actions to address this issue.

Keywords Depression · Anxiety · Asian-Americans · Discrimination · COVID-19

Background

A public health crisis due to the COVID-19 pandemic severely affected people's mental health in the US [1], and soaring psychosocial issues have been identified as another public health crisis [2]. Markedly, there have been serious conversations on the mental health impacts of the pandemic among Asian-Americans with respect to escalated marginalization and discrimination.

The unprecedented global pandemic profoundly impacted the lives of Americans. Given the national emergency, public

health measures, including stay-at-home orders, quarantine, and individuals' social distancing, were implemented swiftly in response to the spread of the communicable disease [3]. While these strategic actions were essential to mitigating the rapid transmission of the novel virus, unfortunately, they resulted in unintended consequences, including major disruptions of nearly all aspects of life. Due to fear of exposure to the virus, people faced social isolation or confinement at home for extended periods [4, 5]. Businesses closed their facilities or scaled down their operations, while individuals were furloughed or lost jobs, which further constrained social interactions that people normally experienced in daily life [1, 6]. Additionally, individuals encountered greater barriers to receiving essential community services, including health care and government social services to meet their needs [7, 8]. The restricted economic and social engagement during the COVID-19 pandemic may have incited or exacerbated mental health problems in the USA, raising significant

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concerns about the psychological well-being of Americans [9–11].

The COVID-19 pandemic was a significant psychological stressor that triggered symptoms of anxiety and depression [12]. Multiple systematic reviews or meta-analysis studies on anxiety and depression highlighted an upsurge in these health conditions [12–14]. Research conducted in the USA showed widespread feelings of anxiety and depression more than doubled during the pandemic [11, 15]. Mental health problems in the presence of preexisting comorbidities, such as diabetes, were even further compounded by a lack of necessary healthcare access due to diminished service provision by providers or individuals' disinclination to visit doctors in person [16, 17]. Moreover, systematic reviews suggested a link between COVID-19 and increased prevalence of post-traumatic stress disorder (PTSD) [14, 18], which can develop as a result of traumatic events related to natural disasters and accidents, for example, Hurricane Katrina in LA [19, 20]. While some note that the COVID-19 pandemic does not meet the current criteria for trauma [4, 21], others suggested an association between an increase in PTSD and the pandemic, particularly among individuals who experienced the COVID-19 infection or those with family members who contracted the novel coronavirus [22, 23].

While mental health problems were relevant to the general population, there has been an alarming concern about the mental health of a minority population. Ever since the first COVID-19 case was confirmed in 2019, media outlets in the USA have sought out the origin of and people considered to be responsible for the novel virus [24]. The increasing media coverage, along with the tone shift could influence the narrative that Asian Americans are accountable for the pandemic, and the rhetoric targeted at this population was provocative and discriminatory [25, 26]. The mounting tensions based on information largely unsupported by available evidence may have led to negative changes in public attitudes, such as physical and verbal violence toward members of a minority community [26]. For example, the Federal Bureau of Investigation reported a 77% increase in race-based violence against Asian Americans between 2019 and 2020 [27]. A population survey found that about 32% of Asian Americans expressed fear of racially motivated threats, while 81% reported increased cases of violence against them [28]. A qualitative study that interviewed Asian-American adults noted that they had a growing tendency of minimizing exposure to the public due to grave concerns about hostility toward them and the possibility of being victims of random threats [29]. While disrupted social interactions and community resources and insecurity may all have contributed to emotional and psychological distress in a general population during the COVID-19 pandemic [1, 4, 30], the emerging mental health issues may have been further amplified by the disproportionate risk among racial

minorities, especially Asian-Americans due to the recent rise of discriminatory and violent behaviors against these individuals [31].

To date, although the scientific community has raised substantial worries about the mental health of Asian Americans during the COVID-19 pandemic, empirical evidence is limited [32–34]. The present study aimed to fill this gap. First, this study aimed to investigate changes in mental health conditions among the general population using a longitudinal database. Second, we further investigated changes in mental health outcomes among the racial groups between 2019 and 2020 to determine whether the analysis supports recent concerns about the mental health issues of Asian Americans. Our findings will significantly contribute to the growing body of literature on mental health among the racial minority and have important policy implications.

