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Increasing psychological distress among Californians from 2013 to 2020: Race/ethnic differences

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ABSTRACT

The influence of the COVID-19 pandemic on mental health is of mounting concern to population-health researchers. While early reports indicated increases in mental health problems, noticeably absent from these studies is how mental health has changed in 2020 compared to previous years (2013–2019) and whether such trends vary by race/ethnicity. The present study used repeated cross-sectional data from the California Health Interview Survey (n = 168,216) to systematically document trends in psychological distress scores (Kessler-6 scale; K6) and severe psychological distress scores (K6; 13+) from 2013 to 2020 and by race/ethnicity over the same period. Among all Californians we find that the reported average psychological distress scores increased by 22% between 2013 and 2020. Reported severe psychological distress scores increased 61% from 2013 to 2020. These increases were largely concentrated in the years 2017–2020. Increases in psychological distress were also especially pronounced among non-Latino/a White Californians (29% increase in K6 from 2013 to 2020), Latino/a Californians (14% increase in K6 from 2013 to 2020), and Asian Californians (35% increase in K6 from 2013 to 2020). Multiple and logistic regression models that accounted for sociodemographic and behavioral health covariates echoed these findings. Future research should continue to investigate secular trends in mental health that coincided with the COVID-19 pandemic and carefully situate the shifts into broader temporal perspective.

1. Introduction

In 2020, the COVID-19 pandemic inexorably altered global society and significantly increased stressors (Chae et al., 2021) and reports of poor mental health (Donnelly and Farina, 2021)–(Jackson and Williams, 2021). In addition to the pandemic, 2020 saw the public murder of George Floyd by police (Curtis et al., 2021), international demonstrations regarding anti-Black violence, elevated anti-Asian discrimination and violence (Wu et al., 2021)–(Kormendi and Brown, 2021), and a divisive presidential election (Blanchflower and Bryson, 2021). Overall, 2020 was marked by increases in stressors, depressive symptoms, psychological distress, and mental health problems (McGinty et al., 2022)–(Ettman et al., 2022), which are critically important for shaping population health (Becker and Kleinman, 2013), (Moreno et al., 2020). However, the changes to mental health in 2020 also coincided with broader societal shifts in the past decade that have likely dramatically restructured the mental health of the American population; increasing dissemination of videos of police brutality (Bor et al., 2018), amplified consumption of social media (Keles et al., 2020), the legacy of the Great Recession/increased economic vulnerability (Case and Deaton, 2015), a polarizing presidential administration (Morey et al., 2021), and increasing frequency/severity of climate events (Ebi et al., 2021), (Cianconi et al., 2020).

Global research indicates that mental health, specifically depression, is the second leading cause of years lost to disability globally (Vos et al., 2012) and the financial costs of mental health disorders are greater than any non-communicable disease (e.g., heart disease, cancer, diabetes (Bloom et al., 2012)). Psychological distress has been linked to subsequent mental health disorders (including depression) (Kessler et al., 2002) as well as serious mental illness (Kessler et al., 2003). Severe psychological distress is also related to serious mental illness (Kessler et al., 2003) and significantly increases the risk of completed suicide (Tanji et al., 2018). Importantly, measures of mental health, such as psychological distress are immediately susceptible to societal shifts and exogenous events (Mirowsky and Ross, 2002). Therefore, trends in psychological distress may provide valuable information regarding the
impact of macro-social events on population-health. Yet how psychological distress has changed in recent years (aside from 2020) remains less clear, and this is an important oversight given the well documented increases in psychological distress in 2020 (Donnelly and Farina, 2021)--(Jackson and Williams, 2021). Analyzing a repeated cross-sectional representative survey from America’s most populous state: The California Health Interview Survey (CHIS) (n = 168,216), we systematically document how reports of psychological distress scores and severe psychological distress scores changed in California from 2013 to 2020, paying close attention to race/ethnic differences in the trends.

Previous findings regarding secular trends in psychological distress (as measured by the Kessler-6 scale) in the United States are relatively consistent. Two independent analyses using the National Health Interview Survey (NHIS) indicated that psychological distress scores were stable from 1997 to 2017 (Johnson, 2021), (Tomitaka et al., 2019). However, Johnson (McGinty et al., 2020) found that treatment for mental health increased significantly over that period. Indeed, other researchers found that mental healthcare treatment increased from 2001 to 2012 (Mojtabai and Jorm, 2015) and U.S. outpatient mental health care increased significantly from 2004 to 2015 (Olsson et al., 2019). International research has similar findings; an analysis of Australia, Canada, England and the U.S. found that from 1990 to 2015 mood and anxiety disorders were stable despite increases in treatment (Jorm et al., 2017). However, in Japan, researchers found increases in severe psychological distress from 2007 to 2016 (Nishi et al., 2018). Notably, broad trends in mental health in the U.S. and globally after 2017 remain less clear, and these trends are important to update, especially given that most researchers analyzing shifts in mental health during 2020 have compared 2020 mental health to the years right before (i.e., 2018 and 2019).

