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Trends in Emergency Department, Primary Care, and Behavioral Health Use for Pediatric Mental Health Conditions in Virginia before and during the COVID-19 pandemic

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Abstract

Background Pediatric emergency department (ED) visits for mental health are costly and often preventable. Access to primary care and behavioral health providers can improve mental health and reduce unnecessary ED visits.

Methods Quantitative analysis of the Virginia All-Payers Claims Database to assess mental health ED and outpatient care for children and adolescents up to age 21 years between 2016 and 2021. We determined the proportion of children and adolescents seen by primary care or behavioral health one week and one year before an ED visit, and how many had follow-up care within one and two months after. Results: From 2016 to 2021, pediatric ED visits dropped 14%, but mental health visits rose 10.6%, and suicidality visits tripled (301 to 929, $p < 0.001$). Only 5% of youth with suicidality ED visits had a primary care visit within 7 days prior, and 18% saw a mental health provider. During the pandemic, prior-year primary care visits for mental health ED cases declined (68.1–61.8%, $p < 0.0001$). Follow-ups within 60 days dropped for primary care (mental health: 40.0–34.2%; suicidality: 37.5–33.5%), slightly improved for behavioral health (32.2–37.1%), and stayed stable for suicidality (64.1–63.0%).

Conclusions The pediatric mental health crisis has worsened since the pandemic. There were substantial missed opportunities for prevention and intervention for children and adolescents prior to and following an ED visit for mental health or suicidality.

Keywords Pediatric mental health, Suicidality, Emergency department utilization, COVID-19 pandemic, Primary care, Behavioral health

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Background

Before the COVID-19 pandemic, emergency department (ED) use by children and adolescents for mental health conditions was increasing [1–3]. Stressors associated with the pandemic including social isolation, school closures, family economic hardship, family loss or illness, and reduced access to healthcare exacerbated the psychological stresses for young people [4, 5]. As a result, the global prevalence of pediatric depression and anxiety doubled compared to the start of the pandemic [6]. In 2020, 44.2% of children experienced persistent sadness or hopelessness, 19.9% seriously considered suicide, and 9.0% attempted suicide [7]. The American Academy of Pediatrics (AAP), the American Academy of Child and Adolescent Psychiatry, and the Children's Hospital Association declared a national emergency in pediatric mental health [8]. Recently, a new joint policy and report from the AAP, American College of Emergency Physicians and Emergency Nurses Association was released to provide updated information, resources, and recommendations to improve emergency care for pediatric mental and behavioral health [9]. It is known that continuity of care, defined as patients seeing the same clinician over time, is a significant factor for reducing ED visits across various ethnic groups [10]. Children and adolescents who receive routine primary care and mental health prevention and follow up may be more likely to experience positive mental health outcomes and be less likely to utilize EDs for mental health concerns.

Emergency departments provide urgent care for children and adolescents in crisis who are experiencing unmet mental health needs. Although COVID-19 made the mental health crisis worse, ED visits overall decreased at the beginning of the pandemic when people were avoiding health care settings due to fears of being exposed to COVID-19 and because lockdown and social isolation procedures resulted in less exposure to communicable diseases such as respiratory viruses [11–13]. Primary care and mental health play a critical role in helping to address the mental health crisis because both specialities provide prevention, identification and treatment, and follow-up care to address mental health needs, and can thereby help mitigate the need for young people to seek mental health care in the ED setting. This is especially important in cases of pediatric suicidality because these children are at increased risk for recurrent ED utilization and inpatient hospitalization as a result of experiencing unmet mental health needs. The primary purpose of this paper is to examine trends in pediatric mental health ED visits and behavioral health and primary care use in Virginia before and during the COVID-19 pandemic.

