Understanding Inequality of Mental Health of US Adults during the Covid19 Pandemic

Julia Yi[1], Olivia Chen[2], and Valerie Alimonti[#]

[1]East Brunswick High School, NJ, USA
[2]Ridge High School, NJ, USA
[#]Advisor

ABSTRACT

US adults experienced significant mental health shocks during the Covid-19 pandemic. Various factors, including quarantine and segregation from family members, anxiously waiting for test results, illness or even death of family members, loss of job or income, and social and economic disruptions, exacerbated mental health problems. Using the Household Pulse Survey conducted by the U.S Census Bureau from April 2020 to October 2021, this study finds that more than half of U.S adults experienced any symptoms of anxiety (61.48%) and depression (52.11%), doubled the 2019 level. Second, 21.11% took prescription medication and less than 10% received professional counseling or therapy (9.96%) for mental health, on a par with the 2019 level (15.8% and 9.5%). Many people had an unmet need for mental health care (10.83%). Third, inequality of mental health was pronounced. Female, younger age cohorts, and low-income adults were more likely to experience mental health shocks, receive mental health services, and have an unmet need of mental health care. Compared with non-Hispanic white adults, Hispanic and non-Hispanic black adults had a higher probability of experiencing mental health problems and having an unmet need of mental health care, but they were less likely to receive mental health service.

Introduction

Unlike other outbreaks in living memory such as SARS, MERS, or Ebola, the COVID-19 was a global disease with extremely high transmissivity, affecting countries poor and rich, industrialized and rural. The World Health Organization (WHO) declared the Covid-19 outbreak a Public Health Emergency of International Concern (PHEIC) on January 30th, 2020 and a pandemic on March 11th, 2020 (WHO 2020). As of November 30, 2021, more than 262 million cases have been reported across around 200 countries and territories, resulting in a death toll of more than five million worldwide; and the U.S. had seen over 48 million infections and over 779 thousand deaths (JHU 2021).

The frightening fast rate of spread led to drastic responses and policies - complete shutdown first in major cities and then expanded to many states. Shelter at home orders were issued by local governments, enforcing curfews and social distancing. Nonessential businesses were shut down, while even essential ones, such as restaurants, were only allowed to ship takeout. Grade schools and universities started online learnings. Employees started to work at home. The pandemic also brought significant disruptions to the US economy, including historically high unemployment rates, shattered supply chains for both food and non-food items, and stagnant economic growth. The uncertainty of economic growth, labor markets, and individual and household financial situation further exacerbated mental health problems. People have experienced both short- and long-term psychosocial and mental health consequences. In the case of children and adolescents, Singh et al. (2020) argue that the magnitude of the mental impacts is affected by many vulnerability factors such as age, pre-existing

mental health conditions, being economically disadvantaged, or being isolated due to infection or fear of infection.

The objective of this study is to examine mental health shocks US adults experienced during the pandemic. We ask the following specific questions: 1) Did the pandemic exacerbated mental health among US adults? 2) were elderly, female, Hispanic and black, low-income population, and adults who were unemployed more likely to experience mental health problems than their counterparts during the pandemic? The findings are expected to help the governments and communities to design and implement intervention and support programs to improving mental health of US adults during the pandemic.

The rest of this paper unfolds in the following order. The next section offers a brief literature review. Section 3 discusses survey data and key variables. Section 4 presents the results and discussions. Section 5 concludes.

Literature Review

Twenge and Joiner (2020) find that the pandemic brought mental health shocks to US adults. People experienced anxiety, depression, confusion, and stress during the Covid-19 Pandemic. Various factors, including illness or death of family members, loss of job, employment income and business, quarantine and segregation from family members, anxiously waiting for test results, and social disruptions, contributed to the rising prevalence of mental health (Khan, Mamun, Griffiths, & Ullah, 2020). Some studies find that stay-at-home policies and social distancing are positively associated with mental health (Allwood & Bell, 2020; Marroquín, Vine, & Morgan, 2020).

The literature also find significant inequality of mental health among US adults during the pandemic. Fitzpatrick, Drawve, and Harris (2020) find that children, Hispanics, and foreign-born respondents reported higher levels of subjective fear and worry, leading to anxiety and/or depression. Goldmann et al. (2021) find that Hispanic and non-Hispanic black were more likely to experience mental health problems than non-Hispanic white and Asian among adults living in the metropolitan areas of Atlantia, Austin, Dallas, Houston, and New Orleans. Purtle (2020) also find a similar race-specific inequality of mental health during the pandemic. In terms of age cohorts, Li et al. (2021) find that mental health of older adults (60 years old or above) was not the worst among the three age groups (below 30, 30-59, and above 60) as they perceived more family support to avoid experiencing negative emotions. Adult who lost jobs or income were more likely to experience symptoms of depression, anxiety, and stress (McDowell, Herring, Lansing, Brower, & Meyer, 2021). Women are more likely to experience mental health than men (Thibaut & van Wijngaarden-Cremers, 2020). Lee and Singh (2021) find persistent inequality in health care during the pandemic -- low-income adults had a lower probability of taking prescription medication for mental health and a higher probability of receiving mental health services.

Vahratian, Blumberg, Terlizzi, and Schiller (2021) is the most relevant study. Using the early waves of the Household Pulse Survey data from August 2020 to February 2021, they find that the percentage of adults with any symptoms of anxiety or depression increased from 36.4% to 41.5% and the percentage of those reporting an unmet need of mental health care increased from 9.2% to 11.7%. Our study uses the entire Household Pulse Survey data to examine prevalence and service of mental health and their inequality during the full course of the pandemic.

Data and Key Variables

Data Sources

The Household Pulse Survey created by the U.S Census Bureau is a 20-minute online survey, focusing on how the Covid-19 Pandemic affected households throughout the U.S economically and socially. The survey collected information about the Covid-19 vaccine, income, employment, and childcare along with social-demographic information. The survey participants well represent the U.S. population aged 18 years old and above. The first week of survey took place on April 23, 2020 to May 5, 2020. The last weekly survey (Week 39) was conducted from September 29, 2021 to October 11, 2021.

Outcome Variables

The participants were asked whether they had experienced any symptoms of anxiety or depression in the last seven days. We define that *Anxiety* = 1 if a participant experienced any anxiety symptoms for "several days", "more than half the days", or "nearly every day;" otherwise, *Anxiety*=0. Similarly, we define that *Depression* = 1 if a participant experienced any depression symptoms for "several days", "more than half the days", or "nearly every day;" otherwise, *Depression* = 0. Starting from Week 13 from August 19 to August 31st, 2020, the survey added questions on mental health services. Accordingly, we create the following three mental health service variables: 1) *ReceiveCounseling* = 1 if the participants reported to receive counseling or therapy from a mental health professional such as a psychiatrist, psychologist, psychiatric nurse, or clinical social worker in the last four weeks; and zero otherwise; 2) *Prescription* =1 if the participants took prescription medication for mental health in the last four weeks; and zero otherwise; and 3) *ReceiveNoNeededCounseling* =1 if they did not receive the needed counseling or therapy for any reason in the last four weeks; zero otherwise.

Variables on Sociodemographic Characteristics

We compile several socio-demographic characteristics, including age cohorts, sex, race background, employment status, and household income level. The participants were asked to choose their age intervals: 18-29 years old, 30-39 years old, 40-49 years old, 50-59 years old, 60-69 years old, 70-79 years old, and 80+ years old. We create five age cohorts, including Gen Z (18-29 years old), Millennials (30-39 years old), Gen X (40-59 years old), Baby Boomers (60-79 years old), and post war and WWII (80+ years old). The participants were also asked to indicate their race among Non-Hispanic white, Hispanic, Non-Hispanic black, Asian, and other races. The participants reported whether they were employed or not. The survey participants were also asked to indicate their household income among the following options: less than $25,000, $25,000-$34,999, $35,000-$49,999, $50,000-$74,999, $75,000-$99,999, $100,000-$149,999, $150,000-$199,999, and $200,000 and above. According to the Census data of 2020, the federal poverty line for an average household with four members was $26,200 and the median household income was $67,521. We create three household income categories: less than $25,000 for those living under poverty; $25,000-$75,000 for those living out of poverty but below the national median household income; and $75,000+ for those having at least median household income.