Indeed, prior research has illustrated significant increases in levels of psychological distress beginning in the spring of 2020 coinciding with the COVID-19 pandemic (McGinty et al., 2020), (Daly and Robinson, 2021), (Holingue et al., 2020a) and persisting throughout 2020 (McGinty et al., 2022). Similarly, recent research has found increasing anxiety and depression compared to 2019 in 2020 that persisted through the fall of 2020 (Twenge et al., 2021). Other longitudinal research focusing on 2020 has indicated that specific COVID-19 related stressors significantly increased psychological distress (McGinty et al., 2020), (Cobb et al., 2021), (Holingue et al., 2020b). Other research indicates increases in the prescription rates of benzodiazepines, Z-hypnotics, and serotonergic drugs in 2020 and 2021 compared to 2018 and 2019 (Milani et al., 2021). These findings are not surprising given the dramatic mitigation measures required to abate the implications of COVID-19, including a national lockdown, that led to the sudden isolation/loneliness and job loss of millions of Americans (Viner et al., 2022), (McDowell et al., 2021).

We extend research on the impact of COVID-19 on mental health by documenting trends in psychological distress and severe psychological distress from 2013 to 2020. While existing innovative research finds rising depression, anxiety, psychological distress, and pharmacological treatment for mental health issues in the U.S especially during the spring of 2020 (Daly and Robinson, 2021), (Holingue et al., 2020b), (Milani et al., 2021), much of the research on psychological distress during COVID-19 focuses on only 2020 or the previous few years. That is, while it is clear that mental health issues increased in the spring of 2020 in comparison to the immediate previous years, it is less clear how mental health has changed relative to multiple other years. Of course, it is critical to update trend research and to place the changes in mental health in 2020 in a broader historical perspective. We focus our research to rule out idiosyncratic baseline comparisons or year-to-year variation. Additionally, analyzing multiple years provides a more comprehensive perspective of population-level changes in mental health by using multiple years as a comparison. Thus, here we utilize a population-based sample of Californians to analyze how psychological distress changed from 2013 until 2020 to not only update previous research regarding trends in psychological distress past 2017 but to also integrate the documented increased secular psychological distress in 2020 into a broader historical perspective.

1.1. Race/Ethnic differences

There are reasons to anticipate differences in the trends of psychological distress and severe psychological distress by race/ethnicity over the study period (2013–2020). Overall, non-Hispanic Black adults (hereafter Black) and Hispanic/Latino/a (hereafter Latino/a) adults tend to report similar mental health to non-Hispanic White adults (hereafter White), and non-Hispanic Asian adults (hereafter Asian) tend to report better mental health than White adults (Barnes and Bates, 2017)--(Schnittker and Do, 2020). In terms of trends, past research analyzing broader trends in race/ethnic differences in depression found that only White adults had increasing levels from 2005 to 2015 (Weinberger et al., 2018). Other research specifically focused on White adults has also illustrated worse mental health (as measured by severe psychological distress), and increasing “deaths of despair” from 1997 to 2011 (Case and Deaton, 2015). However, race/ethnic differences in trends in psychological distress after 2015 remain less clear.

Updating these trends in psychological distress is important as the health, social, and material impact of the COVID-19 pandemic has varied substantially across racial/ethnic lines. Relative to White adults, Black adults and Latino/a adults experienced significantly greater rates of family death (Cooper and Williams, 2020), job loss (Williams, 2020), financial insecurity (Parker et al., 2020), elevated caregiving burdens, (Stokes and Patterson, 2020), (Longacre et al., 2021) and food insecurity (Parker et al., 2020), (Clay and Rogus, 2021) during the pandemic. Collectively, these conditions may have increased psychological distress more for Black adults and Latino/a adults during this period relative to White adults. Yet, recent research has found that Black adults in the U.S. South had lower levels of worsened mental health compared to White adults during 2020, despite higher levels of COVID-19 specific stressors (Goldmann et al., 2021). Asian adults may have increased psychological distress, even though they have experienced lower levels of COVID-19 hardship than other groups (Center of Disease Control, 2020) due to elevated experiences of anti-Asian racism and violence (Chae, 2021; Chen et al., 2020; Wu et al., 2021). Indeed, previous research indicates Asian adults had some of the largest increases in depression and anxiety from 2019 to 2020 (Twenge et al., 2021). The increases in depression and anxiety for Asian Americans is especially notable given that Asian Americans often have lower rates of mental health problems than White Americans (Gavin et al., 2010)--(Park et al., 2018) but have been shown to underreport their mental health symptoms (Cook et al., 2017), (Agbayani-Siewert et al., 1999). Overall, given this evidence, we anticipate race/ethnic differences in trends in psychological distress from 2013 to 2020 among Californian adults.

