E.D.A. of Mental Health Decline in U.S.

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Dataset Intro & Context

Driving question: Did the need for mental health care grow throughout the Covid-19 pandemic, and were different communities disproportionately affected?

Our project seeks to better understand the shift in mental health from 2020 to 2022. Mental health concerns have escalated, as multiple agencies have reported concerning trends of declining mental health. Our project analyzes the "Mental Health Care in the Last 4 Weeks" national and state survey data from data.gov, which electronically gathered survey data on mental health care from 2020 to 2022. Our analysis summarizes national and state trends in mental health and identifies communities whose mental health care was disproportionately impacted within this time period. We conclude our analysis by exploring if states associated with increased likelihood of needing counseling or therapy but not receiving it are associated with increases in suicide per capita rates.

Initial Questions

Our analysis explores the following questions:

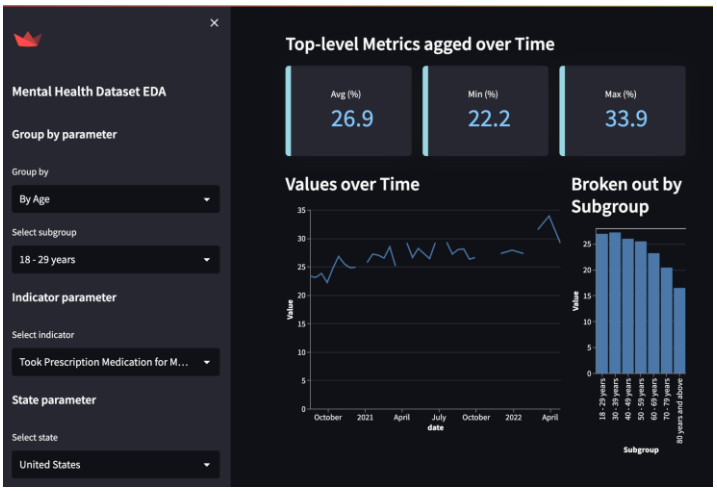
- What is the overall state of mental health in the United States?
    - Are there differences in mental health for residents living in different states?
    - Are there communities where individuals who need mental healthcare are able to get better access to it (in the form of therapy or medication)?
- How has Covid-19 impacted mental health across different communities within the United States?
    - Does the age, gender, ethnicity, sexual orientation, education, disability, or symptoms of depression/anxiety have an association with needing help for mental health?
- Is needing but not receiving counseling or therapy associated with suicide rates?

Data Cleaning & Sanity Checks

Cursory exploration of our dataset revealed our primary dataset was in a long format and was pre-aggregated by various dimensions. Some of these dimensions included: age, education, comorbidities with anxiety/depression, race, sex, and state. The model of the data was 1 row per grouped-by dimension per subgroup per indicator per survey instance. There were 13 instances of the survey being sent out to solicit responses and the timing of the surveys range from 2020 to 2022. One of the first challenges of this dataset was navigating through the different rolled-up aggregations to get a holistic sense of the data. We

could not meaningfully plot initial values without splitting the dataset by dimension first. In order to expedite this, and additionally give us the ability to quickly sift through the average indicator scores for each dimension and subgroup, we built a lightweight web app using the streamlit library to give us a quick, efficient way to explore the data that had been aggregated across different variables.

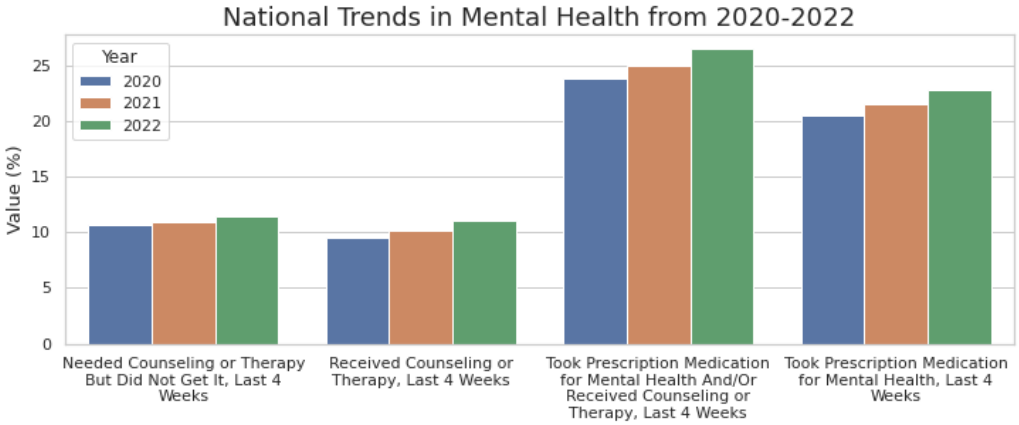
In regard to initial sanity checks, we started by taking the max and min of the "Value" column, which matched our expectation of falling between 0 and 1 (a percentage of respondents). We then checked when the earliest and most recent surveys were sent out, and additionally counted the number of surveys distributed in between. After noting that there were 13 total surveys distributed across the survey period with valid data, we confirmed that each aggregated sub-dataset had an equal number of survey responses without gaps in the timeseries. We found a 'Phase -1' survey without values, which we dropped from our dataset. We then moved on to confirm our understanding of the "Group" and "Subgroup" columns. We confirmed that the values that could be found in the subgroup columns were dependent on the "Group" value. For example, when the "Group" value was sex, the "Subgroup" values could only be one of the possible responses to that question - there was one final value given per subgroup and no rows with missing group/subgroup values. At this point, we felt comfortable with the reliability of the dataset and felt we had a solid understanding to move forward with data cleaning.



