WHAT CAN TRENDS IN EMERGENCY DEPARTMENT VISITS TELL US ABOUT CHILD MENTAL HEALTH?

By

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The data for this paper come from the Health Care Utilization Project and are available for purchase to qualified users. While we cannot share them, we will share all of the information necessary to replicate our data files.

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Abstract

Increases in mental health diagnoses and suicidal behaviors in Emergency Departments are often cited as evidence of an accelerating child mental health crisis. We ask whether trends in ED visits provide an accurate picture of changes in U.S. child mental health. These measures have been profoundly affected by changing conventions about screening, defining, and coding of mental illness. We conclude that child mental health has been deteriorating, but not by the startling magnitudes suggested by jumps and trends in some measures such as suicidal ideation. Although reported suicidal behaviors rose 228% from 2006-2021, the true rise in mental health disorders is unlikely to exceed the 66% rise in youth suicide observed over the same period.

Reports of deteriorating mental health and increases in suicidal behaviors in children and adolescents have steadily increased in the United States since the mid 2000s. These alarming trends have led the American Academy of Pediatrics to declare a state of national emergency regarding child mental health (AAP, 2021). Surgeon General, Vivek Murthy, has also issued a public health advisory about child mental health (Murthy, 2021). As of 2021, suicide was the second leading cause of death for children 10-14 and the third leading cause of death for adolescents 15-19, making it imperative to try to understand the root causes of this situation.

It is difficult to obtain accurate and consistently measured information about the state of child mental health over time. Data on suicides is perhaps most accurately collected, though even these data may be subject to changes in reporting conventions over time. For example, it is possible that reductions in stigma could increase doctor's willingness to code suicide as a cause of death.[1] A larger problem for those trying to understand and prevent youth suicides stems from the fact that they are still thankfully quite rare. Hence, it is difficult to study determinants of child suicide at the county, or even at the state level, given sparse data. This problem is even worse when one attempts to examine suicide by gender, age, or other demographic characteristics.

Aside from information about suicides, data on trends in child mental health come from two broad sources: (i) data about the utilization of mental health services, including prescriptions, outpatient visits, Emergency Department (ED) visits, and mental health

[1] Inconsistent coding of suicide as a cause of death is a recognized problem, though the situation improved after a working group published new guidelines in 1988 (Rosenberg et al., 1988). Using law changes over time, Fernandez (2018) finds that states that have medical examiners rather than relying only on county coroners, have higher suicide rates and lower rates of accidental death recorded. As of the end of his sample period 11 states had county coroners only.

hospitalizations; (ii) and from survey responses. This paper discusses some of the strengths and limitations of these sources but focuses most attention on trends in ED visits.

In principle, ED visits for mental health indications constitute an attractive measure of underlying child mental health, because in the U.S., people suffering from a mental health crisis are advised to go to the nearest hospital ED, even if the hospital does not have a psychiatric unit (Zeller, 2018). Patients arriving at the ED are assessed and referred elsewhere if necessary. Perhaps for this reason, ED visits have become a closely watched indicator of child mental health. For example, Bommersbach et al. (2023) examine mental-health-related ED visits among youth from 2011 to 2020 and conclude that the proportion of pediatric ED visits for mental health reasons has approximately doubled, and that there has been a 5-fold increase in suicide-related visits. This finding has been widely cited, including in the New York Times (Richtel, 2023).[2] Similarly, Kalb et al. (2019) draw attention to significant increases in the number and proportion of mental health ED visits as well as increases in ED visits for suicidal behaviors, defined as the total number of visits involving suicidal ideation, self-harm, or suicide attempts.

Trends in these ED visits have also figured prominently in public discourse about the child mental health crisis. For example, in his testimony before the U.S. Senate Committee on the Judiciary Subcommittee on Privacy, Technology, and the Law on May 4, 2022, Jonathan Haidt cited increases in ED visits for suicide attempts and self-harm, particularly among teenage girls, as evidence of deteriorating youth mental health (Haidt, 2022), and he has also stressed this measure in his best-selling book (Haidt, 2024).

What has received little attention, however, is the fact that there were significant changes in screening recommendations, coding conventions, definitions of mental illness, insurance

[2] As of September 8, 2025, there were 224 citations on Google Scholar.

coverage, and provider reimbursements over the period when measured rates of ED visits for youth mental illness began to rise. In what follows we describe these changes, and present evidence about their impacts on measured rates of child mental illness and suicidal behaviors, as captured in ED records for children ages 10 to 19.

Our overall conclusion is that the deterioration in child mental health, while real, is likely to have been smaller and more gradual than the trends in the overall number of ED visits for mental illness or suicidal behaviors suggest. Furthermore, different suicidal behaviors follow different trends and are not equally sensitive to these changes, suggesting that lumping them together may be misleading. In particular, a sharp rise in suicidal ideation likely mainly reflects changes in detection, whereas self-harm and suicide attempts track more closely with suicide deaths as Haidt has suggested.

Section 2 provides background about changes in provider reimbursements, insurance, screening, mental health definitions, and coding that may have affected the measured trends in mental health. Section 3 provides information about data and methods, while Section 4 provides our main results. This section is broken into four parts covering trends in ED visits for mental health, trends in ED visits for suicidal behaviors, regional differences in trends, and a brief discussion of international trends in mental health and suicide. Section 5 presents a discussion and conclusion.

2. Changes in provider reimbursements, insurance, screening, definitions, and coding that may have affected measured trends in mental illness and suicidal behaviors

Figure 1 shows that in almost every year from 2007 to 2016, there was a policy change that had the potential to significantly affect measured rates of mental illness and/or suicidal

behaviors. This section briefly reviews these policy changes. Further details about the policies, along with links to relevant documentation are in the Appendix B.

Changes in provider reimbursements: There were two changes over this period which allowed providers who coded more secondary diagnoses to receive higher reimbursements. In 2007, Medicare changed the rules surrounding diagnosis related groups to allow higher reimbursements for cases that were complicated by secondary diagnosis of mental illness. Primary diagnoses record the main reason that a person came to the ED, while secondary diagnoses are used for all other conditions affecting the care of the patient. While the Medicare change applied only to the elderly, changes in Medicare tend to spillover to other payers (Clemens and Gottlieb 2017 and Cooper et al., 2019) and Cook and Averett (2020) show that this also happened in this case. This change implies that one should expect to see visits with a secondary mental health disorder rise faster than visits with a primary mental health disorder after 2007.

Changes in insurance coverage: A long literature dating back to the RAND health insurance experiments shows that people are more likely to seek care when they are more generously insured. Hence, several expansions of insurance coverage for mental illness may have increased the propensity of people to seek care for mental illness, including in the ED. The Mental Health Parity Act of 2008 required insurers to treat mental illness as generously as they treated other health conditions, in terms of limits on number of visits, copays, prior authorization, and other features of insurance coverage. The Affordable Care Act of 2010 included mental health care as one of the essential health benefits that all insurers were required to cover—a mandate that took effect in 2014. In 2012, insurers were required to cover preventive services

(such as mental health screenings) if they were recommended by the U.S. Preventive Services Task Force (USPSTF).

Changes in screening: Increasing screening for disorders is likely to increase the number of diagnosed cases. For example, Chorniy, Currie, and Sonchak (2018) show that provider mandates to screen under Medicaid in South Carolina increased child diagnoses of both Attention Deficit Hyperactiviy Disorder and asthma. In 2009, the USPSTF recommended the screening of all adolescents for major depressive disorder, but only if adequate follow up was available. This caveat likely limited the importance of the recommendation. Then in 2011, the Women's Preventive Services Guidelines (WPSI) recommended screening women and girls over 12 for depression annually, making short screeners for depression an expected part of girls' annual physicals. The Affordable Care Act's requirement that insurers pay for these screenings also meant that providers would be reimbursed for screening girls. Increases in screening would be expected to increase measured prevalence by finding cases that would otherwise have been missed.

Such screening would not necessarily have to take place in EDs to influence ED visit coding—a person could carry a diagnosis of depression into the ED just as they would carry a diagnosis of diabetes with them. If they tell the intake person that they have been previously diagnosed with depression, then depression may be more likely to be listed as a secondary diagnosis.

Changes in definitions: Another potentially important change occurred in 2013 with the adoption of the 5th Diagnostic and Statistical Manual of Mental Disorders (DSM-5). The DSM is used to define and diagnose mental health conditions, and the transition between DSM-4 and DSM-5 led to significant changes in diagnostic criteria. For example, several disorders including

disruptive mood dysregulation disorder, bereavement disorder, dysthymic disorder (persistent low mood), and premenstrual dysphoric disorder were added to the definition of depression. A new specifier "with anxious distress" was also added in recognition of the frequent co-existence of anxiety and depression. New instructions were added to help the clinician determine the importance of suicide prevention planning in treatment (American Psychiatric Association, 2013).[3] For anxiety, a rule that only persons over 17 could be diagnosed with social anxiety disorder was dropped in DSM-5. Some also argue that diagnostic thresholds for anxiety were lowered in 2013, resulting in increases in diagnoses (Park and Kim, 2020).

Other changes with the introduction of ICD10 included the creation of a new Autism Spectrum Disorder diagnosis, which combined four separate previous diagnoses, and changes in the criterion for Attention Deficit Hyperactivity Disorder (ADHD) which allowed people who exhibited symptoms after age seven to qualify for a diagnosis. These changes have been associated with a subsequent explosion in cases of these two disorders (Vande Voort et al., 2014; Frances, 2025). Criteria for stress disorders and obsessive-compulsive disorders also changed extensively.

Changes in coding: Important changes in diagnostic coding occurred with the mandatory transition from the 9th International Classification of Diseases (ICD9) to ICD10 in October 2015. When people are treated, they are given a diagnosis or series of diagnoses which are important for billing purposes as well as for medical reasons. The ICD10 increased the number of available diagnostic codes 5-fold and added many new mental health codes, including a range of new codes for anxiety disorders that allowed greater specificity in diagnosis.

[3] In what follows we code anxiety using code 300 in ICD9 and code F4 in ICD10. Mood disorders include codes 296 and 311 in ICD9 and code F3 in ICD10. Note that PTSD was not treated as an anxiety disorder in ICD9 but it is in ICD10 and we have followed that convention.

A second important change in diagnostic coding occurred in October 2016. The Cooperating Parties in charge of implementing the ICD10 recommended that providers code suicidal ideation as a secondary diagnosis if present. Suicidal ideation involves persistent, intrusive thoughts about suicide. This change was significant because previously, claims could not be submitted with suicidal ideation as a secondary diagnosis if the primary diagnosis was a mental health disorder. That is, under ICD9, suicidal ideation was treated as if it was only a symptom of an underlying mental health disorder and not as a separate condition.[4] The 2016 change is likely to have greatly increased diagnoses of suicidal ideation after 2016. The change in coding instructions was reinforced by the rules allowing providers to receive higher reimbursements for more complex cases (i.e. those with secondary diagnoses).

A third important change in the ICD10 was that practitioners could no longer code the cause of an injury or poisoning as "undetermined" by omitting to include a separate external cause of injury code. They had to take a stand on whether it was caused by self-harm or not because this determination was embedded in the new codes. Stewart et al. (2016) use data from 10 large medical networks to show that after this change was made, increases in the number of injuries or poisonings due to self-harm (from about 10 to 15 per 100,000) were offset by declines in the number of injuries or poisonings with undetermined causes.

Any one of these changes had the potential to increase diagnoses of mental health conditions in adolescents, but most research on trends in mental health diagnoses have ignored their possible impact.

[4] Suicidal ideation should only be coded as primary if the clinician has ruled out any other mental health disorder, so it should normally appear as a secondary diagnosis with other mental disorders primary.

3. Using the NEDS and Vital Statistics Mortality data to study trends in ED visits for mental illness and suicidal behaviors

Our analysis of trends in ED visits relies on data from NEDS, the largest U.S. all-payer ED database with information from around 3 million visits to hospital EDs in each year, with lower numbers in 2020 and 2021 (2.3 and 2.6 million, respectively). Over the period 2006-2021, there are 46.8 million visits. In 2021, NEDS represented ED visits from hospitals in 39 States and the District of Columbia and approximated 20% sample of hospital-owned EDs.[5] These data are available as part of the federal Healthcare Cost and Utilization Project (HCUP).[6] The NEDS data include patient age and sex, urban–rural residence, expected payer, and diagnosis and procedure codes.[7]

NEDS not only covers people discharged from the ED, but also people who were admitted to the hospital. As shown in Figures C1, C2, and C3, the NEDS data tracks well with CDCs' Web-based Injury Statistics Query and Reporting System (WISQARS) which includes all injuries including those that result in fatalities.[8]

Diagnoses in the NEDS are coded using the International Classification of Diseases version 9 (ICD9) before October 1, 2015, and the ICD10 afterwards. We focus on ED visits with a diagnosis of a mental health disorder or a suicidal behavior. Visits for mental health disorders are split into two groups, those with any diagnosis of a mood or anxiety disorder, and those with

[5] NEDS is designed as a stratified cluster sample where strata are defined by hospital characteristics such as urban or rural, hospitals are sampled, and every observation for a sampled hospital is included.
[6] Further information about the NEDS is available here: NEDS Overview. Accessed July 20, 2024. https://hcup-us.ahrq.gov/nedsoverview.jsp.
[7] Patient residence is classified as large central metro, large fringe metro, medium metro, small metro, micropolitan, and noncore counties. We count micropolitan and noncore as rural. The NEDS also includes quartile of national median household income for the patient's zip code, and expected payer (Medicaid, Medicare, self-pay, private insurance, no charge, other).
[8] Note that if someone arrived at an ED at a general hospital and was subsequently transferred to a psychiatric hospital, this would be recorded as a discharge from the original ED, and so would be captured in NEDS.

no diagnosis of a mood or anxiety disorder. Suicidal behaviors include suicidal ideation (SI), self-harm, and suicide attempts. Mental health conditions are conceptually distinct from suicidal behaviors, although some visits may involve both. In our data we find that 13% of visits for mental health disorders (823,576/6,151,039) also include suicidal behaviors, while 78% of visits for suicidal behaviors (823576/1,056,373) also include a mental health condition.

Mental health conditions due to intellectual disabilities are excluded from consideration.[9] Self-harm visits are limited to initial visits and do not include visits for subsequent encounters or sequelae of self-harm visits in order to avoid over-counting incidents. Further information about the exact codes used to define each category of diagnoses are given in Appendix B.

An important limitation of the NEDS is that visits with any mental health diagnoses are undercounted in the last quarter of 2015. There are two HCUP files for 2015, one for the first 3 quarters of the year and one for the last quarter. However, the file for the last quarter has about half the number of visits with a mental health diagnosis compared to either 2014 or 2016. Hence, we have chosen to use the visits recorded for the first 3 quarters and inflate them to a 12-month total using information about the proportion of all ED visits that occurred in the last quarter of 2014 and 2016. This means that in the figures, the 2015 data is based on incidents coded using ICD9 only and includes the actual data for the first three quarters and projected data for the last quarter.

Although we believe it is the best dataset available for our purpose, the NEDS data have several additional limitations. First, the only geographic information are indicators for four Census regions. In our graphical analyses, we utilize the NEDS discharge weights for each year to graph nationally representative (or regionally representative) estimates. Second, since they are

[9] In ICD9 these diagnoses correspond to codes 317-319. In ICD10 these diagnoses correspond to categories F70-79.

based on hospital claims data, they are missing household background information such as family income or labor supply. Third, counts in NEDS might have been affected by changes in whether people were willing to go to the ED during the pandemic.

We compare trends in NEDS visits for mental illness and suicidal behaviors to information about suicides by state, year, and five-year age groups (10-14, 15-19) from the Center for Disease Control's CDC Wonder Underlying Cause of Death Files. These data are derived from the National Vital Statistics Mortality data and provide counts of deaths. Population counts used for calculating rates come from the 2010 Census.