Results and Discussions

We employ both graphic and statistical analyses to examine mental health prevalence and inequality by socio-demographic factors.

Overall Prevalence and Care of Mental Health during the Pandemic

The Health People 2020 estimates that, before the pandemic, approximately 18.1% of US adults aged 18 and up suffered from a mental illness in any given year, with 4.2% suffering from a significantly disabling mental

illness (HealthPeople 2020). As shown in Table 1, during the pandemic, more than half US adults experienced some symptoms of anxiety (61.48%) and depression (52.11%), more than doubled the pre-pandemic levels.

Table 1. Summary Statistics of the mental health shock experienced during the pandemic.

	Minimum	Maximum	Mean	Standard Deviation
Anxiety	50.35% (Week 33)	69.09% (Week 12)	61.48%	0.0555
Depression	43.33% (Week 33)	59.43% (Week 21)	52.11%	0.0464
ReceiveCounseling	8.75% (Week 13)	10.76% (Week 33)	9.96%	0.0051
Prescription	19.36% (Week 13)	22.41% (Week 39)	21.11%	0.0086
ReceiveNoCounseling	9.17% (Week 13)	12.42% (Week 21)	10.83%	0.0086

The Health People 2020 estimates that 15.8% of US adults took prescription medication and 9.5% received professional counseling or therapy for mental health in 2019 (HealthPeople 2020). Despite of the increased prevalence of mental health during the pandemic, only 21.11% took prescription medication and less than 10% received professional counseling or therapy (9.96%), on a par with the 2019 level. Table 1 also shows that 10.83% of US adults had an unmet need for mental health care during the pandemic.

Figures (1a) and (1b) shows that the trend of metal health and mental health services among US adults from Week 1 (April 23-May 5, 2020) to Week 39 (August 29-October 11, 2021). They demonstrate that percentage of US adults who experienced any symptoms of anxiety or depression for "several days", "more than half the days", and "almost every day" in the past seven days varied but stayed persistently high. Similarly, Figure (1c) shows that percentage of US adults received professional counseling or therapy or took medication for mental health stayed almost constant.

As shown in Table 1, the smallest proportion of US adults experienced any symptoms of anxiety or depression on Week 33 (June 23-July 5, 2021), where the US had the lowest number of infections, hospitalization, and death toll. From Week 13 (August 19-August 31, 2021) to Week 39 (September 29-October 11, 2021), the smallest proportion of US adults received counseling or therapy from professionals and took prescription medication for mental health were in Week 13 when a large scale of vaccine testing began.
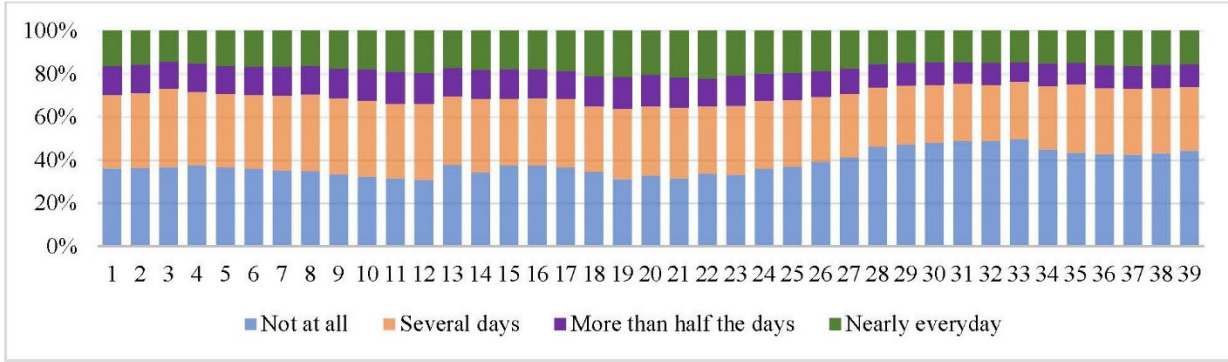
(1a) Experienced any symptoms of anxiety in the past seven days
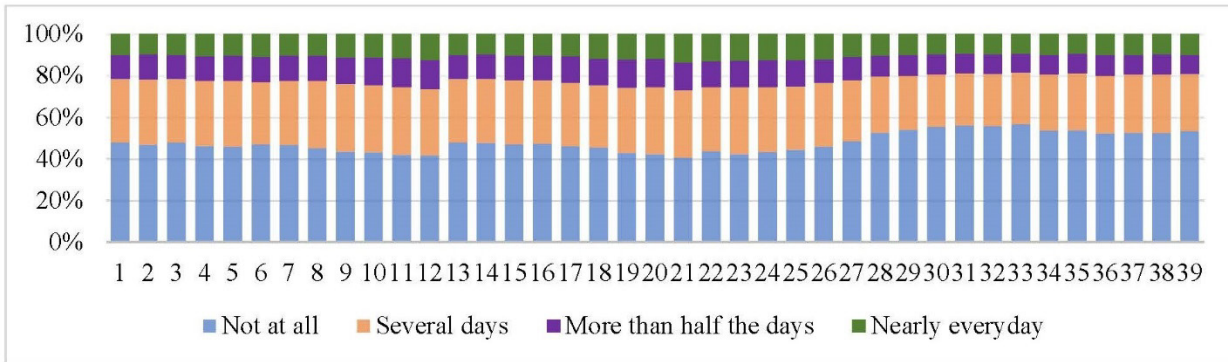
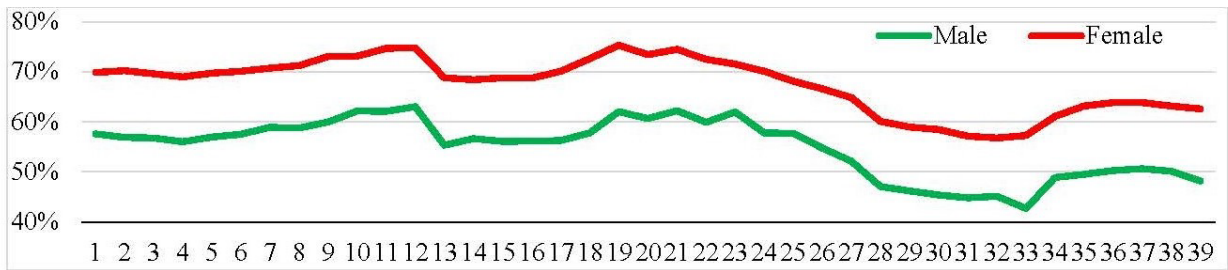(1b) Experienced any symptoms for depression in the past seven days
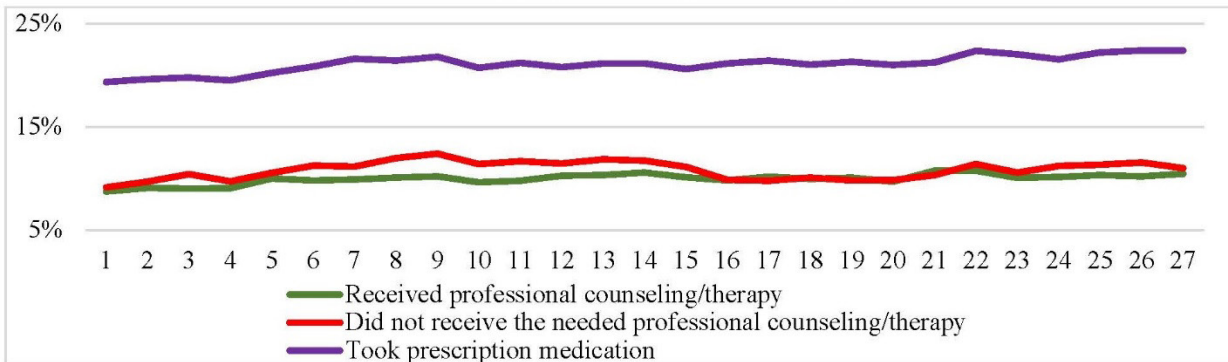
(1c) Mental health services in the past four weeks