We checked rows for null values. There were several columns that did not add value to our driving question and we decided to drop to help distill insights to our driving question, including phase, most columns relating to date, and other alt_value because of their redundant nature. In order to access the timestamp of a survey send, we had to grab the string value of the date from the name of the survey and cast it to a datetime in a new field. Finally, we added a column that mapped state names with their abbreviations in order to more easily join with a geojson file and make visuals more aesthetic.

National Trends

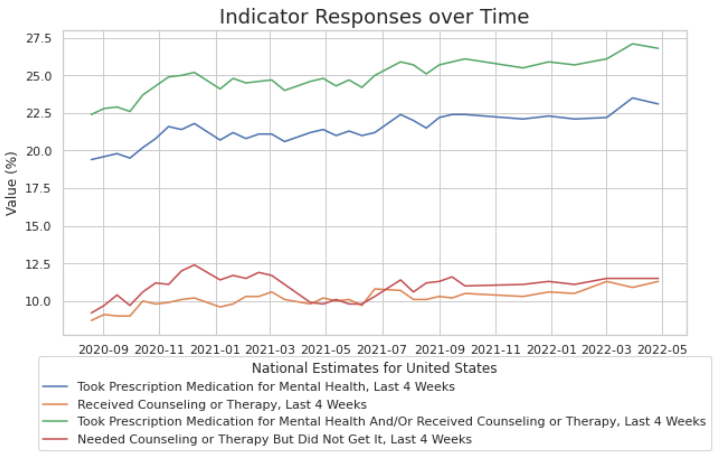
We will start by examining some of the high-level National trends that we see in regard to respondents receiving various degrees of mental health care, before drilling down into the State-level. This will give us helpful overarching context as we continue to investigate subgroups of the population and compare the data collected from those folks to the data representing the national average.



Our exploration of the data revealed a nationally declining trend in mental health from 2020-2022, with an increasing percentage of individuals reporting needing prescription medication, counseling, or therapy. Of alarming concern, is the consistent increase in individuals who indicated needing counseling or therapy but not receiving it. We consider these individuals to be most at risk of self harm or suicide.

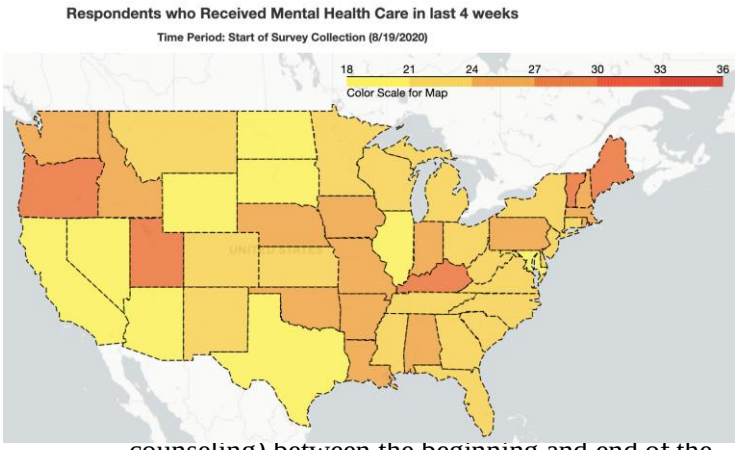
For respondents reporting having needed but not received mental health care, we see a steady increase from ~10% to ~12.5% year-over-year while we see a stronger increase from ~22% to ~26% for respondents who reported having received any kind of mental health care. This year-over-year trend helps to provide early validation on our hypothesis that the pandemic has had tangible, adverse effects on the mental health of communities and in later sections we'll dig into more granular subgroups to examine how the trend has manifested in their demographic.

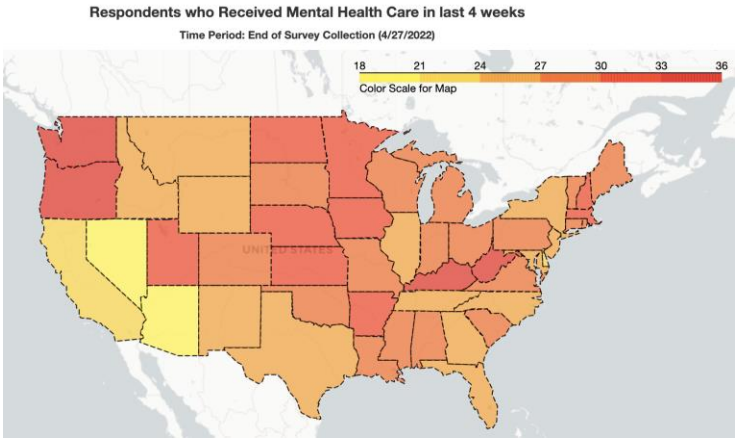
Before taking a look at these trends at the State-level, we'll also take a brief look at the indicator responses plotted at a more granular level. In the figure below, there does not appear to be seasonality at play in the data, nor is there a cyclic trend. Rather, we see each of the indicators has a gradual lift throughout the course of the survey period - specifically in the indicators corresponding to folks receiving mental health care.



