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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. Although reported suicidal behaviors rose 233% from 2006-2021, the true rise in mental health disorders is less than 30-50%.

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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). The 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 that data may be subject to changes in reporting conventions. 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 hospitalizations; and (ii) data from survey responses. This paper discusses some of the strengths and limitations of these sources but focuses most attention on trends in ED visits.

[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.

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.

Trends in ED visits have also figured prominently in public discourse about the child mental health crisis. For example, in his testimony before the Senate Judiciary Committee Subcommittee on Technology, Privacy, 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 coverage, and provider reimbursements over the period when measured rates of ED visits for youth mental illness began to rise. These changes are described briefly in Figure 1, which shows

[2] As of January 31, 2025, there were 142 citations on Google Scholar.

that there was a change that could have had a significant impact on measured rates in almost every year from 2007 to 2016.

In what follows, we describe these changes in more detail, 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 much 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.

Section 2 discusses trends in ED visits for mental illness and for suicidal behaviors more specifically and explores the extent to which the changes shown in Figure 1 may be responsible for some of these trends. Section 3 discusses alternative sources of data on child mental health and suicidal behaviors, with the aim of explaining why there has been such a strong focus on ED visits as an indicator of child mental health trends. Section 4 presents a discussion and conclusion.

2. Factors affecting trends in ED visits for mental illness and suicidal behaviors

This section discusses trends in ED visits for mental illness and suicidal behaviors. Some of our figures show trends in rates per 100,000 teens 10 to 19, but more frequently graphs are normalized so that 2006=1. This normalization makes it easier to compare trends in series that have very different baselines rates.

Data about Emergency Department visits comes from the 2006 to 2021 NEDS from the Healthcare Cost and Utilization Project (HCUP).[3] NEDS is the largest all-payer ED database in America with data from around 30 million ED visits in 2021. The data represent ED visits from hospitals in 39 States and the District of Columbia and approximate a 20 percent sample of hospital-owned EDs.[4] The NEDS variables we make use of include patient age and sex, urban–rural residence, national, identification of injury-related visits, discharge status, and diagnosis codes.[5]

Diagnoses are coded using the International Classification of Diseases version 9 (ICD-9) before October 1, 2015, and the ICD-10 afterwards. This section focuses on ED visits with a diagnosis of a mental health disorder or suicidal behaviors including suicidal ideation (SI, persistent, intrusive thoughts about suicide), self-harm or suicide attempts.[6] The NEDS data seem to have undercounted visits with any mental health diagnoses in the last quarter of 2015, perhaps because of the introduction of the new coding scheme, so this caveat should be kept in mind.[7]

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[3] Further information about the NEDS is available here: NEDS Overview. Accessed July 20, 2024. https://hcup-us.ahrq.gov/nedsoverview.jsp.

[4] 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.

[5] 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 median household income for the patient's zip code, expected payment source of insurance (Medicaid, Medicare, self-pay, private insurance, no charge, other).

[6] We have excluded mental health conditions due intellectual disabilities. In ICD9 these diagnoses correspond to codes 317-319. In ICD10 these diagnoses correspond to categories F70-79. Regarding self-harm, we include initial visits for injuries caused by self-harm, but do not include visits for sequelae of self-harm visits in order to avoid over-counting incidents.

[7] There are two HCUP files for 2015, one for the first 3 quarters of the year and one for the last quarter. However, the last quarter has about half the number of visits with a mental health diagnosis as in 2014 and 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, and the number of visits in the first 3 quarters of 2015. This means that in our figures, the 2015 data is based on incidents coded using ICD9 only.

Unfortunately, the NEDS data do not include any geographic indicator except for four Census regions. Since they are based on hospital claims data, they are also missing household background information such as family income or labor supply. In our graphical analyses, we utilize the NEDS discharge weights for each year to graph nationally representative (or regionally representative) estimates.

Information about suicides by state, year, and five-year age groups (10-14, 15-19) comes from the Center for Disease Control's CDC Wonder Underlying Cause of Death Files. These data are derived from the National Vital Statistics Mortality files. Population counts come from the 2010 Census.

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. Primary diagnoses are supposed to 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. Figure 2b shows changes in the rates in 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 2011, and then showed little trend until 2021. Secondary mental health diagnoses rise slightly more quickly over the period so that there is a 30% increase in primary diagnoses and a 44% increase in secondary diagnoses between 2006 and 2021.

Regarding pre-2011 increase in mental health diagnoses, one possible factor is a 2007 change in Medicare diagnosis related groups that allowed higher reimbursements for cases that were complicated by a secondary diagnosis of mental illness. While this change applied only to

the elderly population, there is evidence that changes in Medicare tend to spillover to other payers (Clemens and Gottlieb 2017 and Cooper et al., 2019) and that this also happened in this case (Cook and Averett, 2020). In the absence of other changes, this change implies that one should see visits with a secondary mental health disorder rise faster than visits with a primary mental health disorder after 2007, as we have already noted. Figure 2b shows more clearly that there are many more secondary diagnoses of mental health disorders than primary diagnoses.