The analysis in this paper is primarily graphical, showing trends in mental illness and suicidal behaviors and allowing readers to judge for themselves whether turning points in these series coincided with any of the policy changes laid out in Figure 1. Some of the figures presented show rates per 100,000 teens 10 to 19, while others focus on growth rates by showing figures where the rate in 2006 is normalized to equal 1. This normalization makes it easier to compare trends in series that have very different baselines rates, such as suicides and ED visits for mental illness.

4. Trends in ED visits

a) ED visits for mental illness

Figure 2a shows trends in ED visits with any mental illness diagnosis between 2006 and 2021, the first and last years of the available NEDS data, for all diagnoses, and primary and secondary diagnoses. Figure 2b shows changes in the rates of overall, primary, and secondary mental health diagnoses over time.

Figure 2a shows that ED visits for 10-19-year-olds with any mental health diagnosis rose gradually between 2006 and 2013, jumped between 2013 and 2014, and then showed little trend until 2021. Secondary mental health diagnoses rise more quickly over the period as one might expect if there is more coding of secondary diagnoses over time--there is a 30% increase in primary diagnoses and a 44% increase in secondary diagnoses between 2006 and 2021. Figure 2b shows more clearly that there are many more secondary diagnoses of mental health disorders than primary diagnoses. Both the gradual increase in mental health diagnoses and the faster increase in secondary mental health diagnoses may have been influenced by the 2007 Medicare DRG rule that allowed higher reimbursements for cases complicated by a secondary diagnosis of mental illness.

Figure 3a shows that when mental health diagnoses are split into two groups, those with and without any diagnosis of anxiety and mood disorders, the two series diverge beginning in 2011. The gap between them grows after 2013 and especially after 2015. These patterns suggest that some of the increase in diagnoses of anxiety and mood disorders over this period reflects a relabeling of mental illnesses that would previously have received another diagnosis. The timing of these patterns suggests that additional screening for anxiety and depression after 2011, changes in mental health definitions with the DSM5, and changes following the introduction of ICD10 may all have played a role.

Figures 3b and 3c shows the same breakdown in trends in diagnoses for females and males. Among females, diagnoses of anxiety and depression began to rise more strongly in 2011, consistent with a stronger increase in screening for girls after 2011. There is further bifurcation between boys and girls after 2013, but for males, the greatest increase occurs after

2015. Figure 3d focuses only on diagnoses of anxiety and mood disorder for girls and boys and shows clearly that they tracked well before diverging between females and males after 2011.

Figures 3a, 3b, and 3c suggest that some of the largest breaks in trends occurred when the 10th International Classification of Diseases (ICD10) was adopted in October 2015. In particular, the figures suggest that this change was accompanied by a large increase in diagnoses for mood or anxiety disorders. Figure A1 shows that the number of diagnoses of anxiety increased especially strongly, converging with the number of mood disorders, and indicating a very large increase in diagnoses of anxiety.

b) ED visits for suicidal behaviors

Suicidal ideation, self-harm, and suicide attempts are often grouped together in analyses of trends in suicidal behaviors. In fact, two commonly used software packages for grouping diagnosis codes (the Clinical Classification Software and the Child and Adolescent Mental Health Disorders Classification System) combine them into one measure (Zima et al. 2020; Children's Hospital Association 2019). In their study of suicidal behaviors and social media, Leventhal et al. (2021) define suicidal behaviors as "suicidal thoughts, plans, or attempts." And in their analysis of Health Care Utilization Project data on ED visits for suicidal behaviors Owens et al. (2020) only report data on the combined measure.

One reason to group suicidal ideation with self-harm is that they are both predictive of future suicide attempts. However, as Figure 4a shows, there are huge level difference in the prevalence of these different behaviors. For example, in 2021, the suicide rate for teens 10 to 19 was 6.8 per 100,000, while the rate of ED visits for self-harm (including suicide attempts) was 394 per 100,000 and the rate of ED visits with suicidal ideation was 892 per 100,000. With

differences of these magnitudes, it is certainly possible for suicides and ED visits for suicidal ideation or self-harm to follow different trends.

Figure 4b shows that trends in suicidal ideation have also increasingly diverged from trends in ED visits for self-harm and from trends in suicides, especially after 2016: While suicides have risen 66%, ED visits with suicidal ideation have grown 459%.[10] Cutler, Gleaser, and Norbert (2001) argue that suicides may be driven by different factors than other forms of suicidal behavior, which provides an additional reason for distinguishing clearly between them.[11] Figure 4b also shows that trends in suicide and trends in ED visits for self-harm have shown very similar growth over time—by 77% compared to 66% for suicide deaths.

Figure 4c focuses on trends in ED visits with suicidal ideation by gender. It is striking that the time series evolve identically until 2011, when the rate of visits for suicidal ideation starts to increase more rapidly for girls. The WPSI recommendation to screen females over 12 for depression annually was made in 2011, so this trend break may reflect the fact that screeners for depression usually include questions about suicidal ideation (Patra and Kumar, 2022), or increasing attention to possible suicidal ideation when someone has previously been diagnosed with depression.

Figure 4d shows that gender differences in ED visits with diagnoses of self-harm also diverged sharply at this point. We do not necessarily think that clinicians began doing a lot more screening for depression in the ED. But in cases where someone mentioned that they had already been diagnosed with depression, clinicians might ask more questions about injuries with

[10] Corredor-Waldron and Currie (2023) show that in New Jersey, screening and coding changes were followed by large increases in the coding of SI. The results here show that this was a more general change, and not something specific to New Jersey.

[11] Cutler, Gleaser, and Norbert (2001) argue that most suicide attempts among youth are strategic actions intended to resolve conflicts. In keeping with this view, they also argue that family resources increase attempts but decrease completed suicides.

uncertain causes, leading to more diagnoses of self-harm. In summary, it is possible that some of the bifurcation by gender in rates of suicidal ideation and self-harm reflects greater scrutiny of girls relative to boys.

Figure 5 focuses on the distinction between injuries caused by self-harm, and those with undetermined cause. As discussed above, changes in the ICD10 made it more difficult to treat "undetermined" as a default category rather than an active coding choice. Figure 5 shows that after this change, and consistent with Stewart et al. (2016), the rates of undetermined intent injuries fell while the rates of injuries due to self-harm rose. The dashed line in Figure 5 shows a counterfactual projection based on the assumption that in the absence of the coding change, the fraction of self-harm plus undetermined cause injuries that were due to self-harm would have stayed constant at the 2015 share. This projection suggests that 24.2% of the rise in self-harm visits might have been due to reclassification of visits from undetermined cause.[12]

Figure 6 puts the data on trends in suicidal ideation, mood and anxiety disorders, and non-fatal injuries due to self-harm into context by comparing them to trends in suicide. Each subfigure shows the actual measured growth in one of the outcomes after 2006, and a counterfactual measure calculated by assuming that the ratio between the outcome and suicides in 2006 had remained constant over time. Panel A shows that the number of cases of suicidal ideation has risen greatly relative to the number of suicides. Compared to the actual 892 cases per 100,000, there would have been 265 cases had the relationship between suicidal ideation and suicide remained fixed over time. Panel B indicates that the growth of suicidal ideation far outpaced what would have been predicted by suicides alone, underscoring a widening divergence between the two trends.

[12] This number was calculated as (394-353)/(394-223). 394 and 223 are the observed numbers in 2021 and 2006, while 353 is the projected number for 2021.

Panel C shows that mood and anxiety disorders also increased substantially more than would be expected if their historical relationship to suicides had remained stable. Panels E and F, by contrast, demonstrate that ED visits for self-harm tracked suicides more closely, suggesting that these visits may provide a more reliable proxy for suicide risk.

Finally, Panels G and H show that when suicidal ideation, self-harm, and suicide attempts are combined, the observed increase is still much larger than would be projected based on trends in suicides alone, reinforcing the idea that increases in diagnoses of suicidal thoughts have driven the growing divergence between completed suicides and suicidal behaviors.

c) *Regional trends in ED visits and suicides*

The discussion to this point has focused on national trends. However, an important characteristic of youth suicide is that rates vary considerably across the four Census regions identified in the NEDS.[13] Figure 7a shows that at its peak in 2017, the youth suicide rate was around 4.5 per 100,000 in the Northeast but closer to 8.5 per 100,000 in the Midwest, which represents a large gap in lives lost. This section asks how trends in ED visits with mental health indications, with SI, and for self-harm and suicide attempts vary across regions.

Comparing Figure 7a with Figure 7b shows that while the Northeast has the lowest youth suicide rates, it has one of the highest rates of ED visits with any mental health diagnosis. Conversely, the West has high suicide rates, but low numbers of ED visits with mental health diagnoses. These observations are consistent with the idea that access to EDs could help to prevent suicides among people with mental health problems. However, the Midwest has both high rates of suicide and high rates of ED visits for people with mental health disorders

[13] It is important to note, however, that the NEDS does not sample every state, but relies on weights to make the data representative of each region.

suggesting that the discrepancy between suicide rates and ED visits for mental health is not so easy to explain.

Comparing Figure 7a with Figure 7c indicates that the four regions are more similar in terms of ED visits with SI than they are in terms of suicides. Moreover, the Northeast has a relatively high incidence of visits with SI and a low incidence of suicide, while the West shows the opposite pattern. Once again, the Midwest is relatively high on both measures.

The comparison of Figure 7a and 7d suggests that the relative ranking of regions in terms of ED visits for self-harm is more similar to the ranking of regions in terms of suicide, but the trends still show considerable discrepancies. For example, the suicide rate rose slowly over the decade in the Northeast, while ED visits for self-harm in the region were relatively flat until 2019, when they rose sharply.

One question about the regional differences noted above is whether they reflect urban-rural differences. Many of the highest suicide states, such as Montana, South Dakota, Wyoming, and Alaska, have large rural populations. Figures A2(e) and A2(f) split rural and urban areas and show that the trends in ED visits for mental health are actually quite similar between them. For instance, ED visits for mental health have grown by 38% over the period in urban areas compared to 33% in rural ones.

It is possible that trends in ED visits for self-harm and suicides are affected by contagion effects. Hawton et al. (2020) review a large literature on geographic suicide clusters, which are more common in young people than in adults. Important contagion effects might help to account for the persistence of high suicide rates in some locations, once established.

d) Figure 1 factors that have had less obvious influences on trends in ED visits

The evidence presented above suggests that new screening guidelines for females over 12, the adoption of the DSM-5, and the adoption of ICD10, all had significant effects on the reporting of mental health conditions and suicidal behaviors during ED visits. It is also worth discussing several factors listed in Figure 1 that had less discernible impacts on trends.

First, the WPSI recommendation to screen females over 12 for depression annually was preceded by a USPSTF 2009 recommendation that all adolescents be screened for major depressive disorder mental health disorders. There are several possible reasons why this earlier recommendation apparently got little traction, at least in terms of generating additional diagnoses. One is that the recommendation was vague as to timing. As written, it suggests that adolescents ought to be screened at some point but is not specific about when. The 2009 recommendation also suggested that adolescents be screened only when adequate follow-up was available, which may have discouraged take up. And unlike the 2011 recommendation, the 2009 recommendation did not coincide with a ruling that insurers had to pay for the screenings.

Second, the decade between 2007 and 2017 coincided with some of the largest expansions of health insurance coverage since the 1960s. The Mental Health Parity Act requiring insurers to treat mental health like other health conditions was passed in 2008. The Affordable Care Act of 2010 involved a large number of measures which became effective at different time points. In 2010, children were able to be covered under their parent's health plans up to age 26. In 2012, the ACA mandate requiring coverage of preventive services at no cost became effective. And 2014 saw Medicaid expansions in states that took them up, as well as the introduction of the health insurance exchanges for people ineligible for Medicaid, and the enforcement of the provision that essential health benefits (including mental health) be covered.

It may be surprising that these changes seem to have little impact on trends in the number of child ED visits. But it is important to remember that most children 10 to 19 were either covered by private health insurance, or eligible for public health insurance, given earlier Medicaid expansions that predated the Affordable Care Act. Kenney et al. (2016) show that increases in adult coverage increased the take up of health insurance by eligible children. But unenrolled, eligible children were likely to have been able to receive services in the ED prior to the ACA, because hospitals who served them could be reimbursed if children became enrolled after receiving the services.

Another surprising finding is that the COVID-19 pandemic did not have an obvious effect on measures of ED visits with mental health diagnoses, as shown in Figures 2a and 3a, 3b, and 3c. The pandemic impacted every aspect of children's lives and is thought to have had a large impact on children's mental health. Ng and Ng (2022) review more than 2000 articles on this theme and cite abundant evidence of increases in both internalizing (e.g. mood disorders) and externalizing (e.g. ADHD) behaviors among children during the pandemic. Yet ED visits with any mental health diagnosis fell during 2020 and 2021, while mood and anxiety disorders remained at their 2018 level. Figure 2b suggests that the decline during COVID was mostly in secondary diagnoses of mental health disorders, while primary diagnoses were flat.

There were, however, increases in ED visits for suicidal behaviors during the pandemic. Figure 4a shows a distinct rise in suicidal ideation, and a shallower increase in ED visits for self-harm/suicide attempts. Figure 4c shows that the increase in suicidal ideation was concentrated among girls, while Figure 4d shows that the increase in self-harm was exclusively among girls, while among boys there was a decline.

Consistent with previous research showing increases in youth suicide during the pandemic (Bridge et al., 2023), Figure 7 shows that there were increases in youth suicides between 2019 and 2021 in all four Census regions and in both urban and rural areas, suggesting that the pandemic increased suicides.

e) Other factors not shown in Figure 1 that may drive trends in ED visits

Declining mental health stigma is one factor that may have driven rising trends in ED visits for mental health and suicidal behaviors. Pescosolido et al. (2021) use data from three waves of the General Social Survey (1996, 2006, 2018), to argue that mental health stigma has fallen in the U.S. Over time, respondents have become more likely to endorse a genetic basis for depression, and less likely to want to distance themselves from a depressed person at work or socially. At the same time, attitudes towards mental health care, and knowledge about mental health conditions have improved (Angermeyer et al., 2017).

Since stigma leads to significant under-reporting of mental health conditions relative to other health conditions (Bharadwaj, Pai, and Suziedelyte, 2017), reductions in stigma might be expected to drive increases in the propensity to seek treatment, the propensity to answer honestly about pre-existing mental health conditions, and greater openness about suicidal behaviors. Improvements in treatment, such as the introduction of SSRIs (Selective Serotonin Reuptake Inhibitors) may also have caused people with mental health problems to be more likely to seek treatment (Conti, Busch, and Cutler, 2011). It is also possible that greater openness about mental illness combined with a higher probability of being in treatment at the time of a death could increase counts of suicides by making the intentions of the deceased clearer.[14]

[14] O'Carroll (1989) and Breiding and Wiersema (2006) point out that the deceased intentions are often unclear, especially in the case of drug overdoses.

These observations raise the possibility that ED visits with mental health diagnoses and suicidal behaviors could be rising in part because of declining stigma. However, because these changes are gradual, it is difficult to identify their effects.

A second factor that has been much discussed is social media. Much has been made of the relationship between youth social media use, mental health, and suicidal behaviors. In one of the more famous studies, Twenge and Campbell (2019) use data from the Youth Risk Behavioral Surveillance Study (YRBSS) and show that both youth with no social media time and those with high social media time report poorer mental health (more "hopelessness") than those with low but non-zero use of social media. Leventhal et al. (2021) look across waves of the same (repeated cross section) survey and find that only a small proportion of the self-reported increases in suicidal behaviors is associated with self-reported increases in social media use.

