

The COVID-19 Pandemic and Mental Health: An Exploratory Analysis within the United States

Final Project

Unleashing Open Data with Python | Dr. Collin Paschall

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I. Introduction

Since the onset of the COVID-19 pandemic, there is a growing discourse about how the mental health of individuals was impacted by the realities that COVID-19 forced us to confront and the manner in which we were forced to confront them.

This research note will carry out an exploratory analysis of how the pandemic has affected the mental health of various demographic groups within the United States. It will do so by analyzing the responses of several questions on the Household Pulse Survey related to anxiety and depressive symptoms from April 23, 2020 to March 14, 2022.

II. Literature Review

Mental health practitioners, researchers, and policymakers have had their eyes on the growing prevalence of anxiety and depression in the United States for some time. Theories attempting to contextualize and explain this phenomenon range across sprawling domains and forces - loneliness, trauma, socioeconomic factors, genetics, and so on. The COVID-19 pandemic brought these discussions into sharp focus as systems and networks once thought reliable were brought to a halt, creating wide-scale disruptions and acute stressors in the lives of many. This also fostered a sense of urgency amongst researchers for determining the degree to which levels of anxiety and depression were changing, the reasons why, and the scope of the impact.

To gauge the prevalence of anxiety and depression at scale, researchers often rely on surveys that screen for various symptoms of serious mental illness. There is extensive research into the effectiveness and appropriateness of various screening measures like the Kessler 6 Scale, GHQ-12 score, or the World Health Organization's Composite International Diagnostic Interview Short-Form (CIDI-SF), all of which show high levels of correlation between responses and diagnosable conditions (Kessler et al., 2003). Survey tools of this kind ask respondents about the frequency with which they experience specific symptoms of psychological distress in order to create composite scores - the higher score signifying more frequent and potentially pronounced symptoms.

Given the pre-existing attention to anxiety, depression and general psychological distress within the United States, these studies were underway before the COVID-19 pandemic was fully underway in early 2020. In 2019, the National Center for Health Statistics found that the percentage of the US population with symptoms of an anxiety disorder was around 8.1% and a depressive disorder was 6.5%, while the percentage with symptoms of an anxiety disorder and/or depressive disorder was 10.8% (Terlizzi and Schiller, 2021). In 2018, another set of researchers found that approximately 3.9% of US adults aged 18 and above had symptoms of serious psychological distress (McGinty et. al, 2020).

Even in the early days of the pandemic researchers noticed drastic changes in self-reported mental well-being measures of US respondents with some studies finding 11% increases in the

likelihood of increasing distress in states with high COVID-19 case counts (Calliope Holingue et al., 2021). Those levels of distress demonstrated staying power, as well, with representative populations in the US being nearly 2 times more likely to experience mental distress in early April 2020 than March 2020 and nearly 2 times more likely in May 2020 than April 2020 (Riehm et al., 2021). Another study found that the prevalence of mental distress did not return to pre-pandemic levels in the UK (Quintana-Domeque and Proto, 2022).

In seeking to understand the sharp rise in levels of mental distress, researchers began to explore the impact across different populations, especially within the context of previous longitudinal studies that suggest being a racial/ethnic minority, younger, female, living alone, etc. are correlated with being at-risk for poor mental health (Lowe et al., 2022). Building on this research within the context of the pandemic, McGinty et al. (2020) found drastic changes in the prevalence of reported symptoms for serious psychological illness between 2018 and 2020 for adults aged 18 to 29 (3.7% in 2018; 24% in 2020) and Hispanic adults (4.4% in 2018; 18.3% in 2020) as well as adults making less than \$35,000 per year.

Age appears to be a particularly strong indicator of symptoms of psychological distress within the context of the pandemic. Cui et al. (2020) found that every year increase in age was associated with a 2.96% decrease in the odds of mental health problems when analyzing data from April 2020 to July 2020 in the US. Lowe et al. (2022) found that older participants in their study in Canada had lower levels of anxiety at baseline and this persisted over the course of the pandemic, which is surprising given that older age is associated with being more at risk for severe infection from COVID-19. In their discussion of why older age might be correlated to lower levels of anxiety in the pandemic, they noted that older respondents might have surer economic footing than younger respondents, are less likely to have young children at home, and have more psychological resilience; all critical factors when dealing with economic insecurity, school closures, and social isolation as a result of the pandemic, respectively (Lowe et al., 2022).