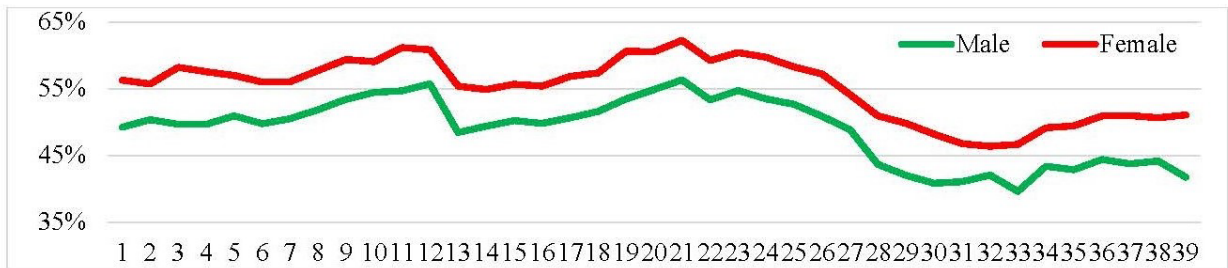**Figure 1.** Mental Health and Services among US Adults during the Pandemic

Mental Health Inequality by Sex

Figures 2 and 3 demonstrate gender-specific inequality of mental health among US adults during the pandemic. Female adults were more likely to have mental health problem, receive mental health services, and had an unmet need of mental health care. Table 2 shows that female adults were more likely to 1) experience symptoms of anxiety (67.58% vs. 54.92%) or depression (55.21% vs. 48.92%); 2) receive professional counseling or therapy in the last four weeks (12.00% vs. 7.79%); 3) take prescription medication for mental health (26.23% vs. 15.53%); and 4) have an unmet need for mental health care (13.23% vs. 8.23%). We formulate the null and alternative hypothesis by sex where *X* denote outcomes for mental health:

Null Hypothesis: $\quad X_{Famale} = X_{Male}$

Alternative Hypothesis: $\qquad X_{Famale} > X_{Male}$
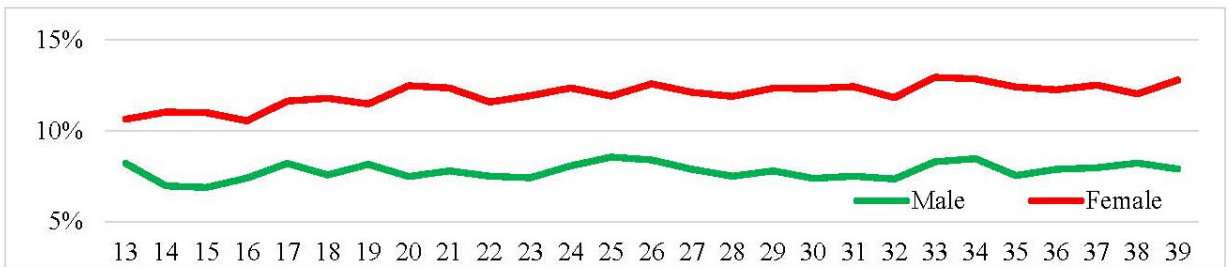

(2a) Experienced any symptoms of anxiety in the past seven days
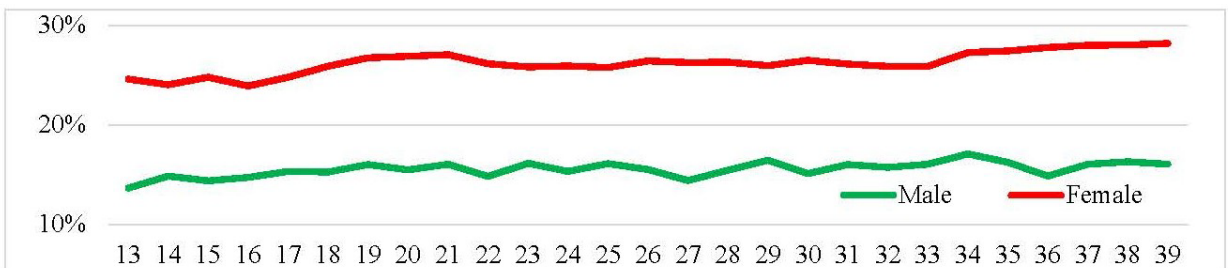

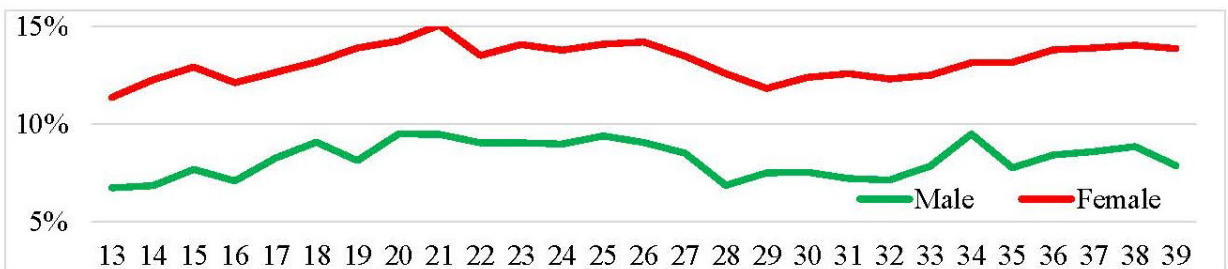(2b) Experienced any symptoms of depression in the past seven days

Figure 2. Prevalence of Mental Health among US Adults during the Pandemic by Sex.

(3a) Received professional counseling/therapy in the past four weeks

(3b) Took Prescription medication for mental health

(3c) Did not recevied the needed professional counseling/theraph for any reason in the past four weeks

Figure 3. Mental Heal Service among US Adults during the Pandemic by Sex

Based on the p-values for one-tail Student t tests reported in Table 4, we reject the null hypothesis at the 1% significance level for each mental health outcome by sex. The results support the gender-specific inequality of mental health -- female adults were more likely to experience mental health shocks and received treatment and they were also more likely to have an unmet need of mental health care than male adults.

Table 2. Mental health and services among US adults by different adult cohorts during the pandemic