Some authors have concluded that the overall effects of social media use on mental health and suicidal behaviors are modest (Orben and Przybylski, 2019; Odgers and Jensen, 2020), which is consistent with the significant but modest findings from several randomized controlled trials of reduced social media use (Allcott et al. 2020; Mosquera et al. 2020; and Allcott, Gentzkow, and Song 2021).[15]

It is however difficult to test for the effects of social media on trends in ED visits, given how quickly social media has been changing over time and the lack of consistently collected data. It is however worth noting that U.S. states such as Alaska, Montana, Wyoming, and South Dakota that have the highest youth suicide rates tend to have lower social media use than many

[15] See also Braghieri et al. (2022) who study the effect of the staggered introduction of Facebook on over 700 college campuses between 2004 and 2005 and find modest effects.

low suicide states such as New York, New Jersey, and California. Moreover, the high-suicide-rate states have had the highest youth suicides rates since before the advent of social media. [16]

Access to firearms is a third factor that is likely to be a very important determinant of suicides, though not perhaps of mental health or non-lethal suicidal behaviors (Currie, 2025). Even among children 10 to 19, the most important means of suicide are firearms and suffocation (hanging), with all other means of suicide being much less frequent. Having ready access to lethal means could mean the difference between momentary despair and a completed suicide.

In the cross section, youth who use drugs or engage in other delinquent behavior are more likely to die by suicide (Cutler, Glaeser, and Norberg, 2001) and might also exhibit more mental health problems and/or suicidal behaviors. Still, it seems unlikely that these behaviors are driving aggregate trends in ED visits given general reductions in youth delinquency following a peak in 1999 (Rovner, 2023).

The alarming increase in opioid deaths, which have risen along with the increase in youth suicides, may be more important. Among teens themselves, trends in drug use remained stagnant and trends in total deaths from drug overdoses were flat until 2019, when they began to spike. But this spike appears to be due largely to the contamination of the drug supply with fentanyl (Friedman et al., 2021). At this point many teens have been impacted by losing friends or family members to the drug epidemic, so this could be a factor driving trends in ED visits for mental health and suicidal behaviors though again it is difficult to investigate given the lack of geographic data in the NEDS.

[16] By 2019-2021, Western states including Montana, South Dakota, and Alaska had suicide rates of 34.1, 37.2, and 41.3 per 100,000 15–19-year-old youths. In contrast, rates in Massachusetts, New Jersey, New York, and California were 4.8, 5.2, 5.4 and 6.5 per 100,000 15–19-year-old youths. Cutler, Glaeser, and Norberg (2001) point out that some of these same high suicide states also experienced the largest increases in youth suicides between 1950 and 1990.

e) Summary

It is sensible to try to understand youth suicide by looking at trends in ED visits with mental health indications, suicidal ideation, self-harm or suicide attempts. All these measures have been shown to be predictive of suicide. However, trends in these measures do not follow trends in youth suicides. One reason is that trends in ED visits have been affected by significant changes in screening, diagnosing, and coding of mental health conditions over the past 10 years. The data also show increase in ED visits for suicidal behaviors during the COVID pandemic, though not in ED visits with mental health diagnoses more generally.

Many other factors could have influenced trends in ED visits including changes in the stigma associated with mental health, increases in insurance coverage for mental health disorders, the increasing scourge of school shootings (Rossin-Slater et al., 2020) and the ongoing opioid epidemic (Powell, 2023), though it is difficult to correlate these factors with ED visits using existing data.

5. Alternative Sources of youth mental health data

a) Survey Data

This section discusses data from several surveys with information about youth mental health over time. While the measures are not exactly comparable, we looked for concepts corresponding to whether a youth had any mental health diagnosis, any mood or anxiety disorder, any other mental health diagnosis but not mood or anxiety, or a measure of self-harming behavior. Graphs of these constructs are shown in the Appendix C for males and females and for all youth 10-19 (unless another age group is noted).

The Youth Risk Behavioral Surveillance Surveys (YRBSS) seem well-suited to looking at trends in child mental health over time. The YRBSS-Highschool is set of surveys of high schoolers that have been conducted biannually since 1999. It is the largest source of health surveillance data about highschoolers. In addition to the national YRBS, most states (45 in 2021) administer their own YRBS surveys. The survey is conducted in schools, usually in the spring. Students are asked about suicidal ideation, whether they have made a plan to commit suicide, and suicide attempts. The survey also asks about whether there was a time in the past 12 months when the student felt so sad or hopeless that they stopped some of their usual activities. This measure of hopelessness (sometimes referred to as "despair") has been widely reported and used in research (see for example, Twenge and Campbell, 2019).

A great advantage of the YRBSS is that these questions have been asked in the same way since the 1990s. Figures C4 and C5 plot responses over time. All series show a sharp rise after 2017, peaking in 2021 and moderating in 2023. Thus, while they are consistent with a worsening of mental health during the pandemic, they suggest that the rise started earlier. The answers suggest that about 10% of youth have attempted suicide, which is 17 times higher than the rate of ED visits for self-harm reported to the CDC's Web-Based Injury Statistics Query and Reporting System (WISQARS),[17] leaving it unclear how to interpret these self-reported data.

The most striking thing about the YRBSS may be that at least 30% of the high schoolers surveyed have reported feeling hopeless for two weeks or more since the question was first asked in the late 1990s, suggesting that the child mental health crisis has existed for decades and is not a recent phenomenon, though it increased between 2017 and 2021. At its peak in 2021, the

[17] In 2022, there were 593 ED visits for self-harm per 100,000 youth aged 15–19 in WISQARS. Data about trends in responses to YRBSS questions on suicide are available in the CDC (2024).

YRBSS hopelessness measure had increased by 50% since 2005, moderating to a 40% increase by 2023. This increase can be compared to Figure 3a above which suggests that visits for any mental health condition increased by 37% between 2006 and 2021 in the NEDS, and that visits for mood or anxiety disorders increased by 103%.

The National Survey of Drug Use and Health (NSDUH) includes questions from the Composite International Diagnostic Interview (CIDI) which incorporates diagnostic screeners for depression, anxiety, and substance abuse. However, the NSDUH was completely redesigned in 2002, 2015, and 2020 which makes it problematic to use it for studying trends in child mental health over time. Figure C6 shows that measured trends moderated after the 2015 redesign, and then spiked after the 2020 redesign, which unfortunately coincided with the pandemic. Leaving these issues aside, the figure suggests a 100% increase in major depressive episodes by 2023. Marcotte and Hansen (2024) use these data and argue that this increase in depression is large enough to explain most of the increase in youth suicide since 2000, but since NSDUH has no questions about self-harm, it makes it difficult to make that connection directly.

The Medical Expenditure Panel Survey (MEPS) asks about the cost and use of health care for different conditions. A serious limitation of the MEPS is that from 2008-2017, expenditures and conditions were reported if they were current or resulted in the use of care. After 2018, only conditions that resulted in use of care were included, resulting in a decline in some conditions, including mental health conditions after 2017 which is likely due to the redesign (see Figures C7, C8, and C9). The survey was also redesigned in 2008.

Two surveys ask parents about their child's mental health. The National Survey of Children's Health (NSCH) questions parents about the mental health of their 0-17-year-old children, but was substantially redesigned in 2016, and estimates after 2016 cannot be directly

compared to those before (Bitsko et al., 2022). Figures C10 and C11 show rates of depression and anxiety from 2016 to 2023, which suggest a rise over this time period, with a rise during the pandemic which spiked in 2022.

The National Health Interview Survey (NHIS) asks parents questions from the Strengths and Difficulties Questionnaire which have been shown to be correlated with measures of child mental health. But we found that the answers to questions such as whether the child is "often unhappy, depressed, or fearful" produce flat or declining rates (Figure C12) though the number reporting that their child saw a mental health professional was increasing over time (Figure C13).

The limitations of the available survey data make it quite difficult to ascertain trends in child mental health from these sources, particularly given many survey redesigns. And aside from the NEDS and the YRBSS it is difficult to compare trends in mental illness to trends in suicidal behaviors. On balance, the data do suggest a deterioration in youth mental health over time, with a peak in mental health problems during the pandemic.

b) Utilization of care

The second broad source of information about child mental health is from health care utilization data. ED visits are one particularly salient type of utilization data, but are there other types which might be useful? There is unfortunately no one source of information about children's outpatient visits in the United States. Data about prescriptions of psychiatric medications are available nationally from companies such as IQVIA, but such data, which comes from retail and mail-order pharmacies, typically has little information about the patient other than age, sex, and residential zip code. Hence, while one can look at the numbers of prescriptions of drugs like SSRIs, it is not possible to know what they were prescribed for. An

attractive feature of the ED data is that they are available nationally and have detailed information about diagnoses and procedures.

An important problem with focusing on utilization as a measure of underlying mental health status is that the utilization of health care is known to be sensitive to financial cost and other barriers to obtaining care such as distance from providers or incentives built into doctor compensation systems.[18] This issue applies to all forms of health care utilization data, including ED visits, though it is possible that outpatient care is more sensitive to these factors than emergency visits. It is also unknown how the choice between EDs and other modes of care (such as treatment by a pediatrician or therapist) has evolved over time. For example, it may be the case that increasing demand for mental health services has made it difficult for many people to find outpatient care, driving them into EDs. Alternatively, to the extent that other sources of care such as psychiatric nurse practitioners have become increasingly available, the share of people with mental health conditions who go to the ED might have fallen over time.

What we do know is that there is huge variation across geographies in metrics such as the fraction of children with a new mental health diagnosis who obtain follow up care within three months, or in the fractions of children who are being prescribed psychiatric medications (Currie and Cuddy, 2020), and these differences matter in terms of mental health outcomes including visits to the ED (Cuddy and Currie, 2026). Some of these variations are driven by the availability of different types of mental health professionals and by differences in provider practice style (Swagel, 2024). But they could also be driven in part by patient preferences and by other factors such as school policies toward children with mental illness. These caveats must

[18] The idea that health care utilization responds to costs is one of the oldest in health economics but see Newhouse et al. (1993) for foundational work on the RAND Health Insurance Experiment.

be kept in mind when interpreting variations across geographies or over time as changes in underlying mental health needs.

c) International comparisons

International comparisons are a third possible source of data about the mental health of U.S. youth. Using data from the World Health Organizations mortality database, Bertuccio et al. (2024) show that U.S. youth suicide rates are higher than a 27-country average of European Union rates, and that they are moving in the opposite directions. That is, while European rates are low and falling, U.S. rates are high and rising.

Given this fact, the available comparative data about underlying youth mental health are puzzling because they suggest that rates of mental distress among U.S. youth are high, but no higher than in European countries. For example, the Health Resources and Services Administration (2020) estimated that 13% of U.S. youth had a current mental health diagnosis, which compares well to UNICEF's (2021) estimate that 13% of children worldwide have a mental health condition.

Looking at more granular measures, Sivertsen et al. (2023) find that among Norwegian university students 40% of women and 26% of men were found to have a disorder and that 17% of women and 11% of men report depression in the past 30 days. By way of comparison, about 12% of U.S. adults are taking antidepressants at any given point in time. Blanchflower (2025) compares the U.S. and the U.K. using a survey response that indicates that the respondent had poor mental health in each of the last 30 days. Roughly 7-8% of 18-year-old Americans report this level of poor mental health compared to roughly 14% of young Britons, suggesting that young Americans are in better mental health.

If the mental health of young Americans is similar to that of young people in other countries, then why do they kill themselves at such high rates? We think this may be the most important question raised by our research. One possibility is that treatment is more adequate in Europe. Another is that features of American culture, such as the wide availability of guns, make the same level of mental illness more deadly in the United States. The disconnect between rates of underlying mental illness and rates of suicide deserves further research.

Discussion and Conclusions

Understanding the trends in child mental health, especially as it relates to suicide risk, is an issue of pressing national importance. Yet the data available for studying these trends are flawed in many ways. We have focused on how the measurement of ED visits for mental health and suicidal behaviors may have been affected by increased screening for mental illness, changing definitions of mental illness, and changes in coding conventions as well as reductions in stigma over time that may be causing people to be more open about seeking mental health care. We have also emphasized that there are also few sources of survey data that have asked questions about mental health and/or self-harm in a way that is consistent over time.

So, what can trends in emergency department visits tell us about child mental health? We have shown that some types of ED visits have been more impacted by changes in measurement than others. For example, focusing on anxiety and mood disorders alone would suggest that the prevalence of such disorders has doubled, whereas the overall number of ED visits with a mental health condition rose by 37%, and the number with a primary diagnosis of a mental health condition grew by 30%. We suggest that given all the changes and reclassifications in types of

diagnoses, the total number of ED visits with any mental health diagnosis is likely to be a more reliable indicator of underlying trends in youth mental health.

Turning to suicidal behaviors, the analysis suggests that it is likely to be misleading to focus on trends in measures of suicidal ideation, which increased by 459%, an increase that may be driven largely by changes in reporting. It is also misleading to include suicidal ideation in overall measures of suicidal behaviors—if they are included, they drive an increase in suicidal behaviors of 228%, which is much greater than the increase in suicides of 66%.

ED visits for self-harm appear to have been less affected by changes in measurement over time, though Figure 5 suggested that approximately 24.2% of the increase in self-harm between 2006 and 2021 was likely to have been due to a reduction in the diagnosis of injuries with "undetermined" causes. Reducing the measured 77% increase in self-harm by 24.2% would result in an estimated "true" increase of 58.3% in self-harm.

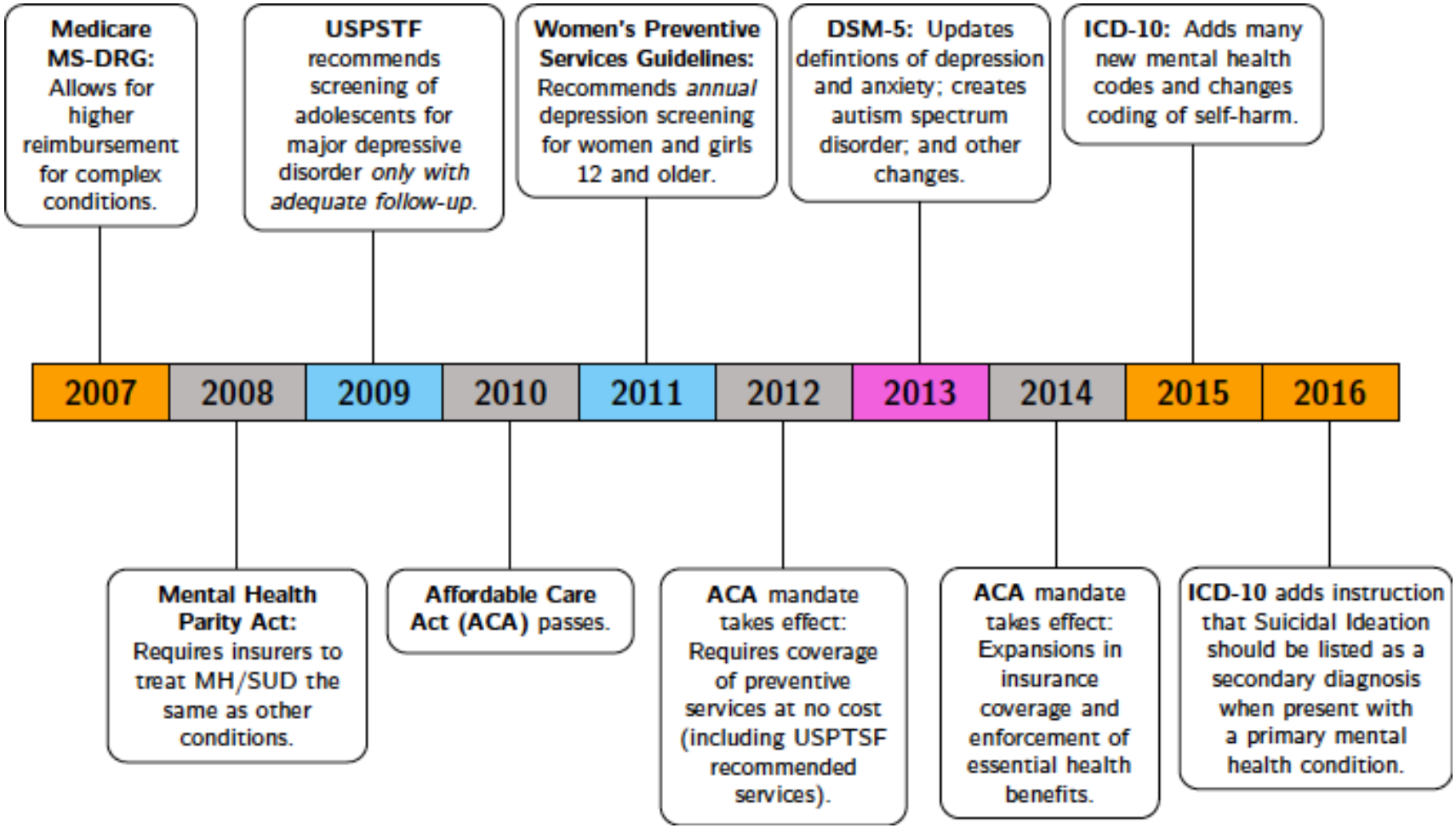
Another striking finding is that mental health visits, ED visits for self-harm, and suicides among 10-19-year-olds, peaked in 2017 or 2018 and started to come down prior to the pandemic, when both ED visits for self-harm and suicides rose. While 2021 is the last available year of the NEDS, youth suicides declined between 2021 and 2022 and declined again slightly in 2023 suggesting some improvements from the pandemic-era highs.[19]

These comparisons suggest that what we can learn from these ED data is that child mental health has been deteriorating over time, but not by the alarming magnitudes suggested by a 228% increase in measured suicidal behaviors between 2006 and 2021. The truth is likely to be closer to the 30% increase in ED visits with a primary mental health diagnosis, our calculation of a "true" 58.3% increase in ED visits for self-harm, or the actual 66% increase in suicides in

[19] See publicly available data on CDC Wonder.

this age group. Any youth suicide is a tragedy and even if rates had been declining, they are still high relative to rates in other rich countries. Having an accurate picture of the magnitude of the problem and how it has been changing over time is perhaps a small first step in finding a solution.

