



# COVID-19 and Youth Mental Health Disparities: Intersectional Trends in Depression, Anxiety and Suicide Risk-Related Diagnoses

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## ABSTRACT

**OBJECTIVES:** Mental health disparities were prevalent among racially and ethnically minoritized youth prior to the COVID-19 pandemic. As complete datasets from 2022 become available, we can estimate the extent to which the pandemic further magnified existing inequities. Our objective was to quantify disparities in trajectories of depression, anxiety, and suicide risk-related diagnoses in youth before and after the start of the COVID-19 pandemic, using an intersectional lens of race, ethnicity and gender.

**METHODS:** Using electronic medical record data from one mid-Atlantic health care system (2015–2022), we evaluated changes in annual rates of depression, anxiety and suicide risk-related diagnoses in 29,117 youths, aged 8–20 years, using graphical analysis, comparison of adjusted mean differences (AMD) and adjusted mixed multilevel logistic regression.

**RESULTS:** Almost all racial and gender subgroups had significantly higher rates of depression and anxiety after the start of COVID-19 compared to the years prior, with the greatest changes observed in Hispanic and Asian females. Suicide risk-

related diagnoses significantly increased among all female subgroups, with the largest increase among Asian females (AMD 4.8, 95% CI 0.2–9.3) and Black females (AMD 4.6, 95% CI 2.2–6.9).

**CONCLUSIONS:** Rates of depression, anxiety, and suicidal thoughts and/or behaviors in young people continued to increase in the post-pandemic period. Many pre-existing disparities between subgroups, especially females, significantly widened, highlighting the importance of using an intersectional lens. Urgent action is warranted, including universal screening of pediatric patients for suicide risk, broadening effective treatment and support options in minoritized patients, and increasing support services to patients and families.

**KEYWORDS:** adolescent; COVID-19; disparities; mental health; suicide

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## WHAT'S NEW

We used an intersectional approach to elucidate changes in disparities during the COVID-19 pandemic. We found that rates of depression, anxiety, and suicidality in youth increased in the post-pandemic period and many pre-existing disparities between subgroups, especially females, widened significantly.

## BACKGROUND

Suicide was the second leading cause of death among youths aged 8 to 17 years in the United States (US) in

2023 and the third leading cause of death among youth aged 8 to 20 years.<sup>1</sup> Rates of suicidal ideation, attempts, and deaths among racially and ethnically minoritized youth have shown increasing trends in recent decades, and these increases have been the most pronounced among young females.<sup>1–3</sup> These troubling trends have led to calls to use an intersectional lens in suicide-related research, in order to acknowledge the unique structural and individual discrimination experienced by individuals belonging to multiple marginalized groups.<sup>4,5</sup> There are subgroup-specific stressors and sociocultural constructs unique to Asian, Black, Hispanic and White young males and females (respectively) in the US, which are contributing in unique ways to the mental health crisis within each

subgroup.<sup>6</sup> In addition to the stress caused by isolation from peers, economic concerns and health worries directly related to the pandemic, these groups have also experienced racism-specific stress. In the case of Black Americans, worsening mental health has been attributed to fear of police-involved racialized violence and internalized racism-related vigilance and anxiety.<sup>7–9</sup> Anti-Asian racism and violence as a result of the politicization of the COVID-19 pandemic have negatively impacted Asian Americans' mental health.<sup>10</sup> Increased externalizing and internalizing symptoms during the pandemic have been found among Hispanic youth, and have been attributed to increased childcare responsibilities and perceived family financial instability.<sup>11</sup> Given these and other external stressors, it is important to note that there are also subgroup-specific stigma, preferences and beliefs that have led racial and ethnic minoritized subgroups to traditionally be less likely to engage in mental health treatment.<sup>6,12–15</sup>

Recent historical, political and public health events, most notably the COVID-19 pandemic, have collectively contributed to increased stress and mental health challenges that disproportionately affected minoritized racial and ethnic groups.<sup>7,16–19</sup> Among adolescents, increases in racial and/or gender disparities in mental health diagnoses, such as suicidal ideation and depression, were documented during the first year of the COVID-19 pandemic, and were attributed largely to social isolation and family stress.<sup>7,10,20</sup> The direction of trends in these mental health diagnoses after the peak of the pandemic and related quarantines and school closures are not yet known. It is critically important to understand the extent to which trajectories in mental health disparities seen prior to and during COVID-19 continued in the years that followed.

In this study, we sought to leverage electronic medical record (EMR) data because it is an accessible way for health systems, governments, and other stakeholders to track and understand patient-level service interaction and care utilization. EMR data is increasingly available, and best practices are being developed for employing these data for precision patient care and larger scale public health program planning.<sup>21</sup> EMR data can provide valuable information about longitudinal interactions with service providers as they relate to patients' histories, diagnoses, referrals for outside care and medications without the extensive financial and time cost of implementing a large-scale survey effort.

Our study aims to quantify annual changes in mental health for racial, ethnic and gender subgroups of pediatric patients using proxy measures available in the pediatric primary care EMR. We focused specifically on annual trends and mean rates of first diagnoses of anxiety, depression and suicidal thoughts and behaviors before and during the pandemic. Examining the presence of mental health diagnoses stratified by specific subgroups may help to tease apart the complicated web of gender, race and ethnicity when it comes to suicide prevention and mental health needs, especially in light of the political and historical events surrounding the COVID-19 time period.

## METHODS

### PATIENT POPULATION

We conducted a retrospective, cross-sectional cohort study<sup>22</sup> using outpatient EMR encounter data from the Johns Hopkins Community Physicians (JHCP), a health care system that includes 40 locations providing ambulatory, general, and specialty care throughout Maryland. Fully de-identified patient data was extracted from Epic, the EMR system used by JHCP beginning in 2013. The institutional review boards of Johns Hopkins approved this study as exempt, due to the full de-identification of the data. The study cohort included patients from JHCP pediatric and family practices, ages 8–20 years old, who had a primary care encounter between January 1, 2015 and December 31, 2022.