Methods

Data and Design

A retrospective cohort study was conducted using the third through fourth quarters of 2019–2020 longitudinal data from the National Center for Health Statistics, National Health Interview Survey (NHIS) [35]. The NHIS is a nationally representative, population-based annual household survey of non-institutional adult individuals within 50 states and the District of Columbia in the USA to monitor health behaviors and health status in a population. Due to the disruption of data collection caused by the COVID-19 pandemic in early 2020, NHIS shifted from in-person interviews to telephone interviews starting in late March 2020 without further follow-ups. From July through December, telephone interviews remained a primary survey method, but in-person interviews were followed up to complete the survey. Considering the possible loss of data collection associated with a telephone interview, part of the samples from the 2019 survey were reinterviewed in the third through fourth quarters of 2020 to obtain robust survey data. These repeated measures of the same individuals from 2019 through 2020 generated a longitudinal dataset with 10,415 individuals, which provided an opportunity to assess changes in health outcomes measured in both survey years. Our analysis used the entire sample from the longitudinal dataset aimed to investigate the change in receiving a diagnosis of anxiety and depression between the 2 years.

Key Outcomes

Self-reports of diagnosed depression and anxiety disorder were key outcomes. Respondents were asked questions about their mental health conditions, 'Have you ever been told by

a doctor or other health professional that you had any type of depression?’ and ‘Have you ever been told by a doctor or other health professional that you had any type of anxiety disorder?’. The responses were dichotomized as having the condition or not for the self-reported diagnosis of depression and anxiety disorder.

Covariates

The year indicator for 2019 and 2020 was a key independent variable given the study’s focus on changes in the risk of mental health outcomes between the two years. Racial/ethnic groups were classified as Non-Hispanic Whites, Non-Hispanic Blacks, Non-Hispanic Asians, Non-Hispanic others, and Hispanics.

Secondary covariates included demographic characteristics of the participants, based on the literature review, to control for potential confounders, including sex, education, employment status, health insurance, smoking status, and rural–urban classification [8, 16, 36, 37]. Sex was a binary variable, and age was a categorical variable: 18–24, 25–44, 45–64, 65–84, and 85 or above. Education was categorized into less than high school diploma, high school diploma, some college education, bachelor’s degree, and professional degree. Employment was dichotomized into employed or not, and health insurance was coded as no insurance, private insurance, public insurance, and other types of insurance. Smoking status was coded as never-smoking, former-smoking, and current-smoking. Rural–urban classification had four categories according to the 2013 National Center for Health Statistics: large metro, large fringe metro, small metro, and non-metro. Secondary covariates also included mental health services use and health conditions [8, 38]. Psychological counseling was dichotomized for having counseling or not. Chronic health conditions included: diabetes, hypertension, obesity, chronic obstructive pulmonary disease (COPD), cancer, and arthritis. These health conditions were dichotomized.

Statistical Analysis

The analysis started with a description of baseline sample characteristics. The percentage of depression and anxiety disorder was calculated to understand the scope of mental health problems. The unadjusted hazard was estimated and presented to graphically assess the patterns of mental health conditions for racial groups between the 2 years. We reported HRs that represent measures of an association determining the risk of a disease occurrence over time and that are widely accepted in cohort studies [39, 40]. We specifically employed a discrete-time hazard model, which is suggested for the discrete measure of time, which was done in our study [41]. Recent studies using longitudinal

data estimated hazard ratios for a disease occurrence, such as AIDS and SARS-CoV-2 [42, 43]. A series of regression analyses were performed to estimate the hazard for depression and anxiety disorder [38]. In the initial model, the unadjusted regression analysis was conducted with a year or race covariate, respectively. In the multivariable models, the analysis fully accounted for secondary covariates, including age, sex, education, marital status, employment, insurance, smoking, rurality, psychological counseling, and a range of chronic conditions. Subsequently, hazard models stratified by race/ethnicity were used to report HRs, 95% confidence intervals (CI), and *p*-values. Analysis was adjusted for survey weights and design variables and was performed using R statistical software. The statistical significance test was set to a two-tailed $p < 0.05$. This project was reviewed by the University of Texas at San Antonio Institutional Review Board and determined to be research not involving human subjects.