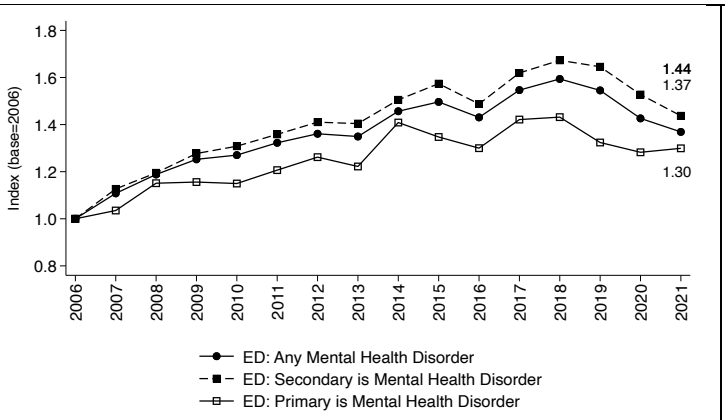
Figure 1: Regulatory factors influencing ED mental health diagnoses.



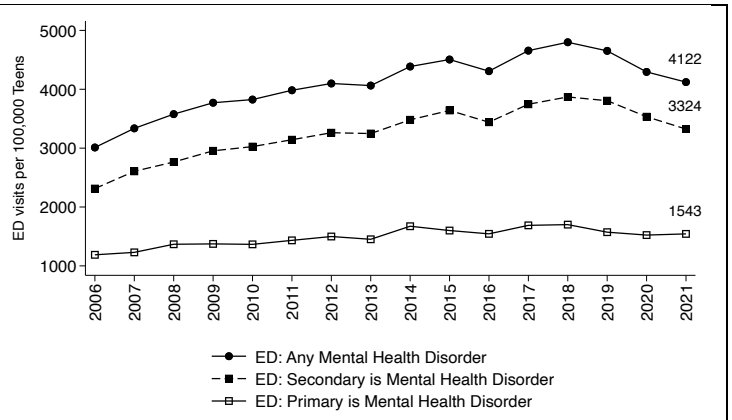
Notes: Color code indicates changes in screening guidelines, coding rules, diagnostic standards, and insurance coverage.

Figure 2: ED visits involving primary and secondary mental health diagnoses.

a. Growth



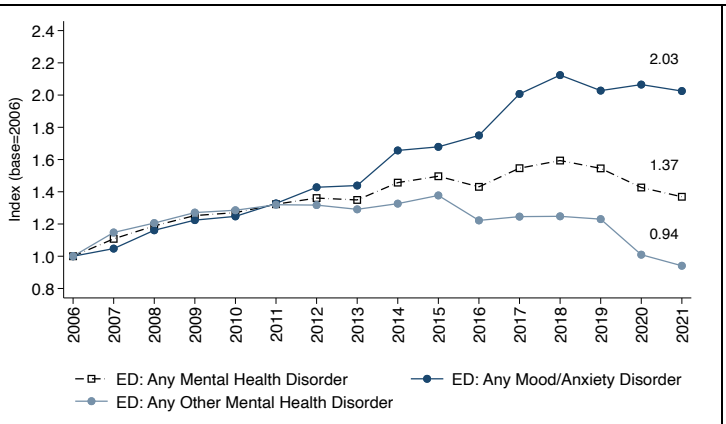
b. Rate



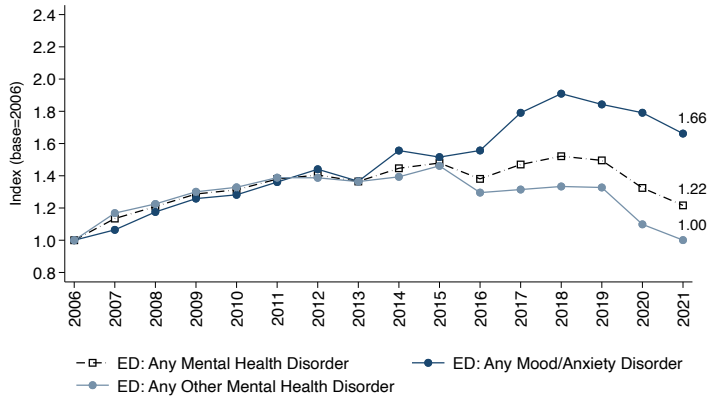
Notes: This figure presents the growth and rate of emergency department (ED) visits with a primary or secondary mental health diagnosis. Panel (a) shows the growth of primary, secondary, and any mental health diagnoses relative to their 2006 levels. Panel (b) displays the rate per 100,000 teens for ED visits with a primary, and secondary, and any mental health diagnosis. "Any" indicates that a mental health diagnosis was recorded either as the primary or as a secondary diagnosis for the visit. We use data from the Nationwide Emergency Department Sample (NEDS) and population counts from the 2010 U.S. Census.

Figure 3: ED visits involving mental health disorders by gender and type of diagnosis

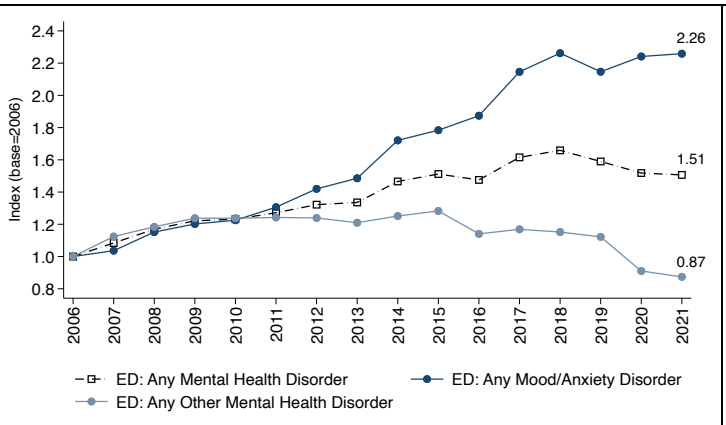
a. All



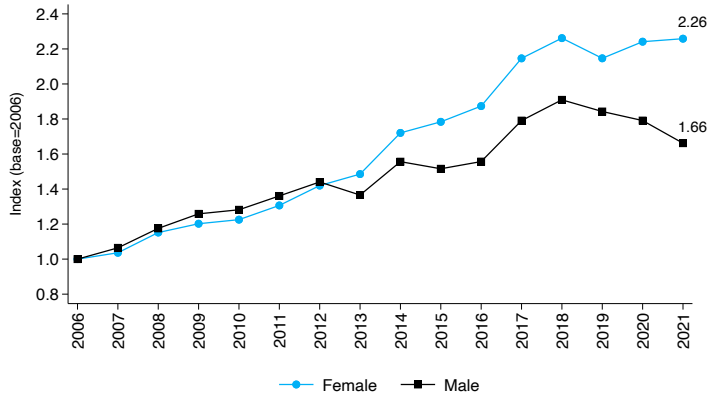
b. Males



c. Females



d. All – Mood/Anxiety disorder by sex

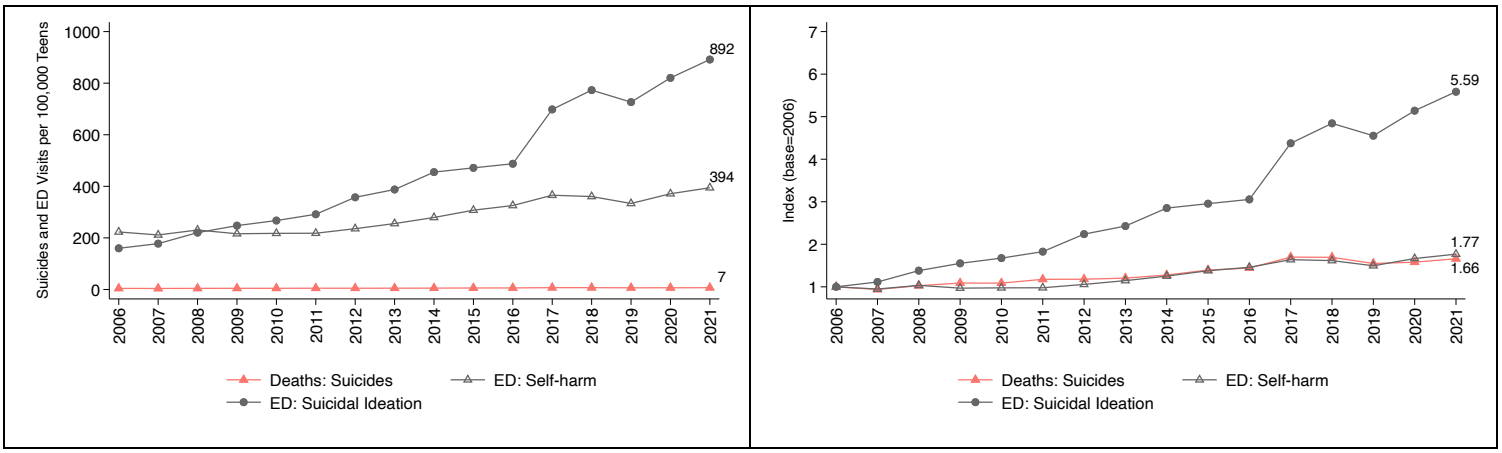


Notes: This figure presents the growth of ED visits involving mental health disorders relative to 2006 levels. All panels plot visits in which the diagnosis was recorded as either the primary or secondary diagnosis ("any"). The four panels represent different demographic breakdowns: panel (a) for all teens combined, panel (b) for males, panel (c) females, and panel (d) focuses on ED visits related to mood and anxiety disorders, further distinguished by sex. We use the Nationwide Emergency Department Sample (NEDS) and discharge weights to compute aggregates.

Figure 4: Prevalence and growth of suicidal behaviors

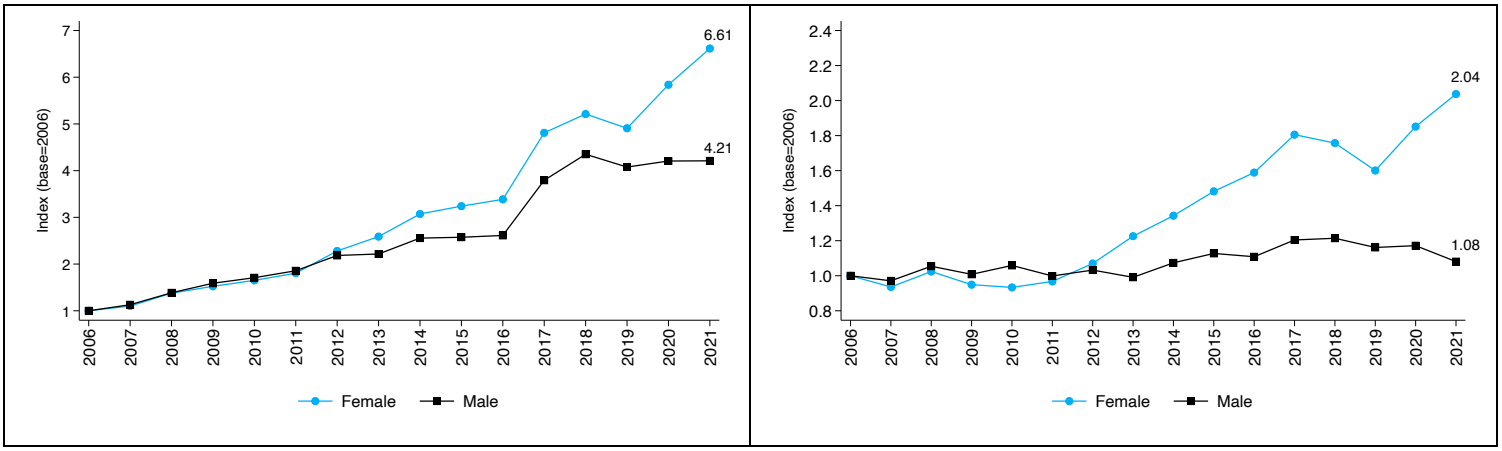
a. Prevalence of suicidal behaviors

b. Growth of suicidal behaviors



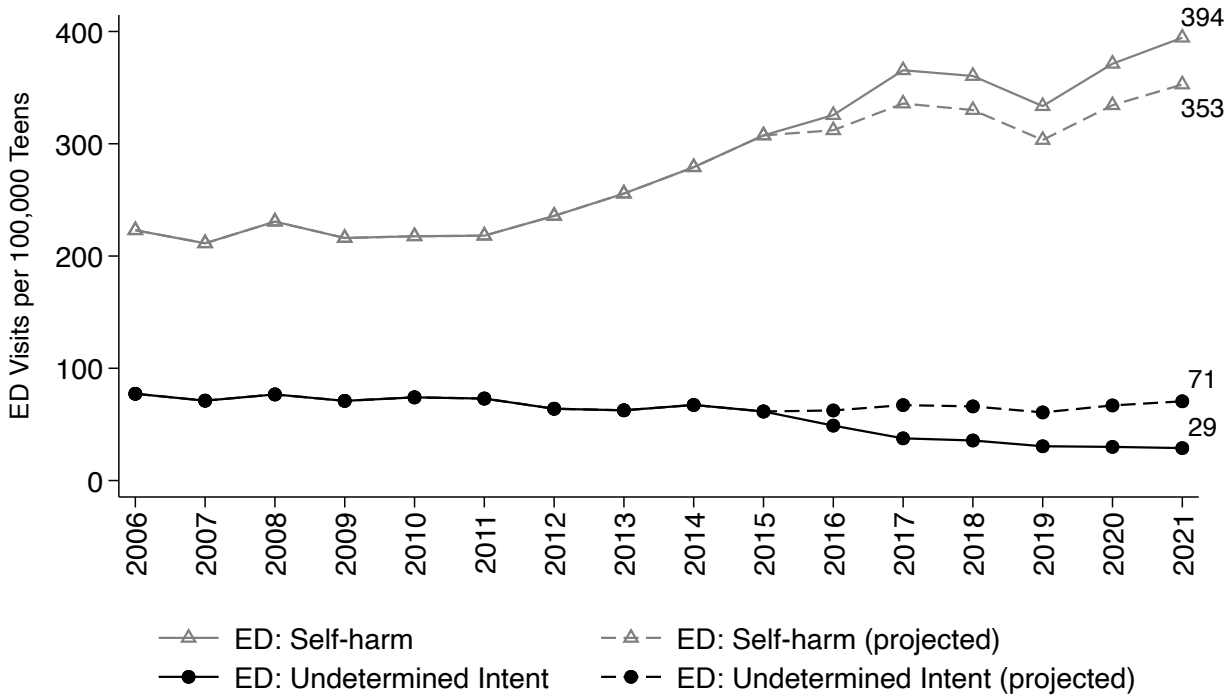
c. ED visits involving suicidal ideation by sex

d. ED visits involving self-harm by sex



Notes: This figure presents trends in suicidal behaviors using data from the CDC WONDER Multiple Cause of Death database and the Nationwide Emergency Department Sample (NEDS). All ED visits shown refer to visits in which the diagnosis was recorded as either the primary or secondary diagnosis ("any"). Panel (a) reports the prevalence of suicidal behaviors, measured as deaths by suicide, ED visits for self-harm, and ED visits for suicidal ideation, using population counts from the 2010 U.S. Census. Panel (b) shows the growth of these behaviors relative to their 2006 levels. Panels (c) and (d) display ED visits involving suicidal ideation or self-harm, further disaggregated by sex.