Figure 3a shows that if we split visits with mental health diagnoses into two groups, those with and without any diagnosis of anxiety and depression, the two series diverge beginning in 2011. The gap between them grows after 2013 and especially after 2015. These patterns suggest that much 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.

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, with further bifurcation after 2013, whereas for males, the greatest increase occurs after 2015. Figure 3d breaks illustrates the way that diagnoses of anxiety and mood disorder diverged between females and males after 2012.

The 2011 turning point in diagnoses of anxiety and mood disorders for females suggests that 2011 U.S. Preventive Services Task Force (USPSTF) guidelines for women's preventive care may have been a factor. The task force recommended screening women and girls over 12 for depression annually, making short screeners for depression part of expected annual physicals. Starting in 2012, the Affordable Care Act required insurers to pay for all USPSTF-recommended screenings without patient cost-sharing. This change meant that providers could be confident that they 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.

A second 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. And new instructions were added to help the clinician determine the importance of suicide prevention planning in treatment (American Psychiatric Association, 2013).[8] In terms of anxiety, a rule that only persons over 17 could be diagnosed with social anxiety disorder was dropped in DSM-5. It has also been argued that diagnostic thresholds for anxiety were lowered in 2013, resulting in increases in diagnoses (Park and Kim, 2020).

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. 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 for greater specificity in

[8] 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. Other changes with the introduction of ICD10 included the creation of the 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. Criteria for stress disorders and obsessive-compulsive disorders were also extensively changed.

diagnosis. The figures suggest that this change was accompanied by a large increase in diagnoses for mood or anxiety disorders. Appendix Figure 1 shows that the number of diagnoses of anxiety increased, converging with the number of mood disorders, and that this implied a very large increase in diagnoses of anxiety.

b) ED visits for suicidal behaviors

Suicidal ideation (SI, defined as persistent and intrusive thoughts about suicide), 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 include SI and self-harm is that they are 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 382 per 100,000 and the rate of ED visits with SI was 892 per 100,000. With differences of these magnitudes, it is certainly possible for suicides and ED visits for SI or self-harm to follow different trends.

Figure 4b shows that trends in SI have also increasingly diverged from trends in ED visits for self-harm and from suicides, especially after 2016: While suicides have risen 66%, ED visits

with SI have grown 459%.[9] 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.[10] Figure 4b also shows that trends in suicide and trends in ED visits for self-harm have shown very similar growth over time—by 71% compared to 66% for suicide deaths.

In addition to the changes in diagnostic codes discussed above, the ICD10 also brought more subtle changes. In October 2016, the Cooperating Parties in charge of implementing the ICD10 recommended that providers code SI as a secondary diagnosis if present. This change was significant because previously, claims could not be submitted with SI as a secondary diagnosis if the primary diagnosis was a mental health disorder. That is, under ICD9, SI was treated as if it was only a symptom of an underlying mental health disorder and therefore not worthy of being diagnosed independently. In ICD10, SI is treated as an additional separate condition. Moreover, SI can only be assigned as a primary diagnosis if the clinician has ruled out any other mental health disorder. This change is likely to have greatly increased diagnoses of SI and to explain at least some of the upswing in ED visits with SI after 2015. The change in coding instructions was further reinforced by provider incentives to code multiple diagnoses, if applicable, to receive higher reimbursements for more complex cases.

Figure 4c focuses on trends in ED visits with SI by gender. It is striking that the time series evolve identically until 2011, when the rate of visits for SI starts to increase more rapidly for girls. The USPSTF recommendation to screen females over 12 for depression annually was

[9] 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.

[10] 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.

made in 2011, so this trend break may reflect the fact that screeners for depression usually include questions about SI (Patra and Kumar, 2022). 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 uncertain causes, leading to more diagnoses of self-harm.

A second 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. Figure 5 shows that this change was accompanied by a noticeable decline in injuries with undetermined causes, and an increase in injuries caused by self-harm. This finding is consistent with Stewart et al. (2016) who use data from 10 large medical networks to show that, in those settings, 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.

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.[11] Figure 6a 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

[11] 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.

represents a large gap in lives lost. In this section, we ask how trends in ED visits with mental health indications, for self-harm and suicide attempts, and with SI compare across regions.

Comparing Figure 6a with Figure 6b 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 perhaps 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 suggesting that the discrepancy between suicide rates and ED visits for mental health is not so easy to explain.

Comparing Figure 6a with Figure 6c 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 6a and 6d 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, Figure 7 shows that while suicides rose slowly over the decade in the Northeast, ED visits for self-harm in the Northeast 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. Panels e and f of Appendix Figure 2 split rural and urban areas and show that the trends in ED visits for mental health are 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.