Results

The baseline description of the sample characteristics is shown in Table 1. Of a total of 10,415 participants, 16.3% (17.3% in 2020) of the participants reported that they were diagnosed with depression, while 14.1% (16.0% in 2020) of them reported a diagnosis of anxiety disorder. We observed variations in the prevalence of these two mental health conditions across the population characteristics. More females were reported to be diagnosed with depression and anxiety disorder compared to males (depression 21.1% vs 11.2%; $p < 0.001$; anxiety disorder 18.2% vs 9.6%; $p < 0.001$). Furthermore, Whites had a higher percentage of depression (19.2% vs 5.9–17.4%; $p < 0.001$) and anxiety disorder (16.9% vs 5.1–17.0%; $p < 0.001$) than other racial groups. Self-reported depression and anxiety disorder were more frequent among those who were single, unemployed, current smokers, and living in non-metro areas. In general, individuals with underlying chronic conditions had a higher percentage of mental health conditions.

The graphical description of the unadjusted hazard showed that the risk of receiving a diagnosis of depression tended to be greater in 2020 than in 2019 in all the racial groups, with a relatively larger upsurge among Asian Americans (Fig. 1). Asian-Americans (5.9 to 8.4%) showed a larger increase in depression than Whites (19.2 to 19.8%), Blacks (13.3 to 14.5%), and other racial/ethnic groups (17.4 to 18.1%). Similarly, in anxiety disorder, Asian-Americans (5.1 to 7.9%) and Hispanics (8.7 to 11.5%) revealed a greater increase than others, such as Whites (16.9 to 18.8%), Blacks (10.1 to 10.3%), and other groups (17.0 to 18.4%). The unadjusted hazard ratios (Table 2) showed a consistent pattern that revealed that Asian Americans were 1.45 times more depressed (95% CI 0.94–2.23; $p = 0.095$) in 2020 compared

Table 1 Baseline (2019) sample characteristics ($n = 10,415$)