Villatoro et al. (2022) also builds on this explanation in the context of young Latinx adults in Texas, providing a model of how research looking at the intersection of factors like age and race/ethnicity are crucial for understanding the impact of COVID-19 on mental health. Young Latinx adults tend to step in as economic providers for their families and work in jobs that were particularly vulnerable to COVID-19, including restaurants, retail and transportation, all while being more likely to live in multi-generational households with older family members that could be at-risk (Villatoro et al., 2022). Findings on the disproportionate mental distress impacts of COVID-19 across racial/ethnic identities were also confirmed in larger-scale studies, prompting the need for a more comprehensive look at the dynamics at play (Riehm et al., 2021).

Females also experienced larger spikes in mental distress compared to males during the early months of the pandemic, confirming a potential relationship between sex and symptoms of psychological distress in the context of COVID-19 (Riehm et al., 2021). Riehm et al. (2021) note

from their studies that “the absolute odds of mental distress were approximately four times higher across the study period in females compared to males” exploring a plethora of potential factors - increased childcare burden, disproportionate unemployment rates, presence of females in healthcare workforce and increased stressors for that field in the course of the pandemic (pg. 100).

The pre-existing literature appears to position us to expect clear trends when mental health data is disaggregated by age, race/ethnicity, and sex during the course of the COVID-19 pandemic. As such, we would expect to see higher levels of psychological distress in younger respondents, racial and/or ethnic minorities, and females.

This paper will build upon the literature exploring these trends over a longer timeframe of the pandemic and take an explicitly exploratory approach to highlight the larger context of mental distress across populations in the United States.

III. Data, Methodology and Analysis

In April 2020, the US Census Bureau, in collaboration with the National Center for Health Statistics (NCHS) and several other agencies, launched a 20-minute survey called the *Household Pulse Survey* to provide timely information on how people across the US were being affected by the pandemic (Mental Health - Household Pulse Survey - COVID-19, 2022).

Several questions on this survey explore the presence of anxiety or depressive symptoms in respondents. Specifically, there were two questions to gauge Generalized Anxiety Disorder and two questions for measuring depressive systems based on the Patient Health Questionnaire (PHQ-2) questions.

From April 23, 2020 to July 21, 2021, the questionnaire asked about the presence of symptoms “over the last 7 days”, but after July 21, 2021 this moved back to “over the last two weeks”, which was the norm prior. In total, the survey covers 43 unique time periods - one week periods from April 23, 2020 to July 21, 2021 and two week periods after that from April 23, 2020 to March 14, 2022.

The two questions related to depressive symptoms were:

Over the last 7 days, how often have you been bothered by ... having little interest or pleasure in doing things?

Over the last 7 days, how often have you been bothered by ... feeling down, depressed, or hopeless?

The two questions for anxiety symptoms were as follows:

*Over the last 7 days, how often have you been bothered by the following problems ...
Feeling nervous, anxious, or on edge?*

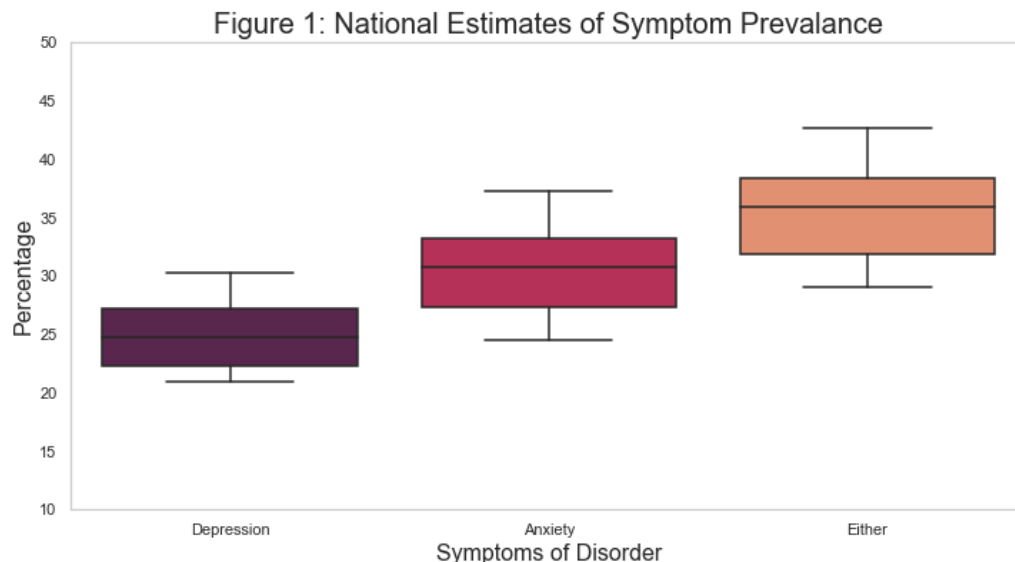
*Over the last 7 days, how often have you been bothered by the following problems ... Not
being able to stop or control worrying?*