California provides an important setting to investigate trends in mental health broadly and by race/ethnicity in particular. California is the most populous state in the United States and one of the most diverse, with one of the largest Asian populations (Census Bureau, 2021). California also operates a long-running representative survey regarding the mental (Prochaska et al., 2012) and physical (Babey et al., 2008) health, as well as the racial/ethnic health disparities (Nguyen et al., 2014) of the state residents. Importantly, data collection continued during the pandemic (Ponce et al., 2021), allowing us to compare 2020 to previous years in terms of psychological distress.

1.2. Aims

This study has two major aims. First, we seek to descriptively document trends in psychological distress scores and severe psychological distress scores from 2013 to 2020 California. Second, we document racial/ethnic differences in the trends of psychological distress scores and severe psychological distress scores between 2013 and 2020. Overall, we aim to provide a comprehensive documentation regarding how psychological distress and severe psychological distress have changed in California from 2013 to 2020 while paying special attention to racial and ethnic differences.
2. Materials and methods

2.1. Data

The repeated cross-sectional data for this study came from the publicly available California Health Interview Survey (CHIS) adult files. CHIS used random-digit-dial sampling and telephone interviewing to collect representative, diverse health information of Californians. Starting in 2019, CHIS transitioned into a mixed method approach using both web and telephone interviewing in order to account for the growing transition into online platforms and this was continued in the pandemic (Ponce et al., 2021). CHIS oversamples certain areas and ensures accurate state level representation. CHIS also conducts interviews in English, Chinese (Cantonese and Mandarin), Spanish, Korean, Vietnamese, and Tagalog. Data are collected continuously throughout each 2-year cycle to collect information more frequently and account for possible seasonal changes; CHIS then releases the data as yearly public datasets. While we present results from the individual survey years, substantive overall results and race/ethnic differences in trends were quite similar when we used the 2-year pooled data (please see Supplemental Table 1 and Supplemental Table 2). More information regarding CHIS, including information regarding response rates can be found elsewhere (i.e., https://healthpolicy.ucla.edu/chis/design/Pages/methodology.aspx).

We began with the 2013 file as the full values of the Kessler Psychological Distress Scale (K6) were not continuously available before that year. We pooled the adult data from 2013 to 2020 for our variables of interest totaling 168,768 respondents aged 18+. However, 552 proxy interviews were conducted for adults who were unable to answer for themselves. CHIS assigned their psychological distress values as “Proxy Skip.” For this reason, we removed these respondents for the purposes of our analyses, but notably, ancillary analyses with the proxy respondents included and assumed to be psychologically distressed provided similar substantive results. This resulted in a final analytic sample of 168,216 (99.7% of the respondents). CHIS implements a complex imputation procedure to account for missing data; more information is provided elsewhere (https://healthpolicy.ucla.edu/chis/design/pages/methodology.aspx), thus our analytical sample contained no missing values.

2.2. Measures

2.2.1. Psychological distress

Psychological distress was measured based on the Kessler Psychological Distress Scale (K6). The K6 scale is widely used (Muñoz and Santos-Lozada, 2021) and has been validated within the CHIS (Shon, 2020), (Drapeau et al., 2010). Participants were asked to answer the K6 questions for the past 30 days; however, we also analyzed a question regarding the most stress over the past year which provided substantively similar results (results available upon request). The K6 scale consisted of six questions: (1) how often did you feel nervous? (2) how often did you feel hopeless? (3) how often did you feel restless? (4) how often did you feel so depressed? (5) how often did you feel that everything was an effort? and (6) how often did you feel worthless? The responses range from 0 [none of the time] to 4 [all of the time] and summed to produce a psychological distress score, ranging from 0 to 24. To measure severe psychological distress, we followed the cutoff used by previous researchers as this cutoff increases the risk of serious mental illness and completed suicide (Kessler et al., 2003), (Tanji et al., 2018), (Tomitaka et al., 2019). Specifically, respondents were coded as having a severe psychological distress score if their reported psychological distress was 13 or more and not having a severe psychological distress score if their reported psychological distress was less than 13. Thus, we analyzed a continuous specification and a dichotomous specification of the reported psychological distress score.

2.2.2. Year of survey and race/ethnicity

We coded the respondents in the year of survey as specified by the CHIS. We used a categorical specification and set 2013 as the reference; however, additional analyses using alternate specifications such as a linear specification of year and the pooled year approaches provided substantively similar results (i.e., increasing psychological distress scores). Race and ethnicity were measured through self-report. Participants indicated whether they were Non-Hispanic White, Hispanic, Non-Hispanic Black, Non-Hispanic Asian, Non-Hispanic Native American, or Other. We combined Non-Hispanic Native American Californians (n = 1450) and Non-Hispanic Other Californians (n = 4479) in this study due to the small sample sizes across years.