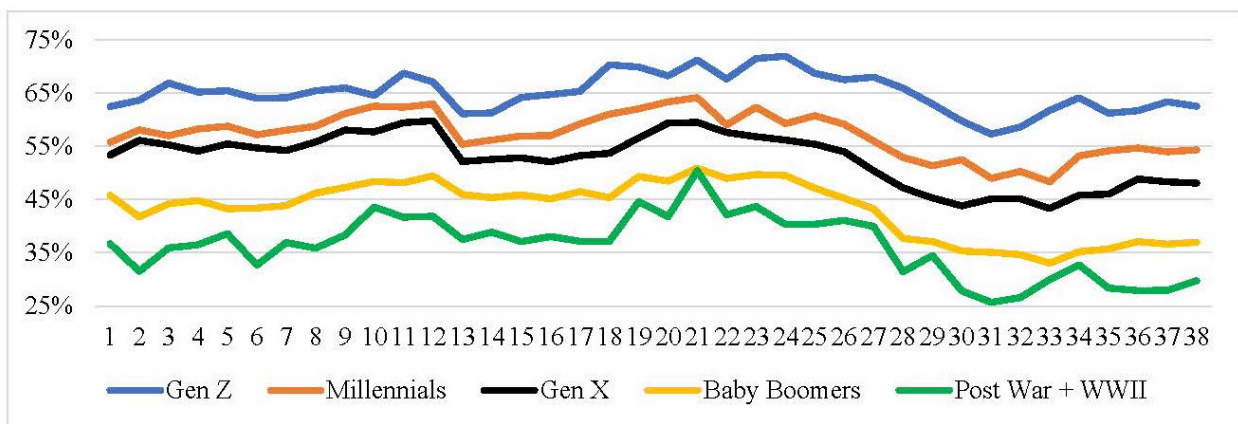|	Mental Health		Mental Health Services		
	Anxiety	Depression	Receive Counseling	Prescription Medication	Receive No Counseling
Sex: Male	54.92%	48.93%	7.79%	15.53%	8.23%
Female	67.58%	55.21%	12.00%	26.23%	13.23%
$X_{Female} - X_{Male}$	12.65%	6.28%	4.28%	10.71%	5.01%
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age: Gen Z	74.24%	65.12%	14.98%	20.50%	19.80%
Millennials	70.58%	57.30%	14.18%	21.31%	15.38%
Gen X	63.31%	52.72%	10.10%	22.28%	10.37%
Baby Boomers	52.96%	43.36%	5.30%	20.43%	4.81%
Post war and WW II	41.07%	36.38%	3.79%	14.95%	3.40%
$X_{Gen Z} - X_{Millenial}$	3.66%	7.82%	0.79%	-0.81	4.43%
	(0.00)	(0.00)	(0.48)	(0.03)	(0.00)
$X_{Millenial} - X_{GEN X}$	7.27%	4.58%	4.08%	-0.97%	5.01%
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$X_{Gen X} - X_{Baby Bommer}$	10.35%	9.36%	4.80%	1.81%	5.56%
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$X_{Baby Boomer}$	11.89%	6.98%	1.51%	5.51%	1.41%
$- X_{Post War+WW II}$	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Race: Non-Hispanic white	60.22%	49.71%	10.34%	24.02%	10.48%
Hispanic	67.25%	58.84%	9.02%	15.99%	11.89%
Non-Hispanic Black	59.85%	55.17%	9.52%	15.41%	11.47%
Asian	57.74%	51.11%	6.13%	9.49%	6.73%
$X_{Hispanic} - X_{black}$	7.40%	3.67%	-0.05%	0.58%	0.42%
	(0.00)	(0.00)	(0.18)	(0.02)	(0.06)
$X_{black} - X_{white}$	-0.36%	5.46%	-0.82%	-8.61%	0.98%
	(0.18)	(0.00)	(0.00)	(0.00)	(0.00)
$X_{white} - X_{Asian}$	2.48%	-1.40%	4.20%	14.53%	3.75%
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
HH Income: <$25k	71.50%	61.66%	13.69%	27.16%	16.33%
$25k-$75k	63.80%	56.68%	9.18%	22.18%	11.91%
$75k+	56.70%	43.59%	9.81%	19.02%	8.55%
$X_{\$25k-} - X_{\$25k-\$75k}$	7.70%	4.98%	4.51%	4.98%	4.43%
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$X_{\$25k-\$75k+} - X_{\$75k+}$	7.11%	13.09%	-0.62%	3.16%	3.35%
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Employed	61.52%	49.83%			
Unemployed	61.42%	55.20%	Data were not collected for mental health		
$X_{Unemployed} - X_{Employed}$	-0.09%	5.37%	services by employment status.		
	(0.39)	(0.00)			

Numbers in parentheses are p-value for Student t tests.

Mental Health Inequality by Age Cohorts

During the pandemic, younger adults were more likely to have anxiety or depression (Figures (4a) and (4b)), received professional counseling or therapy (Figure (5a)), and had an unmet need of mental health are (Figure (5c)). However, Figure (5b) does not show a clear age-specific pattern for taking prescription medication for mental health, except that adults born in post war or WW II were least likely to take prescription medication.
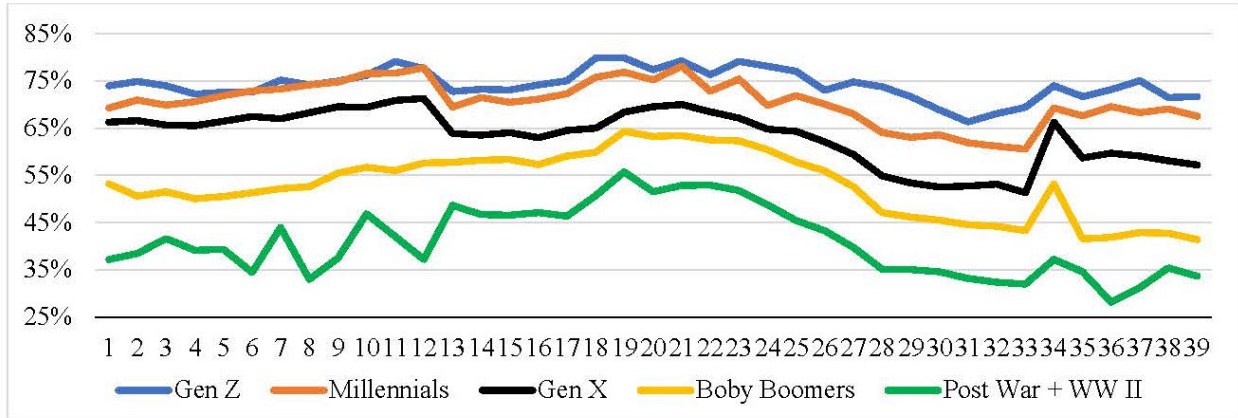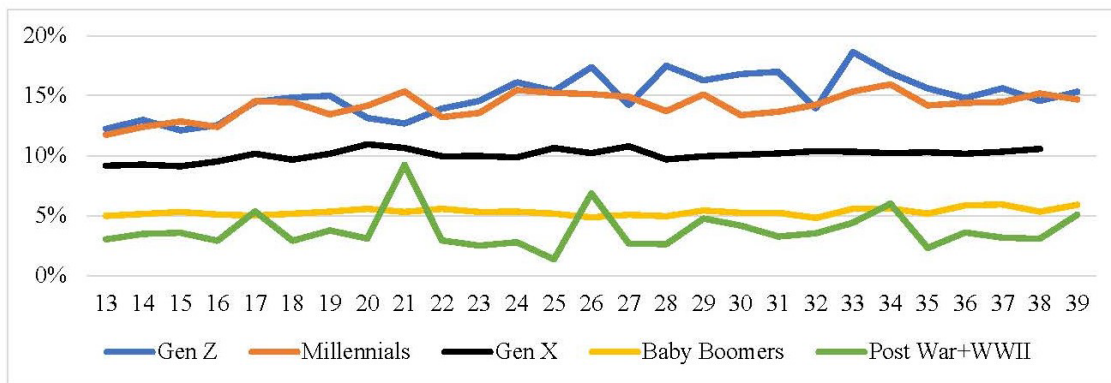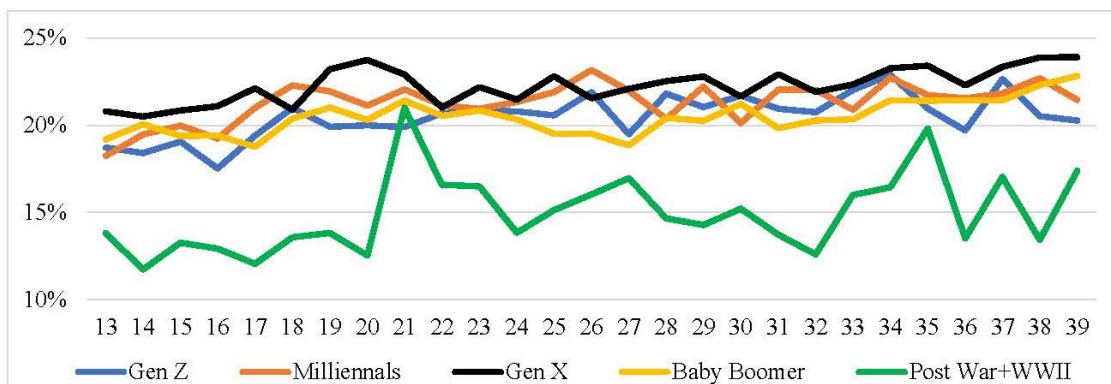