Like other methods for assessing potential mental distress discussed in the previous section, this survey created a composite score based on the frequency of the symptoms respondents claim in their answers. There were single-choice answers to each of these questions with “Not at all” equalling 0, “Several days” equalling 1, “More than half of the days” equalling 2, and “Nearly every day” equalling 3.

If the sum of the responses was more than 3 for the two depression questions, then the respondent was said to be displaying symptoms related to depression. The same was true for the two anxiety questions as it pertains to symptoms for Generalized Anxiety Disorder.

The dataset for this analysis aggregates this data at the level of various subgroups nationally, showing the percentage of respondents from that subgroup that were showing (a) Symptoms of Anxiety Disorder, (b) Symptoms of Depressive Disorder, and (c) Symptoms of Anxiety Disorder or Depressive Disorder.

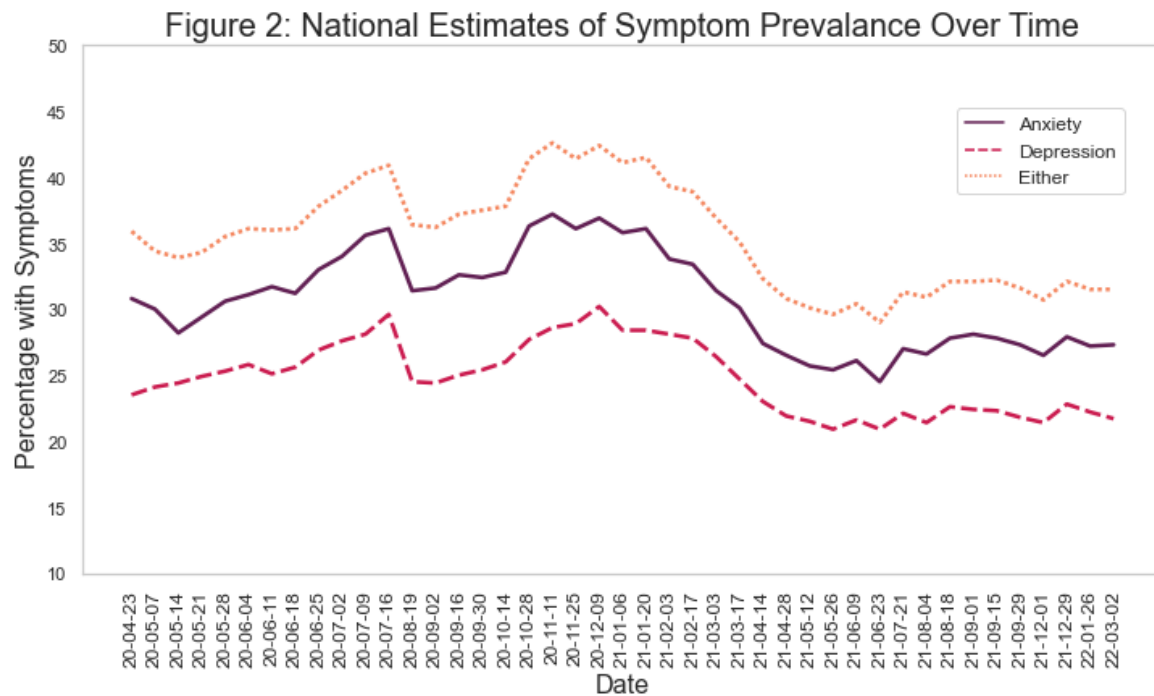
In taking an overall look at the data at the national level in *Figure 1*, we see an astonishing level of symptom prevalence across all categories:



If we are to take the 2019 estimates of the National Center for Health Statistics of approximately 8.1% of the US population with symptoms of an anxiety disorder, 6.5% with a depressive disorder and 10.1% with either, this is an incredible difference (Terlizzi and Schiller,

2021). We can also see a wide-range for the upper tail, showing that there may be higher spikes and outliers on the upper end.