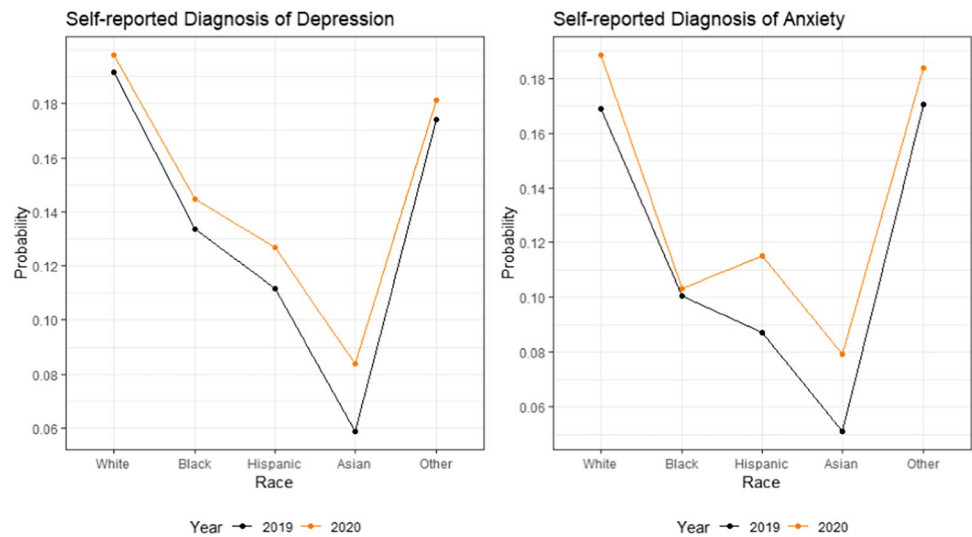
Variable	<i>n</i>	wt%	Self-reported diagnosis of depression		Self-reported diagnosis of anxiety disorder	
			wt%	<i>P</i> -value	wt%	<i>P</i> -value
Overall			16.3 (17.3)*		14.1 (16.0)*	
Sex				<0.001		<0.001
	Male	4790	48.3	11.2	9.6	
	Female	5624	51.7	21.1	18.2	
Age				0.010		0.007
	18–24	531	11.8	18.9	17.0	
	25–44	2910	34.2	15.0	14.9	
	45–64	3569	33.0	18.1	14.0	
	65+	3396	21.1	14.4	11.4	
Race/ethnicity				<0.001		<0.001
	White	7495	63.2	19.2	16.9	
	Black	999	11.8	13.3	10.1	
	Asian	512	5.7	5.9	5.1	
	Other	256	2.7	17.4	17.0	
	Hispanic	1153	16.5	11.2	8.7	
Education				0.001		0.006
	High school	3089	39.7	16.6	14.6	
	Some college	3038	31.2	18.5	15.3	
	Bachelor	2498	17.7	13.3	12.5	
	Professional	1730	11.4	14.5	11.0	
Marital status				<0.001		<0.001
	Married	5731	61.2	13.7	12.1	
	Singled	2735	16.6	23.3	18.5	
	Nonmarried	1949	22.3	18.6	16.4	
Employment status				<0.001		<0.001
	No	4213	35.4	21.3	18.2	
	Yes	6197	64.6	13.6	11.9	
Health insurance				<0.001		<0.001
	No insurance	726	11.4	14.6	11.3	
	Private	6641	62.8	13.9	12.5	
	Public	2384	20.7	22.6	18.8	
	Other	646	5.1	25.1	21.3	
Smoking status				<0.001		<0.001
	Never	6375	64.3	13.2	11.4	
	Former	2781	22.7	18.4	15.7	
	Current	1259	13.0	28.3	24.4	
Rural–urban classification				0.040		0.001
	Metro	8687	85.7	15.9	13.4	
	Non-Metro	1728	14.3	19.1	18.0	
Psychological counseling				<0.001		<0.001
	No	9203	90.1	11.5	9.7	
	Yes	1081	9.9	605	54.1	
Diabetes				<0.001		0.007
	No	9311	90.8	15.6	13.7	
	Yes	1098	9.2	22.9	17.8	
Obesity				<0.001		<0.001
	No	6829	66.4	14.5	12.5	

Table 1 (continued)

Variable		n	wt%	Self-reported diagnosis of depression		Self-reported diagnosis of anxiety disorder	
				wt%	P-value	wt%	P-value
Cardiovascular	Yes	3392	33.6	20.1	0.030	17.2	0.390
	No	9799	95.9	16.1		14.0	
Hypertension	Yes	596	4.1	20.4	<0.001	15.7	<0.001
	No	6463	67.9	13.9		12.3	
Chronic obstructive pulmonary	Yes	3944	32.1	21.5	<0.001	17.9	<0.001
	No	9807	95.7	15.5		13.5	
Stroke	Yes	602	4.3	35.7	<0.001	27.8	<0.001
	No	10,043	97.0	16.0		12.8	
Arthritis	Yes	367	3.0	28.1	<0.001	22.2	<0.001
	No	7493	78.5	13.5		11.7	
	Yes	2915	21.5	26.6		22.8	

Counts are unweighted, percentages are adjusted based on survey design, and population weights. * Values in the parenthesis represent 2020

Fig. 1 Unadjusted probability for a self-reported diagnosis of depression and anxiety disorder across racial group in 2019 and 2020



to 2019, but the result was not statistically significant. Asian Americans showed 1.57 times increase in anxiety disorder (95% CI 1.06–2.32; $p=0.024$) between the 2 years, followed by Hispanics (HR 1.34, 95% CI 1.07–1.68; $p=0.011$) and Whites (HR 1.13, 95% CI 1.06–1.20; $p<0.001$).