(4a) Experienced any symptoms of anxiety in the past seven days

(4b) Experienced any symptoms of depression in the past seven days

Figure 4. Mental Health among US Adults during the Pandemic by Age Cohorts

Table 2 shows that the proportion of US adults in different age cohorts experienced any symptoms of anxiety were 74.24% for Gen Z, 70.58% for millennial, 63.31% for Gen X, 52.96% for baby boomers, and 41.07% for post war and WW II. The corresponding percentage of experiencing any symptoms of depression were 65.12% for Gen Z, 57.30% for millennials, 52.72% for Gen X, 43.35% for baby boomers, and 36.38% for post war and WW II. Table 3 also shows that 1) the percentage of adults who received professional counseling or therapy for mental health was 14.98% for Gen Z, 14.18% for millennials, 10.10% for Gen X, 5.30% for baby boomers, and 3.79% for post war and WW II; 2) the percentage of adults who took prescription medication for mental health was 20.50% for Gen Z, 21.31% for millennial, 22.28% for Gen X, 20.47% for baby boomers, and 14.95% for post war and WW II; and 3) the percentage of adults who did not receive the need mental health care was 19.80% for Gen Z, 15.38% for millennials, 10.37% for Gen X, 4.81% for baby boomers, and 3.40% for post war and WW II. We formulate the null hypotheses and the alternative hypotheses below:

Null Hypothesis: $X_{Gen\ Z} = X_{Millenial} = X_{Gen\ X} = X_{Baby\ Boomer} = X_{Post\ War+WW\ II}$

Alternative Hypothesis: $X_{Gen\ Z} > X_{Millenial} > X_{Gen\ X} > X_{Baby\ Boomer} > X_{Post\ War+WW\ II}$

Based on the p-values reported in Table 2, we reject the null hypotheses at the 1% statistical significance level for experiencing any symptoms of anxiety or depression, receiving professional counseling or therapy, and having unmet mental health service needs: $X_{Gen\,Z} > X_{Millenial} > X_{Gen\,X} > X_{Baby\,Boomer} > X_{Post\,War+WW\,II}$. On the other hand, we find that Gen X was most likely to take prescription medication, followed by millennials, and adults born in post war and WW II being the least likely, but no statistical difference was found between Gen Z and baby boomers as the corresponding p-vlaues exceeds 0.10: $X_{Gen\,X} > X_{Millenial} > \{X_{GEN\,Z}, X_{Baby\,Boomer}\} > X_{Post\,War+WW\,II}$. Therefore, our results suggest younger adults were more likely to have mental shocks during the pandemic and receive professional counseling for mental health. A higher percentage of young adults did not receive the needed mental health services.

(5a) Received professional counseling/therapy in the past four weeks

(5b) Took prescription medication for mental health in the past four weeks
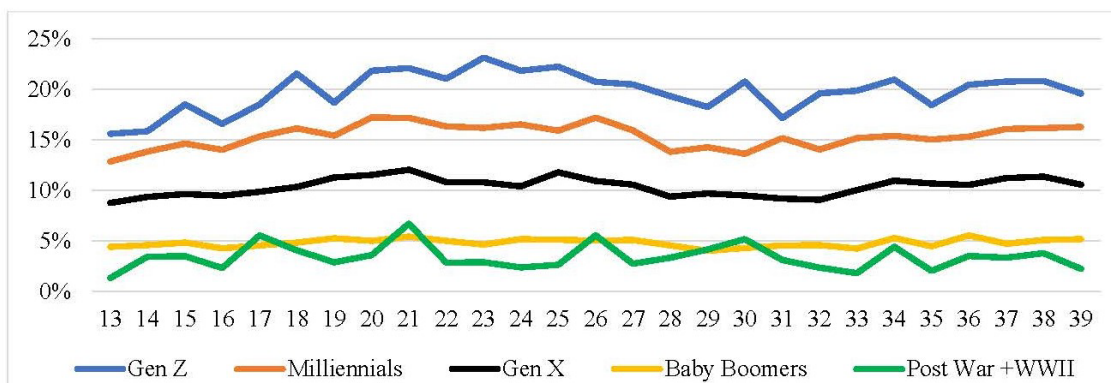
(5c) did not receive the needed counseling/therapy in the past four weeks

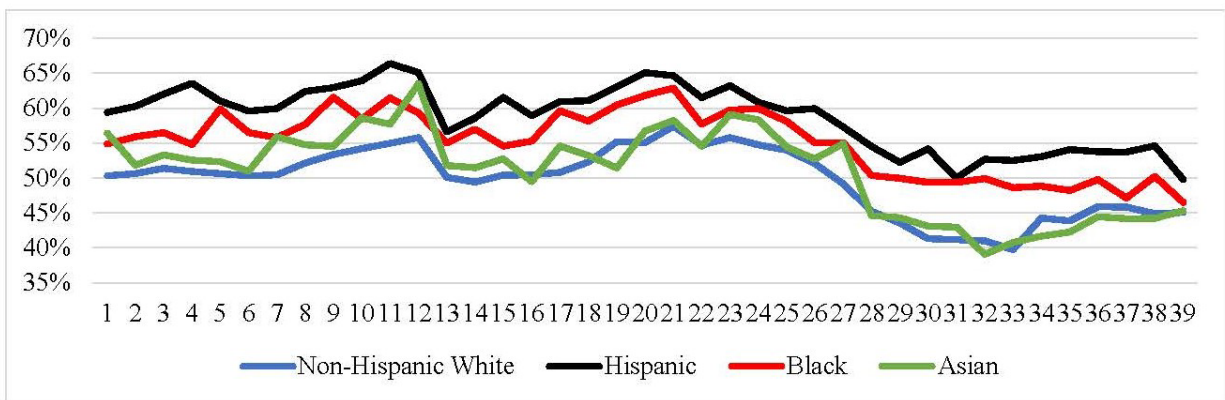**Figure 5.** Mental Health among US Adults during the Pandemic by Age Cohorts

Mental Health Inequality by Race

Figures (6a) and (6b) demonstrate that Hispanic adults were likely to experience symptoms of anxiety or depression and the least for Asian. Table 2 shows that adults that experienced any symptoms of anxiety were 67.25% for Hispanic, 60.22% for Non-Hispanic white, 59.85% for Non-Hispanic black, and 57.74% for Asian. The corresponding percentage of experiencing any symptoms of depression were 58.84% for Hispanic, 55.17% for Non-Hispanic black, 49.71% for non-Hispanic white, and 51.11% for Asian. We therefore formulate the null and alternative hypothesis by race:

Null Hypothesis: $\quad X_{Hispanic} = X_{Non-Hispanic\ Black} = X_{Non-Hispanic\ white} = X_{Asian}$

Alternative Hypothesis: $\quad X_{Hispanic} > X_{Non-Hispanic\ Black} > X_{Non-Hispanic\ white} > X_{Asian}$
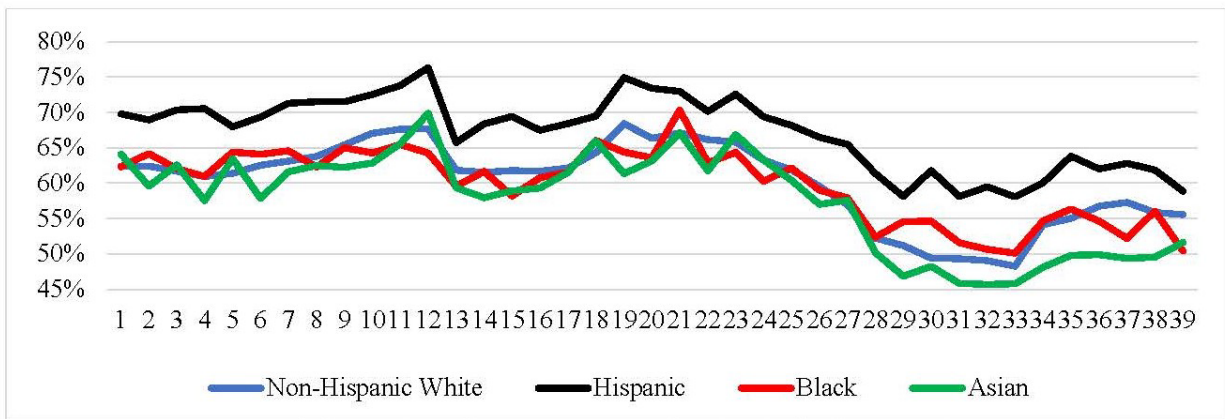
(6a) Experienced some symptoms of anxiety in the last seven days