In fact, when we look at the trends for the percentage of symptoms evident in the US population over the time period this survey was administered in Figure 2 those upper spikes come into focus:



There was a brief spike in the summer of 2020, culminating at the highest point in that period in mid-July. We then see a sustained period of high anxiety and depression throughout the winter of 2020. While beyond the scope of this paper to explore, some scholars have pointed to socio-political events happening during those same times that may have expounded the levels of anxiety and depression - the Black Lives Matter protests in the summer 2020 and the US election and subsequent turmoil in late 2020-early 2021, respectively (Chu et al., 2020).

Included in the *Appendix* are a series of visualizations looking at data over the course of the time period of April 23, 2020 to March 14, 2022 taking a closer look at age, sex, and race/ethnicity to confirm our hypothesis regarding the trends we'd expect to see in each subgroup.

In Figure 3 and Figure 4, we elevated levels of anxiety and depression in the 18-29 year old age bracket. There are several items here of note. First, we can see that the level of anxiety and depression appears to reduce by several percentage points with each increase in age bracket, which confirms our hypothesis that the older a respondent the less likely to have symptoms of

serious psychological illness. Second, we can see spikes generally following the overall trends of high points in the summer and winter of 2020 across all age groups. And, lastly, we see a relatively sustained level of anxiety and depression over the course of the time period in question.

In Figures 5 and 6, we see the highest rates of anxiety and depression in those respondents identifying as “Other” or “Multiple Races” with “Hispanic or Latino” respondents the second-highest. There appears to be less of a disparity in the levels amongst ethnicities here. Asian respondents had the lowest levels for both anxiety and depression except for a brief spike in the summer of 2020.

Lastly, in Figures 7 and 8 we see a sustained difference between female and male respondents with roughly 10% more female respondents experiencing anxiety symptoms on average than male respondents and 5% more female respondents experiencing depression symptoms on average than male respondents. The ebbs-and-flows of these percentages appear to mirror each other, moving in parallel over the course of the time period studied.

V. Conclusion

This analysis of the Household Pulse Survey questions related to anxiety and depressive symptoms from April 23, 2020 to March 14, 2022 adds several important contributions to our understanding of the effect of the COVID-19 impact on mental health.

For one, this analysis looks across a longer timeframe than previous studies that focused their analysis on the first months of the pandemic. By looking across this longer time period (approximately 23 months) we aim to understand whether the impacts to mental health are sustained. At the national level (Figure 2), there appears to be a slight drop from the levels at the beginning of the pandemic in levels of anxiety, depression or either, while data at the subgroup level appears to confirm that levels are still elevated and relatively consistent with the beginning months of the pandemic. This appears to confirm the work of other researchers that claim levels of mental distress have not yet returned to pre-pandemic levels (Quintana-Domeque and Proto, 2022).

Second, our findings appear to confirm two important hypotheses related to anxiety and depression in the United States. The first hypothesis is that young adults in the US are experiencing significantly higher rates of anxiety and depression than older respondents and that these differences are sustained. There appears to be an almost perfectly predictable reduction in anxiety or depression levels with each older age bracket. The second hypothesis is that females in the United States are experiencing higher levels of anxiety and depression than males, which appears to be borne out in the data we have available.

More work must be done to understand the specific correlations and associations at play in these trends. A major limitation of this research note is that data is not provided at the individual

level. This means we cannot see the inter-play of intersectional identities (for example, whether Black women are more likely than white women to experience anxiety) or how additional factors like income, the state one lives in, etc. play into the picture.

Another limitation of this research note is that it does not analyze larger trends in the pandemic (rising cases, lockdowns, etc) or sociopolitical events (Black Lives Matter protests, US election, etc.) into the analysis. In essence, this analysis is treating the pandemic as one consistent event, while the truth is that we should aim to control for various factors to see how significant they may be in contributing to these differences.

VI. Appendix

Below are Figures 3 through 8, which show the prevalence of symptoms for anxiety or depression over time, broken up by subgroup:

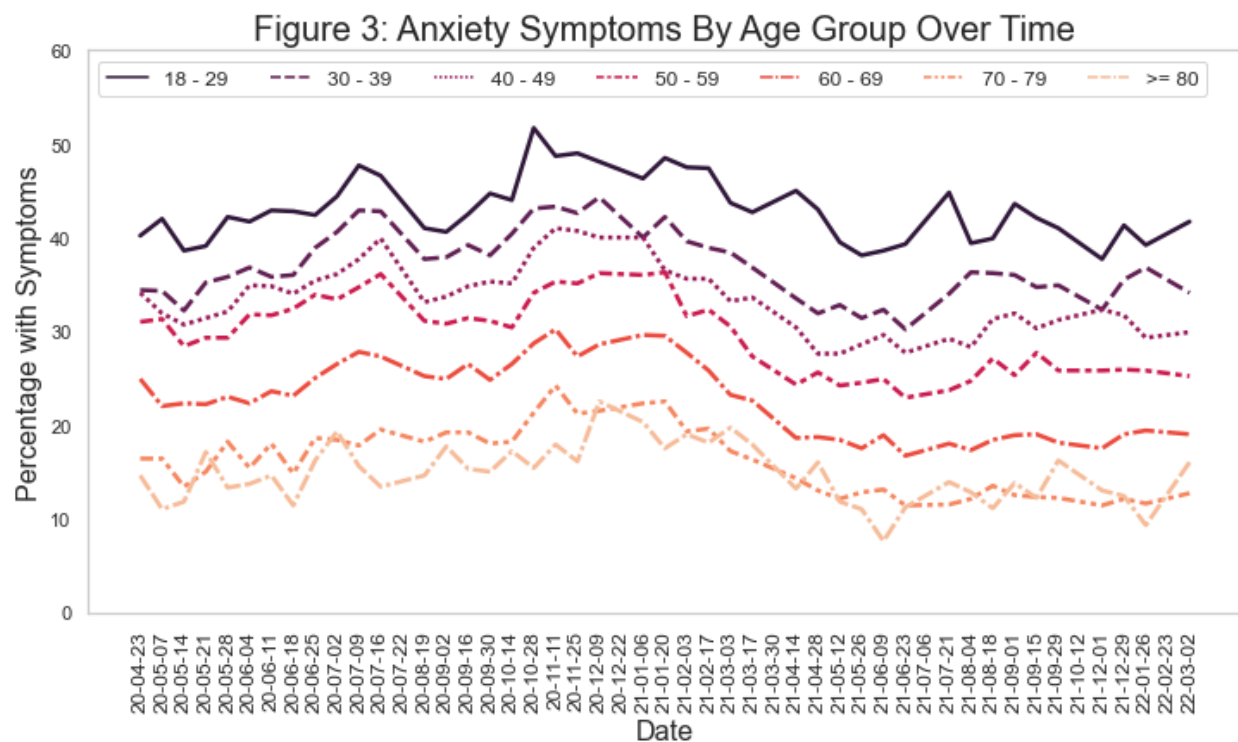


Figure 4: Depression Symptoms By Age Group Over Time