State Trends

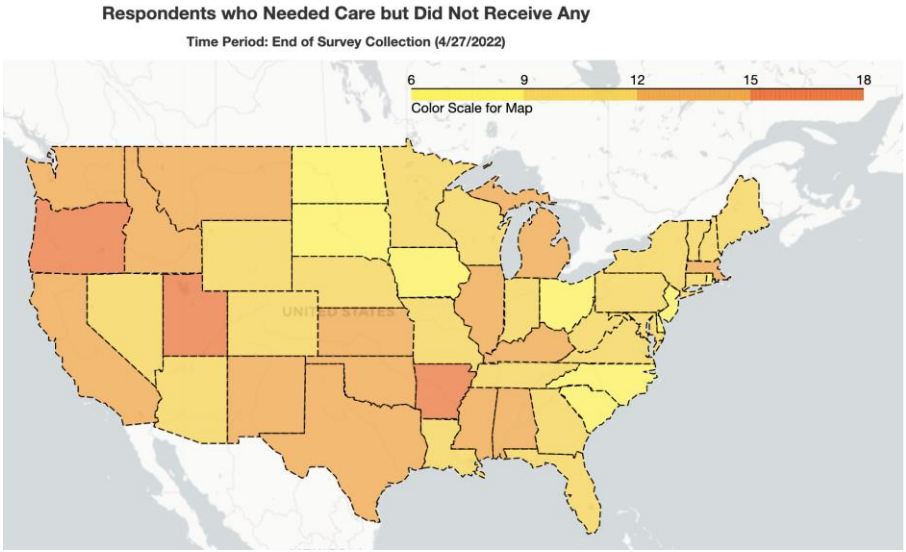
Now that we have seen the national level trend, we'll break the data out by state and identify the states with the highest level of respondents receiving mental health care, as well as the states with the largest gaps getting folks the care that they need.





counseling) between the beginning and end of the survey collection period (8/19/2020 to 4/27/2022). At the start of the survey period we see most states within the 18% to 21% range, with peaks in Maine, Kentucky, Utah, Vermont, and Oregon having 27% to 30% of respondents receiving mental health care. At the end of the period, we see enormous spread in mental health care received both in breadth (across states) and in depth (% of respondents in a given state). In the most recent survey, the difference is stark with most states having 30% or more of respondents receiving mental health care.

States with the largest unmet need in delivering mental health care are also essential to highlight for a full picture of mental health trends at the state level. In the below figures we can see the heatmap representing respondents who needed care and didn't receive it. We again see Oregon and Utah with the highest rates, and we additionally see some of the most populous states, California and Texas, with elevated rates just below 15%.

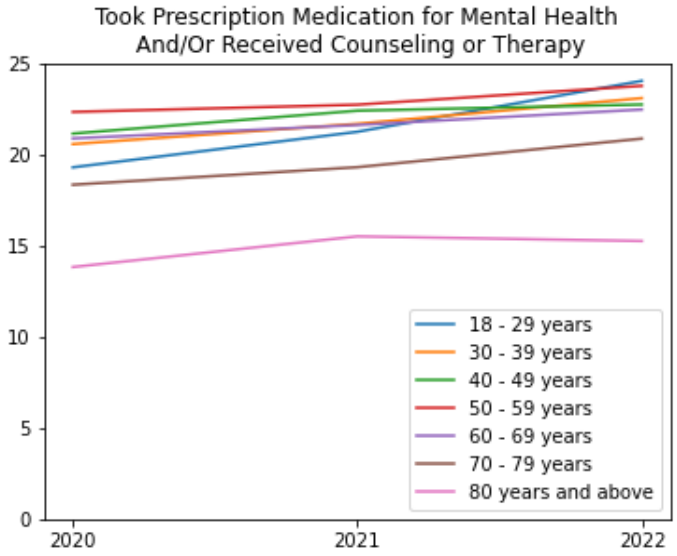


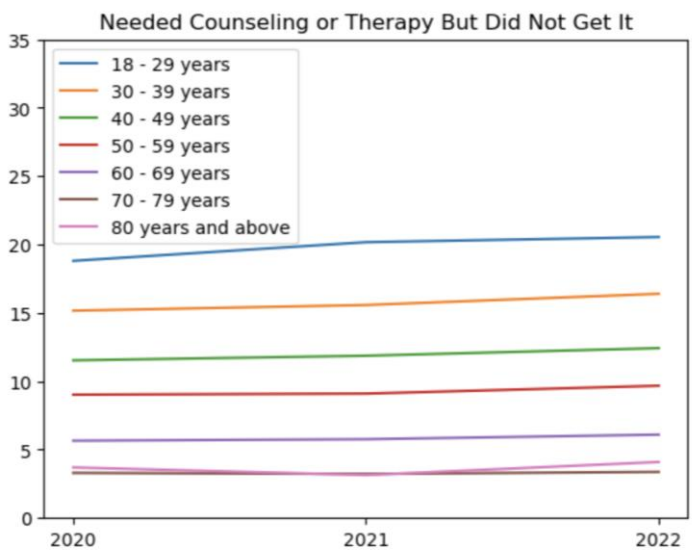
Communities Impacted

In order to understand the shift in mental health over the past 3 years at a more granular level, we decided to look at the data as separated by communities. If we look into subgroups within age, gender, race/ethnicity, and sexual orientation, we are able to identify differences within those groups and understand how Covid may have impacted some more strongly than others.