2.2.3. Covariates

Covariates included gender, age, marital status, federal poverty level, educational attainment, employment status, rural/urban status, English proficiency, perception of neighborhood safety, self-reported health, and source of healthcare. Gender was coded dichotomously (0 = male, 1 = female). We coded age into five categories: 18–25 (reference group), 26–34, 35–44, 45–64, 65+. Marital status was coded as a categorical variable: married (reference group), never married, or other. Income was inferred using federal poverty level (hereafter; FPL): 0–99% FPL (reference group), 100–199% FPL, 200–299% FPL, and 300% or above FPL. Educational attainment was categorized into less than high school (reference group), high school, some college/associate degree/technical school, and bachelor’s or more. Employment status was coded as employed full-time (reference group), employed part-time or other, and unemployed. Rural/urban status was coded dichotomously as rural (reference group) and urban. English proficiency was only assessed for adults who spoke a language aside from English in their home and/or were interviewed in another language. Participants self-reported their skills as “very well,” “well,” “not well,” “not at all,” or the question was inapplicable to them because they spoke English at home (reference group). Neighborhood safety was assessed by asking participants “How often do you feel safe in your neighborhood?” on a scale of 1 (all of the time) to 4 (none of the time). For self-reported health, participants were asked “Would you say that in general your health is excellent, very good, good, fair, or poor?” Their answers were collapsed into “fair”/”poor” (reference, coded “0”) and “excellent”/”very good”/”good” (coded “1”). Source of care was characterized with the following question: “What kind of place do you go to most often?” We coded the possible responses as a categorical variable: clinic/hospital clinic (reference group), doctor’s office, emergency room, other place, and no place.

2.3. Analyses

We first calculated the reported psychological distress score and severe psychological distress score by year and calculated the year-by-year change and change relative to 2013. We then calculated these descriptive statistics by race/ethnicity. We also calculated the descriptive statistics for the sample and covariates (presented in Supplemental Table 3). Next, using the svyglm command, which returns robust estimates of standard errors, we specified two models: a multiple linear regression predicting reported psychological distress score based on year of survey and race/ethnicity and a second model that additionally accounted for gender, rural/urban status, age group, FPL, educational attainment, employment status, English proficiency, perception of neighborhood safety, self-rated health, and source of medical care. We then specified two additional models, using a dichotomous variable predicting severe psychological distress scores (psychological distress score 13+). Given the dichotomous outcome, we fit logistic regression models and implemented an identical analytic strategy as modeling psychological distress scores. We present the coefficients from the logistic models in the form of Odds Ratios. Finally, we fit models with an interaction between year of survey and race/ethnicity adjusting for all covariates. The interaction results are presented in Supplemental Table 4. For ease of interpretation, we included a figure of the predicted psychological distress scores from the interaction model with all covariates by year and race/ethnicity and 95% confidence intervals. All analyses used weights provided in the publicly available California Health Interview Survey (CHIS) adult files.
available version of the CHIS (Boehmer et al., 2012), (DeBell and Krosnick, 2009) and we relied on the survey package in R for these analyses (Lumley, 2021). To be thorough, we also conducted unweighted ancillary analyses that provided substantively similar results. That is, our results are not driven by weighting per se. The code for the analyses and figures is publicly available at [https://osf.io/27unp/].

3. Results

3.1. Trends among Californians

In Table 1, we documented the average level of self-reported psychological distress score by year. In 2013, the average psychological distress score was 3.68, but by 2020 that had increased to 4.47 (a 22% relative increase). An independent t-test suggests the increase in psychological distress score (on a scale of 0–24) between 2013 and 2020 was statistically significant (t = 9.739, p < .001). In addition to the full distribution of psychological distress scores in the population, we were interested in the proportion of respondents reporting severe psychological distress (i.e., ≥13 on K6 psychological distress scale) (Kessler et al., 2002). This proportion also significantly increased between 2013 and 2020 from 3.84% to 6.18% (Table 1; t = 5.44, p < .001), corresponding to almost a 61% relative increase in severe psychological distress between 2013 and 2020.

3.2. Race/Ethnic differences in trends among Californians

In Table 2 we documented the psychological distress scores and severe psychological distress by race/ethnicity. We also calculated the distribution by Race/Ethnicity is presented in Table 2. Data are weighted.