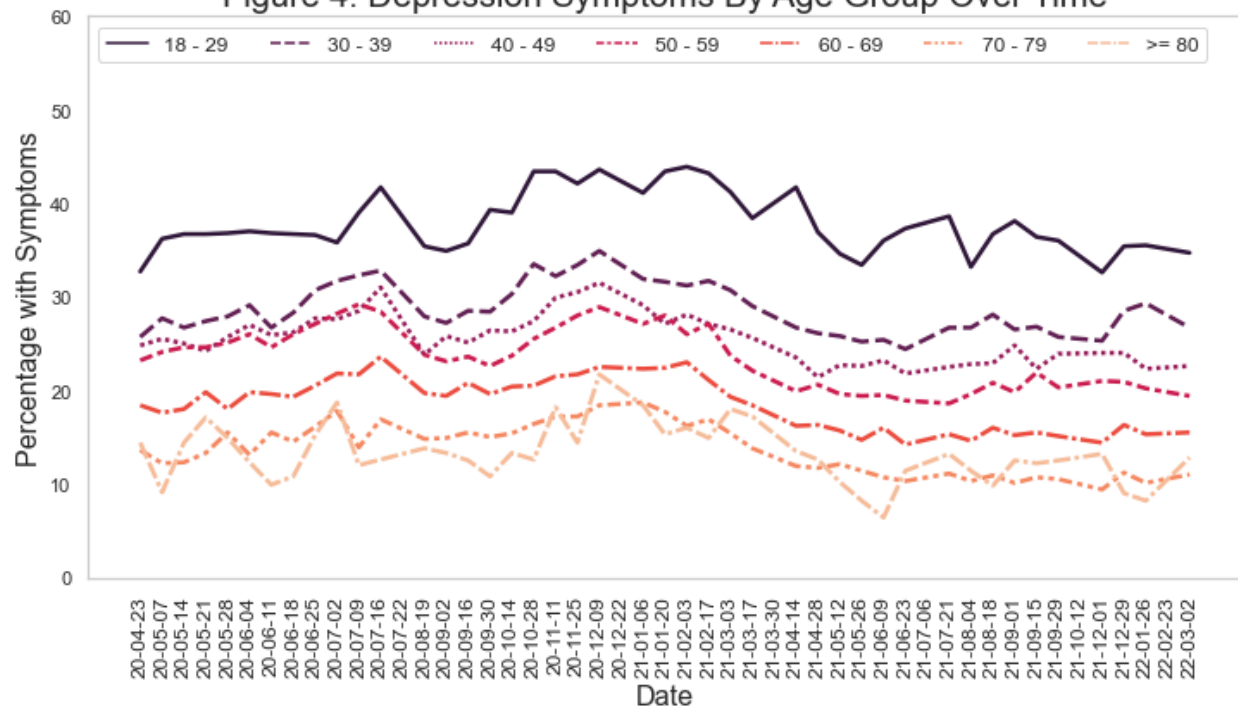


Figure 5: Anxiety Symptoms By Race/Ethnicity Over Time