Age

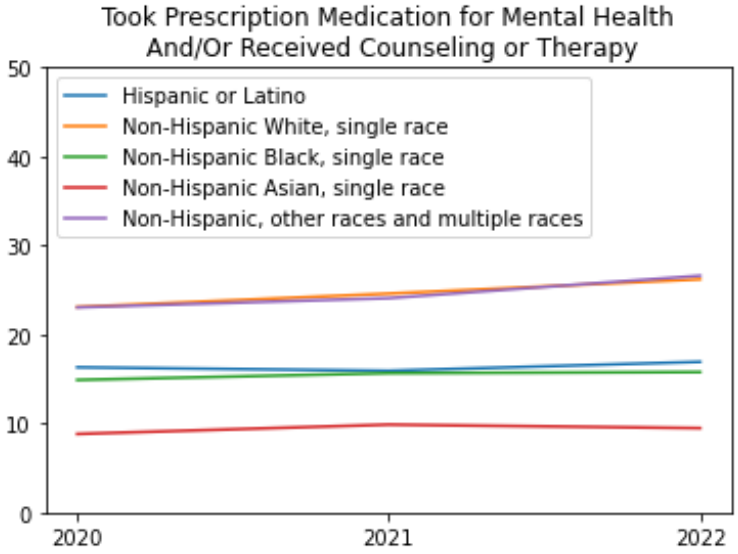
In the figures below, it seems that the older age groups have relatively less percentages of reported mental health compared to the younger age groups. Our intuition for this is that individuals in older age groups are less likely to self report mental health issues and take prescription/attend therapy for it due to growing up with stigmas surrounding mental health. However, you can still see large jumps in values for older age groups, *70-79 years* and *80 years and above*, towards the end of 2020 during the height of the pandemic if you reference the more granular graphs which can be found in the appendix. This makes intuitive sense, as older citizens were more at risk of more severe symptoms from Covid 19, and therefore quarantined themselves more strictly and were more affected at this time. Another interesting data point is that the percentage of people who need therapy but don't get it actually increases as we go down age groups, with the younger age groups, *18-29 years* and *30-39 years*, having the highest rates. The time series graphs, which can be found in the Appendix, generally showed increases in the indicators over time, showing that over the course of the pandemic more and more people needed access to mental health resources.

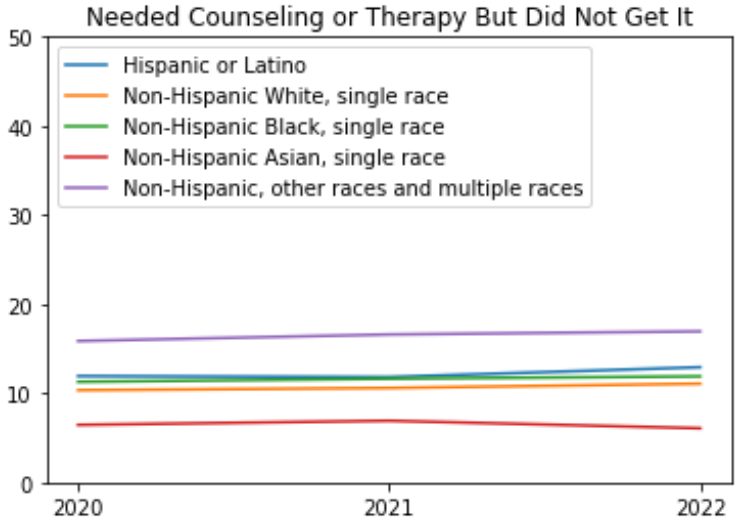




Race

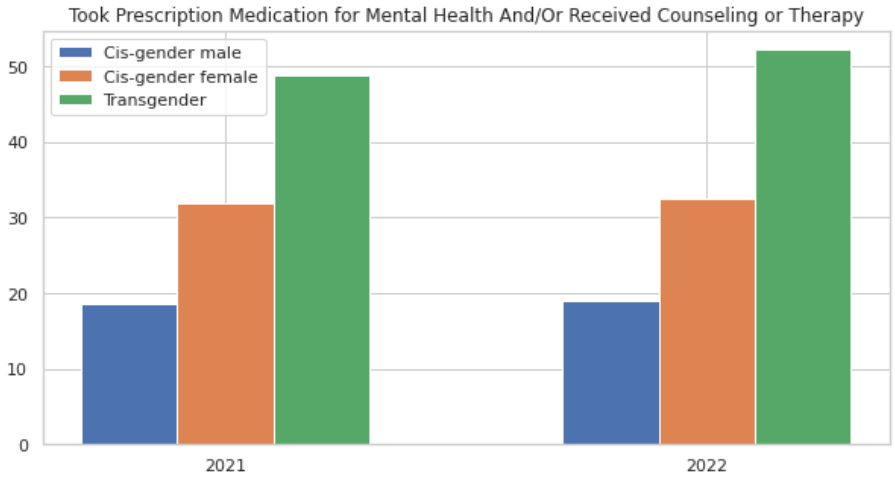
For each of the indicators, the *other races and multiple races* subgroup has the highest percentages of taking medication, receiving therapy, both, and neither. This may be because of all races other than Hispanic/Latino, White, Black, and Asian being grouped together and leading to it having high values. The *Asian* subgroup had the lowest percentages of all four indicators, which may be due to the stigmas still present about mental health in those cultures. There might be less self reporting about needing therapy, as well as less people taking medication or going to therapy even if they do need it. One time series trend that became clear is that, for *White* and *other races and multiple races* subgroups, the percentage of people who took prescription medication and/or received therapy went up over the years of the pandemic. Other trends remained stagnant or went up in 2021 and back down again by 2022.