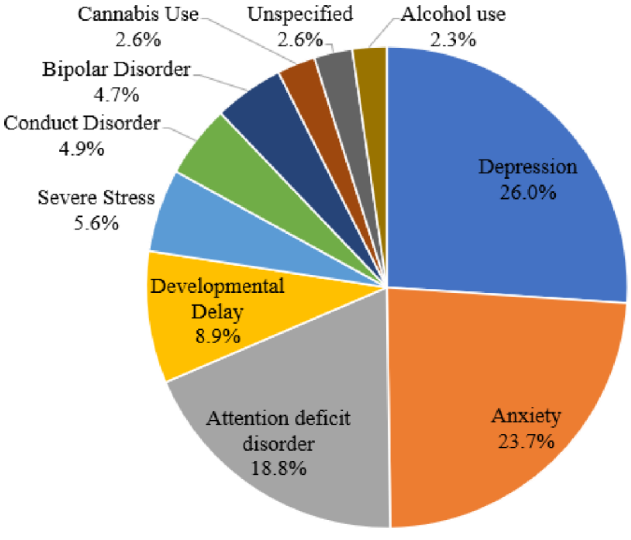

Fig. 1 Top ten mental health diagnoses for pediatric emergency department visits in 2021 ($n=23,671$). * In 2021, fully 68% of children with an ED visit for suicidality also had a mental health diagnosis that year

Methods

We conducted a retrospective observational analysis of ED visits before and during the COVID pandemic for children and adolescents under the age of 21 years, from 2016 to 2021, using the Virginia All Payers Claims Database (APCD). Our goal was to summarize and contextualize ED visits (overall, for mental health conditions, and for severe mental health crises (suicidality)) in children and adolescents based on patient- and community-level characteristics, as well as timing with respect to the COVID-19 pandemic. This study was approved by the VCU IRB (HM#20028776).

Data collection

We obtained data from the Virginia APCD between 2016 and 2021. The APCD includes submissions from institutional encounters (e.g., hospitals, ambulatory care), medical professional services (e.g., clinician visits), and claims (ICD-10 or Current Procedural Terminology CPT codes) for mental health diagnoses, suicidality codes, ED, primary care, and behavioral health visits (Fig. 1). The database includes individual plan member characteristics (e.g., demographics and enrollment), clinician information, who the service is delivered by, and the patient's insurance. We obtained community-level data from HealthLandscape Virginia (HLVA), a geospatical and analytic data warehouse that has novel community-level metrics for various spatial units (e.g., census tract, ZIP Code Tabulation Area (ZCTA), county) in Virginia from the American Community Survey (ACS) and other sources that spans workforce, clinical care, community characteristics, social, and economic factors.

Study population

We included all individuals ages 0 to 21 years in the APCD with a relevant mental health diagnosis using the World Health Organization (WHO) ICD-10 classification [14]. We determined whether the diagnosis met the definition of suicidal behavior [15], defined by current suicidal ideation or suicide attempt at the time of an ED visit. We linked primary care, behavioral health, and ED visits for mental health and suicidality using National Provider Identifier's (NPIs) and CPT codes. Primary care visits were identified through NPIs on APCD claims for individuals with ED visits for mental health or suicidality. NPIs were cross-referenced with a primary care database for visits between 2016 and 2021. Behavioral health visits were identified using specific CPT codes (e.g., 90791–90853) for evaluations, psychotherapy, and group therapy. ED visits for suicidality were identified using CPT codes (e.g., 99281–99288) for various ED service levels linked to mental health crises.

Data elements

We recorded the following variables from the APCD for analysis: (1) NPI for primary care and behavioral health (psychologist, psychiatrist, social worker), (2) claims (ICD-10 or CPT codes) for mental health diagnoses, suicidality codes, and ED visits, and (3) child and adolescent characteristics including birth year, race, ethnicity, insurance type, sex, and rurality.

Outcomes

We compared the change in overall pediatric ED visits to the change in pediatric mental health visits. For each child and adolescent with an ED visit, we calculated the time prior to the ED event that the youth was seen in primary care or mental health (to potentially prevent the ED visit) and the time for the follow-up visit with primary care and mental health after the ED visit (follow-up care for acute mental health needs). Mental health diagnoses, suicide codes, and service utilization was determined based on submitted claims (NPI) for primary care and behavioral health.