In order to create a cohort of patients who would be likely to seek services from JHCP the majority of the time, patients were excluded if they had less than two years between first and last encounter during the study period, or if they were older than 20 at the time of the first encounter, or if the first encounter was after December 31, 2022. A patient was counted as part of the denominator for the annual cross-sectional rates of the outcomes of interest if they had any type of primary care encounter in a given year. A patient was counted as part of the numerator for the annual rate if they had an encounter and a first recorded diagnosis of anxiety depression and/or suicide in a given year. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines were followed in this work.<sup>23</sup>

### MEASURES

Race was defined using the first chosen race category for the child by parent or caregiver upon registration with the health system. We generated an eight-level composite gender and race variable, coded as 1) White male, 2) White female, 3) Black male, 4) Black female, 5) Hispanic male, 6) Hispanic female, 7) Asian male and 8) Asian female. For these analyses, patients were classified as Hispanic if ethnicity was identified as “Hispanic or Latino” in the EMR. Patients were classified as Asian if their race was any of 13 separate East and South Asian and Pacific Islander identities in the EMR race field. We use the term “Asian”, while noting that this group does include <0.05% of patients who identified as Native Hawaiian or Pacific Islander. Patients with a race or ethnicity that did not fall into any of these categories were not included in this analysis. Gender was defined using the “sex” variable in the Epic demographic module, which represented legal gender of the patient as reported by the parent or caregiver upon registration with the health system. More specific information about gender identity was not collected within the JHCP Epic system until 2019, and as a result there is extremely sparse recording of gender subgroups other than “Male” or “Female” (<0.05%). For the purposes of this analysis, patients identifying as “Nonbinary”, “Other”, or “Unknown” were excluded.

Patients were classified according to whether there was a diagnosis of depression, anxiety, and/or suicide, and by

the year that each was first recorded in a patient's EMR. We used a broad classification that encompassed all suicide diagnoses including suicidal ideation, suicide attempt and/or intentional self-harm with suicidal intent in order to ensure that no suicide risk-related diagnoses would be missed due to misspecification.<sup>3</sup> Anxiety and depression were also broadly classified using any anxiety- and/or depression-related diagnosis code. Each of the three outcomes (anxiety, depression, suicide-risk related diagnosis) was defined as positive for a patient if a related ICD-10 code was listed in an encounter diagnosis list, in the problem list, or in the history and was classified using the coding conventions presented in [Supplemental Table 1](#).<sup>3</sup>

Insurance was classified based on insurance at first recorded encounter and was categorized as public, private, or other (self-pay, none). National Area Deprivation Index (ADI) was calculated within the EMR using patient's address and corresponding Census block group, with those with greatest deprivation having higher values.<sup>24</sup> The Elixhauser score was calculated using all encounter diagnosis codes, and was used as a measure of underlying comorbidities.<sup>25</sup> Number and type of complex chronic conditions were calculated using ICD-10 codes.<sup>26</sup> Number of primary care encounters during the period of interest was calculated for each patient. Missing data was a problem only for the national ADI measure (<10%), and missing values were imputed using the mean value.

#### GRAPHICAL RETROSPECTIVE CROSS-SECTIONAL COHORT STUDY DESIGN

Clinical and demographic characteristics were explored for patients in the entire cohort, and the outcomes of interest were calculated in terms of "ever" presence of a given diagnosis, as well as the year of a "first" presence of a given diagnosis. As a first step in the retrospective cohort analysis, we graphically represented unadjusted annual rates of first diagnosis during the study period of depression, anxiety and suicidality by race and gender subgroup, comparing each minoritized subgroup with White males and females in separate graphs.

#### ADJUSTED MEAN DIFFERENCES (AMD) ANALYSIS DESIGN

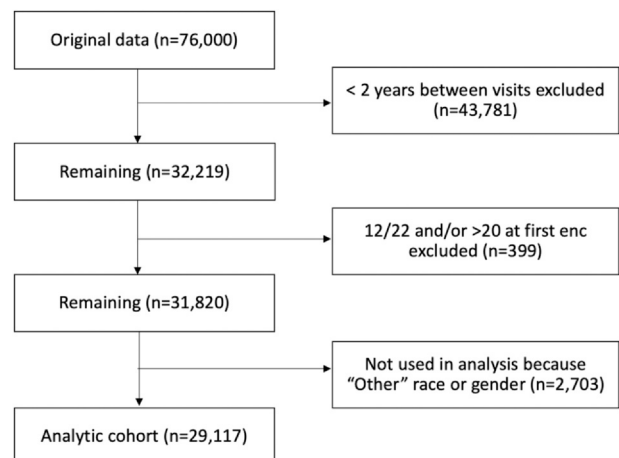
We calculated the adjusted mean rates and differences of first recorded anxiety, depression or suicide risk-related diagnosis by composite race/gender group separately before (2015–2019) and after (2020–2022) the start of the pandemic. These analyses were performed using a series of mixed multilevel logistic regression models controlling for age, insurance type, National ADI, number of complex chronic conditions, Elixhauser score, year, number of encounters in the data, number of years in the data and Department of encounter. Due to the longitudinal nature of the data, the patient was treated as a nested layer within the model and given the potential clustering of patient outcomes and demographic characteristics within practices, individual JHCP Departments were also analyzed as a nested level within the model.