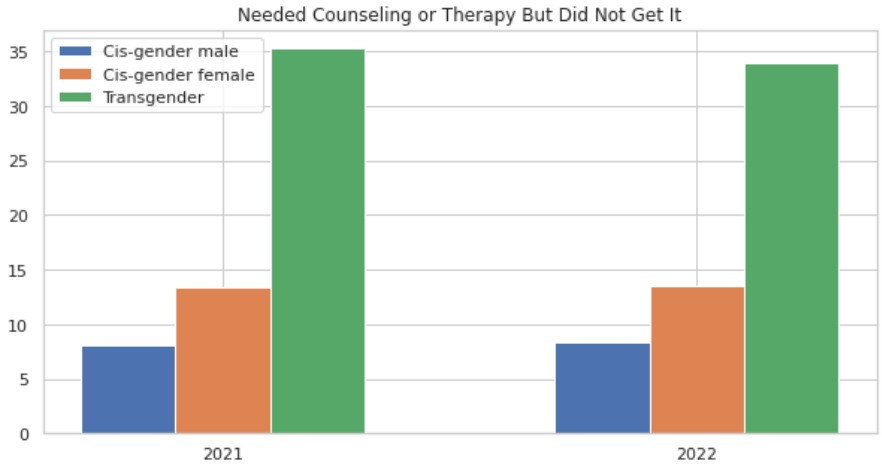




Gender

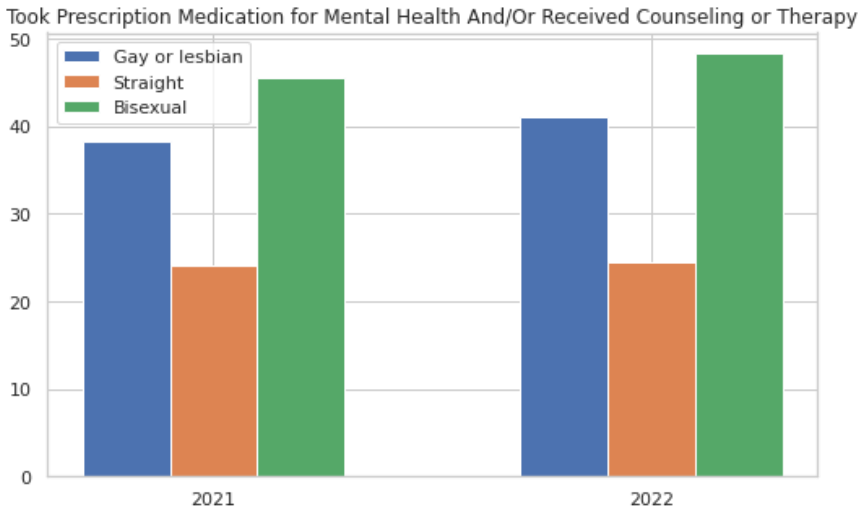
When separated by gender, a concerning trend emerges of Transgender and Cis-gender females disproportionately indicating they needed counseling or therapy but did not get it. Around 30% more women than men reported mental health issues. We can also tell that there were high rates of transgender individuals who faced mental health problems, as we know that around 50% of transgender people took prescription medication for mental health and/or received counseling or therapy and around 35% needed counseling or therapy but did not get it. That is a total of 85% of transgender individuals who participated in the survey who admitted they suffered from mental health problems, leaving only 15% who did not. From 2021 to 2022, the percentages stayed about the same, so we don't see a big time series change in the years after Covid. However, this analysis did tell us a lot about the general relationship between gender and mental health and highlighted troubling conclusions.