Analysis

To identify opportunities for prevention and early intervention, we assessed the proportion of youth with an ED visit who were seen in primary care or behavioral health settings 7 days and 30 days prior to the ED visit. Another way we measured opportunities for prevention and having an established relationship with a provider, was to assess the proportion of children seen in either primary care or mental health one year prior to the ED visit. For follow-up care, we determined the proportion of children and adolescents who received follow-up visits in primary care or behavioral health settings within 7 days, 30 days, and 60 days after an ED visit for mental health or suicidality concerns. These outcomes were summarized with frequencies and proportions based on patient-level characteritics (age, gender, insurance type), as well as community-level characteristics (percentage of people with a high school education or less, the percentage of people living under 200% of the Federal Poverty Level, and the Social Deprivation Index (SDI)), with the latter averaged across each ZCTA of residence for those with more than 1 residence during the study period.

We conducted a Chi-square (χ^2) test to examine the association between the year and the number of pediatric mental health ED visits. Suicidality visits were analyzed separately, as described above. For follow-up care trends after mental health ED visits, p-values were calculated using Chi-square tests to assess statistically significant changes from 2016 to 2021. These analyses were selected as they are well-suited for assessing categorical variables over time and emphasize patterns in follow-up care utilization. In contrast, the analysis of visits prior to ED admission was descriptive, aimed at highlighting the low rates of preventive care utilization. This approach was chosen to draw attention to gaps in care, consistent with the study's goal of identifying missed opportunities for intervention rather than testing statistical differences. No p-values were calculated for these proportions to maintain a descriptive focus.

To address potential under-reporting in commercial claims within the Virginia APCD, we applied inflation factors to adjust the counts of children with mental health diagnoses, suicidality diagnoses, and those with primary care or behavioral health visits. These inflation factors, derived by the APCD based on comparisons to external benchmarks (e.g., payer membership and claims completeness), accounted for incomplete claims submission by certain commercial payers. Commercial claims for each year were adjusted using the following inflation factors: 2.24 for 2016, 2.14 for 2017, 2.24 for 2018, 2.27 for 2019, and 2.28 for 2020 and 2021. Non-commercial claims were not adjusted. Annual counts for commercial and non-commercial claims were tabulated separately, ensuring consistent and reliable comparisons of trends over time.

Results

Compared to 2016, there were 34.0% fewer total ED visits in 2020 and 14.0% fewer total ED visits in 2021 (589,920 vs. 389,212 vs. 507,415) (Fig. 2). The opposite trend was observed for ED visits for mental health. Compared to 2016, ED visits for mental health increased 7.2% in 2020 and increased 10.6% in 2021 (29,028 vs. 31,109 vs. 32,114, $p < 0.0001$) (Fig. 2). The top ten diagnoses for mental health ED visits were depression (29.4%), anxiety (26.8%), ADHD (21.2%), developmental delay (10%), severe stress

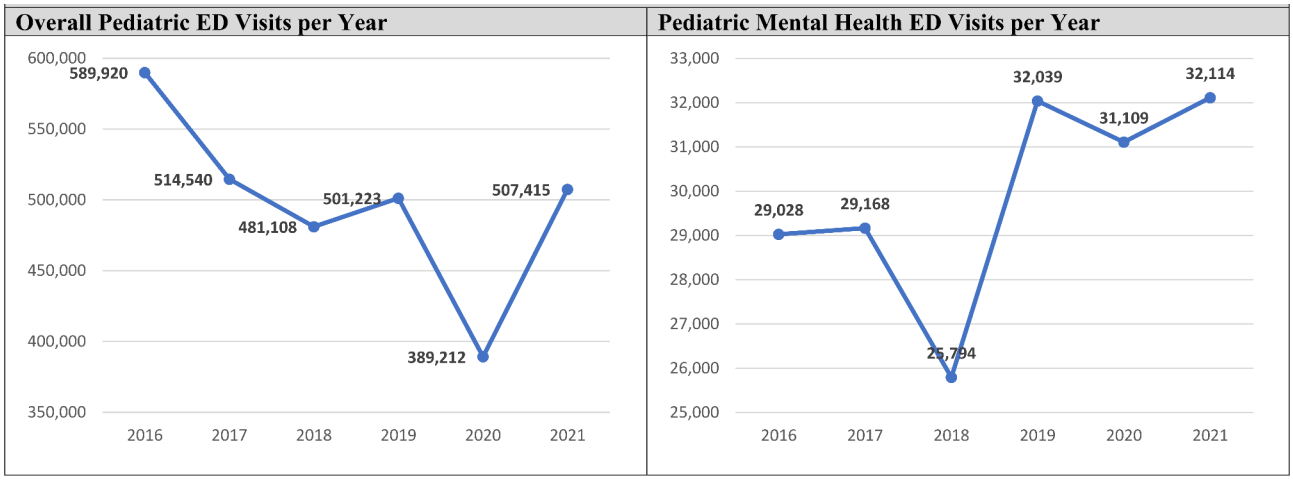

Fig. 2 Annual number of pediatric emergency department visits overall and for mental health between 2016 and 2021