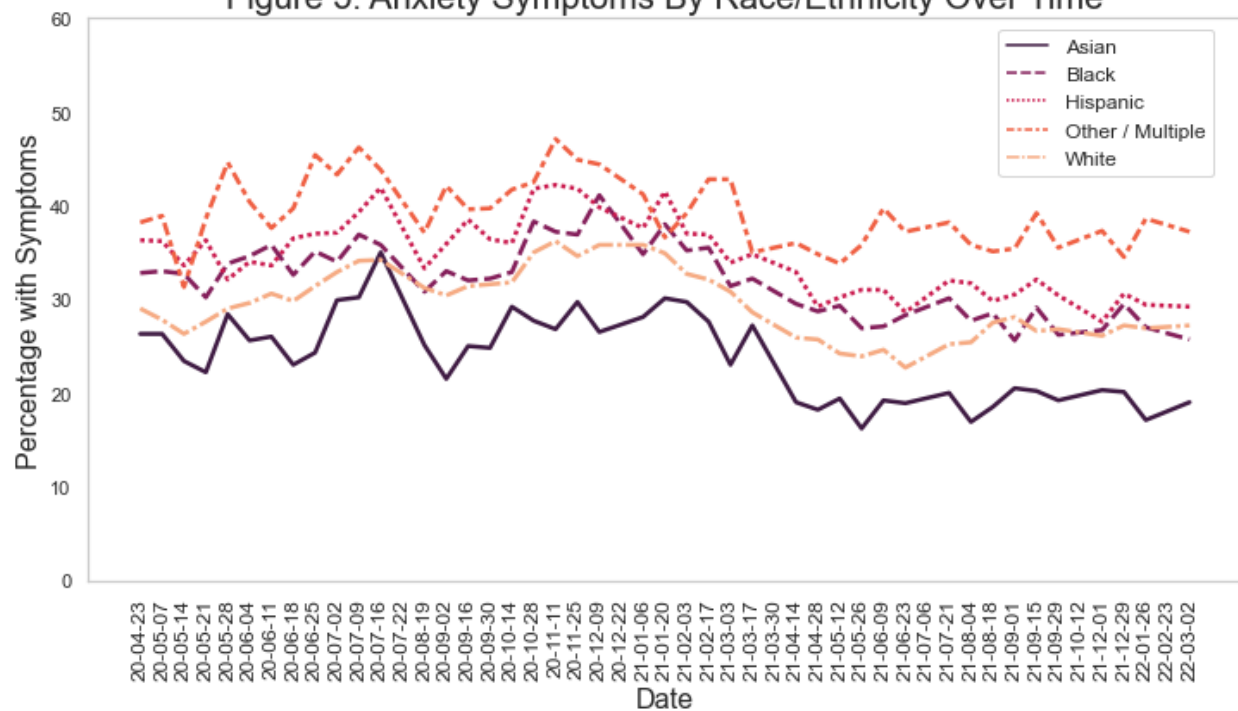
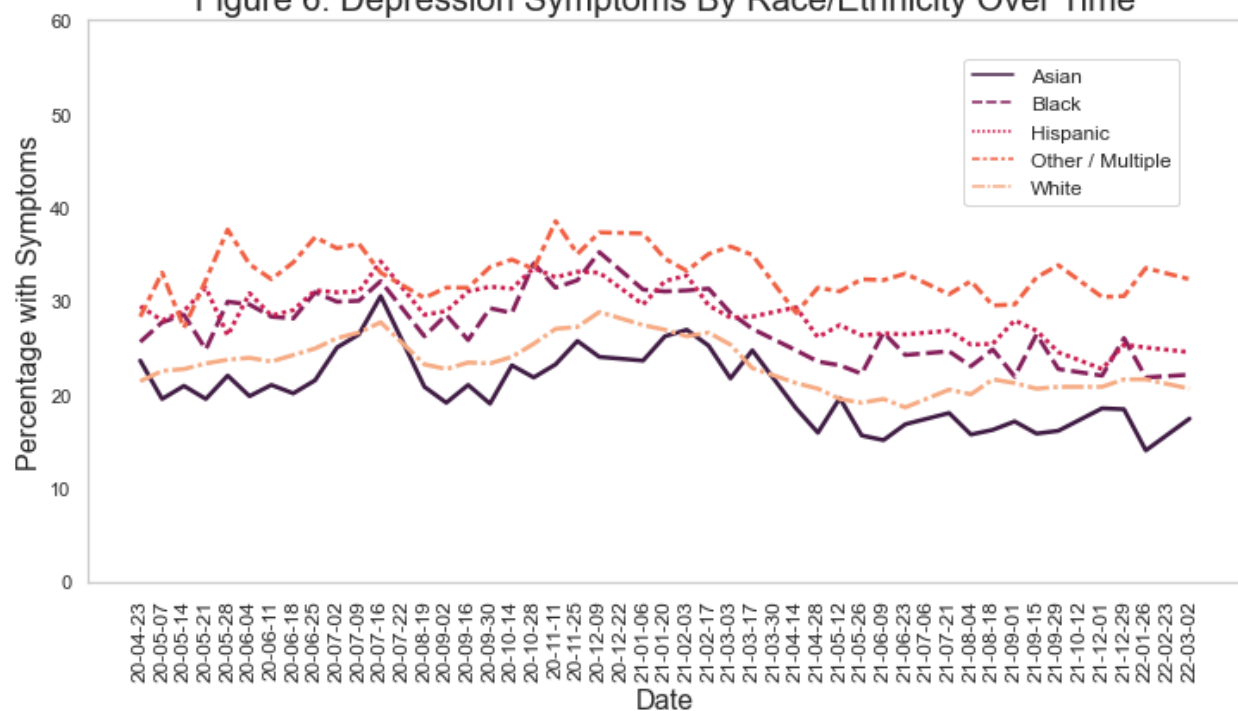