Sexuality

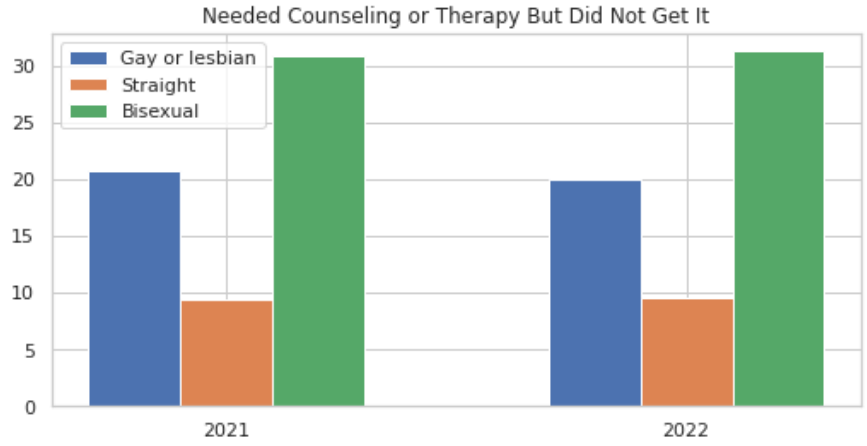
Sexual Orientation shows us another concerning trend, as we can see that higher percentages of Gay or lesbian and Bisexual individuals reported having mental health issues than Straight individuals. We can also tell that there were high rates of bisexual individuals who faced mental health problems, as we know that around 45% of bisexual people took prescription medication for mental health and/or received counseling or therapy and around 30% needed counseling or therapy but did not get it. That means 75% of bisexual individuals who participated in the survey who admitted they suffered from mental health problems, and by doing similar

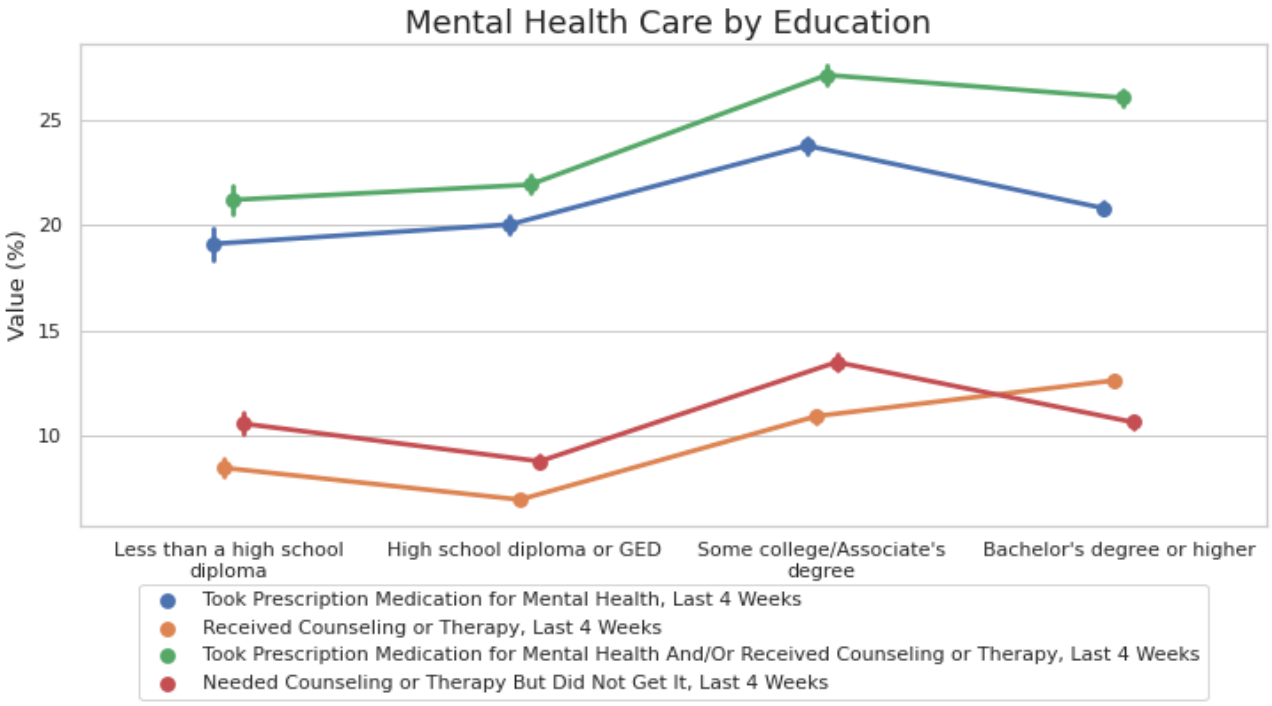


calculations, 60% of gay or lesbian people admitted they suffered from mental health problems. From 2021 to 2022, the percentages stayed about the same, so we don’t see a big time series change in the years after Covid. However, this analysis did tell us a lot about the general relationship between sexual orientation and mental health and that certain communities are much more affected by mental health problems as a result of societal pressure.