(6.3%), conduct disorder (5.5%), bipolar disorder (5.3%), cannabis use (2.9%), unspecified mood disorder (2.9%), and mental and behavioral disorders due to alcohol use (2.6%) (Fig. 1). In 2021, fully 68% of children and adolescents with an ED visit for suicidality also had a mental health diagnosis that year.

In 2021, youth with a mental health ED visit were more likely to be female (57.3%), aged 15–19 years (45.4%), White (36.3%), have Medicaid (65.9%), and live in rural communities (54.9%). Compared to children and adolescents with any ED visit, youth with a mental health ED visit were more likely to be female (57.3% vs. 50.3%, $p < 0.0001$), older, White (36.3% vs. 32.1%, $p < 0.0001$), and live in rural communities (54.9% vs. 49.3%, $p < 0.0001$); but less likely to be Black (20.6% vs. 17.9%, $p < 0.0001$) (Table 1).

The number of ED visits for suicidality more than doubled comparing 2016 and 2021 (301 vs. vs. 929, $p < 0.001$). The demographics of children and adolescents with ED visits for suicidality were similar to the demographics for youth with ED visits for mental health. Youth with an ED visit for suicidality were predominantly female (75.0%), aged 15–19 years (53.8%), White (36.0%), had Medicaid (61.8%), and lived in rural communities (52.9%). Of note, youth with any ED visit, an ED visit for mental health, or an ED visit for suicidality lived in ZCTAs with a higher proportion of people with a high school education or less, a higher proportion of people with a household income under 200% the federal poverty limit, and a higher Social Deprivation Index score (Table 1).

There were significant missed opportunities to screen and assess for mental health or suicidality, resulting in missed opportunities for prevention. Of children and adolescents with a mental health ED visit, only 6.4% and 10.5% were seen by a PCP or mental health provider, respectively, seven days prior to the ED admission (Table 2); and only 62.2% and 37.6% were seen by a PCP or mental health provider the year prior, a surrogate for having an established relationship with a provider. Results were similar for the more severe case of an ED visit for suicidality with only 5.1% and 18.1% were seen by a PCP or mental health provider, respectively, seven days prior; and only 62.1% and 37.9% by a PCP or mental health provider one year prior to the ED visit. The rates of PCP and mental health provider visits prior to an ED visit were relatively unchanged between 2016 and 2021.

There was also missed opportunities for follow-up with PCPs and mental health clinicians after ED visits for mental health and suicidality, and follow-up got worse during the pandemic for primary care (Table 2). Follow-up with a PCP within 60 days of a mental health ED visit decreased from 2016 to 2021, (40.0% vs. 34.2%, $p < 0.0001$) but increased slightly with a mental health provider (32.2% vs. 37.1%, $p < 0.0001$). There was a similar trend for follow up with a PCP within 60 days for an ED visit for suicidality from 2016 to 2021 (37.5% vs. 33.5%, $p = 0.2226$) and with a mental health provider (64.1% vs. 63.0%, $p = 0.9438$).

Discussion

During the COVID pandemic, there were substantially fewer ED visits overall, but significant increases in mental health ED visits. The increase was even greater for severe mental health conditions, such as suicidality. Our findings are consistent with other studies that have shown relative increases in ED utilization and primary care visits for youth mental health conditions during the COVID-19 pandemic [16–18], but to our knowledge this is the first statewide analysis that links utilization among ED, primary care, and mental health. Despite these increases, within one week prior to an ED visit for suicidality, only 5% of children and adolescents had a primary care visit within seven days and just 18% had a mental health visit. These care gaps persisted up to sixty days later, as 67%

Table 1 Children with Emergency Department visits before versus during the pandemic