Figure 5: ED visits involving undetermined intent injury or self-harm

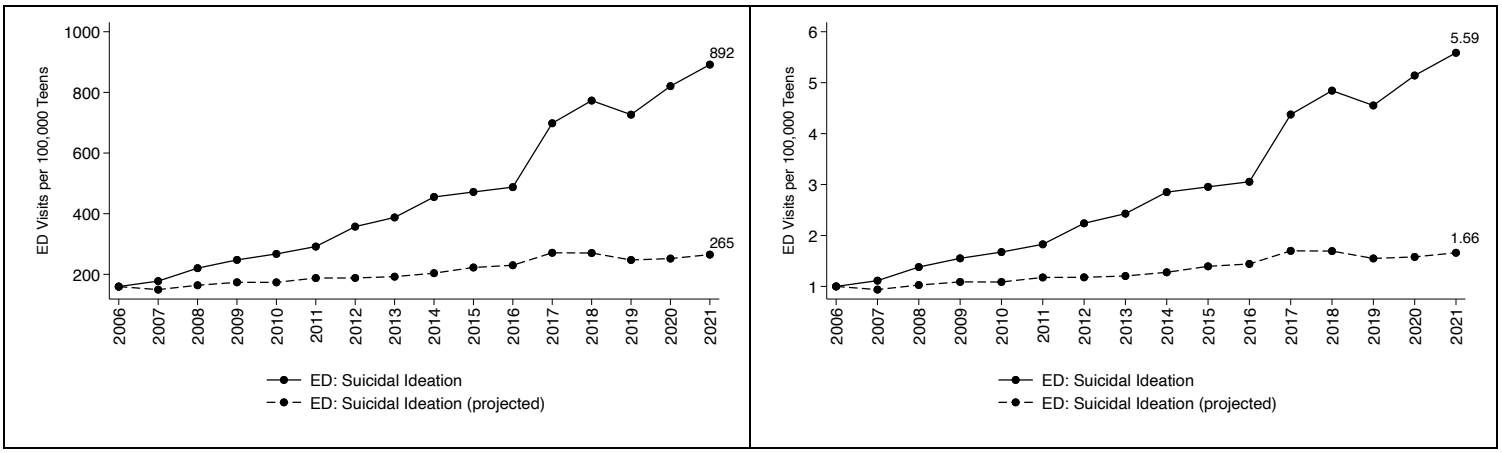


Notes: This figure presents rates of ED visits for events of undetermined intent and self-harm, using data from the Nationwide Emergency Department Sample (NEDS) and population counts from the 2010 U.S. Census. All ED visits shown refer to cases in which the relevant diagnosis was recorded as either the primary or secondary diagnosis ("any"). In addition to the observed rates, we present two projection trends: (1) self-harm visits adjusted by holding constant, at the 2015 level, the share of combined self-harm and undetermined intent injuries that were attributed to self-harm, and (2) undetermined intent visits adjusted by holding constant, at the 2015 level, the share of combined self-harm and undetermined intent injuries that were attributed to undetermined intent.

Figure 6: Observed versus projected trends in ED visits for self-harm, suicidal ideation, and mental health disorders

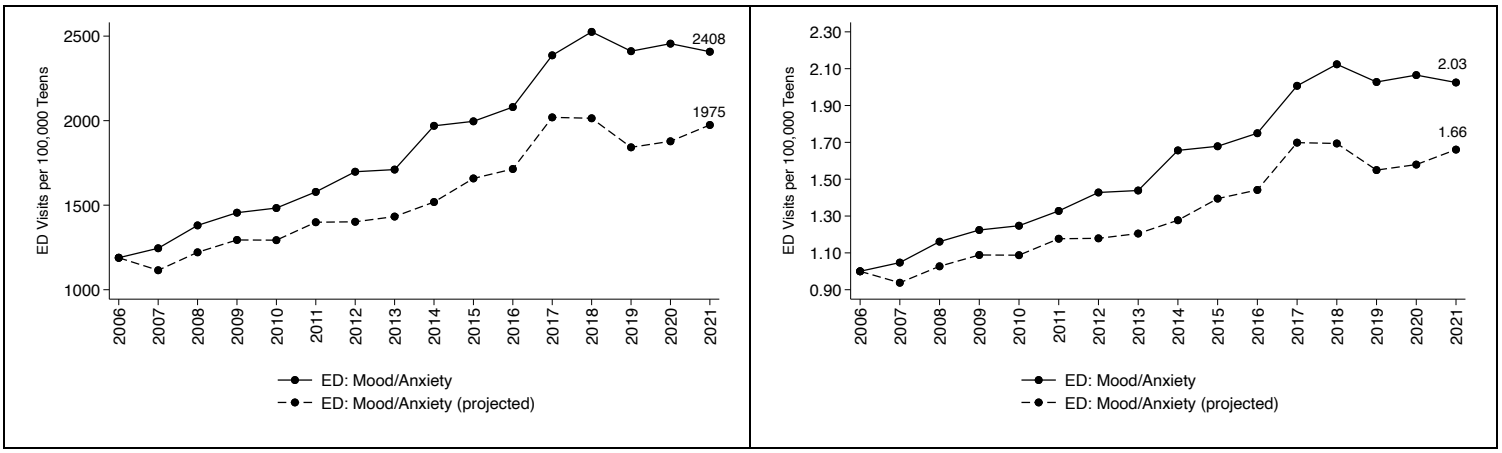
a. Prevalence of suicidal ideation

b. Growth of suicidal ideation



c. Prevalence of mood and anxiety disorders

d. Growth of mood and anxiety disorders



g. Prevalence of self-harm

f. Growth of self-harm

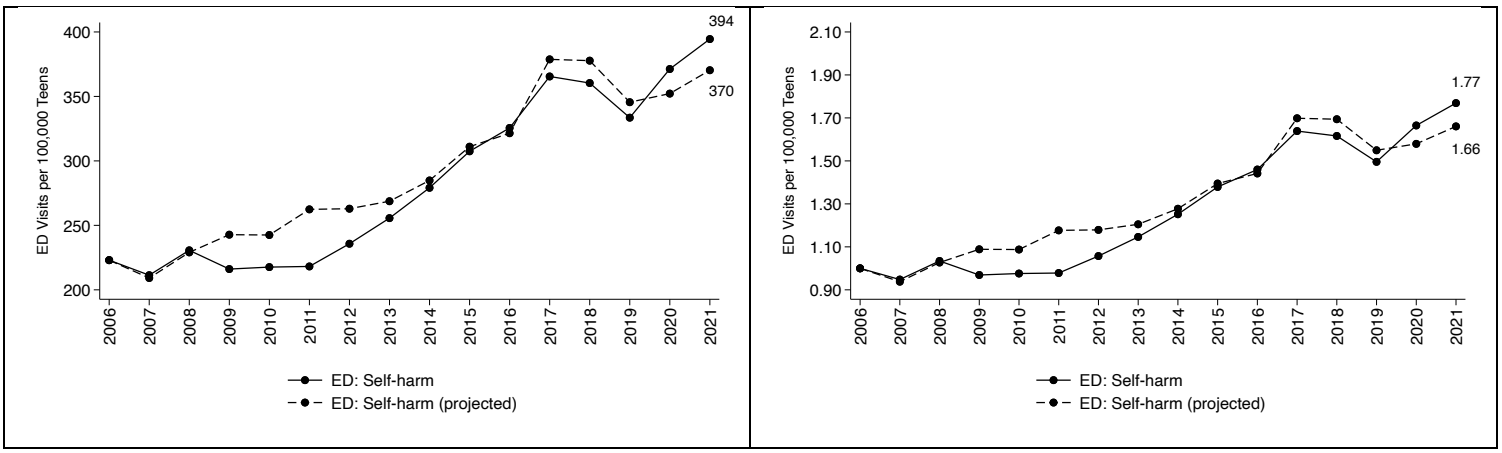
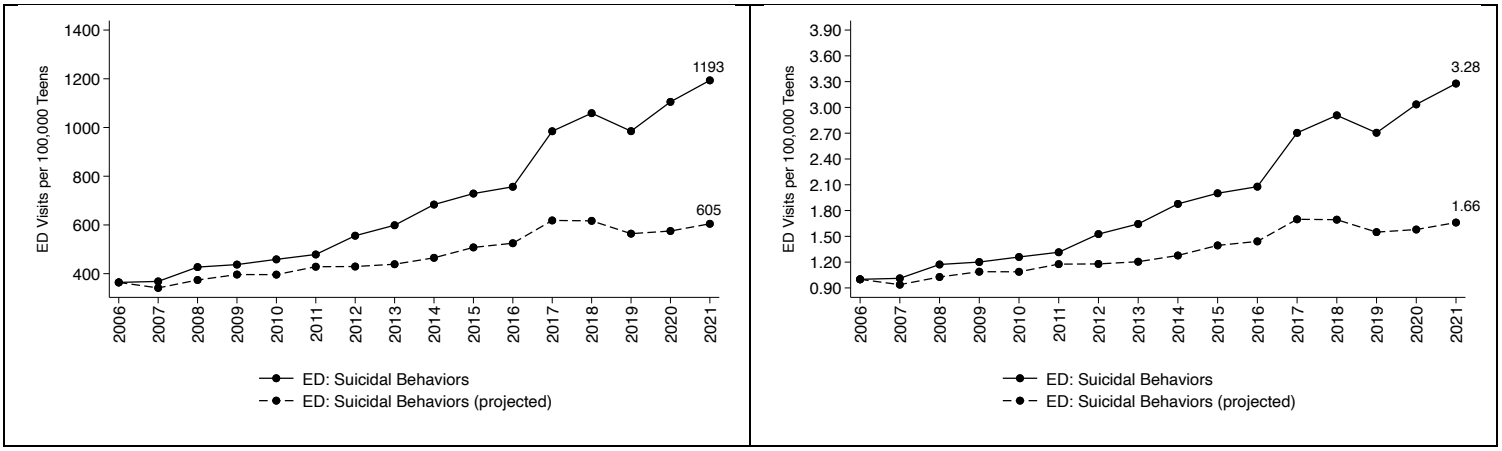


Figure 6 continued

g. Prevalence of all three suicidal behaviors

h. Growth of all three suicidal behaviors

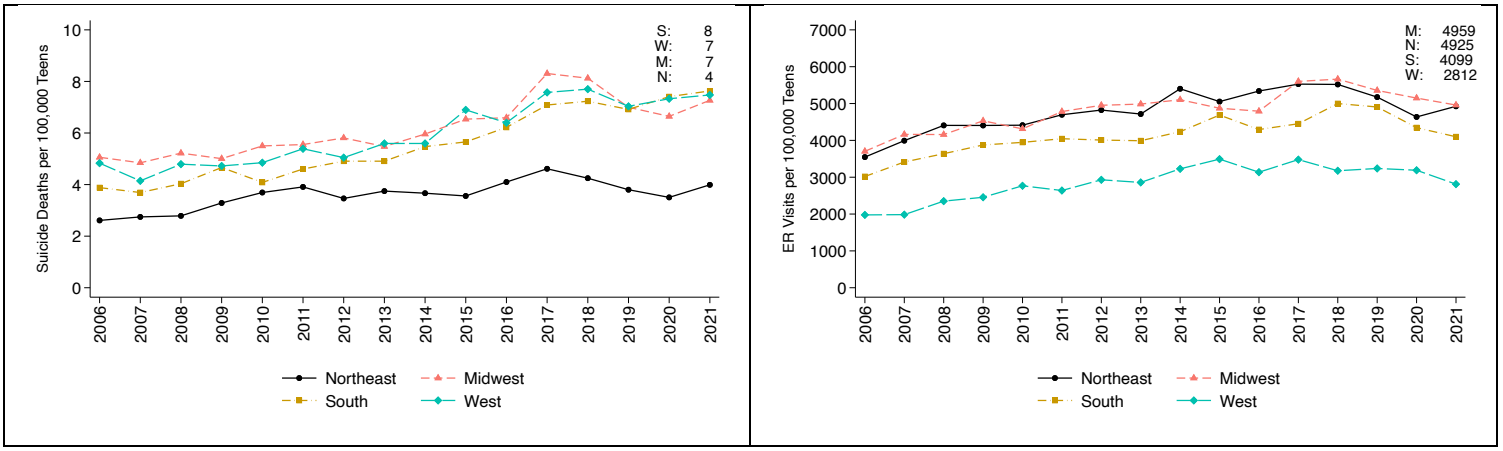


Notes: This figure presents eight panels. Panels (a), (c), (e), and (g) show rates per 100,000 teens, while panels (b), (d), (f), and (h) display the growth of the trends shown in the corresponding left-hand panel. Each panel presents the observed rate of ED visits alongside a projected trend. Projected trends were generated by taking the 2006 ratio of ED visits in each category (Panel a: suicidal ideation; Panel c: mood or anxiety disorder; Panel e: self-harm, and Panel g: combined count of self-harm and suicidal ideation – suicidal behaviors) to the number of suicides, and then applying this ratio to the total number of suicides over time, assuming that this share remained constant. All ED visits refer to cases in which the relevant diagnosis was recorded as either the primary or secondary diagnosis ("any").

Figure 7: Deaths by suicide and ED visits involving mental health disorders or suicidal behaviors by region

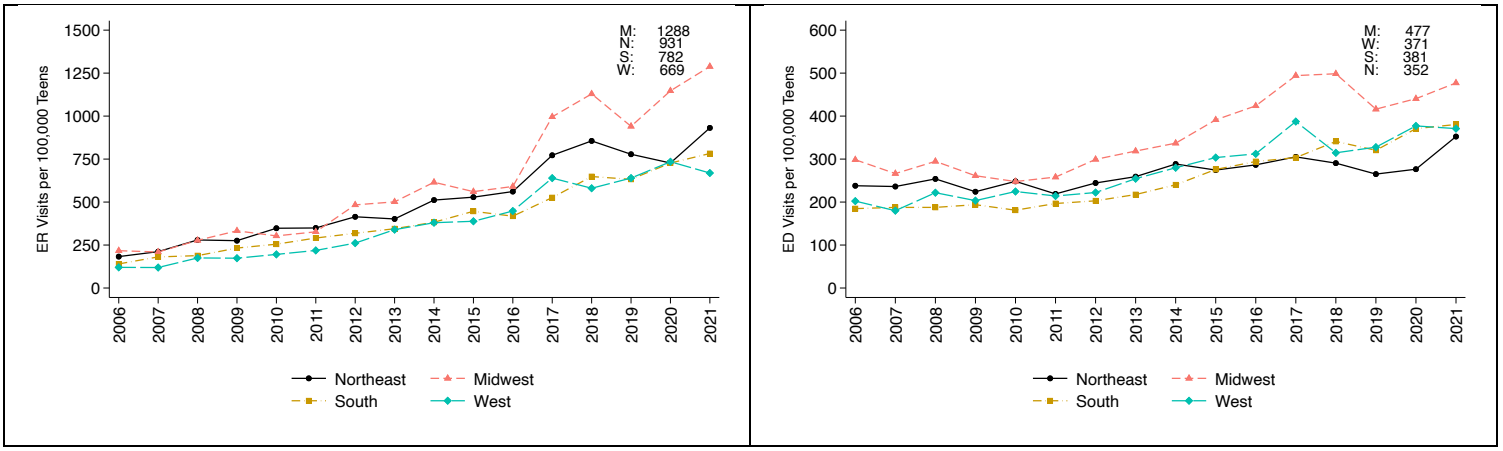
a. Deaths by suicide

b. ED visits involving at least one mental health disorder



c. ED visits involving suicidal ideation

d. ED visits involving self-harm



Notes: This figure presents trends in suicide rates, emergency department (ED) visits with a mental health disorder code, ED visits with a suicidal ideation code, and ED visits with a self-harm code across the four U.S. regions: Northeast, Midwest, South, and West. All ED visit rates refer to cases in which the relevant diagnosis was recorded as either the primary or secondary diagnosis ("any"). Rates were calculated using data from the Nationwide Emergency Department Sample (NEDS) and population counts from the 2010 U.S. Census.