#### RELATIVE DISPARITIES ANALYSIS STUDY DESIGN

To understand potential changes in relative disparities before versus during the pandemic, we employed a series of mixed multilevel logistic regression models calculating the odds of the first recorded anxiety, depression or suicide risk-related diagnosis by composite race/gender group. The models included age at first encounter, insurance type, National ADI, number of complex chronic conditions, Elixhauser score, year, number of encounters in the data, number of years in the data and Department and were calculated separately for the two time periods (before vs during the pandemic). As in the previous models, JHCP practices and patients were treated as nested levels within the model to account for clustering and the longitudinal structure of the data. Odds ratios were deemed to differ significantly between the two time periods if the 95% confidence intervals for a given subgroup did not overlap. All analyses were conducted using Stata software, version 18.0.<sup>27</sup>

### RESULTS

While the overall number of patients seen during the study period was 76,000, after applying the exclusion criteria, our final analytic cohort consisted of 29,117 patients, with 4.85 mean years between first and last encounter (SD 2.04) and nine median encounters during the study period (IQR 6,14), ([Fig. 1](#), [Table 1](#)). This analytic cohort was used for all analyses. As seen in [Table 1](#), the mean age at first encounter was 11.37 (SD 3.00) years, and 16,440 (51.7%) were female. For the measure of primary race, 15,555 (48.9%) of patients were classified as Non-Hispanic White, 10,278 (32.3%) of patients were non-Hispanic Black, 2159 (6.8%) were Hispanic, and 1805 (5.7%) were non-Hispanic Asian. At first recorded encounter, 16,207 (51.3%) of patients had a private primary health insurance and 6632 (21.0%) of patients had public health insurance. At least one complex chronic condition was present in 2867 (9.0%) of patients, and the mean Elixhauser score was 0.58 (SD 0.76). The national ADI rank median was 22 (IQR 14, 37).



**Figure 1.** Numbers flow chart.

**Table 1.** Demographic and Clinical Characteristics of Patients in Analytical JHCP Cohort\*

Characteristic	N (%), mean (SD) or median (IQR)
N	31,820
Age at first encounter, mean (SD)	11.37 (3.00)
Number of encounters, median (IQR)	9 (6, 14)
Years stayed in cohort, mean (SD)	4.85 (2.04)
Gender	
Female	16,440 (51.7%)
Male	15,364 (48.3%)
Nonbinary	13 (< 1%)
Other or Unknown	3 (< 1%)
Race and Ethnicity	
Non-Hispanic White	15,555 (48.9%)
Non-Hispanic Black	10,278 (32.3%)
Hispanic	2159 (6.8%)
Non-Hispanic Asian	1805 (5.7%)
Other	2023 (6.4%)
Insurance	
Public	6632 (21.0%)
Private	16,207 (51.3%)
Other/None <sup>†</sup>	8755 (27.7%)
Elixhauser comorbidity score, mean (SD)	0.58 (0.76)
National ADI percentile, median (IQR)	22 (14, 37)
Any presence of Complex Chronic Condition (CCC)	
No	28,953 (91.0%)
Yes	2867 (9.0%)
Number of CCC, mean (SD)	
0	28,953 (91.0%)
1	2519 (7.9%)
2	266 (0.8%)
≥3	82 (0.3%)
Combined gender and race	29,117
White Female	7799 (24.5%)
White Male	7348 (23.1%)
Black Female	5275 (16.6%)
Black Male	4782 (15.0%)
Hispanic Female	1087 (3.4%)
Hispanic Male	1072 (3.4%)
Asian Female	924 (2.9%)
Asian Male	830 (2.6%)
Other	2703 (8.5%)
MBHD Prevalence	
Anxiety	8109 (25.5%)
Depression	5963 (18.7%)
Behavioral disorders	8856 (27.8%)
Substance use	777 (2.4%)
Suicide-related behavior	1059 (3.3%)
Schizophrenia	78 (0.2%)
Other disorders	1208 (3.8%)

ADI indicates Area Deprivation Index; JHCP, Johns Hopkins Community Physicians; MBHD, Mental and/or Behavioral Health Diagnosis.

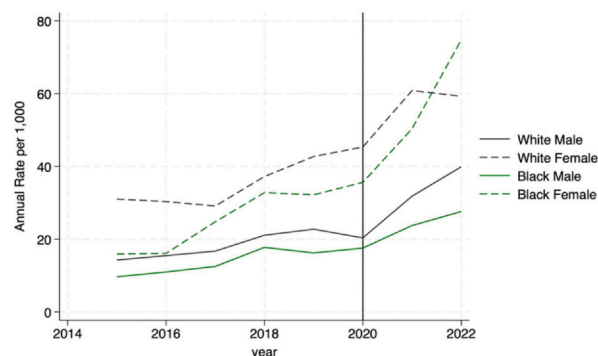
\* Patients with at least 2 years of encounter data, 2015-2022, aged 8-20 at first encounter.

<sup>†</sup> Includes Government/Military insurance.

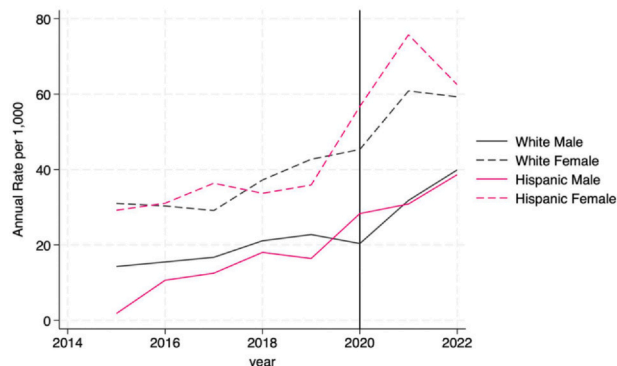
### GRAPHICAL RETROSPECTIVE ANALYSIS

In the unadjusted graphical retrospective analysis of depression, we found that all groups displayed increasing trends, and this slope frequently appeared steeper after 2019. Black, Asian and Hispanic females tracked higher than male counterparts (at rates similar to White females, especially after 2020) and Black, Asian and Hispanic males also tracked at similar rates (Fig. 2). In the graphs