	2016				2021			
Patient Characteristics	**All Children**	**Any ED visit**	**ED visit for mental health**	**ED visit for suicidality**	**All Children**	**Any ED visit**	**ED visit for mental health**	**ED visit for suicidality**
Sample Size, frequency	2,331,947	372,818	21,540	301	2,634,728	328,640	23,671	929
Age, frequency (%)								
0–4	528,113 (22.6)	120,027 (32.2)	632 (2.9)	< 10	576,028 (21.9)	100,255 (30.5)	715 (3.0)	< 10
5–9	537,245 (23.0)	80,108 (21.5)	2,501 (11.6)	< 10	580,856 (22.0)	58,841 (17.9)	1,850 (7.8)	13 (1.4)
10–14	537,491 (23.0)	67,579 (18.1)	4,962 (23.0)	75 (24.9)	603,584 (22.9)	56,108 (17.1)	5,464 (23.1)	270 (29.1)
15–19	525,839 (22.5)	78,137 (21.0)	9,753 (45.3)	180 (59.8)	617,701 (23.4)	77,201 (23.5)	10,741 (45.4)	500 (53.8)
20–21	203,257 (8.7)	26,965 (7.2)	3,690 (17.1)	40 (13.3)	256,557 (9.7)	36,232 (11.0)	4,900 (20.7)	145 (15.6)
Race, frequency (%)								
Black	184,748 (7.9)	60,971 (16.4)	3,054 (14.2)	36 (12.0)	226,330 (8.6)	67,579 (20.6)	4,232 (17.9)	160 (17.2)
White	348,795 (15.0)	90,799 (24.4)	7,166 (33.3)	91 (30.2)	444,238 (16.9)	105,601 (32.1)	8,591 (36.3)	334 (36.0)
Asian	48,623 (2.1)	6,661 (1.8)	248 (1.2)	< 10	62,884 (2.4)	7,690 (2.3)	401 (1.7)	18 (1.9)
Other/Unknown	1,749,780 (75.0)	214,385 (57.5)	11,070 (51.4)	167 (55.5)	1,901,275 (72.2)	147,769 (45.0)	10,445 (44.1)	416 (44.8)
Ethnicity, frequency (%)								
Hispanic/Latino	28,818 (1.2)	3,058 (0.8)	200 (0.9)	< 10	23,504 (0.9)	2,323 (0.7)	152 (0.6)	12 (1.3)
Not Hispanic/Not Latino	411,438 (17.6)	72,104 (19.3)	5,847 (27.1)	95 (31.6)	497,035 (18.9)	84,885 (25.8)	7,851 (33.2)	380 (40.9)
Unknown	1,891,690 (81.1)	297,654 (79.8)	15,492 (71.9)	202 (67.1)	2,114,188 (80.2)	241,431 (73.5)	15,667 (66.2)	537 (57.8)
Insurance, frequency (%)								
Commercial	1,504,997 (64.5)	135,791 (36.4)	9,553 (44.4)	136 (45.2)	1,684,669 (63.9)	107,629 (32.7)	8,059 (34.0)	355 (38.2)
Medicaid	826,724 (35.5)	236,985 (63.6)	11,975 (55.6)	165 (54.8)	949,849 (36.1)	220,986 (67.2)	15,604 (65.9)	574 (61.8)
Medicare	226 (0.0)	42 (0.0)	12 (0.1)	< 10	210 (0.0)	25 (0.0)	< 10	< 10
Gender, frequency (%)								
Female	1,147,798 (49.2)	184,770 (49.6)	10,873 (50.5)	199 (66.1)	1,299,071 (49.3)	165,371 (50.3)	13,569 (57.3)	697 (75.0)
Male	1,184,143 (50.8)	188,047 (50.4)	10,667 (49.5)	101 (33.6)	1,335,512 (50.7)	163,265 (49.7)	10,102 (42.7)	232 (25.0)
Unspecified	< 10	< 10	< 10	< 10	144 (0.0)	< 10	< 10	< 10
Rurality, frequency (%)								
City	416,576 (17.9)	79,057 (21.2)	3,536 (16.4)	33 (11.0)	470,358 (17.9)	66,989 (20.4)	4,519 (19.1)	173 (18.6)
Rural	1,086,084 (46.6)	181,600 (48.7)	12,408 (57.6)	162 (53.8)	1,246,726 (47.3)	161,942 (49.3)	13,007 (54.9)	491 (52.9)
Suburban	821,649 (35.2)	110,915 (29.8)	5,504 (25.6)	103 (34.2)	892,195 (33.9)	96,362 (29.3)	5,885 (24.9)	257 (27.7)
Unknown	7,637 (0.3)	1,245 (0.3)	91 (0.4)	< 10	25,447 (1.0)	3,345 (1.0)	258 (01.1)	< 10
Percent of people with high school education of less**	33.9	38.3	38.5	36.5	31.2	35.7	35.9	35.4
Percent of people under 200% Federal Poverty**	25.1	29.4	29.1	27.2	22.3	26.5	26.2	24.9
Average Social Deprivation Index**	37.9	46.1	43.4	40.3	38.4	47.0	44.8	43.0