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Appendix For Online Publication

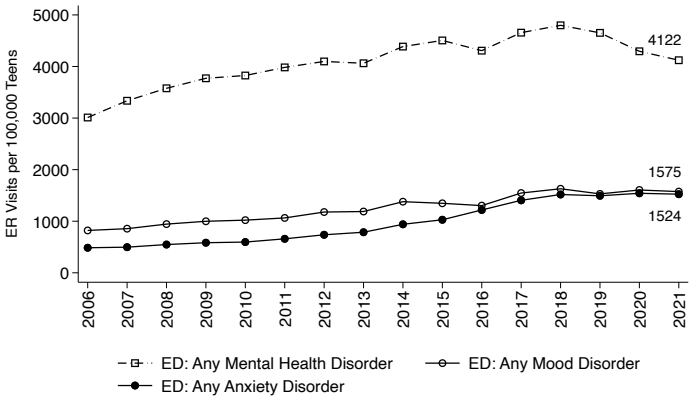
What Can Trends in Emergency Department Visits Tell Us About Child Mental Health?

Choi, Corredor-Waldron, Currie, and Felton (2025)

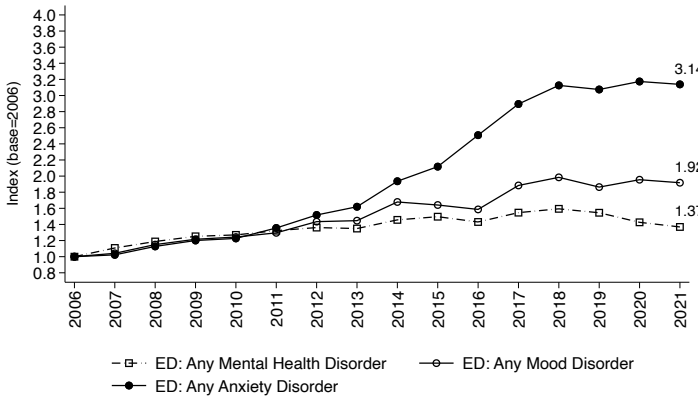
A: NEDS-Based Supplementary Figures

Figure A1: ED visits involving any mental health disorder, mood, or anxiety.

a. Rates



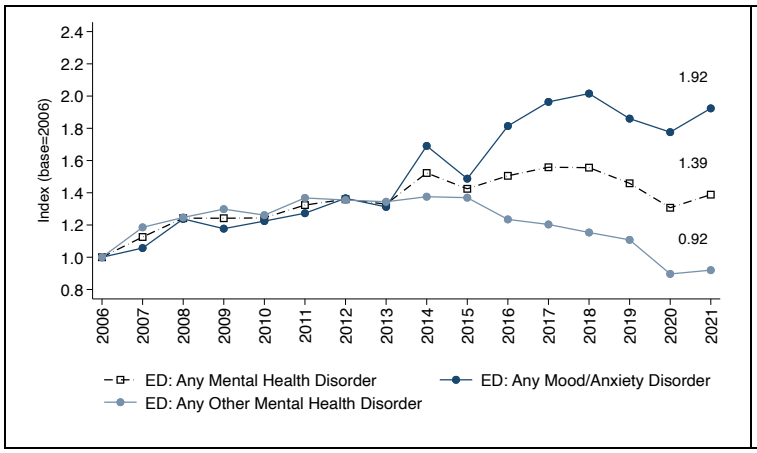
b. Growth



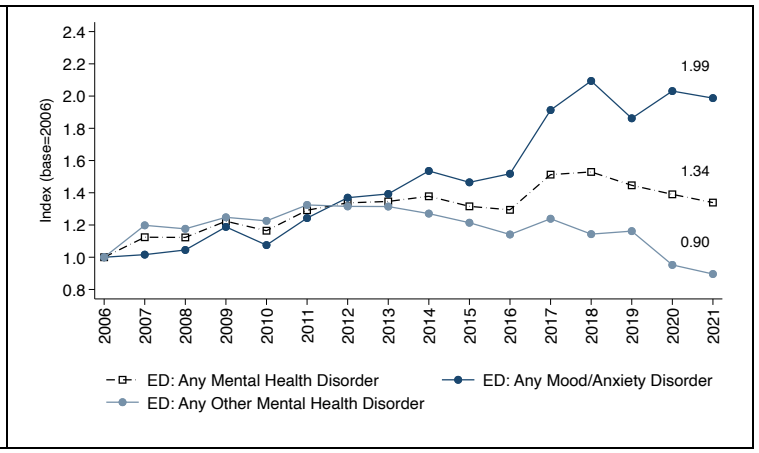
Notes: This figure presents trends in emergency department (ED) visits related to mental health diagnoses. All ED visit rates refer to cases in which the relevant diagnosis was recorded as either the primary or secondary diagnosis ("any"). Panel (a) displays the rate per 100,000 teens for shows the change relative to 2006 for ED visits with a mental health diagnosis, mood disorder, and anxiety disorder. Panel (b) shows the change relative to 2006 for displays the rate per 100,000 teens for these same categories and using NEDS discharge weights.

Figure A2: Growth of ED visits involving mental health disorders by region and urban-rural

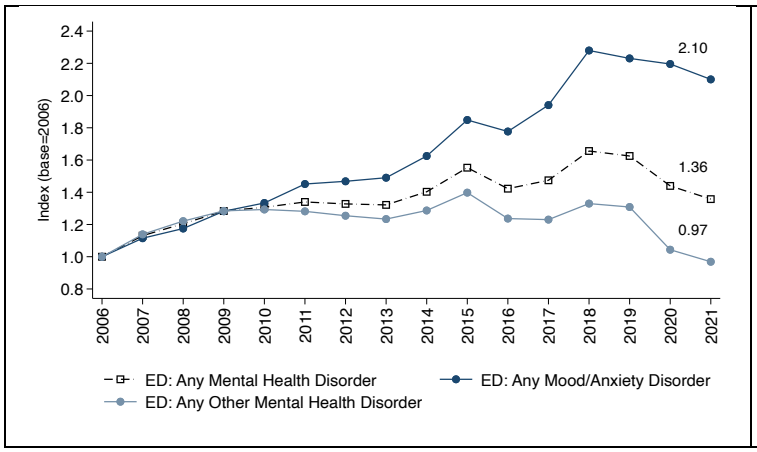
a. Northeast



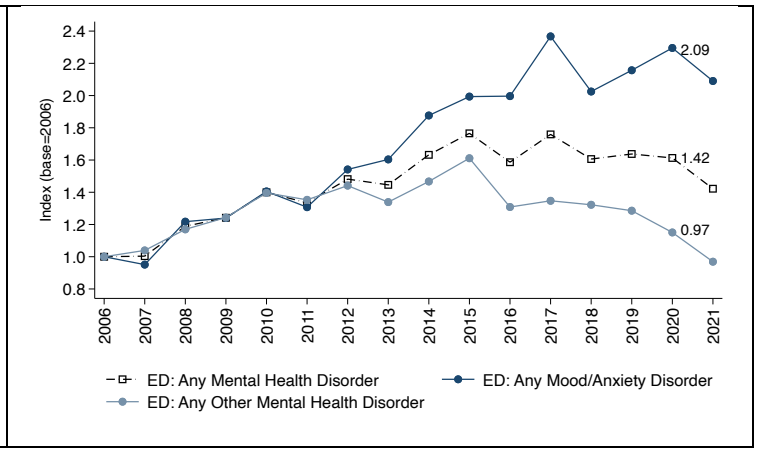
b. Midwest



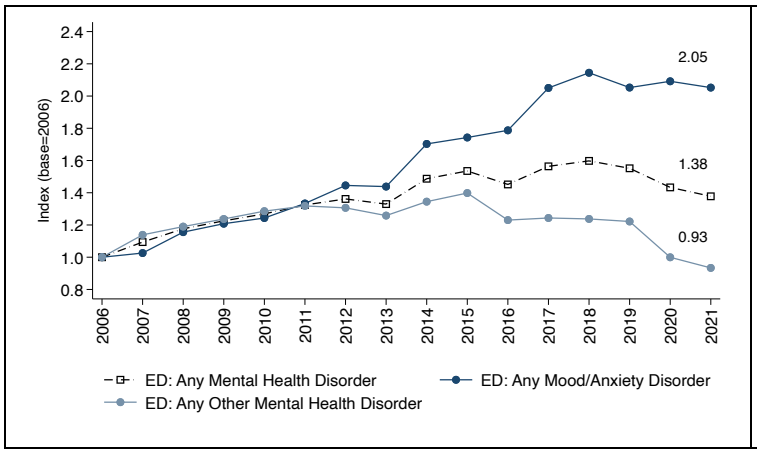
c. South



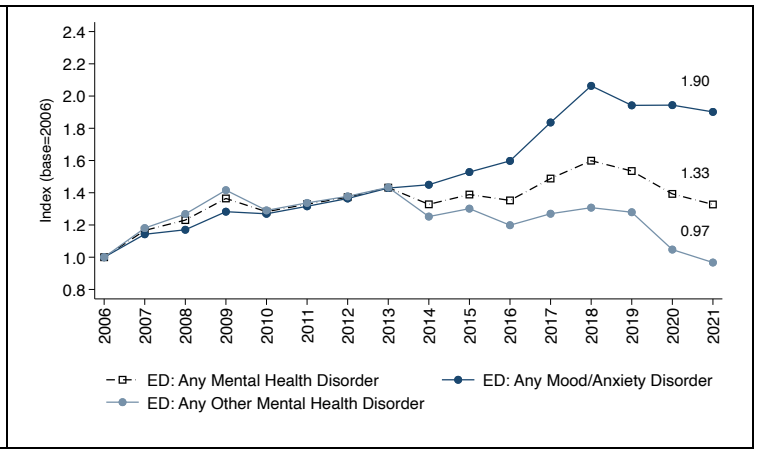
d. West



e. Urban



f. Rural



Note: This figure presents the change in emergency department (ED) visits for mental health disorders, including mood and anxiety disorders and other mental health disorders, stratified by U.S. region and

urban/rural status and using NEDS discharge weights. All ED visit rates refer to cases in which the relevant diagnosis was recorded as either the primary or secondary diagnosis (“any”).

B: Supplementary Tables

Table B1: Clinical Guidelines and Government Regulation Related to Children's Mental Health

Effective	Expert Medical Body	Government Agency	Recommendation	Law	Source
2007		Centers for Medicare and Medicaid (CMS)		Creates the MS-DRG to allow for higher reimbursement for complex conditions	https://www.govinfo.gov/content/pkg/FR-2007-08-22/pdf/07-3820.pdf
2008		Federal government		The Mental Health Parity Act (MHPAEA) requires insurers to treat MH/SUD the same as other conditions	https://www.cms.gov/regulations-and-guidance/health-insurance-reform/healthinsreformforconsume/downloads/mhpaea.pdf
2009	U.S. Preventive Services Task Force (USPSTF)		USPSTF assigns a grade B to screening for depression in adolescents, 12-18 years of age when systems are in place to ensure accurate diagnosis, psychotherapy (cognitive-behavioral or interpersonal), and follow-up. A grade A or B means the USPSTF recommends providers offer or provide this service.		https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/depression-in-children-and-adolescents-screening-2009

Table B1 continues.

Effective	Expert Medical Body	Government Agency	Recommendation	Law	Source
2010/2011		Federal government		The Affordable Care Act (ACA) requires insurance plans to cover preventive services without patient cost-sharing. The law recognizes items with an A or B rating from the USPSTF, immunizations recommended by the CDC, and services recommended by Bright Futures /AAP as preventive services. In addition, it commissions the Department of Health and Human Services to develop additional guidelines for women.	https://www.law.cornell.edu/uscode/text/42/300gg-13
2012		Department of Health and Human Services (HHS)		Creates the Women's Preventive Services Guidelines (WPSI). The WPSI mandate annual depression screening for women aged 12 and older.	https://nap.nationalacademies.org/catalog/13181/clinical-preventive-services-for-women-closing-the-gaps
2013	American Psychiatric Association[a]			Releases the updated Diagnostic and Statiscal Manual of Mental Disorders (DSM) 5th version. It expands the definitions of depression and anxiety; creates autism sprectrum disorder.	https://www.psychiatry.org/File%20Library/Psychiatrists/Practice/DSM/APA_DSM-5-Diagnoses-for-Children.pdf

Table B1 continues.

Effective	Expert Medical Body	Government Agency	Recommendation	Law	Source
2014		Federal government		ACA expands on the MHPAEA by mandating that non-grandfathered individual and small group health plans include MH/SUD as one of the ten essential health benefit categories.	https://www.law.cornell.edu/uscode/text/42/18022
				ACA expands Medicaid eligibility to nearly all adults under age 65 with incomes up to 133% of the federal poverty level	https://www.law.cornell.edu/uscode/text/42/1396a
2015		HHS		ICD-10: Sets compliance date for the International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM) to October 1, 2015. The new coding system adds codes for suicide attempt and intentional self-harm.	https://www.federalregister.gov/documents/2014/08/04/2014-18347/administrative-simplification-change-to-the-compliance-date-for-the-international-classification-of
2016		CMS		ICD-10: Includes symptoms and signs codes (R40-R46) as an Exclusion 2 note for mental disorder codes (F01-F99).	https://www.cdc.gov/nchs/data/icd/interim_advice_updated_final.pdf

Notes: [a] The DSM-5 is available for purchase at: https://psychiatryonline.org/doi/book/10.1176/appi.books.9780890425787

Table B2: ICD-9 and ICD-10 code classifications for mental health diagnosis, suicidal ideation, and self-harm

Diagnosis	ICD-9	ICD-10
Mental	290, 291, 292, 293, 294, 295, 296, 297, 298, 299,300, 310, 311, 312, 313, 314, 315, 316	F0, F1, F2, F3, F4, F5, F6, F8, F9
Mood	296, 311	F3
Anxiety	300	F4
Other Mental	290, 291, 292, 293, 294, 295, 297, 298, 299, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 312, 313, 314, 315, 316	F0, F1, F2, F5, F6, F8, F9
Suicidal Ideation	V6284	R45851
Intentional Self-Harm	E950, E951, E952, E953, E954, E955, E956, E957, E958	T1491, T360X2A, T361X2A, T362X2A, T363X2A, T364X2A, T365X2A, T366X2A, T367X2A, T368X2A, T3692XA, T370X2A, T371X2A, T372X2A, T373X2A, T374X2A, T375X2A, T378X2A, T3792XA, T380X2A, T381X2A, T382X2A, T383X2A, T384X2A, T385X2A, T386X2A, T387X2A, T38802A, T38812A, T38892A, T38902A, T38992A, T39012A, T39092A, T391X2A, T392X2A, T39312A, T39392A, T394X2A, T398X2A, T3992XA, T400X2A, T401X2A, T402X2A, T403X2A, T404X2A, T405X2A, T40602A, T40692A, T407X2A, T408X2A, T40902A, T40992A, T410X2A, T411X2A, T41202A, T41292A, T413X2A, T4142XA, T415X2A, T420X2A, T421X2A, T422X2A, T423X2A, T424X2A, T425X2A, T426X2A, T4272XA, T428X2A, T43012A, T43022A, T431X2A, T43202A, T43212A, T43222A, T43292A, T433X2A, T434X2A, T43502A, T43592A, T43602A, T43612A, T43622A, T43632A, T43692A, T438X2A, T4392XA, T440X2A, T441X2A, T442X2A, T443X2A, T444X2A, T445X2A, T446X2A, T447X2A, T448X2A, T44902A, T44992A, T450X2A, T451X2A, T452X2A, T453X2A, T454X2A, T45512A, T45522A, T45602A, T45612A, T45622A, T45692A, T457X2A, T458X2A, T4592XA, T460X2A, T461X2A, T462X2A, T463X2A, T464X2A, T465X2A, T466X2A, T467X2A, T468X2A, T46902A, T46992A, T470X2A, T471X2A, T472X2A, T473X2A, T474X2A, T475X2A, T476X2A, T477X2A, T478X2A, T4792XA,