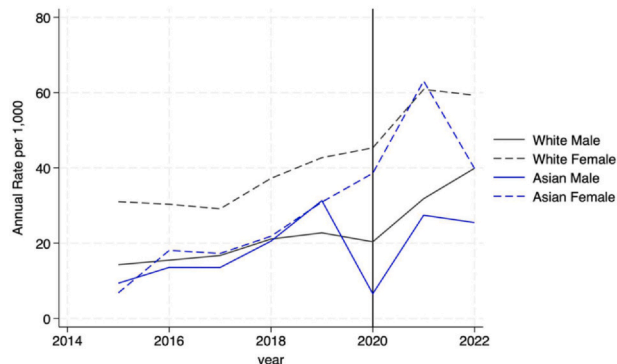
a. Black Males and Females vs White Males and Females



b. Hispanic Males and Females vs White Males and Females



c. Asian Males and Females vs White Males and Females

**Figure 2.** Depression diagnoses.

depicting anxiety diagnoses, we found a similar pattern, though all slopes were generally less steep than for depression and Black females tracked at lower rates than White females, but Hispanic and Asian females had rates that increased over time to be similar to the higher rates of White females (Fig. 3). In terms of suicide, small numbers made graphical depictions somewhat difficult to interpret, but it is notable that Hispanic and Black females are demonstrating sharp increases in suicide risk-related diagnosis rates after 2020 (Fig. 4).

### ADJUSTED MEAN DIFFERENCES ANALYSIS

We found that there were significant differences in adjusted mean rates of depression across most subgroups during the pandemic (as compared to before the pandemic). The largest differences were seen in Hispanic

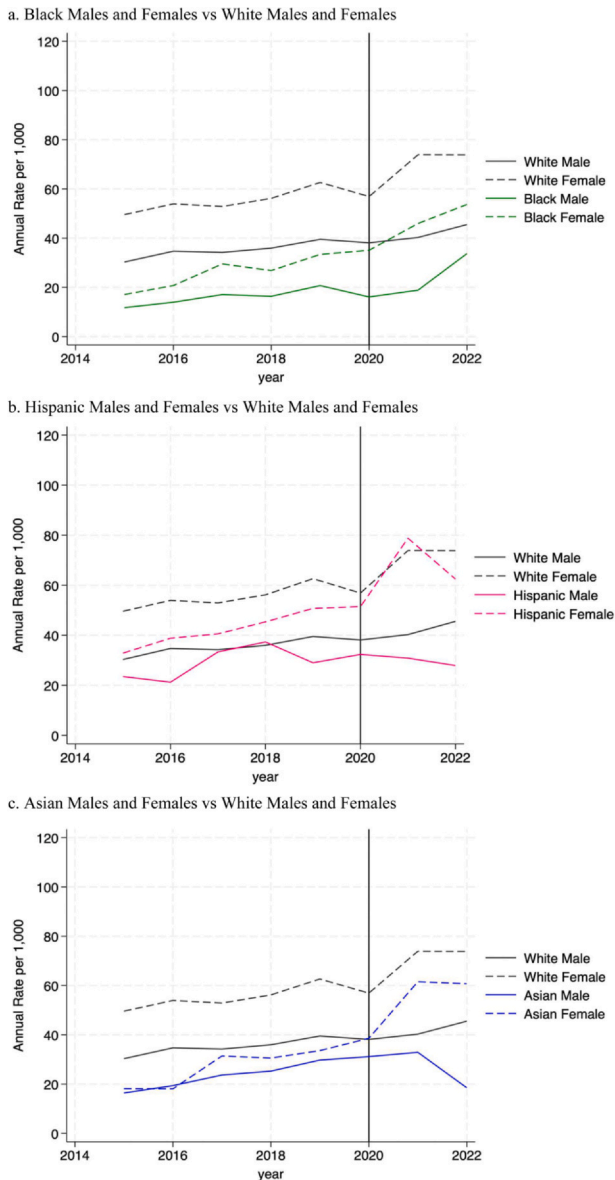


Figure 3. Anxiety diagnoses.

females, AMD 41.9 per 1000 (95% CI 28.1–55.6), but differences were also seen among Asian (AMD 34.2, 95% CI 22.6–45.8), Black (AMD 33.2, 95% CI 27.8–38.5) and White females (AMD 34.6, 95% CI 29.6–39.5). Rates of first depression diagnosis were not significantly different only for Asian males. For the outcome for first anxiety diagnosis, females also had higher AMD rates across racial groups, with the largest difference seen in Asian females (AMD 34.5, 95% CI 21.7–47.3). Rates of first anxiety diagnosis were not significantly different between the two time periods for Hispanic or Asian males. As for the outcome of first suicide risk-related diagnosis, the gender/race subgroups with significant increases in rates during the pandemic were Asian females (AMD 4.8, 95% CI 0.2–9.3), Black females (AMD 4.6, 95% CI 2.2–6.9) and White females (AMD 2.7, 95% CI 0.9–4.5; Table 2).



Figure 4. Suicide-related diagnoses.

RELATIVE DISPARITIES ANALYSIS

The results of the mixed multilevel adjusted logistic regression analysis of disparities during the pre-COVID-19 time period were compared to those reported during the pandemic, we found multiple changes over time among gender and racial subgroups, as compared to White males (the group presumed to be least impacted by racism and sexism). In terms of first depression diagnosis (Fig. 5a, Table 3), most notably, Black females had similar odds as White males to have a first depression diagnosis before the pandemic (OR 0.96, 95% CI 0.83, 1.11), but during the pandemic were more likely to have a depression diagnosis (OR 1.47, 95% CI 1.27–1.71), and the confidence intervals for the two time periods did not overlap, indicating a significant difference in relative odds between

**Table 2.** Adjusted Mean Rates and Differences per 1000 of First Diagnosis for Depression, Anxiety, or Suicidal Thoughts/Behaviors by Race and Gender Subgroup, Before versus During the COVID-19 Pandemic, n = 29,117, years 2015–2022