* Counts are adjusted using commercial correction factor (see Methods)

** Values represent the average value of the ZCTA of residence

of youth never received primary care follow up and 37% never received mental health follow up. These results suggest a concerning lapse in prevention and follow-up for children and adolescents with suicidality.

There are limited data on how ED and outpatient utilization for pediatric mental health has changed as a result of the pandemic. One national study showed a 6.7% increase in youth with any mental health ED visit during the second year of the COVID-19 pandemic [19]. Research from single hospital systems shows an initial drop in ED visits followed by a return to or increase above pre-pandemic levels [20–22]. Among a national sample of children and adolescents aged 3–17 years prior to the pandemic, 9.6-10.1% had received mental health services, 7.8% of these youth had taken medication for mental health problems during the past year, and one in four youth aged 12–17 reported having received mental health services during the past year [23]. State-level prevalence estimates of children before the pandemic with at least one mental health condition who did not receive needed treatment from a mental health professional ranged from 29.5-72.2% [24].

Table 2 Proportion of childrenn with a primary care and mental healthvisittpriorr to andafterr Emergency Department Visits for Mental Health or Suicidality in 2021

	Mental Health ED Visit (*n* = 23,969)		ED Visit for Suicidality (*n* = 929)	
	Primary care physician visit	Mental health provider visit	Primary care physician visit	Mental health provider visit
Opportunity to Intervene and Prevent the ED Visit				
1 year prior	62.2%	37.6%	65.8%	57.9%
30 days prior	18.5%	20.1%	15.2%	34.3%
7 days prior	6.4%	10.5%	5.1%	18.1%
Follow-up Care from the ED Visit				
7 days after	13.0%	18.7%	14.2%	36.4%
30 days after	34.2%	37.1%	26.9%	58.0%
60 days after	40.0%	34.2%	33.5%	63.0%

There are several possible explanations for these trends. First, children and adolescents may experience unique barriers to mental health access, including transportation, limited resources, family issues, low perceived need, and attitudinal barriers [25, 26]. Second, primary care and behavioral health are stressed. Both specialties are experiencing workforce shortages that might be contributing to the lack of follow-up care, which has been associated in other studies with adverse outcomes such as increased suicides [27]. Third, youth who are publicly insured or uninsured have limited choices about where they can receive care, so there may be a lower likelihood of them receiving care outside of safety net networks [28–30]. All of these sociodemographic trends have been further exacerbated by the COVID-19 pandemic leading to a substantial drop in US children's preventive care, with national prevalences of 26.4% of households having ≥ 1 child or adolescent missing or delaying a preventive visit because of COVID-19 or material or economic hardships [31].

A substantially higher percentage of children and adolescents received care from a primary care clinician rather than a mental health clinician in the year leading up to an ED visit for suicidality. This finding has several potential implications. One possibility is that youth and parents may initially turn to their primary care provider for mental health concerns, especially if they already have an established and trusted relationship with their primary care clinician or perceive their mental health care to be inadequate [32]. Second, there may be a perception that primary care clinicians are more accessible than mental health clinicians or that pediatric emotional-behavioral concerns are not immediately recognized as mental health concerns. Third, there may be higher gaps in mental health services or barriers to accessing these services that are distinct from primary care [33].