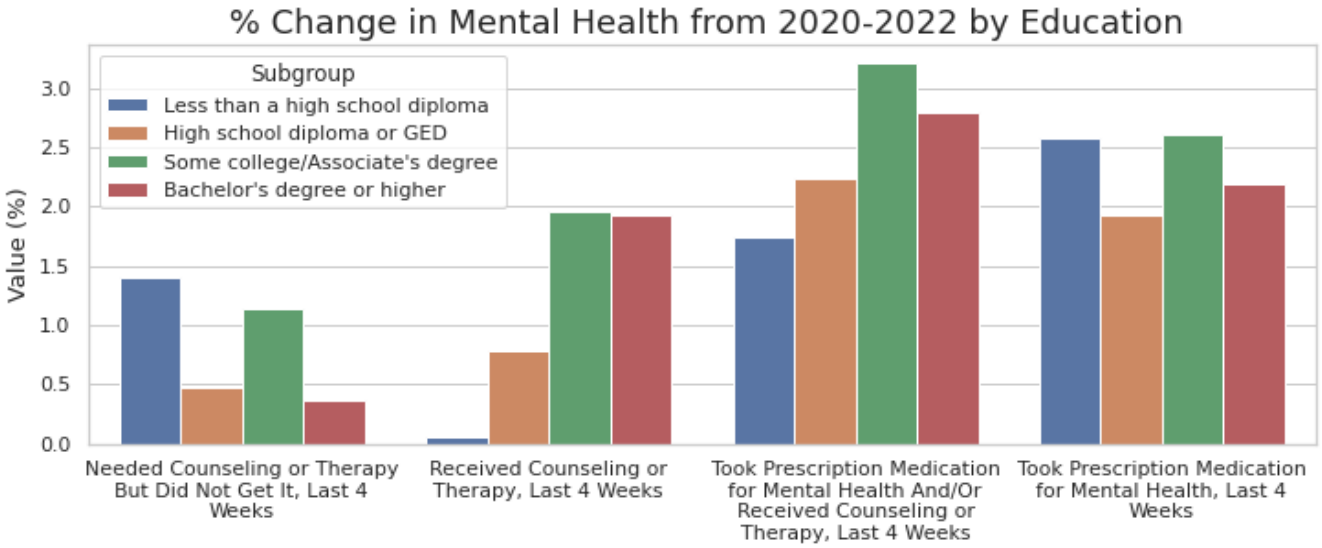
Education

An interesting trend appears when the dataset is grouped by education. It appears that as education increases, so does one's likelihood of needing help for mental health. This appears to peak while studying in university and slightly alleviate post college, although it remains high.



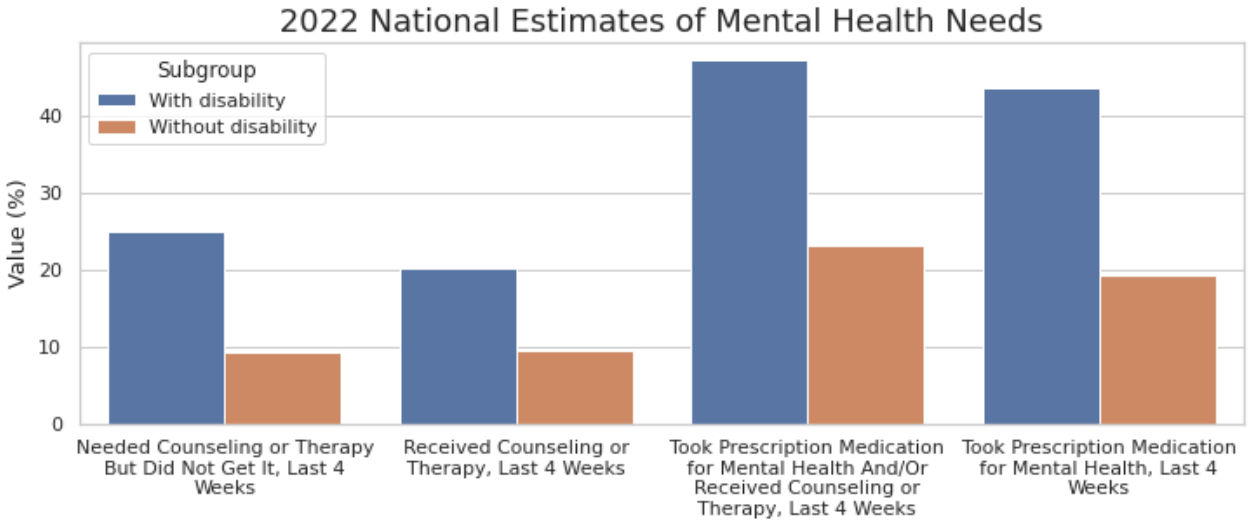


Of further interest is the progressive changes in mental health from 2020-2022. With the greatest increases in needing help for mental health following similar trends in education, with increasing education resulting in increased reporting of needing help for mental health. It appears that groups who were more likely to be at risk of needing help for mental health experienced a disproportionate surge in the growth of that risk. A surprising, and concerning exception is the increase in risk from individuals reporting having less than a high school diploma, who reported the greatest increase in risk of needing counseling or therapy and not receiving it from 2020-2022.