	Pre-COVID (2015-2019) mean (SD)	During COVID (2020-2022) mean (SD)	Adjusted Mean Difference* (95% CI)
<i>First Depression Diagnosis (per 1000)</i>			
White male	16.6 (14.8)	36.0 (35.7)	19.4 (15.5-23.4)
White female	31.2 (20.2)	65.7 (45.8)	34.6 (29.6-39.5)
Black male	13.3 (13.8)	24.5 (27.3)	11.2 (7.4-15.1)
Black female	23.9 (18.4)	57.1 (40.5)	33.2 (27.9-38.5)
Hispanic male	12.1 (13.1)	35.1 (32.6)	23.0 (13.5-32.5)
Hispanic female	31.5 (20.7)	73.3 (46.4)	41.9 (28.1-55.6)
Asian male	17.3 (15.4)	22.0 (25.6)	4.7 (-4.3 to 13.6)
Asian female	18.8 (16.5)	53.0 (37.7)	34.2 (22.6-45.8)
<i>First Anxiety Diagnosis (per 1000)</i>			
White male	34.7 (22.5)	42.2 (36.5)	7.6 (3.2-12.0)
White female	52.7 (27.1)	73.7 (47.6)	21.0 (15.6-26.5)
Black male	16.5 (15.9)	21.8 (25.3)	5.3 (1.6-9.1)
Black female	25.1 (19.1)	48.7 (38.3)	23.7 (18.5-28.8)
Hispanic male	28.7 (20.4)	32.9 (31.7)	4.2 (-6.0 to 14.5)
Hispanic female	40.9 (24.4)	67.4 (44.3)	26.4 (12.7-40.2)
Asian male	23.0 (18.6)	29.9 (29.3)	6.9 (-3.5 to 17.3)
Asian female	25.4 (19.3)	59.9 (41.1)	34.5 (21.7-47.3)
<i>First Suicide-related Diagnosis (per 1000)</i>			
White male	4.5 (8.2)	5.5 (13.6)	1.0 (-0.6 to 2.6)
White female	5.0 (8.5)	7.7 (16.1)	2.7 (0.9-4.5)
Black male	3.0 (6.9)	3.3 (9.8)	0.4 (-1.2 to 1.9)
Black female	5.1 (8.7)	9.7 (17.5)	4.6 (2.2-6.9)
Hispanic male	4.2 (7.9)	6.9 (14.7)	2.8 (-1.8 to 7.3)
Hispanic female	4.8 (8.5)	7.8 (15.5)	3.0 (-1.8 to 7.8)
Asian male	5.8 (9.5)	3.8 (15.5)	-2.0 (-6.2 to 2.2)
Asian female	2.8 (6.6)	7.5 (14.9)	4.8 (0.2-9.3)

\* Mixed multilevel adjusted logistic regression analysis, nested level is individual patient and Department, adjusted for age, insurance type, number of encounters, years in the data, number of complex chronic conditions, Elixhauser score, National Area Deprivation Index and Department of encounter.

the two time periods for Black females as compared with White males.

For the outcome of first anxiety diagnosis, Black females had lower odds than White males to have a first anxiety diagnosis before the pandemic (OR 0.67, 95% CI 0.59, 0.76), but similar odds of first anxiety diagnosis during the pandemic (OR 1.06, 95% CI 0.92–1.22). Asian females had lower odds of a first anxiety diagnosis before the pandemic (OR 0.79, 95% CI 0.62, 0.99), but during the pandemic were more likely than White males to have a first anxiety diagnosis (OR 1.33, 95% CI 1.06–1.67), in both cases the confidence intervals for the two time periods did not overlap, indicating a significant difference (Fig. 5b, Table 3). As for the outcome of first suicide risk-related diagnosis, Black males had lower odds of first suicide risk-related diagnosis, both before and during the pandemic, as compared to White males (pre- OR 0.60, 95% CI 0.42–0.87, post- OR 0.61, 95% CI 0.38–0.97). Other differences were not significant (Fig. 5c, Table 3).

## DISCUSSION

We employed EMR data to quantify changes in mental health disparities among gender and racial subgroups of youths before and after the start of the COVID-19 pandemic. We were able to illuminate some specific patterns in mental health needs in this work, supporting previous work that has found

sharply increasing depression, anxiety and/or suicidality in recent years among Black, Hispanic, and Asian females.<sup>1,5,10,28–30</sup> Even when adjusting for a wide range of socioeconomic and health measures, the intersectional differences in mental health indicators persisted, and among most groups these indicators increased after the start of the pandemic. It is of note that we had access to data through the end of 2022, allowing us to analyze some of the most recent peri-pandemic data available. Although three years of data (2020–2022) were not sufficient to have a clear understanding of trajectories for our outcomes for every subgroup, it is troubling that females in minoritized groups are trending toward ever higher rates of depression, anxiety, and suicidal thoughts and/or behaviors in the post-pandemic period. While these data are not nationally representative, and thus not necessarily generalizable to the entire US, the study cohort represents a diverse, mid-Atlantic urban and suburban population of pediatric patients, and thus provides important call for future, larger scale research efforts to explore these trends among ethnically and racially diverse subgroups of pediatric patients.

There are limitations inherent in using EMR demographic data. Importantly, we have very little information about gender identity of sexual orientation, and we hope that future research will focus on the mental health effects of the unique intersectional stressors faced by subgroups within the LGBTQIA+ community. Additionally, we recognize that the broad racial and ethnic groupings used in this analysis mask the myriad of heterogeneous subgroups within each, and that

**Table 3.** Odds of First Diagnosis for Depression, Anxiety, or Suicide by Race and Gender Subgroup, Before versus During the COVID-19\* Pandemic, n = 29,117, years 2015–2022