(6b) Experienced some symptoms of depression in the last seven days

Figure 6. Mental Health among US Adults during the Pandemic by Age Cohorts

Based on the p-values for the Student t tests reported in Table 2, we rejected the null hypotheses at the 1% statistical significance level with two exceptions. We cannot reject the null hypotheses for the comparison on anxiety between non-Hispanic black and non-Hispanic white and those on mental health services between non-Hispanic black and Hispanic. The results show a gender-specific inequality of mental health. Hispanic adults and Non-Hispanic were more likely than non-Hispanic white and Asian adults to experience symptoms of anxiety, Hispanic experienced depression symptoms most, and Asian experienced both anxiety and depression the least.

Figures (7a) and (7b) show that Non-Hispanic white were most likely to receive professional counseling or therapy and take prescription medication for mental health, followed by Hispanic and non-Hispanic black, and Asian being the least likely. Table 2 shows that 1) the percentage of adults who received professional counseling or therapy were 10.43% for non-Hispanic white, 9.52% for non-Hispanic black, 9.02% for Hispanic, and 6.13% for Asian; and 2) the percentage of adults who took prescription medication for mental health was 24.02% for non-Hispanic White, 15.99% for Hispanic, 15.41% for non-Hispanic black, and 9.49% for Asian. We formulate the null and alternative hypotheses on receiving mental health service:

Null Hypothesis: $X_{Non-Hispanic\ white} = X_{Non-Hispanic\ Black} = X_{Hispanic} = X_{Asian}$

Alternative Hypothesis: $X_{Non-Hispanic\ white} > X_{Non-Hispanic\ Black} > X_{Hispanic} > X_{Asian}$

Based on the p-values reported in Table 2, we reject the null hypotheses at the 1% statistical significance level for the comparison between non-Hispanic white and people of color. The difference between non-Hispanic black and Hispanic was statistically different at the 5% significance level. The results show race-specific inequality in receiving treatments for mental health – Non-Hispanic white were most likely to receive mental health service, followed by Hispanic and non-Hispanic black, and Asian lest likely.
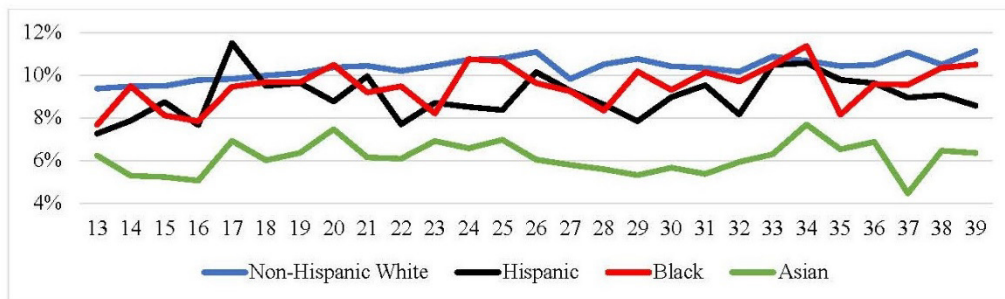
(7a) Received professional counseling/therapy in the last four weeks
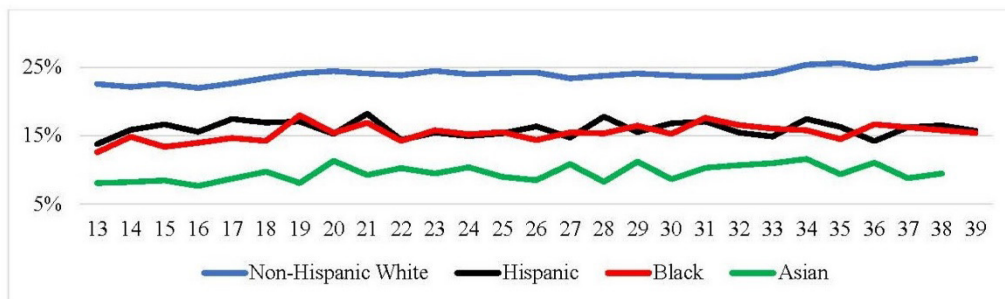
(7b) Took prescription medication for mental health in the last four weeks
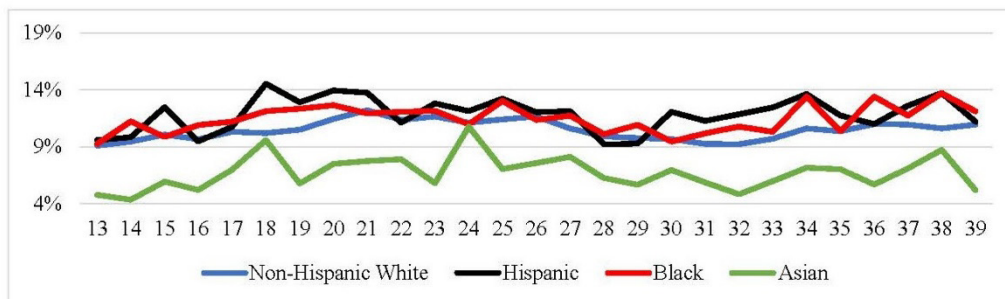
(7c) Did not receive the needed professional counseling/therapy in the last four weeks

Figure 7. Mental Health among US adults during the Pandemic by Race/Ethnicity

Figure (7c) does not show a clear pattern on the unmet need of mental health care among non-Hispanic white, Hispanic, and non-Hispanic black. Table 2 shows that the percentage of adults who had an unmet need of mental health care was 11.89% for Hispanic 11.47% for non-Hispanic black, 10.48% for non-Hispanic white, and 6.73% for Asian. We formulate the null hypotheses and the alternative hypotheses on the unmet mental health care need:

Null Hypothesis: $X_{Hispanic} = X_{Non-Hispanic\ Black} = X_{Non-Hispanic\ White} = X_{Asian}$
Alternative Hypothesis: $X_{Hispanic} > X_{Non-Hispanic\ Black} > X_{Non-Hispanic\ White} > X_{Asian}$

Based on the p-values for the statistical student t tests reported in Table 2, we reject the null hypothesis at the 1% significance level, with an exception for the 10% significance level for the difference between Hispanics and non-Hispanic black. We conclude that Hispanic and non-Hispanic black adults had a higher probability for not receiving the need mental health care, followed by non-Hispanic white, the least for Asian.
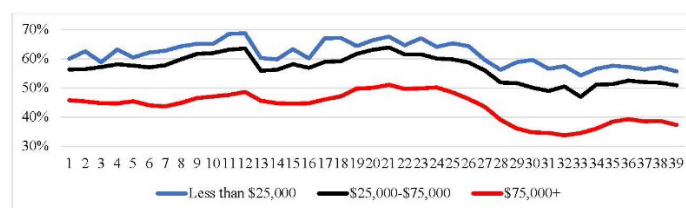
Mental Health Inequality by Household Income Levels