Figure 6: Depression Symptoms By Race/Ethnicity Over Time



Note: The official labels in the dataset for race/ethnicity were changed to make the visualization more readable. Those initial categories are: Hispanic or Latino (Hispanic), Non-Hispanic Asian, single race (Asian), Non-Hispanic Black, single race (Black), Non-Hispanic White, single race (White), Non-Hispanic, other races and multiple races (Other / Multiple)

Figure 7: Anxiety Symptoms By Sex Over Time

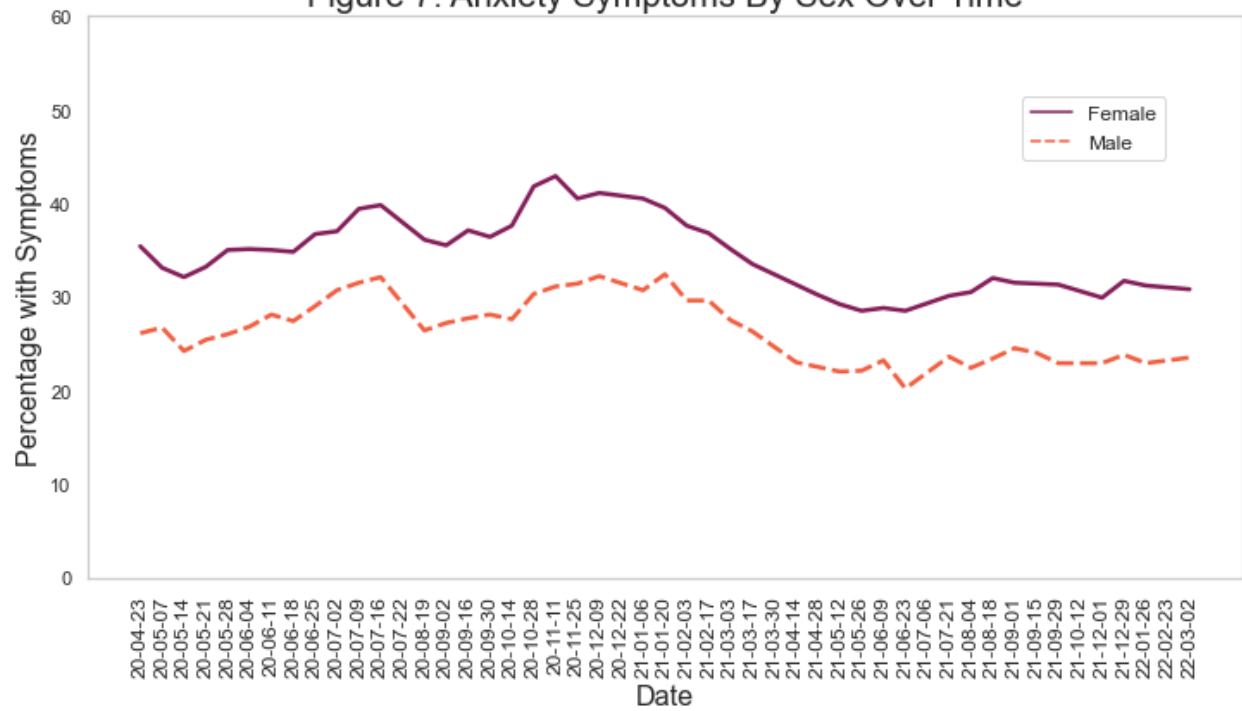
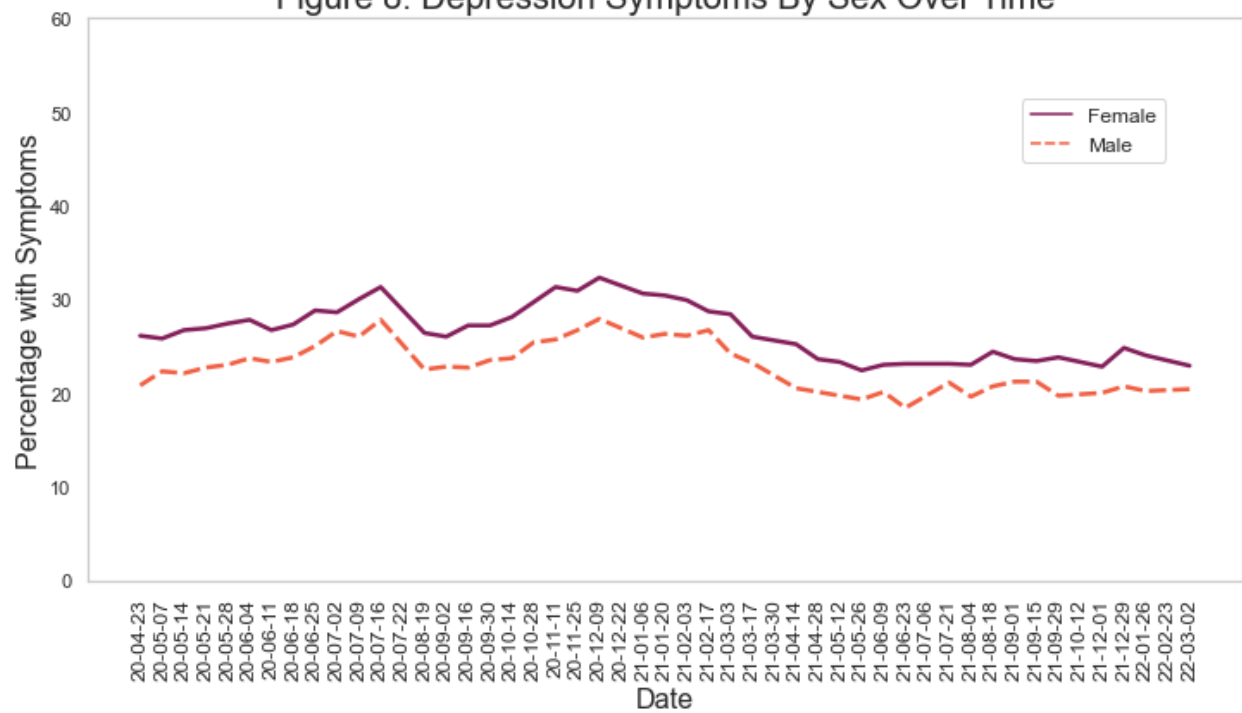


Figure 8: Depression Symptoms By Sex Over Time



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