	Pre-COVID (2015-2019)				During/Post-COVID (2020-2022)			
	Odds ratio	95% conf. interval		P > z	Odds ratio	95% conf. interval		P > z
<i>First Depression Diagnosis</i>								
White male	Reference				Reference			
White female	1.51	1.33	1.70	.000	1.75	1.53	2.01	.000
Black male	0.65	0.55	0.78	.000	0.63	0.52	0.77	.000
Black female	<b>0.96</b>	<b>0.83</b>	<b>1.11</b>	<b>.606</b>	<b>1.47</b>	<b>1.27</b>	<b>1.71</b>	<b>.000</b>
Hispanic male	0.61	0.43	0.86	.004	1.03	0.77	1.37	.867
Hispanic female	1.37	1.10	1.72	.006	1.97	1.57	2.47	.000
Asian male	1.02	0.74	1.40	.891	0.65	0.44	0.97	.033
Asian female	1.21	0.91	1.60	.187	1.77	1.37	2.27	.000
<i>First Anxiety Diagnosis</i>								
White male	Reference				Reference			
White female	1.40	1.28	1.54	.000	1.63	1.45	1.83	.000
Black male	0.47	0.40	0.54	.000	0.55	0.46	0.66	.000
Black female	<b>0.67</b>	<b>0.59</b>	<b>0.76</b>	<b>.000</b>	<b>1.06</b>	<b>0.92</b>	<b>1.22</b>	<b>.406</b>
Hispanic male	0.79	0.63	0.98	.032	0.74	0.56	0.99	.044
Hispanic female	0.98	0.81	1.19	.823	1.48	1.19	1.83	.000
Asian male	0.67	0.52	0.88	.003	0.70	0.51	0.97	.030
Asian female	<b>0.79</b>	<b>0.62</b>	<b>0.99</b>	<b>.044</b>	<b>1.33</b>	<b>1.06</b>	<b>1.67</b>	<b>.013</b>
<i>First Suicide-related Diagnosis</i>								
White male	Reference				Reference			
White female	0.91	0.70	1.18	.491	1.26	0.90	1.75	.174
Black male	0.60	0.42	0.87	.006	0.61	0.38	0.97	.035
Black female	1.01	0.76	1.36	.925	1.44	1.02	2.05	.041
Hispanic male	0.69	0.38	1.25	.219	1.08	0.57	2.07	.811
Hispanic female	0.87	0.52	1.46	.590	1.07	0.58	1.99	.820
Asian male	1.38	0.81	2.34	.237	0.83	0.36	1.93	.664
Asian female	0.69	0.35	1.36	.283	1.45	0.79	2.66	.229

Bold = Confidence Intervals for the two time periods do not overlap.

\* Mixed multilevel logistic regression analysis, nested levels are individual patient and Department, adjusted for age, insurance type, number of encounters, years in the data, number of complex chronic conditions, year, Elixhauser score, National Area Deprivation Index and Department of encounter.

because we used these broad groupings, we did not include 6.4% of patients in the analysis. It is an important direction for future research to develop best practices to address race and ethnicity in a more inclusive manner.

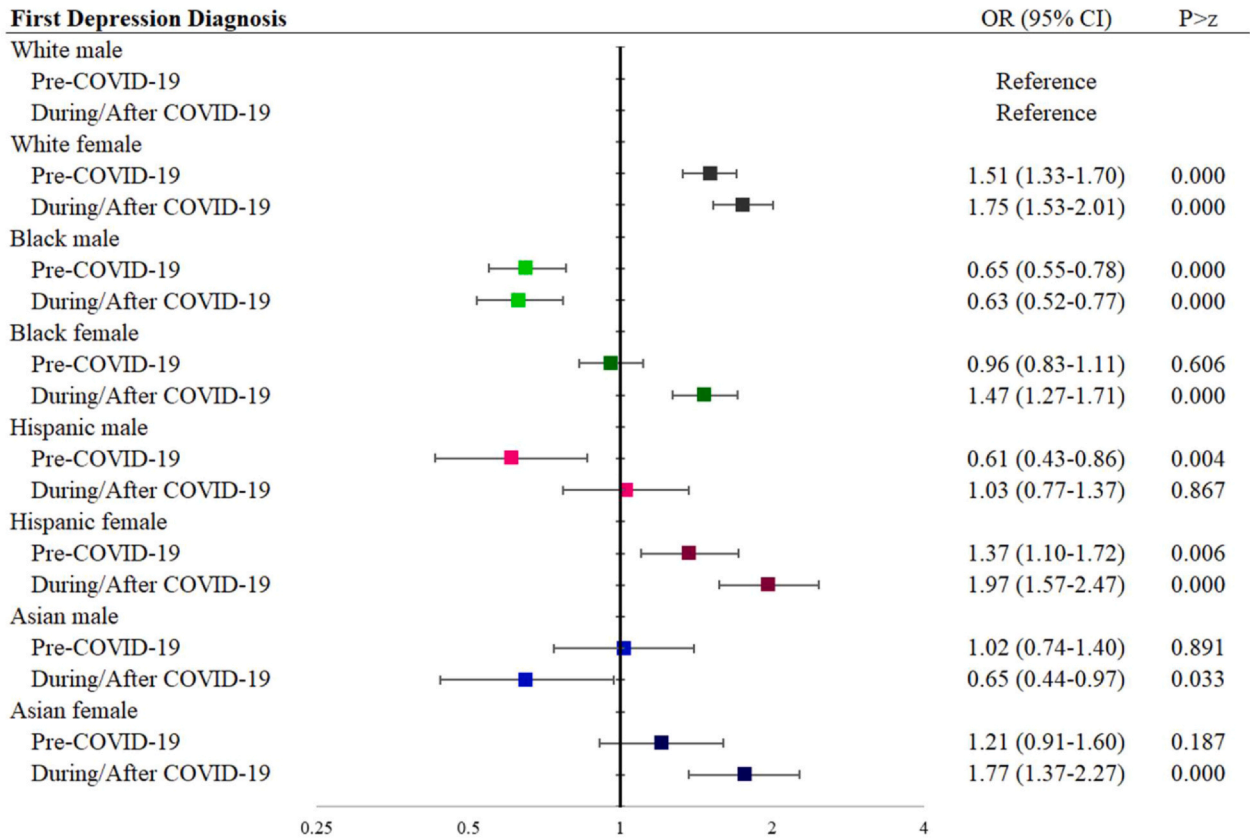
It is a limitation that for anxiety or depression to be recorded in the medical record, it must first be recognized and/or treated clinically. Given that racial and ethnic minoritized groups have historically been less likely to have recognized need from health providers for mental health treatment, more likely to have underlying depression or anxiety misdiagnosed as a behavioral disorder,<sup>31</sup> and less likely to access services successfully if a need is identified, this hinders our ability to draw conclusions based on this data.<sup>32</sup> We cannot determine, based on EMR data, whether the intersectional trends we are seeing represent actual increases in prevalence of these mental health indicators, better primary care identification of these mental health indicators, or increased willingness to ask providers for treatment of mental health concerns which may represent decreased cultural stigma or other cultural trends. It is most likely these findings are the result of all three factors, to some extent. Finally, we want

to note that previous studies have found increasing trends in anxiety, depression and suicidal thoughts and behaviors in the years prior to the pandemic, and this makes it difficult to distinguish between the impact of the pandemic versus a continuation of existing trends.<sup>7,19,29,30</sup>