In the next set of analyses (Table 3), we fit multiple linear regression predicting self-reported psychological distress score including year of survey and race/ethnicity. Relative to 2013, respondents in 2014 had lower psychological distress scores (β2014 = −0.20, 95% CI: -0.37, −0.03) while the year’s 2017 to 2020 respondents had significantly higher psychological distress scores (β2017 = 0.25, 95% CI: 0.11, 0.39; β2018 = -0.40, 95% CI: 0.25, 0.55; β2019 = 0.62, 95% CI: 0.45, 0.79; β2020 = 0.76, 95% CI: 0.60, 0.92). In the second model, we included the additional covariates. When these covariates were accounted for, the psychological distress scores from 2014 and between 2017 and 2020 remained statistically significantly different from 2013. Next, we examined whether severe psychological distress scores followed a similar pattern. Using logistic regression we fit two models, the first model using only year and race and the second with controls added. The results were quite similar to the continuous specification: in both models, 2018–2020 were significantly different than 2013 as each year had significantly higher odds of severe psychological distress than in 2013.

Finally, we fit an interaction model between year of survey and race/ethnicity, this model accounted for all covariates. The coefficients from the interaction terms are presented in Supplemental Table 4. For ease of interpretation and given the relative comparisons inherent in categorical variable interaction models, we present the results in the form of Fig. 1. While there was an upward trajectory in psychological distress scores for each race/ethnic group, it was particularly pronounced for White Californians, Latino/a Californians, and Asian Californians in general and in 2020. These results echo the descriptive results presented in Table 2 that suggested especially large increases in psychological distress scores among these groups. We also fit additional models where we added different groups of controls, and generally the findings were similar, but we note the importance of socioeconomic measures in explaining the differences between Latino/a Californians compared to White Californians in 2020.

4.0. Discussion

There is growing concern regarding the mental health consequences of the global COVID-19 pandemic. Given early increases of accounts in

| Table 1 | Psychological Distress Scores (Kessler-Six; K6) and Severe Psychological Distress Scores (Kessler-Six 13+) by Year. Californian Adults aged 18 + 2013–2020. |
|---------|---------------------------------------------------------------------------------------------------------------------------------|
|         | Reported Psychological Distress Score (K6) Fast 30 days. | Percentage of Respondents Reporting Severe Psychological Distress Score in Past 30 days (K6 13+). |
|         | K6 past 30 | 95% CI | Change compared to previous year | Change compared to 2013 | % with Severe Distress in past 30 days | 95% CI | Change compared to previous year | Change compared to 2013 | Unweighted n |
| 2013    | 3.68       | 3.56   | 3.79          | –                       | –                     | 3.84% | 3.31%   | 4.45% | –                     | –                     | 20,590     |
| 2014    | 3.48       | 3.35   | 3.60          | −5%                     | 6%                    | 3.61% | 3.01%   | 4.32% | −6%                     | 10%                    | 18,402     |
| 2015    | 3.74       | 3.64   | 3.83          | 7%                      | 2%                    | 4.44% | 3.98%   | 4.96% | 23%                     | 16%                    | 18,099     |
| 2016    | 3.66       | 3.54   | 3.77          | −2%                     | 1%                    | 3.91% | 3.39%   | 4.51% | 12%                     | 2%                     | 20,916     |
| 2017    | 3.93       | 3.84   | 4.02          | 7%                      | 8%                    | 4.47% | 4.01%   | 4.98% | 14%                     | 16%                    | 21,150     |
| 2018    | 4.08       | 3.98   | 4.18          | 4%                      | 12%                   | 4.90% | 4.41%   | 5.45% | 10%                     | 28%                    | 21,163     |
| 2019    | 4.30       | 4.17   | 4.43          | 5%                      | 17%                   | 6.70% | 6.01%   | 7.46% | 37%                     | 74%                    | 22,152     |
| 2020    | 4.47       | 4.36   | 4.58          | 4%                      | 22%                   | 6.18% | 5.58%   | 6.84% | −8%                     | 61%                    | 21,944     |

Source: California Health Interview Survey, 2013–2020.

Notes: Distribution by Race/Ethnicity is presented in Table 2. Data are weighted.
psychological distress among Americans during the first months of the COVID-19 pandemic (Holingue et al., 2020a), we asked whether these trends are part of a larger temporal shift in psychological distress in the population. The findings reported here indicated that psychological distress was increasing for Californians from 2017 onwards and this trend continued in 2020. Overall, our analyses suggest three primary conclusions.