Figures 8 and 9 show that the lower the household income, the more likely they experienced mental health shocks, received mental health service, and had an unmet need of mental health care. As shown in Table 2, the percentage of US adults experienced any symptoms of anxiety was 71.50% for adults with household income less than $25,000, 63.80% for adults with household income between $25,000 and $75,000, and 56.70% for adults with household income of $75,000 or greater. The corresponding percentage of experiencing any symptoms of depression were 61.66%, 56.68 and 43.59%. Table 2 also shows that the percentage of adults who received professional counseling or therapy for mental health was for 13.69% for adults with household income less than $25,000, 9.18% for adults with household income between $25,000 and $75,000, and 9.81% for adults with household income of $75,000 or greater. The corresponding percentages of adults who took prescription medication for mental health was 27.16%, 22.18%, and 19.02% for three different household income levels. Table 2 also show the percentage of adults who did not receive the needed mental health service was 16.33% for adults with household income less than $25,000, 11.91% for adults with household income between $25,000 and $75,000, and 8.55% for adults with household income at least $75,000. We formulate the null and alternative hypotheses:

Null Hypothesis: $X_{Less\ than\ \$25,000} = X_{\$25,000-\$75,000} = X_{\$75,000+}$
Alternative Hypothesis: $X_{Less\ than\ \$25,000} > X_{\$25,000-\$75,000} > X_{\$75,000+}$
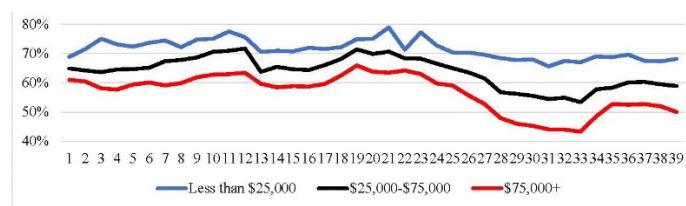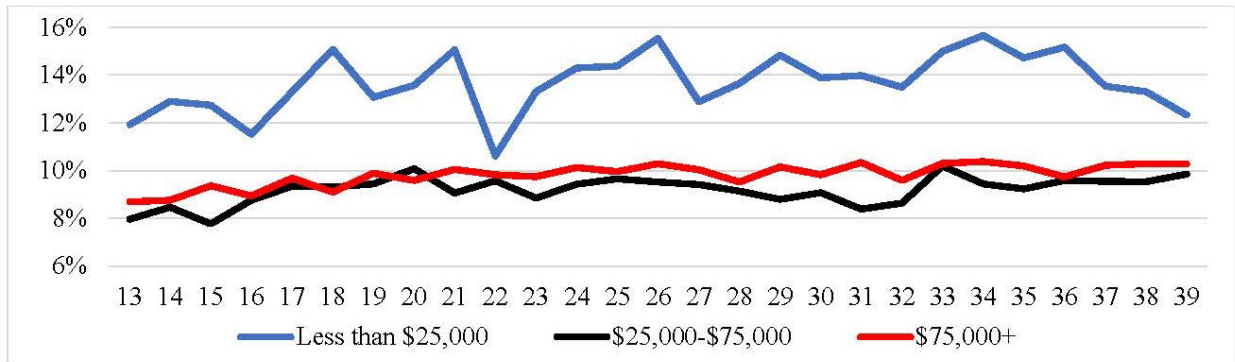

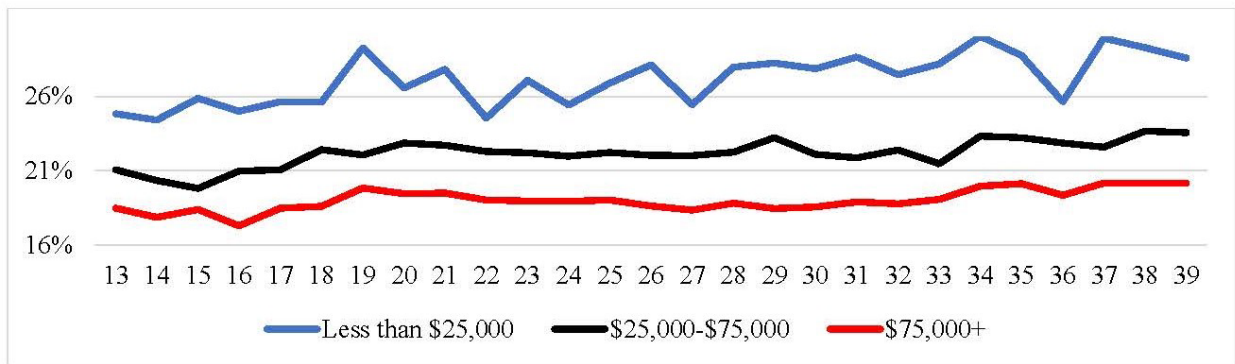(8a) Experienced symptoms of anxiety in the last seven days

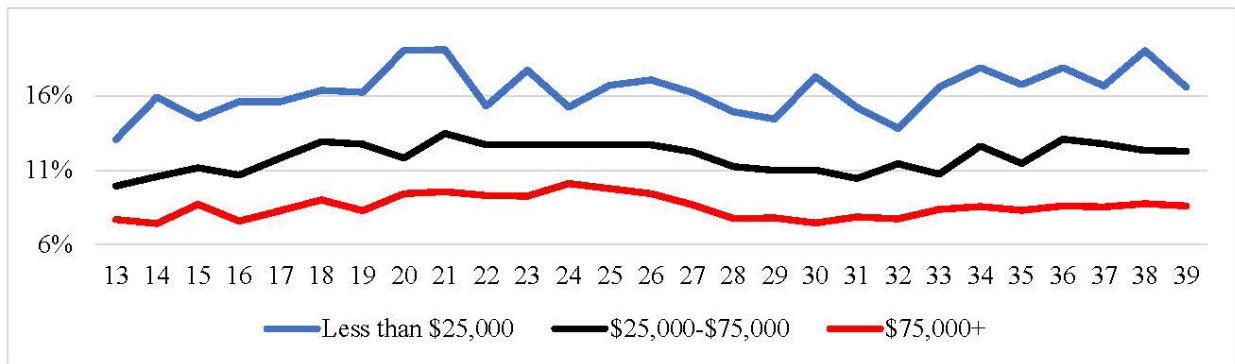(8b) Experienced symptoms of depression in the last seven days

Figure 8. Mental Health among US adults during the Pandemic by Household Income Levels

(9a) Received professional counseling/therapy in the past four weeks

(9b) Took prescription medication for mental health in the past four weeks

(9c) Did not receive the needed professional counseling/therapy in the past four weeks

Figure 9. Mental Health among US adults during the Pandemic by Household Income Levels
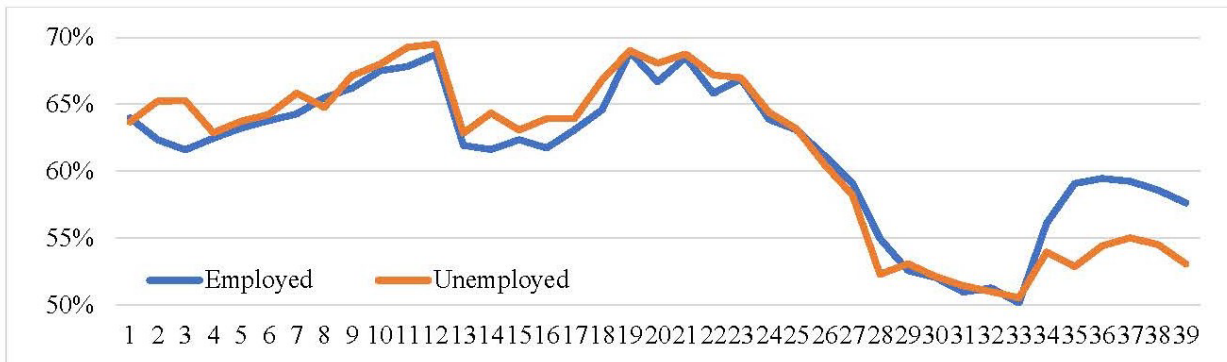
Based on the p-values for the statistical Student t tests reported in Table 2, we reject the null hypotheses at the 1% statistical significance level, except for the comparison on receiving mental health counseling between adults with household income $25,000-$75,000 and $75,000+. The results show that adults with lower household income were more likely to experience symptoms of anxiety or depression, take prescription medication for mental health, and not receive the needed counseling or therapy. In terms of receiving professional counseling of mental health, the highest percent was among adults of household income of $25,000 or less, followed by those with $75,000 or above, the lowest for adults of household income between $25,000 to $75,000.