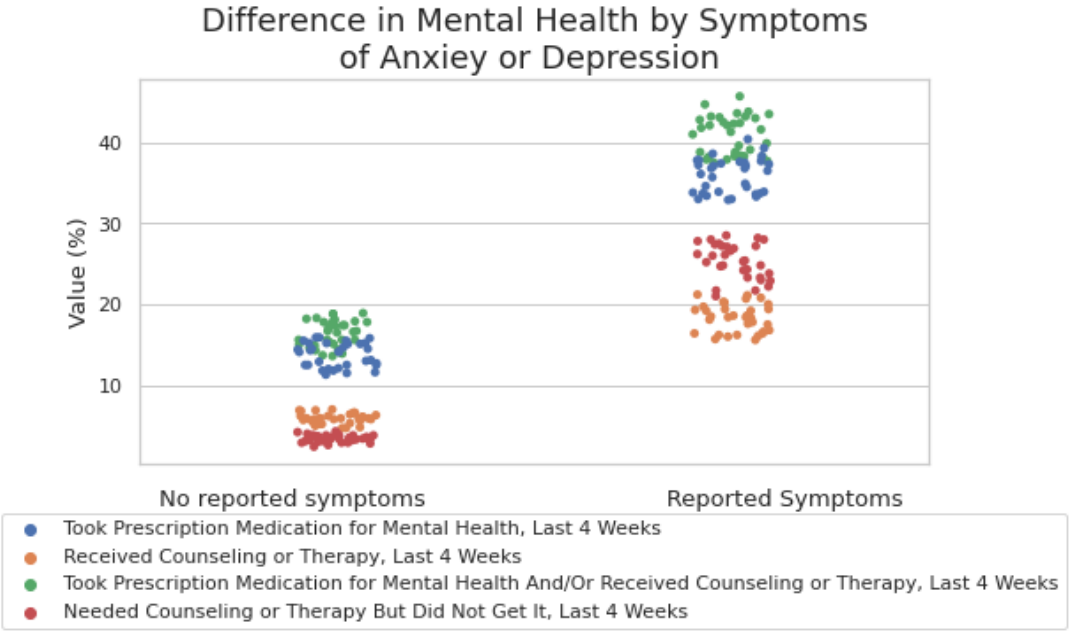
Disability

When analyzing the Subgroup category of our primary dataset by disability status, a concerning trend of increased risk for individuals indicating disability appears. Although our dataset lacked data from 2020, analysis of the 2022 data available illustrated a starkly contrasted disparity between these communities, with those who indicate being disabled often being at over 200% of the risk of needing help for mental health than those without disability.



Symptoms of Anxiety or Depression

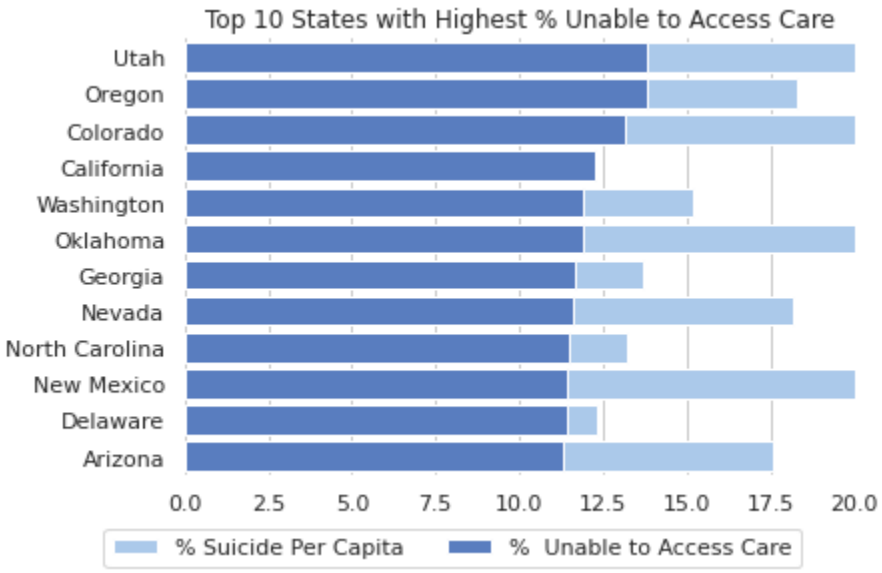
We noticed an intriguing pattern in the data when contrasting those who indicated having symptoms of depression or anxiety and their shifts from 2020 to 2022. A clear disparity already existed which was further increased during this time frame.



Risk of Suicide

The relationship between mental health decline and suicide is well established.[1] The revelation from our analysis of increased reporting in needing help for mental health led us to question if declines in access to mental health care are associated with suicide. To explore this possibility we used the C.D.C.'s dataset on suicide rates per capita by state in 2021 and compared these rates to states with the highest percentages of needing help for mental health but not receiving it.

[1] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6165520/



Conclusions

Our analysis concludes that there does appear to be a national increase in the decline of mental health, and that the issue is far more extensive than one may assume, with the majority of surveyed individuals indicating needing medication, counseling or therapy. We noticed a statewide increase in needing help for mental health, with highest increases occurring in the Midwest and pacific northwest.

Drilling down into the data, our analysis identified the 18-29 age group, White and other races and multiple races ethnic groups, transgender people, and bisexual, gay, and lesbian groups as being communities with higher likelihoods of needing help with mental health. Some of these were due to the effects of Covid-19, and others could be linked to societal pressures and general high mental health values. Although not all of our individual community analyses showed trends that displayed Covid impacting mental health, all of these sections gave us valuable insights on the outlook of mental health for certain communities over others.

Our analysis indicates a broader trend, that those communities who were already at higher likelihoods of needing help for mental health saw their respective likelihoods increase more dramatically when contrasted to less at risk communities. We can also link these likelihoods and rates of mental health in communities or states to data involving other correlated dangers, suicide for one, that are closely intertwined with the prevalence of mental health issues in those population subsets.

Mental health care poses a real and disproportionate danger to different communities. Identification of those communities can help align resource allocation to those who are most in need of support. We recommend conducting additional research to better understand the relationship between mental health decline at the national and state level to better understand why these communities have different rates of decline