Table B2 continues

Diagnosis	ICD-9	ICD-10
Intentional Self-Harm		T480X2A, T481X2A, T48202A, T48292A, T483X2A, T484X2A, T485X2A, T486X2A, T48902A, T48992A, T490X2A, T491X2A, T492X2A, T493X2A, T494X2A, T495X2A, T496X2A, T497X2A, T498X2A, T4992XA, T500X2A, T501X2A, T502X2A, T503X2A, T504X2A, T505X2A, T506X2A, T507X2A, T508X2A, T50902A, T50992A, T50A12A, T50A22A, T50A92A, T50B12A, T50B92A, T50Z12A, T50Z92A, T510X2A, T511X2A, T512X2A, T513X2A, T518X2A, T5192XA, T520X2A, T521X2A, T522X2A, T523X2A, T524X2A, T528X2A, T5292XA, T530X2A, T531X2A, T532X2A, T533X2A, T534X2A, T535X2A, T536X2A, T537X2A, T5392XA, T540X2A, T541X2A, T542X2A, T543X2A, T5492XA, T550X2A, T551X2A, T560X2A, T561X2A, T562X2A, T563X2A, T564X2A, T565X2A, T566X2A, T567X2A, T56812A, T56892A, T5692XA, T570X2A, T571X2A, T572X2A, T573X2A, T578X2A, T5792XA, T5802XA, T5812XA, T582X2A, T588X2A, T5892XA, T590X2A, T591X2A, T592X2A, T593X2A, T594X2A, T595X2A, T596X2A, T597X2A, T59812A, T59892A, T5992XA, T600X2A, T601X2A, T602X2A, T603X2A, T604X2A, T608X2A, T6092XA, T6102XA, T6112XA, T61772A, T61782A, T618X2A, T6192XA, T620X2A, T621X2A, T622X2A, T628X2A, T6292XA, T63002A, T63012A, T63022A, T63032A, T63042A, T63062A, T63072A, T63082A, T63092A, T63112A, T63122A, T63192A, T632X2A, T63302A, T63312A, T63322A, T63332A, T63392A, T63412A, T63422A, T63432A, T63442A, T63452A, T63462A, T63482A, T63512A, T63592A, T63612A, T63622A, T63632A, T63692A, T63712A, T63792A, T63812A, T63822A, T63832A, T63892A, T6392XA, T6402XA, T6482XA, T650X2A, T651X2A, T65212A, T65222A, T65292A, T653X2A, T654X2A, T655X2A, T656X2A, T65812A, T65822A, T65832A, T65892A, T6592XA, T71112A, T71122A, T71132A, T71152A, T71162A, T71192A, T71222A, T71232A, X710XXA, X711XXA, X712XXA, X713XXA, X718XXA, X719XXA, X72XXXA, X730XXA, X731XXA, X732XXA, X738XXA, X739XXA, X7401XA, X7402XA, X7409XA, X748XXA, X749XXA, X75XXXA, X76XXXA, X770XXA, X771XXA, X772XXA, X773XXA, X778XXA, X779XXA, X780XXA, X781XXA, X782XXA, X788XXA, X789XXA, X79XXXA, X80XXXA, X810XXA, X811XXA, X818XXA, X820XXA, X821XXA, X822XXA, X828XXA, X830XXA, X831XXA, X832XXA, X838XXA

C: Alternative Sources of Trends in Mental Health

This memo presents figures showing trends in mental health and self-harm from several data sources, for the period 2004 or 2005 to 2021 or 2023 if possible. Data is shown for 10-19-year-olds whenever possible (unless otherwise noted) and is shown for all teens as well as separately for males and females. In addition, both crude rates (or percentage responding affirmatively to questions) and an index where the starting year is set to one are shown.

While the measures available in different data sources are not exactly comparable, the measures that are closest to the following constructs have been extracted:

- Any mental health diagnosis
- Any mood or anxiety disorder
- Any other mental health diagnosis besides depression or anxiety (i.e. #1-#2)
- Measures of self-harming behaviors

Some surveys were subject to significant redesigns. Dates of redesigns are indicated on the figures with a vertical dashed line so that it is possible to see whether the redesign appears to have led to large changes in reporting.

The Web-based Injury Statistics Query and Reporting System (WISQARS)

For non-fatal injuries, the U.S. Center for Disease Control (CDC) Web-based Injury Statistics Query and Reporting System (WISQARS) provides data from the National Electronic Injury Surveillance System. Data come from a national sample of 24-hour Emergency Departments. Onsite coders abstract data from electronic records. For fatal injuries, data come from Vital Statistics Mortality Records and the National Violent Death Reporting System. These data are nationally representative and consistently reported. More information is available at: https://wisqars.cdc.gov.

Figure C1 shows trends in fatal self-harm injuries, while Figure C2 shows trends in non-fatal self-harm injuries. These data show a sharper rise in ED visits for non-fatal injuries during the pandemic than is apparent in the NEDS. One possible source of difference between the two is that the NEDS does not include visits that resulted in fatalities without hospitalization or an ED visit. WISQARS is also more timely, allowing us to see a downturn in self-harm injury visits between 2022 and 2023.

Figure C3 shows however that the NEDS data and the WISQARS data about non-fatal injuries track each other well until 2021. The discrepancy in 2021 is likely due to the addition of a new self-harm code in 2021, R45.88. Like suicidal ideation, this code belongs to the category "Symptoms and signs involving emotional state," and is meant to be coded as a secondary diagnosis if other mental health conditions are present. Since in our NEDS data this code only applies in 2021, for consistency, we did not include it. Hence, comparing NEDS and HCUP in 2021 provides another example of how small differences in coding can affect counts.

Youth Risk Behavioral Surveillance Surveys (YRBSS)

The U.S. Centers for Disease Control's Youth Risk Behavioral Surveillance Survey (YRBSS) information about trends in the mental health of high school–aged youth, who are typically 14-18 years old. It is a nationally representative survey of high school students that has asked consistent questions every second year since 1991. The YRBSS is the largest source of health surveillance data about high schoolers in the U.S. In addition to the national YRBS, most states (45 in 2021) administer their own YRBS surveys. The YRBSS surveys take 45-minutes and are conducted in schools, usually in the spring.
Students complete a scannable questionnaire anonymously. See https://www.cdc.gov/yrbs/index.html.

This section focuses on four YRBSS questions:

1. "During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities?" (only asked since 1999).
2. "During the past 12 months, did you ever seriously consider attempting suicide?"
3. "During the past 12 months, did you make a plan about how you would attempt suicide?"
4. "During the past 12 months, how many times did you actually attempt suicide?"

Figure C4 shows the percentage of respondents answering yes to the questions about hopelessness and suicidality. Figure C5 shows indices where 2005 has been normalized to one. These measures all show a rise, particularly after 2017. This pattern is not consistent with that observed for completed suicides which peaked in 2017 and then fell slowly. Figure C 2 showed a peak in non-fatal injuries in 2021, which may be consistent with the peak in people answering yes to all of these YRBSS survey questions in 2021.

The National Survey of Drug Use and Health (NSDUH)

The National Survey of Drug Use and Health (NSDUH) is an annual national survey sponsored by the Substance Abuse and Mental Health Services Administration. It is the primary source of statistical information on illegal drug use by Americans 12 or older and also has questions about mental health. See https://nsduhweb.rti.org/respweb/homepage.cfm.

A limitation of the NSDUH is that survey questions have changed over time, and the survey has also been subject to major redesigns in 2015 and 2020, with the result that data before and after those dates may not be strictly comparable. See https://www.cdc.gov/nchs/hus/sources-definitions/nsduh.htm and https://www.samhsa.gov/data/data-we-collect/nsduh-national-survey-drug-use-and-health/national-releases/2020#:~:text=The%20coronavirus%20disease%202019%20(COVID,other%20effects%20on%20the%20estimates. Users are specifically warned that data from before and after these redesigns may not be comparable.

Questions about suicidality are asked to adults 18 and over and to people who were screened in as a result of other mental health questions. As a result, questions about suicidality were asked

to very few teens. Moreover, although some teens were asked about suicide attempts, this variable does not appear in the public use data.

Questions about depression have been asked in a similar way to youths 12-17 since 2004. Respondents who report ever having depression were then asked about whether they had depressive symptoms for two weeks or more in the past year. If the answer is yes, then they are coded as having had a major depressive episode in the past year.

Figure C6 shows time series patterns for having had a major depressive episode in the past year, i.e. having had symptoms of depression for two or more weeks in the past year. The trend is similar to the YRBSS time series for feeling sad or hopeless for at least two weeks in the past year shown in Figures C4 and C5. However, like the YRBSS responses, the patterns are inconsistent with those for completed suicides. Figure C 6 shows a peak in 2021 that may be consistent both with the 2021 peak shown in Figure C2, and with the 2021 peak shown in Figures C4 and C5.

The Medical Expenditure Panel Survey (MEPS)

The MEPS is a set of large-scale U.S. survey of individuals, families, their medical providers, and employers under the auspices of the Agency for Health Care Research and Quality. It collects information about the cost and use of health care and health insurance coverage. See https://www.meps.ahrq.gov/mepsweb/.

The MEPS has undergone several redesigns having to do with which conditions are reported. Before 2007, conditions were reported if they were current, were considered a priority condition, or resulted in use of medical care. From 2008-2017 the condition was reported if it was current (where the definition of current was refined) or resulted in the use of care. In 2018 to present, the condition is only included if it resulted in the use of care.

Figure C7 shows trends in any mental health condition, Figure C8 shows trends in mood and anxiety disorders, and Figure C9 shows trends in other mental health condition (other than mood and anxiety). The figures suggest that the change in the way that conditions were counted, especially after 2017, may have impacted trends in reporting. Focusing on the period between 2008 and 2017 when there were no changes in the survey, the figures suggest increases in mood and anxiety disorders and some increases in other mental health disorders for girls, but less so for boys. These data are complementary to the NEDS because they cover mental health conditions even if they did not lead to ED visits. However, they suggest a smaller rise in mood and anxiety disorders than the NEDS (e.g. as of 2019, the NEDS suggests that ED visits for mood and anxiety had roughly doubled, whereas the MEPS suggests that they had gone up around 50%).

National Survey of Children's Health (NSCH)

The NSCH conducted by the Census Bureau in order to document trends in children's health conditions. A redesigned annual survey (growing out of an earlier survey of children with

special health care needs) began in 2016. In each household, a knowledgeable adult answers questions about a randomly selected child. Questions about depression and anxiety take the form of asking whether the respondent has ever been told that the child has anxiety or depression. See https://www.census.gov/programs-surveys/nsch.html.

Figure C10 shows the fraction of adult respondents who had been told that the index child 10-19 had depression. Figure C11 shows the fraction who had been told that the index child 10-19 had anxiety. The fraction who report having ever been told that their child had depression is remarkably flat until 2020. There is more of a rising trend for anxiety, though there is again a sharp uptick in 2020. Reports of anxiety are rising especially for girls over this (relatively short) time interval. Comparing these patterns to those in the NEDS, NEDS shows an increase in ED visits for mood and anxiety disorders between 2016 and 2017, whereas in Figures C10 and C11, the first increase is between 2017 and 2018. Moreover, the NEDS does not show sharp rises in ED visits for mood disorders in 2020 and 2021.

National Health Interview Survey (NHIS)

The NHIS is an annual national survey conducted by the National Center for Health Statistics of the CDC. Parents are asked whether their 10-17-year-old child was often unhappy, depressed, or tearful, and whether the child saw a mental health professional (such as a psychiatrist, psychologist, psychiatric nurse, or clinical social worker) in the past year. The survey was significantly redesigned in 2019. Data is not available for every year. See https://www.cdc.gov/nchs/nhis/index.html.

Figure C12 shows trends in the number of adult respondents reporting that their children were unhappy, depressed, or tearful, while Figure C13 shows trends in the number reporting that their child saw a mental health professional. The redesign in 2019 clearly impacted reporting and makes it difficult to assess trends over the recent time period. Prior to 2019, there is a clear upward trend in the number of children seeing mental health professionals starting around 2013. But if anything, there is a negative trend in the number of parents reporting that their children are unhappy, depressed, or tearful. This is not consistent with much of the other data and suggests that the question may be framed too broadly to elicit specific mental health information from parents.