The multivariable model showed that Asian-Americans experienced a substantial increase in the probability of receiving a diagnosis of depression by 104% between the 2 years

(HR 2.04, 95% CI 1.19–3.52; $p=0.010$), while no other groups had a statistically significant increase. Moreover, Asian-Americans had a 97% (HR 1.97, 95% CI 1.23–3.15; $p=0.005$) greater probability of being diagnosed with anxiety disorder in 2020 than in the previous year, while Hispanics and Whites had a relatively moderate increase of 40% (HR 0.40, 95% CI 1.01–1.76; $p=0.040$) and 11% (HR 1.11, 95% CI 1.03–1.20; $p=0.007$), respectively (Table 3).

Table 2 Risk of Self-reported diagnosis of depression and anxiety disorder in 2020 compared to 2019

	Self-reported diagnosis of depression				Self-reported diagnosis of anxiety disorder			
	Unadjusted		Adjusted ^a		Unadjusted		Adjusted ^a	
	HR (95% CI)	P-value	HR (95% CI)	P-value	HR (95% CI)	P-value	HR (95% CI)	P-value
Year								
2019	1		1		1		1	
2020	1.06 (1.01–1.12)	0.019	1.04 (0.97–1.11)	0.301	1.15 (1.09–1.21)	<0.001	1.15 (1.06–1.23)	<0.001
Race								
White	1		1		1		1	
Black	0.69 (0.55–0.86)	0.001	0.52 (0.41–0.64)	<0.001	0.55 (0.43–0.69)	<0.001	0.39 (0.31–0.49)	<0.001
Hispanic	0.59 (0.49–0.70)	<0.001	0.63 (0.51–0.78)	<0.001	0.54 (0.45–0.66)	<0.001	0.57 (0.46–0.70)	<0.001
Asian	0.34 (0.24–0.50)	<0.001	0.51 (0.36–0.70)	<0.001	0.34 (0.24–0.50)	<0.001	0.47 (0.33–0.66)	<0.001
Other	0.90 (0.59–1.38)	0.638	0.67 (0.47–0.95)	0.023	0.99 (0.66–1.49)	0.960	0.74 (0.52–1.03)	0.706

^aThe adjusted model accounted for age, sex, education, marital status, employment, insurance, smoking, rurality, psychological counseling, and chronic conditions

Table 3 Race-stratified hazard of self-reported diagnosis of depression and anxiety disorder in 2020 compared to 2019

Year	Self-reported diagnosis of depression				Self-reported diagnosis of anxiety disorder			
	Unadjusted		Adjusted		Unadjusted		Adjusted	
	HR (95% CI)	P-value	HR (95% CI)	P-value	HR (95% CI)	P-value	HR (95% CI)	P-value
White								
2019	1		1		1		1	
2020	1.04 (0.98–1.10)	0.196	1.02 (0.95–1.09)	0.587	1.13 (1.06–1.20)	<0.001	1.11 (1.03, 1.20)	0.007
Black								
2019	1		1		1		1	
2020	1.09 (0.93–1.27)	0.271	1.06 (0.83–1.36)	0.622	1.03 (0.80–1.32)	0.824	1.19 (0.82, 1.66)	0.239
Hispanic								
2019	1		1		1		1	
2020	1.15 (0.97–1.35)	0.107	1.07 (0.86–1.35)	0.541	1.34 (1.07–1.68)	0.011	1.40 (1.01, 1.76)	0.040
Asian								
2019	1		1		1		1	
2020	1.45 (0.94–2.23)	0.095	2.04 (1.19–3.52)	0.010	1.57 (1.06–2.32)	0.024	1.97 (1.23, 3.15)	0.005
Other								
2019	1		1		1		1	
2020	1.04 (0.78–1.39)	0.767	0.96 (0.50–1.84)	0.911	1.09 (0.87–1.35)	0.451	0.88 (0.56, 1.38)	0.570