First, replicating the findings of past researchers who used national level data, we found generally little changes in psychological distress scores from 2013 to 2016 (Johnson, 2021), (Tomitaka et al., 2019). However, beginning in 2017 we found increases in psychological distress scores (3.93 in 2017 compared to 3.66 in 2016). In addition, we found year-by-year increases in psychological distress scores in 2018 (4.08) and 2019 (4.30) and an additional increase in psychological distress scores in 2020 (4.47). That is, Californians reported significantly increased psychological distress scores from 2017 to 2020, culminating in the highest psychological distress scores on record in 2020. Collectively, these increases led to an increase in average psychological distress scores from 3.68 in 2013 to 4.47 in 2020, corresponding to a 22% increase in reported psychological distress scores between 2013 and 2020. Even after adjusting for sociodemographic and behavioral/health covariates, we found significant increases in psychological distress scores from 2017 until 2019 (relative to 2013) and in 2020 where it increased the most.

Second, we found that the percentage of the population reporting severe psychological distress scores increased from 3.84% in 2013 to 6.18% in 2020, corresponding to a severe psychological distress scores increased from 3.84% in 2013 to 6.18% in 2020, corresponding to a relative increase in severe psychological distress scores from 2013 to 2020. The significant increases in severe psychological distress scores are consistent with research focusing on Japan thorough 2016 (Nishi et al., 2018). The large relative increases in severe psychological distress have considerable clinical importance, given that severe psychological distress has been linked to serious mental illness (Kessler et al., 2003) and completed suicide (Tanji et al., 2018). While we documented significant increases in psychological distress scores and severe psychological distress scores from 2013 to 2020, we were unable to determine the influence of specific stressors. For instance, the 2016 election was divisive and has been linked to more poor mental health days, especially in states, such as California, that voted for Hillary Clinton rather than Donald Trump (Morey et al., 2021), (Yan et al., 2021). Social media consumption also increased precipitously over that period and social media has also been linked to negative mental health outcomes (Keles et al., 2020). Since the Great Recession, many Americans are living increasingly economically perilous lives, which may have also increased their psychological distress (Case and Deaton, 2015). Still other factors unique to California could result in psychological distress such as the catastrophic climate events (e.g., landslides, floods, and fires) that occurred from 2013 to 2020 (Ebi et al., 2021), (Cianconi et al., 2020). We also lacked measures of precise pandemic related stressors (e.g., being diagnosed with COVID-19, losing one’s job, increased caretaking responsibilities). As more data are released understanding the potential reasons for the changes in psychological distress becomes a critically important avenue for stemming potential subsequent increases in psychological distress.

Third, we find important racial/ethnic differences in trends in psychological distress scores over the study period (2013–2020). We are unaware of research that has updated racial/ethnic trends in mental health past 2015 (Weinberger et al., 2018). The results indicated that increases in psychological distress scores were particularly pronounced for White Californians, Latino/a Californians, and Asian Californians. The results for White Californians were consistent with national level research illustrating trends up until 2015 (Weinberger et al., 2018) and increasing severe psychological distress from 1997 to 1999 to 2011–2013 (Case and Deaton, 2015). Broadly, these results are consistent with the worsening mental health of White adults which has been associated with increasing “deaths of despair” and decreasing life expectancy (Case and Deaton, 2015). Our results contributes to this research by finding that the worsening mental health of White adults in California did not abate, instead psychological distress scores increased significantly for White Californians from 2013 to 2020.

The pandemic has disproportionately impacted racial minorities in the U.S. – from rising rates of anti-Asian violence to disproportionate exposure to COVID-19 (for Black Americans, Latino/a Americans), food insecurity, caretaking responsibilities, and unsafe working conditions (Garcia et al., 2021). As such, it may be unsurprising that Asian Americans, and Latino/a Americans reported increased rates of psychological distress in 2020 relative to prior years. We note that increases in severe psychological distress were particularly high for Asian Californians, who reported 123% higher levels of severe psychological distress scores in 2020 (6.30%) than in 2013 (2.83%). These results are consistent with recent research that illustrates Asian adults in particular faced higher levels of anxiety and depression in 2020 (Twenge et al., 2021). Asian adults in particular experienced especially elevated anti-Asian racism and violence in 2020 (Wu et al., 2021) – (Kormendi and Brown, 2021), which in turn may have increased psychological distress. The experience of both direct and vicarious experiences of anti-Asian racism may have resulted in higher levels of psychological distress among Asian Americans due to the fact that racism is often degrading, traumatizing, and/or stigmatizing (Brown et al., 2000). We also found significantly higher levels of psychological distress scores among Latino/a Californians, beginning in 2017. This coincides with the election of President Trump, which previous research has illustrated had negative implications for the mental health of Latino/a Americans (Morey et al., 2021), (Krupenkin et al., 2019).