Figure C1: Fatal self-harm injuries, WISQARS, youth 10-19

a) Rate per 100,000 b) Index, 2005=1

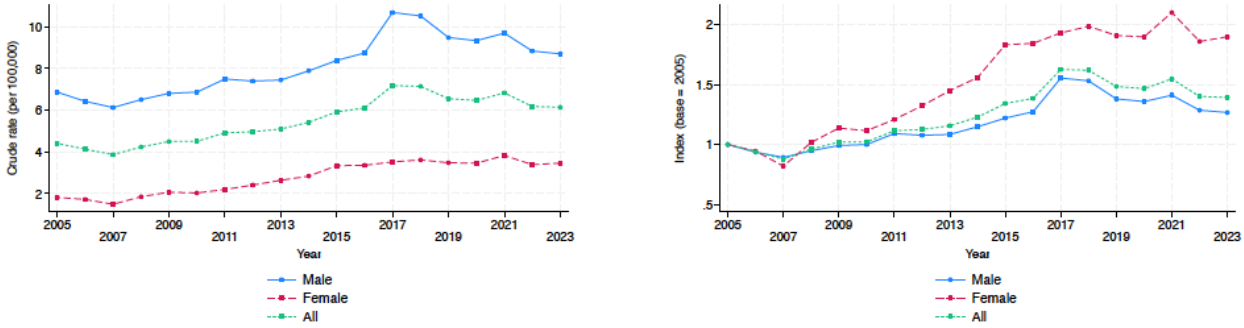


Figure C2: Non-fatal self-harm injuries, WISQARS, youth 10-19

a) Rate per 100,000 b) Index, 2005=1

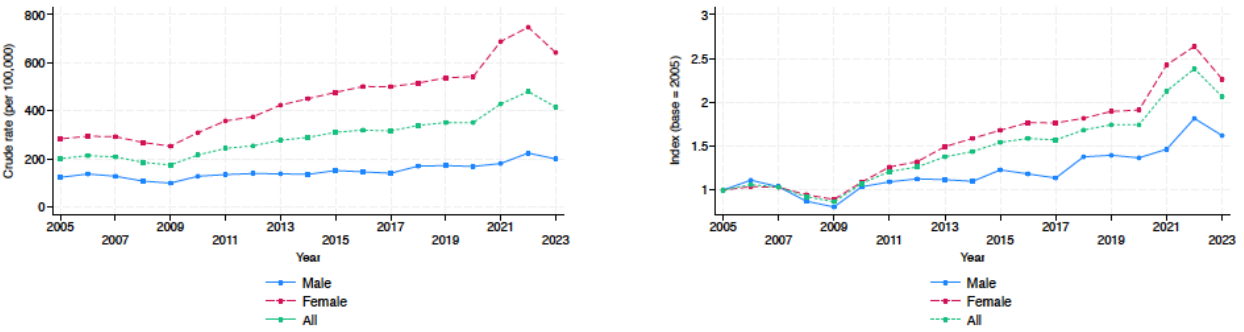


Figure C3: Rates of Injury Due to Non-Fatal Self-Harm in NEDS and WISQARS

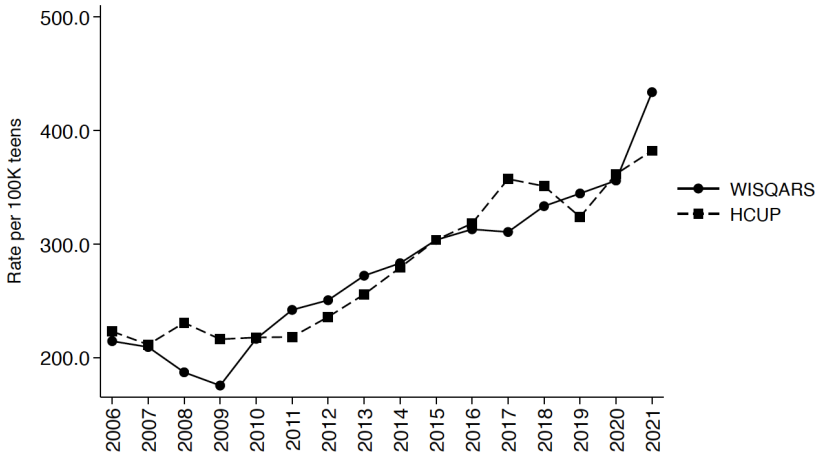
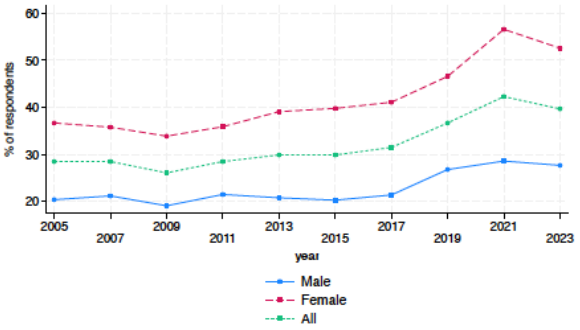
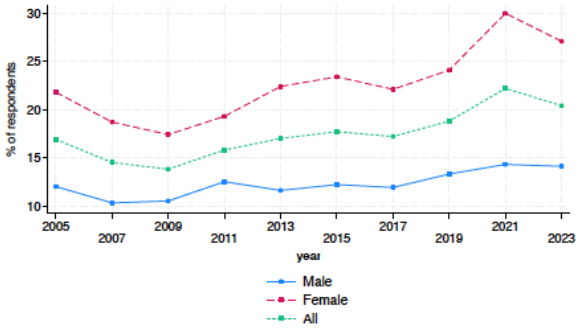


Figure C4: Percent of affirmative responses to questions about hopelessness and suicidality, YRBSS, high school students

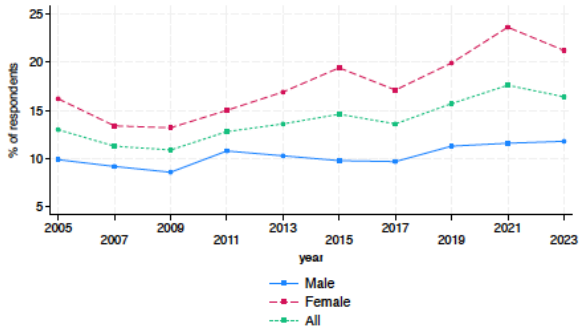
(a) Feeling Hopeless



(b) Considered Suicide



(c) Made a Suicide Plan



(d) Attempted Suicide

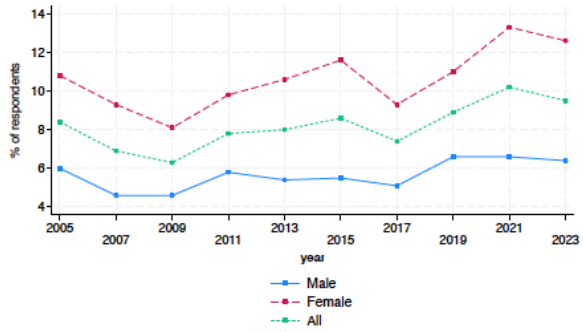
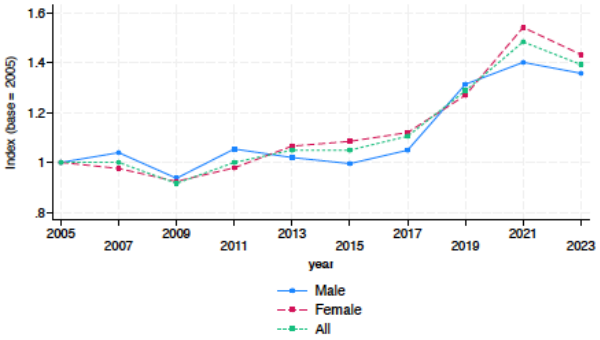
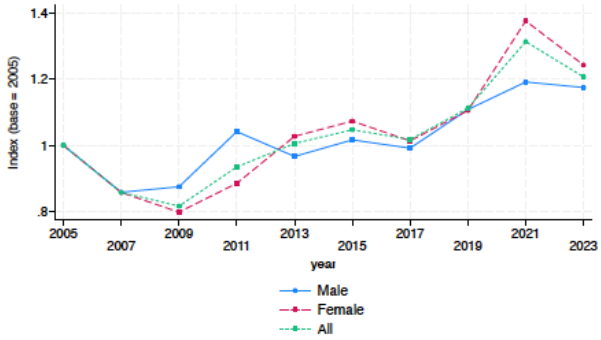


Figure C5: Index of affirmative responses, YRBSS, 2005=1, high school students

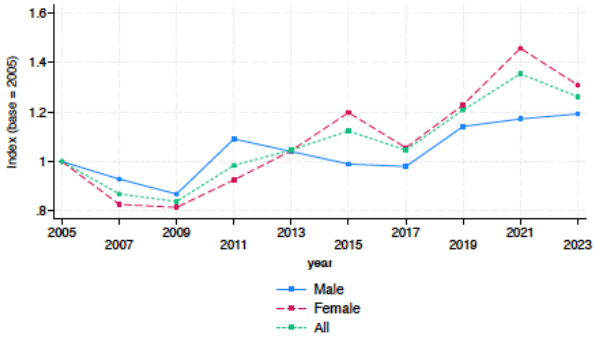
(a) Feeling Hopeless



(b) Considered Suicide



(c) Made a Suicide Plan



(d) Attempted Suicide

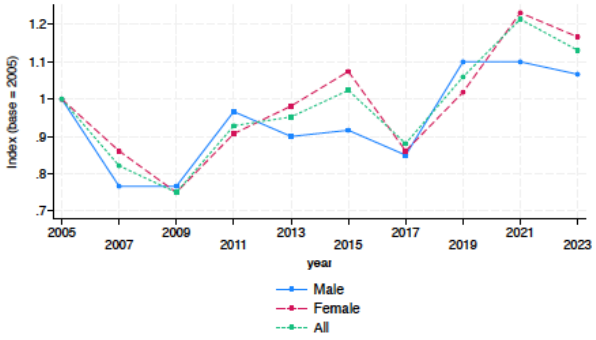
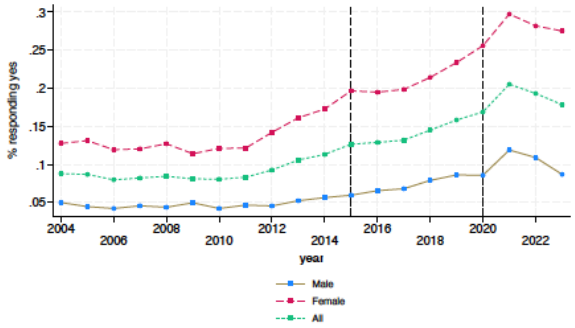


Figure C6: Respondent had a major depressive episode in the past year, youths 12-17, NSDUH

a) Rate per 100,000



b) Index, 2004=1

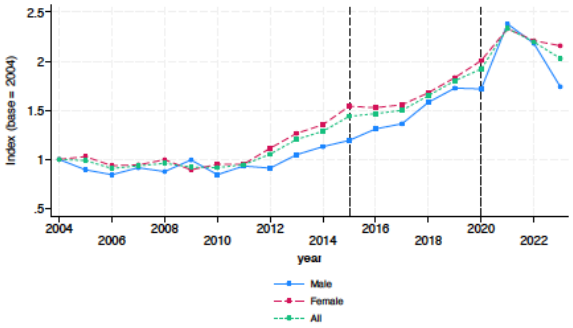
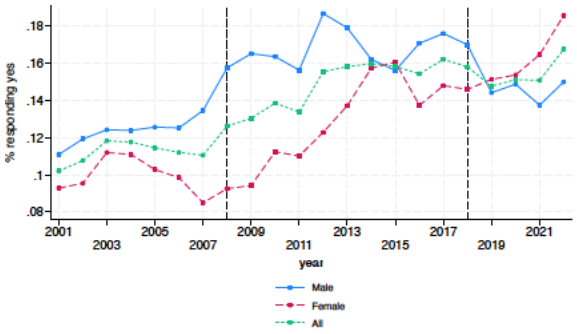


Figure C7: Any Mental Health Condition in the Past Year, 10-19-year-olds, MEPS

a) Rate per 100,000



b) Index, 2004=1

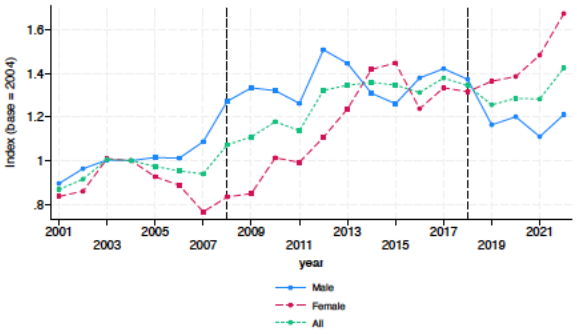


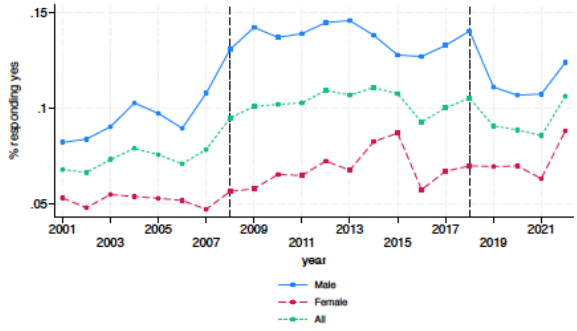
Figure C8: Mood or Anxiety Disorders, 10-19-year-olds, MEPS

a) Rate per 100,000

b) Index, 2004=1

Figure C9: Any Other Mental Health Disorder (no Mood or Anxiety Disorders), 10-19-year-olds, MEPS

a) Rate per 100,000



b) Index, 2004=1

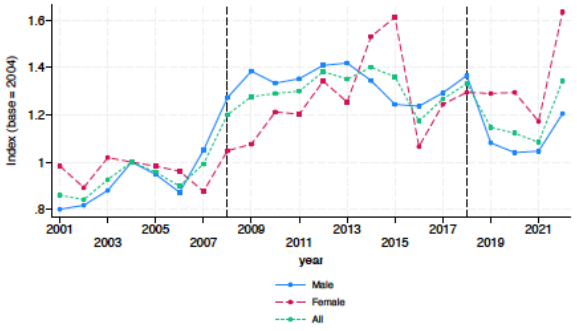
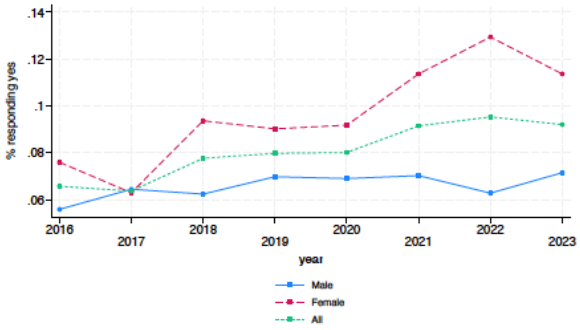


Figure C10: Has Respondent Ever Been Told that the Child has Depression, 10-19-year-olds, NSCH

a) Rate per 100,000



b) Index, 2016=1

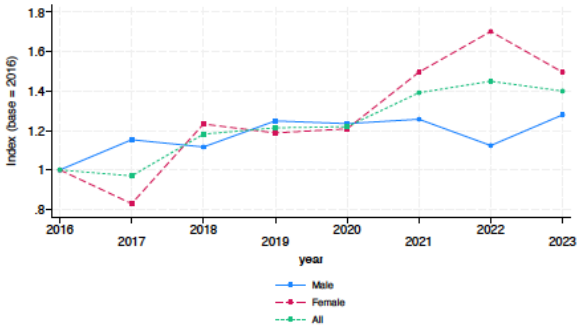
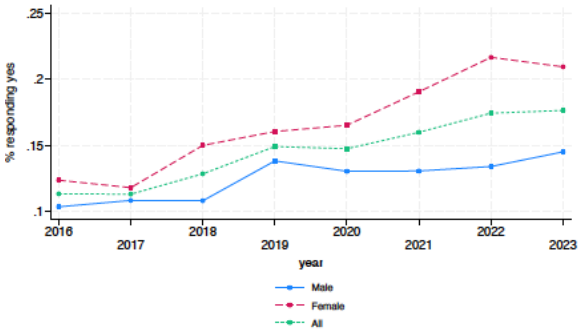


Figure C11: Has Respondent Ever Been Told that the Child has Anxiety, 10-19-year-olds, NSCH

a) Rate per 100,000



b) Index, 2016=1

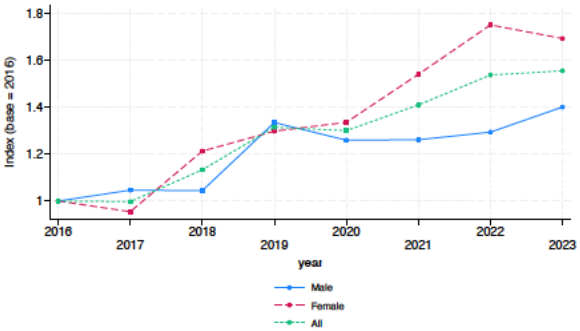


Figure C12: Adult respondents who report that their 10-17-year-old child was often unhappy, depressed, or tearful, NHIS

a) Rate per 100,000

b) Index, 2005=1

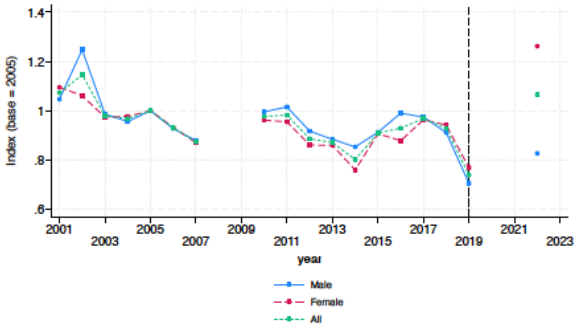
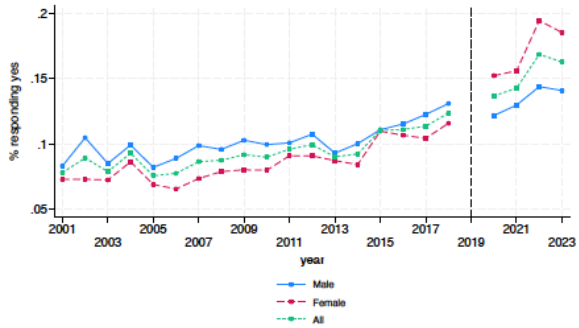


Figure C13: Adult respondents who report that their 10-17-year-old child saw a mental health professional last year, NHIS

a) Rate per 100,000



b) Index, 2005=1