Models adjusted for age, sex, education, marital status, employment status, health insurance, smoking status, rural–urban classification, psychological counseling, and chronic conditions

Discussion

This study investigated the change in risk of depression and anxiety disorder in the third through fourth quarters between 2019 and 2020 by race/ethnicity. The analysis showed that anxiety disorder increased by 15% between 2019 and 2020, but depression was not significantly different between the two years. While other racial groups showed relatively small or no significant changes, Asian Americans experienced a substantial increase in both

depression and anxiety disorders. These findings provide important evidence for elevated mental health problems and health disparities among Asian Americans during the COVID-19 pandemic.

The findings of the present study suggest that the COVID-19 pandemic was associated with increased anxiety disorder in the general population, consistent with findings in previous studies [44, 45]. Although depression also increased [1, 44], it was not statistically significant after controlling for population characteristics, such as sex, education, and

chronic conditions. Historically, in a public health emergency, mental health becomes another troubling public health concern because of the stressful conditions associated with the crisis [46, 47]. Major stressors, such as isolation, insecurity, and closures of schools and health care facilities, can all contribute to psychological distress [8, 29, 46]. Remarkably, given the unprecedented scale of disease transmission and disruptions of life during the COVID-19 pandemic, individuals may have experienced even more prevalent symptoms of emotional and psychological distress [29].

Our findings highlight a greater mental health impact among Asian Americans during the COVID-19 pandemic. In the analysis stratified by race, Asian Americans had a substantial increase (2.04 times) in the depression between 2019 and 2020, while Whites, Blacks, and Hispanics did not show a significant uptick. Furthermore, Asian Americans showed a disproportionate increase (1.97 times) in anxiety disorder compared to Hispanics (1.40 times) and Whites (1.11 times). The mental health problems that Asian Americans experience are disturbing. Amid the COVID-19 pandemic, Asian Americans were reportedly targeted due to the perception that these individuals were responsible for the novel virus [25]. Social media platforms played an instrumental role in influencing the conversation that resulted in the finger of blame and racism or discrimination against Asian Americans, although much of the information was not supported by evidence [25]. These evolving discriminatory attitudes may have led to various forms of threats and attacks on members of the Asian American community. According to recent data, one-third of Asian Americans reported experiencing slurs or racist jokes [24, 48]. The Federal Bureau of Investigation reported that hate crimes against Asian-Americans increased by 77% in 2020 compared to 2019 [49]. Considering the propensity of incidents to be underreported, the actual offenses are likely to be even more widespread and serious [50]. The biased attitudes toward the Asian American community perhaps fueled fear and a disproportionate increase in mental health issues in this minority group.

While the increase in mental health conditions was greater among Asian Americans during the COVID-19 pandemic, our analysis also showed that overall, these individuals had a lower frequency of mental health conditions compared to white persons, consistent with previous reports [51, 52]. However, it is important to be cautious in interpreting findings of the mental health impacts that Asian Americans experienced during the COVID-19 pandemic. Despite alterations in mental health conditions in Asian Americans, it is possible that the impacts among these individuals have been underreported. Even before the pandemic, many suggested underreports of mental health issues among Asian Americans resulting from their suboptimal utilization of necessary mental health services [53, 54]. Practical barriers, including language, low health literacy, and access to

care, keep these individuals from obtaining necessary mental health care, suggesting that mental health problems among Asian Americans go unrecognized or are underestimated [55, 56]. Negative attitudes or perceptions toward mental illnesses among this minority group might have also led to hesitancy to receive essential services required for adequate diagnosis and treatment [57]. Given the unique landscape during the COVID-19 pandemic, in which Asian Americans tended to minimize social activities due to fear of discrimination and threats, the public health crisis may have further affected the underreports of mental health conditions among this subpopulation, limiting our understanding of the scope of their impact.