We also note that we observed slight decreases in psychological distress for Black Californians over the study period. The results for Black Californians in 2020 were consistent with previous research conducted in the U.S. South (Goldmann et al., 2021). While we can only speculate, the lower levels of psychological distress among Black adults compared to White adults could be because Black adults have more social support and

### Table 2

| Psychological Distress Scores (Kessler-Six; K6) and Severe Psychological Distress Scores (Kessler-Six 13+) | Year | White | Latino/a | Asian | Black | Other |
|---|---|---|---|---|---|---|
| Reported Psychological Distress Score (K6) Past 30 days. | 2013 | 3.27 | 4.18 | 3.31 | 3.91 | 4.92 |
| | 2014 | 3.19 | 4.13 | 2.84 | 2.94 | 3.96 |
| | 2015 | 3.49 | 4.03 | 3.42 | 4.09 | 4.54 |
| | 2016 | 3.46 | 3.74 | 3.51 | 4.45 | 4.65 |
| | 2017 | 3.67 | 4.20 | 3.85 | 3.67 | 5.29 |
| | 2018 | 3.92 | 4.37 | 3.60 | 4.05 | 5.23 |
| | 2019 | 3.94 | 4.64 | 4.33 | 4.28 | 5.04 |
| | 2020 | 4.24 | 4.77 | 4.47 | 3.64 | 4.85 |
| Unweighted n | 102,284 | 36,036 | 16,191 | 7776 | 5929 |

Source: California Health Interview Survey, 2013–2020.
Notes: Data are weighted.
Table 3
Regression Coefficients from Models Predicting Psychological Distress Scores (Kessler-Six) in The Past 30 Days and Odds Ratios from Logistic Regression Models Predicting Severe Psychological Distress Scores (Kessler-Six 13+) in the Past 30 Days. Californian Adults aged 18+, 2013–2020.

| Year of Survey | Regression Models Predicting Reported Psychological Distress (Kessler-Six) Past 30 days. | Logistic Regression Models Predicting Reported Severe Psychological Distress (Kessler-Six 13+). |
|---------------|---------------------------------|--------------------------------------------------|
|               | Model 1 | Model 2 | Model 1 | Model 2 |
|               | b       | 95% CI  | OR      | 95% CI  |
| 2013 (ref)    |         |         |         |         |
| 2014          | -0.20   | -0.37   | -0.03   | -0.18   | -0.33   | -0.02   | 0.94   | 0.74   | 1.19   | 0.95   | 0.74   | 1.23   |
| 2015          | 0.06    | -0.09   | 0.20    | 0.02    | -0.12   | 0.15    | 1.16   | 0.96   | 1.41   | 1.16   | 0.95   | 1.41   |
| 2016          | -0.02   | -0.19   | 0.14    | -0.06   | -0.21   | 0.09    | 1.01   | 0.82   | 1.26   | 1.02   | 0.81   | 1.28   |
| 2017          | 0.25    | 0.11    | 0.39    | 0.34    | 0.21    | 0.47    | 1.17   | 0.96   | 1.41   | 1.26   | 1.03   | 1.55   |
| 2018          | 0.40    | 0.25    | 0.55    | 0.43    | 0.29    | 0.57    | 1.28   | 1.06   | 1.55   | 1.34   | 1.09   | 1.63   |
| 2019          | 0.62    | 0.45    | 0.79    | 0.69    | 0.54    | 0.85    | 1.79   | 1.48   | 2.17   | 2.04   | 1.66   | 2.50   |
| 2020          | 0.76    | 0.60    | 0.92    | 0.97    | 0.82    | 1.11    | 1.61   | 1.34   | 1.95   | 2.09   | 1.71   | 2.55   |

Race/Ethnicity
Non-Latino/a White (ref)
Latino/a
0.61 0.52 0.70
0.61 0.52 0.70

Non-Latino/a Asian
0.02 0.09 0.14
0.02 0.09 0.14

Non-Latino/a Black
0.23 0.05 0.41
0.23 0.05 0.41

Non-Latino/a Other
1.15 0.93 1.38
1.15 0.93 1.38

Gender
Female (ref)

Male
-0.18 -0.26 -0.11
-0.18 -0.26 -0.11

Rural/Urban Status
Rural (ref)

Urban
0.06 -0.02 0.13
1.06 0.96 1.18

Age
18-25 (ref)

26-34
-0.26 -0.42 -0.09
0.87 0.74 1.02

35-44
-0.61 -0.78 -0.44
0.78 0.65 0.94

45-64
-1.12 -1.28 -0.96
0.66 0.56 0.78

65+
-2.46 -2.63 -2.28
0.25 0.20 0.31

Marital Status
Married (ref)

Never Married
0.81 0.69 0.93
1.76 1.53 2.03

Other
0.7 0.6 0.79
1.75 1.55 1.99

Federal Poverty Level
Below 100% (ref)

100–199%
-0.27 -0.42 -0.11
0.94 0.82 1.09

200–299%
-0.43 -0.59 -0.27
0.83 0.70 0.98

300%+
-0.71 -0.85 -0.56
0.62 0.53 0.72

Educational Attainment
Less than High School (ref)