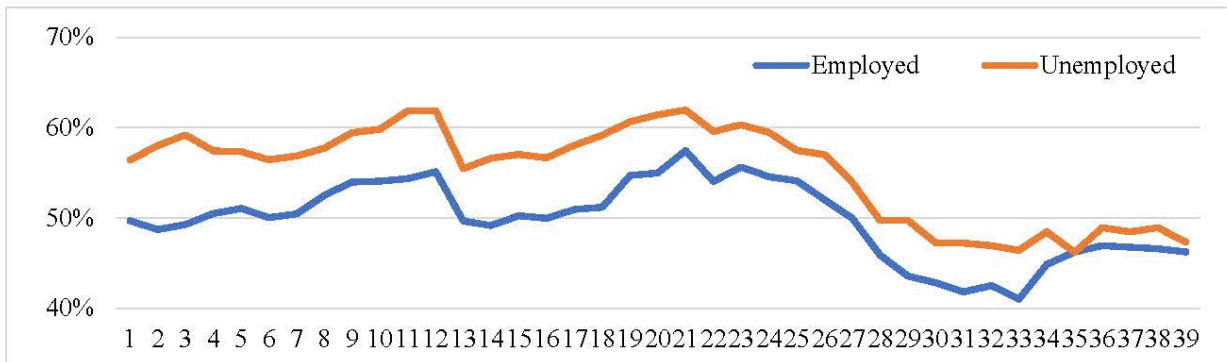## Mental Health Inequality by Employment Status

The Household Pulse survey collected information of mental health but not on mental health service by employment status. Figure 10(a) does not suggest statistical difference in experiencing any symptoms of anxiety between employed and unemployed adults. Figure 10(b) suggests unemployed adults were more likely to experience depression symptoms. Table 2 shows that 61.41% of unemployed adults and 61.52% of employed adults had symptoms of anxiety in the last seven days. The corresponding numbers for experience symptoms of depression are 55.20% for unemployed adults and 49.83% for employed adults. We expect unemployment leads to anxiety and depression due to the lack of income. Therefore, we formulate the null and alternative hypotheses below:

Null Hypothesis: $X_{Unemployed} = X_{Employed}$
Alternative Hypothesis: $X_{Unemployed} > X_{employed}$

(10a) Experienced symptoms of anxiety in the past seven days

(10b) Experienced symptoms of depression in the last seven day

Figure 10. Mental Health among US adults during the Pandemic by Employment Status

Based on the p-value of the one tail student t-tests reported in Table 2, we cannot reject the null hypothesis at the 10% statistical significance level for anxiety (p-value = 0.39). However, we reject the null hypothesis at the 1% statistical significance level for depression (p-value = 0.00). There are two possible channels that employment status can work through to impact mental health: income and work environment. First, income difference between unemployed and employed adults was expected to cause the difference in their mental health. Second, the change of work environment can cause stress. Employed adults who worked at home during the pandemic are expected to have more stress. Starting from Week 33 to Week 39, employed adults were more likely to experience anxiety as they faced another change of work environment -- starting to go back to their office to work.

Conclusions and Policy Implications

The COVID-19 pandemic had significant social and economic impacts comparable only to the crash of the Great Depression. Many people experienced anxiety, depression, confusion, and stress for different reasons during the pandemic. This study uses the Household Pulse Survey conducted by the U.S Census Bureau to analyze mental health issues among US adults during the pandemic from April 2020 to October 2021. Based on the statistical analyses of this nationally representative dataset, this study offers the following findings. First, during the pandemic, almost half of U.S adults experienced symptoms of anxiety (61.48%) and depression (52.11%), more than double the pre-pandemic levels in 2019 (20.6% with any mental illness). Second, 21.11% took prescription medication and less than 10% received professional counseling or therapy (9.96%) for mental health, on a par with the 2019 level (15.8% and 9.5%). Many people had an unmet need for mental health care (10.83%). Third, inequality of mental health was pronounced. Female, younger age cohorts, and low-income adults were more likely to experience mental health shocks, receive mental health services, and have an unmet need of mental health care. Compared with non-Hispanic white adults, Hispanic and non-Hispanic black adults had a higher probability of experiencing mental health problems and having an unmet need of mental health care, but they were less likely to receive mental health service. These findings help identify adults who need the most help and support for their mental health during the pandemic. These findings can also be used to guide the government and communities to form and implement mental health support programs and interventions.

Acknowledgments

References

Allwood, L., & Bell, A. (2020). Covid-19: understanding inequalities in mental health during the pandemic. *Centre for Mental Health: London, UK*.

Fitzpatrick, K. M., Drawve, G., & Harris, C. (2020). Facing new fears during the COVID-19 pandemic: The State of America's mental health. *Journal of anxiety disorders, 75*, 102291.

Goldmann, E., Hagen, D., El Khoury, E., Owens, M., Misra, S., & Thrul, J. (2021). An examination of racial and ethnic disparities in mental health during the Covid-19 pandemic in the US South. *Journal of Affective Disorders, 295*, 471-478.

HealthPeople (2020) https://www.healthypeople.gov/2020/topics-objectives/topic/mental-health-and-mental-disorders Last accessed on December 3, 2021.

JHU (2021) https://coronavirus.jhu.edu/ Last accessed on November 30, 2021.

Khan, K. S., Mamun, M. A., Griffiths, M. D., & Ullah, I. (2020). The mental health impact of the COVID-19 pandemic across different cohorts. *International journal of mental health and addiction*, 1-7.

Lee, H., & Singh, G. K. (2021). Monthly Trends in Access to Care and Mental Health Services by Household Income Level During the COVID-19 Pandemic, United States, April: December 2020. *Health Equity, 5*(1), 770-779.

Li, F., Luo, S., Mu, W., Li, Y., Ye, L., Zheng, X., . . . Zhou, M. (2021). Effects of sources of social support and resilience on the mental health of different age groups during the COVID-19 pandemic. *BMC psychiatry, 21*(1), 1-14.

Marroquín, B., Vine, V., & Morgan, R. (2020). Mental health during the COVID-19 pandemic: Effects of stay-at-home policies, social distancing behavior, and social resources. *Psychiatry research, 293*, 113419.

McDowell, C. P., Herring, M. P., Lansing, J., Brower, C. S., & Meyer, J. D. (2021). Associations between employment changes and mental health: US data from during the COVID-19 pandemic. *Frontiers in Psychology, 12*, 255.

Purtle, J. (2020). COVID-19 and mental health equity in the United States. *Social psychiatry and psychiatric epidemiology, 55*(8), 969-971.

Singh, S., Roy, M. D., Sinha, C. P. T. M. K., Parveen, C. P. T. M. S., Sharma, C. P. T. G., & Joshi, C. P. T. G. (2020). Impact of COVID-19 and lockdown on mental health of children and adolescents: A narrative review with recommendations. *Psychiatry research*, 113429.

Thibaut, F., & van Wijngaarden-Cremers, P. (2020). Women's mental health in the time of Covid-19 pandemic. *Frontiers in Global Women's Health, 1*, 17.

Twenge, J. M., & Joiner, T. E. (2020). Mental distress among US adults during the COVID-19 pandemic. *Journal of Clinical Psychology, 76*(12), 2170-2182.

Vahratian, A., Blumberg, S. J., Terlizzi, E. P., & Schiller, J. S. (2021). Symptoms of anxiety or depressive disorder and use of mental health care among adults during the COVID-19 pandemic—United States, August 2020–February 2021. *Morbidity and Mortality Weekly Report, 70*(13), 490.

World Health Organization WHO (2020). https://www.who.int/publications/m/item/covid-19-public-health-emergency-of-international-concern-(pheic)-global-research-and-innovation-forum and https://time.com/5791661/who-coronavirus-pandemic-declaration/ Last accessed on December 3, 2021.