Public health experts predict that the global community may encounter the next generation of infectious diseases or public health crises in the coming years [58, 59]. They noted that future pandemics are likely to originate from zoonotic diseases transmitted from animals to humans. As we have just experienced, the burden of morbidity and mortality, as well as disruptions to every aspect of human life from pandemics, are substantial. While efforts to control animal reservoirs and construct disease monitoring systems should be put in place, pandemic preparedness is critical to minimizing the negative impacts of infectious disease on public health, including mental health [58, 60]. Resilient health systems that maintain patient care and hospital administration capacities to respond to emergencies are key [58, 61]. Moreover, the lack of early detection, characterization, and management mechanisms of infectious diseases, as revealed by the recent pandemic, will require improvements to swift public health responses, while public trust and risk-mitigation measures, including adherence to masking and vaccination, are also crucial [58, 62, 63].

Notably, the impacts of the pandemic revealed stark disparities in mental health among racial/ethnic minority groups [64]. The finger of blame may have played an important role in stigmatizing members of a minority community, causing another public health crisis and worsening health disparities [65, 66]. Individuals' experiences of being pushed out or blamed can significantly damage their perception of membership and security in the community, resulting in a serious sense of insecurity, stress, and psychological distress [48, 67]. The history of blame against Asian Americans has been repeated over time in public health emergencies, including the bubonic plague in San Francisco in 1900, and taught us how severe the consequences are in an extensive range of health outcomes, such as anxiety, depression, and suicidal ideation [48, 68]. Institutional support, including appropriate responses from law enforcement, along with policy and regulatory measures, is a bare necessity [66]. It is vital to learn from history about the negative impacts of race-based stigmatization or bias and translate those lessons into practice in our community, especially during a public health crisis when social integration is needed more

than ever [65, 68]. Future studies are warranted to closely examine institutional or person-level biases toward Asian Americans and the associated health impacts.

The strengths of the present study include the use of a large, nationally representative sample and the longitudinal design. This study also has some limitations. First, although the study database is a nationally representative and primary source on a broad range of health issues of non-institutional civilians, as with any other survey study, our study's reliance on self-reports of mental health diagnoses is an inherent limitation. Also, it is appropriate to note potential recall bias and social desirability issues. For example, individuals tend to underreport their mental health problems [69]. Second, it is possible that racial minorities were less likely to visit doctor's offices and get diagnosed for their mental health symptoms, as these groups may have intensified barriers to access to care during the COVID-19 pandemic [70]. Thus, the study might not have fully captured the magnitude of mental health issues. Third, despite accounting for identified covariates, a potential unmeasured issue still exists, which may have potential confounding effects and can undermine the study findings. Despite the longitudinal study that would have reduced the limitation of a cross-sectional study, given the nature of an observational study, our study did not aim to find a causal relationship. Lastly, while previous studies also suggested increased concerns of PTSD during the COVID-19 pandemic, we could not examine this mental issue due to a lack of information on PTSD in the study data.

Despite some limitations, the current study significantly contributes to the growing body of literature on mental health problems during the COVID-19 pandemic. While the public health crisis triggered significant stressors and thus increased psychosocial problems in the general population, evidence suggests that Asian-Americans experienced disproportionate mental health problems.

Conclusions

The unprecedented COVID-19 pandemic caused severe mental health problems in the US, and Asian Americans experienced a disproportionate increase in mental health conditions. Discriminatory behaviors against Asian Americans, such as blame and verbal and physical threats, may be critical contributors to emerging mental health issues among this minority group. The study findings suggest the need for serious conversations and actions to address this concern.

Author Contribution Jusung Lee: conceptualization, data curation, methodology, original draft, and review editing. Jeffrey T. Howard: interpretation of results, review editing, and project administration.

Data Availability The data of this study are publicly available from the Centers for Disease Control and Prevention. National Center for Health Statistics. <https://www.cdc.gov/nchs/nhis/data-questionnaires-documentation.htm>.

Declarations

Ethics Approval This project was reviewed by the University of Texas at San Antonio Institutional Review Board and determined to be research not involving human subjects.

Competing Interests The authors declare no competing interests.

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