High School
-0.45 -0.62 -0.28
0.87 0.72 1.04

Some College, AA, or Vocational School
-0.19 -0.37 -0.01
0.96 0.80 1.15

Bachelors or more
-0.22 -0.39 -0.04
0.76 0.63 0.93

Employment Status
Employed (ref)

Unemployed
0.61 0.5 0.71
1.89 1.68 2.13

Part-time/Other Arrangement
0.19 0.05 0.32
1.21 1.01 1.44

English Proficiency
English Spoke at home (ref)

Not at all
-0.75 -1.03 -0.48
0.56 0.41 0.77

Not well
-0.55 -0.74 -0.36
0.57 0.45 0.73

Well
-0.31 -0.47 -0.16
0.76 0.62 0.93

Very Well
0.02 -0.09 0.13
0.98 0.85 1.13

Perception of Neighborhood Safety

“Fair”/“Poor” (ref)

“Excellent”/“Very Good”/“Good”
-2.47 -2.59 -2.35
0.24 0.21 0.27

Primary Source of Medical Care
Government Clinic/Community Hospital (ref)

Doctors Office/HMO/Kaiser
-0.18 -0.28 -0.08
0.96 0.84 1.09

Emergency Room/Urgent Care
1.16 0.73 1.59
1.84 1.38 2.46

No Usual Source
0.15 0.01 0.29
1.23 1.05 1.42

Other Place/No One Place
0.34 -0.04 0.73
1.36 0.89 2.07

Intercept
3.42 3.30 3.53
9.9 9.53 10.27
0.03 0.03 0.04
0.47 0.32 0.69

n
168,216

Source: California Health Interview Survey, 2013–2020. Data are weighted.
higher levels of resilience than White adults (Louie et al., 2021; Louie and Wheaton, 2018); Riehm et al., 2021), or that Black older adults appraise chronic stressors to be less upsetting than White older adults (Brown et al., 2020). As the pandemic continues to disproportionately impact racial/ethnic minorities, this research should be updated.

There are important limitations that should be considered. First, the CHIS data are collected in 2-year cycles, and while the 2-year file trends were overwhelmingly consistent with the 1-year results we show, this research should be updated with the inclusion of the 2021 data. Indeed, the date of interview was unavailable in the publicly available version of CHIS that we used and documenting trends throughout the entire year of 2020 compared to previous years remains important to better understand broad trends in psychological distress. The meaning or perception of questions may have changed over time, however prior research using the CHIS found construct validity in K6 was relatively stable from 1994 to 2007 (Drapeau et al., 2010) and we find it unlikely that the perceived meaning would have suddenly shifted in 2017. Still, longitudinal data would help to better elucidate secular trends in psychological distress. The results are also only generalizable to California; however, the substantive results were quite similar to studies focusing on the U.S. South (Goldmann et al., 2021) and U.S. more broadly (Twenge et al., 2021). Still, this research should be conducted at the national and international levels. Finally, we were unable to disaggregate racial groups into specific ethnic categories (e.g., Chinese Americans vs. Korean Americans or Middle Eastern and North African Americans (MENA) who are classified as White adults (Awad et al., 2022)) or analyze other racial/ethnic groups (e.g., Mixed Race Californians). It is possible that there is important heterogeneity within racial groups that we were unable to analyze. While we documented broad trends among racial/ethnic groups, there is likely considerable intersectional heterogeneity based in other characteristics such as gender, age, educational attainment and other characteristics. Thus, subsequent research should provide greater intersectional nuance regarding the trends we document here.

5.0. Conclusions

Our study provides some of the first evidence that psychological distress increased in the U.S. population starting in 2017 and that the increases in psychological distress scores peaked in 2020. As researchers continue to document the impact of COVID-19 on mental health, attention to historical change is of utmost importance. In order to make claims about the negative impact of the COVID-19 pandemic on the mental health of the population, scholars must situate the pandemic within broader social changes that have occurred in the past. Moreover, attention to racial differences in mental health from 2013 to 2020 reveal complexities within the observed population-level trends, with White, Latino/a, and Asian Californians enduring the largest increases over this period. Going forward, it remains critically important for scholars to continue to examine the societal implications of these profound shifts in psychological distress, with special attention to how these changes in mental health may impact communities differently by race/ethnicity.

CRediT authorship contribution statement

Sydney Tran: Conceptualization, Methodology, Software, Validation, Investigation, Data curation, Visualization. Alexandra S. Wormley: Methodology, Software, Validation, Formal analysis, Visualization, Supervision. Patricia Louie: Conceptualization, Supervision, Project administration. Connor Sheehan: Conceptualization, Methodology, Resources, Supervision, Project administration, Funding acquisition.

Declaration of competing interest

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

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmmh.2022.100101.

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