If mental health concerns can be identified early and addressed regularly at the primary care level, it could potentially prevent the escalation of mental health crises leading to an ED visit. Healthcare systems would benefit from more integrated care models, where primary care and behavioral health work collaboratively to provide comprehensive care, which has been shown in prior studies to be effective [34]. Future research is needed to understand the reasons behind these patterns of underutilization. Additionally, future research in addressing identified care gaps is necessary for children to receive more effective and timely mental health care, potentially reducing the need for emergency interventions.

Comparing pre-pandemic and pandemic periods, there was a decrease in the percentage of youth attending a primary care visit during the pandemic compared to the pre-pandemic period. This trend may indicate potential disruptions in routine healthcare utilization patterns or changes in access to mental health services during the pandemic. In contrast, there were no differences in the percentage of children and adolescents with an ED visit for mental health who had a mental health visit between the pre-pandemic and pandemic periods. This suggests that, despite broader disruptions and challenges in healthcare posed by the pandemic, including surges in the rates of pediatric depression, anxiety, and suicide, the percentage of young people accessing behavioral health services in the year preceding an ED visit remained consistently low.

Our study has several limitations. First, because we used claims data, patients who paid for services out of pocket or received care in settings outside of a health system may have been excluded from the analyses. This is more likely to be a factor for outpatient mental health utilization than for ED or primary care use. It is therefore possible that our analyses represent a slight underestimation of mental health utilization. Second, our analyses focus on a single state and the most recent VA-APCD data available are from 2021. It is possible that the observed trends may be different in other states, nationwide, and over the past two years. However, the increased need for youth mental health services after the COVID-19 pandemic has been described elsewhere and our findings are consistent [16–18]. Finally, the study is limited by use of claims data in terms of using specified ICD-10 and CPT codes to indicate mental health diagnoses and services, which may not always accurately or comprehensively reflect the actual presenting problems or services received in any given medical encounter. Despite these limitations, our results align with other reports in terms of trends in youth mental health needs and gaps in accessing healthcare.

Addressing the root causes of pediatric mental health cannot be done with simple episodic and acute care.

Rather, caring for young people with mental health conditions requires resources and a commitment to provide regular and timely primary care and mental health services to improve prevention and treatment, thereby reducing crisis-related events and outcomes. Understanding these trends in care utilization for pediatric mental health can inform healthcare policies and interventions to address potential care gaps, especially during challenging times such as a pandemic. Doing so may highlight areas where improvements in accessibility and service delivery are needed.

In summary, there is a critical need to train ED and primary care clinicians in pediatric mental health and suicidality, improve primary care and mental health prevention and follow up care, build care teams, maintain multidisciplinary referral networks, and address the social and system determinants of health for where kids live, learn, and play. Initiatives that assist systems of care coordination have demonstrated a reduction of mental health–related burdens across multiple domains [35]. Policy efforts aimed at reducing burden and improving treatment across states are needed. Although in the current models of care and with health systems and practices facing complex payment issues, this represents one more task and an unfunded task at that. However, if this is something primary care and mental health values, then we need to fund it and make it a core responsibility in health systems.

Conclusion

Children and adolescents seeking care in the ED for psychiatric concerns signifies a crisis of unmet mental health needs. There is a critical need to increase access to primary care and behavioral health, and enhance mental health training for primary care, behavioral health, and ED clinicians. Addressing the pediatric mental health crisis requires a collaborative effort involving healthcare providers, policymakers, educators, and community organizations. Early intervention, preventive and comprehensive integrated care, are key to reducing reliance on ED's for pediatric mental health and ensuring that children receive the support they need. Moving forward, this will help the primary care and behavioral health workforce to better prepare and respond to meet the mental health needs of children during a pandemic or public health crisis.

Author contributions

J.G. wrote the main manuscript text. J.G. prepared tables and figures. B.W. edited tables and figures. E.F., J.L., R.S. data analysis. B.N., J.B. E.W., E.M.B., S.S., S.C., A.K edited the manuscript. A.S.W., R.R., K.W., data collection and methodology. All authors reviewed the manuscript.

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Data availability

Data is provided within the manuscript.

Declarations

Ethics approval and consent to participate

This study was approved by the Institutional Review Board at Virginia Commonwealth University and was conducted in accordance with the Declaration of Helsinki.

Human Ethics and Consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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