The historical under-recognition of anxiety and depression among minoritized subgroups makes our findings that Hispanic, Asian and Black youth in post-COVID years have rates of these disorders as high as White counterparts especially troubling, as the rates that we see using primary care data are very likely undercounting minoritized patients with mental health needs.<sup>33</sup> We also caution that null results, such as the finding that Asian male youth are less likely than White males to have an anxiety or depression diagnosis post-pandemic, do not necessarily indicate an absence of mental health needs, but possibly indicate persistent under-recognized need for mental health treatment in this subgroup.

EMR-recorded suicidal thoughts and/or behaviors are less likely to be impacted by ascertainment bias, as these can be entered into the medical record through a positive in-office screening or through health exchange technology, meaning

a.



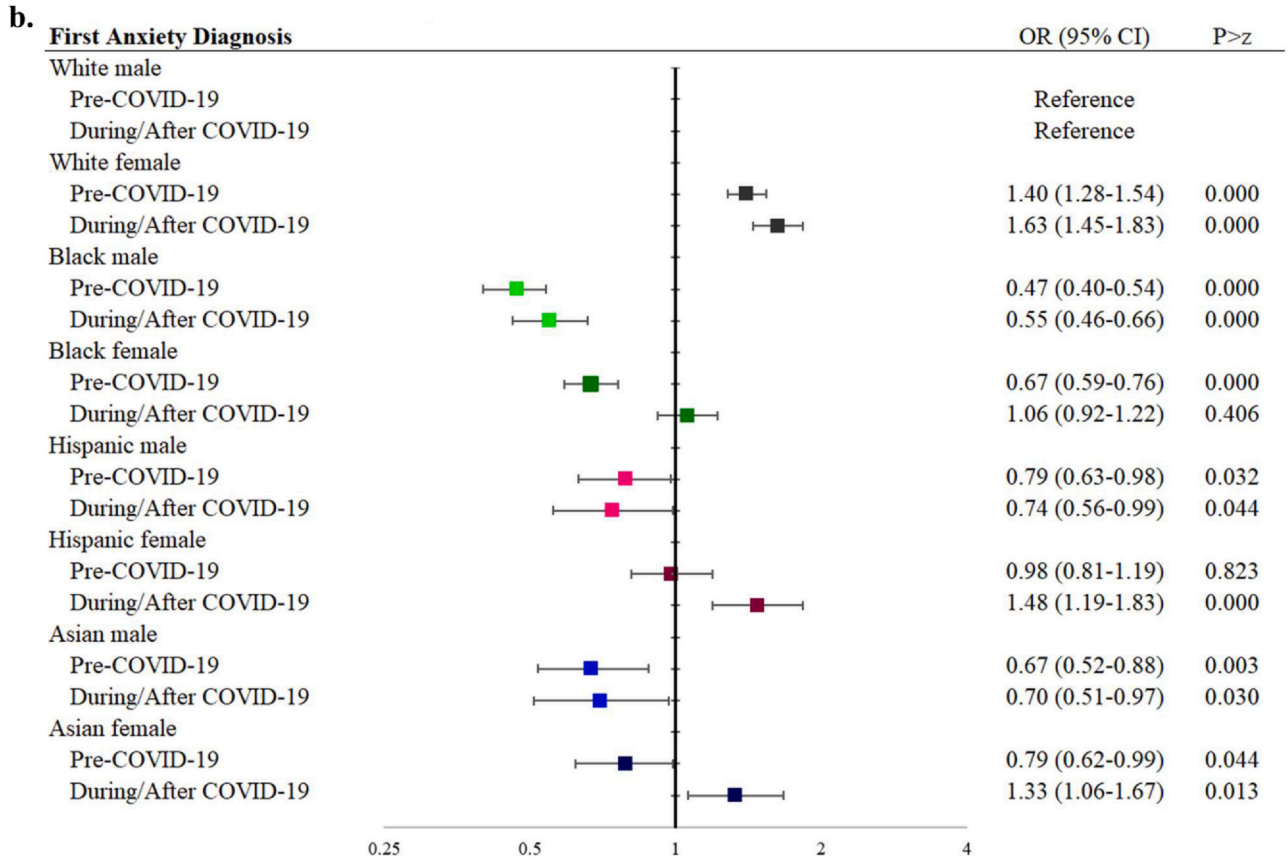
**Figure 5a.** Forest plot of the odds ratios and 95% confidence intervals for first depression diagnosis before and during the COVID-19 pandemic as compared to White males.

that suicide risk-related emergency visit would likely be recorded in a patient’s primary care record. That our findings related to suicidal thoughts and/or actions track closely with our anxiety and depression results would also argue against ascertainment bias as the cause for our findings. That said, in this work we group intentional self-harm (with suicidal intent) with suicidal ideation and attempt, which represent different constructs. Studying each of these as independent outcomes is an important direction for future research. We want to note that much previous work has focused on rates of death by suicide, which has created a narrative in the literature that suicide is a problem isolated largely to male youth.<sup>34,35</sup> By using EMR data to explore rates of suicidal thoughts and/or behaviors as well as depression and anxiety, we are able to see a broader picture that includes female youth, a subgroup who do not die by suicide as often as male peers, but who are still clearly in need of screening and mental health care, including suicide prevention resources.

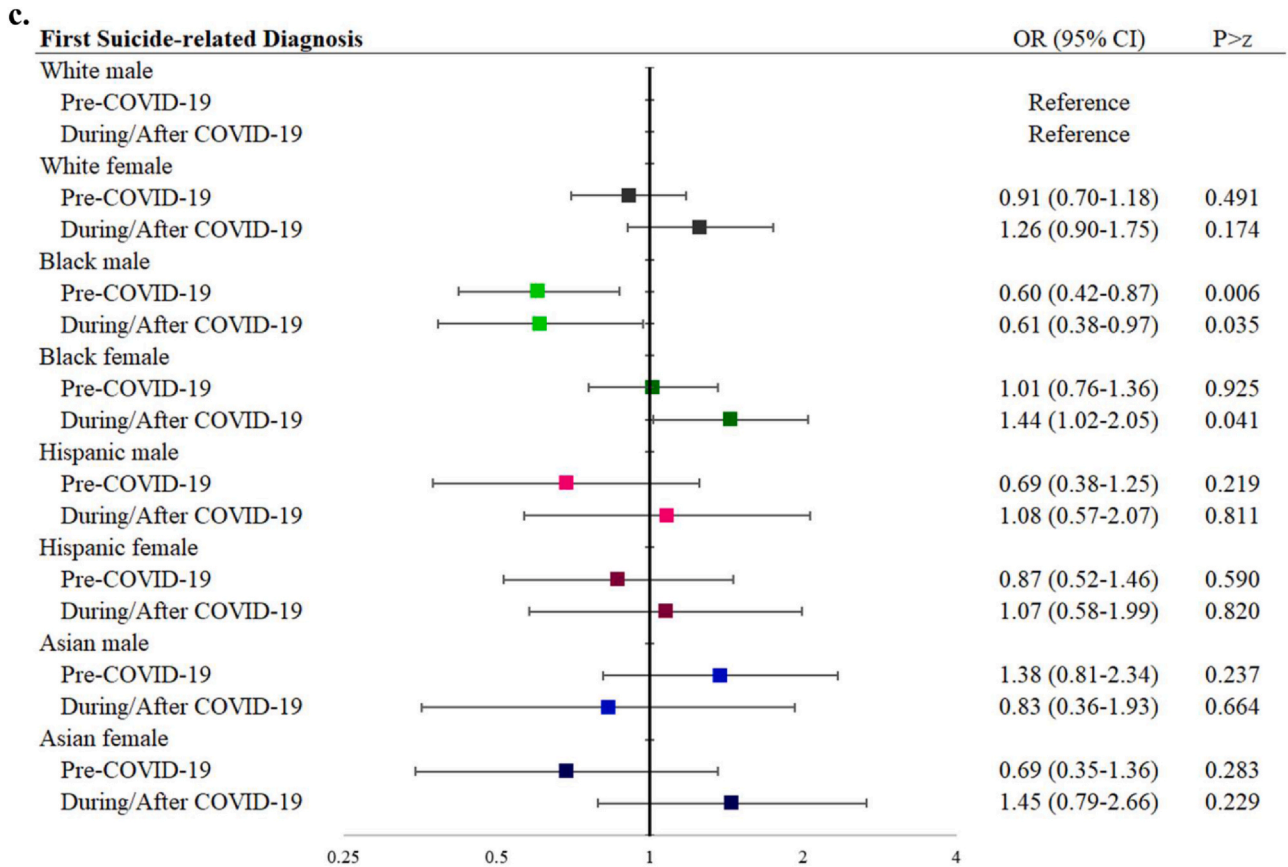
White males and females were used as the comparison group in the graphs, because these groups have historically not been impacted by structural racism and in relation to health care access, nor have they experienced the stressors of belonging to a racial or ethnic minoritized group. White males were used as the reference group in the regression models focused on disparities for a similar reason, as they have generally been less impacted by racism and sexism in relation to mental health care. In the disparities analysis, we are most interested in whether the comparative odds (as

compared to White males) have changed over time for various race, ethnic and gender subgroups. This is not to indicate that rates of depression, anxiety and suicide have not also been rising among White males, we can see clearly from the AMD analysis that White males have trended higher in depression and anxiety diagnoses since the pandemic as have Black and Hispanic males. Using an intersectional lens in this analysis allowed us to tease out gender and race/ethnicity-specific patterns in mental health indicators that may be missed if investigators focus solely on gender, race or ethnicity as groupings of interest, which supports recent trends supporting intersectional approaches to mental health research.<sup>4,5</sup>

Our results support previous studies indicating that suicide-related diagnosis trends continue to rise at an alarming rate among young females, especially Black, Asian and Hispanic females. In contrast, rates have plateaued or decreased among young males and White females since 2021, suggesting some young people may be recovering from the toll the pandemic has taken on their mental health, while others continue to struggle immensely. Disparities in receiving mental health specialty care, for example, treatment from a therapist, have been demonstrated in previous studies and may be contributing to these trends.<sup>32,33</sup> Whether related to the differences in primary care or mental health access available to minoritized groups, the under recognition of the mental health disorders in these groups, or the inequity in community



**Figure 5b.** Forest plot of the odds ratios and 95% confidence intervals for first anxiety diagnosis before and during the COVID-19 pandemic as compared to White males.



**Figure 5c.** Forest plot of the odds ratios and 95% confidence intervals for first suicide-related diagnosis before and during the COVID-19 pandemic as compared to White males.

and school resources available, an urgent and comprehensive call to action is necessary.<sup>33,36</sup> Important next steps include universal screening of youths in multiple settings including schools and in primary care, broadening our understanding of effective treatment and support options in minoritized patients, and increasing support services to these patients and families at school, work, and home.<sup>7,33,37</sup>

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### SUPPORTING MATERIAL

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.acap.2024.01.021](https://doi.org/10.1016/j.acap.2024.01.021).

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