The discussion to date establishes that trends in ED visits with mental health diagnoses and with diagnoses of suicidal ideation are often quite different than trends in suicide. A comparison of Figures 6a and 6d suggests that ED visits for self-harm may track suicides more closely. This hypothesis is investigated further in Figure 7 which shows trends in suicide and ED visits for self-harm for the four Census regions and for urban and rural areas. Figure 7a shows that in the Northeast, ED visits for self-harm show less of an upward trend than suicide deaths, though they converge at the end of the period. In the other three regions and in the graphs for urban and rural areas, the two series track rather closely. This comparison suggests that while imperfect, trends in ED visits for self-harm may be a better proxy for youth suicide deaths than the other measures of ED visits.

It is possible that trends in ED visits for self-harm and also for suicides are driven to some extent 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 discernable impacts on trends.

First, the USPSTF recommendation to screen females over 12 for depression annually was preceded by a 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, as a result of 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 as long as the 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 but did not have obvious effects on ED visits for mental health other than the increases in self-harm among girls.

e) Other factors 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 Seratonin 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.[12]

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

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

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).[13]

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 low suicide states such as New York, New Jersey, and California. Moreover, these states have had the highest youth suicides rates since before the advent of social media. [14]

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. Even among children 10 to 19, the most important means of suicide are firearms and suffocation (hanging)

[13] 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.

[14] 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.

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.

It is remarkably difficult to accurately measure access to guns, or changes in access over time. The General Social Survey suggests that the number of households with a gun changed very little, from 36.5 to 35.2 percent, between 2000 and 2021 (Violence Policy Center, 2022). However, it is possible that many gun-owning households do not respond to social surveys such as the GSS.

Estimates of the number of gun sales are based largely on background checks that are required in some states, and for some types of weapons, but not for others. However, the available data suggest that sales have continued to grow, and that they surged in 2020 (Joint Economic Committee Democrats, 2023). It is estimated that there are about 120 civilian guns per 100 persons in the U.S., more than in any other country (Karp, 2018). These data suggest that many U.S. firearm owners have multiple guns, complicating attempts to measure gun access via gun ownership.

Some researchers have taken a different tack, measuring the relationship between youth suicide and the strength of state firearm safety laws. Studies have shown that in the cross section, states with stricter gun laws have lower youth suicide rates (for example, Haines et al., 2024). The gap in legal regimes between states has widened greatly in the last decade as Democratically controlled states pass gun safety laws and Republican dominated states repeal them and pass laws allowing the carrying of concealed weapons without a permit as well as "shoot first" laws allowing people who feel threatened to shoot before exploring less lethal options (Amy, 2023). But given the lack of geographic identifiers it is not possible to examine the effects of changes in gun laws longitudinally in the NEDS.

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.

e) Summary

It makes sense that people would try to understand youth suicide by looking at trends in ED visits with mental health indications, with suicidal ideation, or for 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, a divergence between states in laws governing firearms, 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.

3: Alternative Sources of youth mental health data

a) Survey Data

There are several surveys with information about youth mental health but as discussed in this section, only 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 attempting suicide. The survey also asks about whether there was a time in the past 12 months that 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. But 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),[15] 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.

One of the more promising survey data sets available is The National Survey of Drug Use and Health (NSDUH) which includes questions from the Composite International Diagnostic Interview (CIDI). The CIDI 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 changes in child mental health over time.

Monitoring the Future, which has been surveying high schoolers since the 1970s focuses on substance abuse but has few questions on mental health per se, though they do ask about whether the person is seeing a psychologist/psychiatrist.

Two surveys ask parents about their child's mental health. 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 very low and flat rates suggesting that parents may not be well attuned to their child's mental health struggles. The National Survey of Children's Health (NSCH) also questions parents about the mental health of their 0-17-year-old children, but it was

[15] 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).

substantially redesigned in 2016, and estimates after 2016 cannot be directly compared to those before (Bitsko et al., 2022).

The limitations of the available survey data make it quite difficult to ascertain trends in child mental health from these sources, particularly since so many were redesigned around the same time that significant changes in screening, diagnosis, and coding of mental health diagnoses were taking place in the ED data.

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 is 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.[16] 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

[16] 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.

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

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 is flawed in many ways. We have focused on how the measurement of ED visits for mental health and suicidal behaviors 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 their mental health difficulties. We have also emphasized that there are also few sources of survey data that have asked questions about mental health in a way that is consistent over time. An important exception in the United States is the Youth Risk Behavioral Surveillance Survey, though the very high incidence of self-reported hopelessness and suicide attempts does raise questions about how to interpret these self-reported data.

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 only 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 a more reliable indicator of underlying trends in youth mental health.

Turning to suicidal behaviors, our analysis suggests that it is likely to be misleading to focus on trends in measures of suicidal ideation, which increased by 459%, largely because of changes in measurement. It is also misleading to include them in overall measures of suicidal behaviors—if they are included, they drive an increase in suicidal behaviors of 233%, 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 showed that some of the increase in self-harm between 2015 and 2017 was likely to have been due to a reduction in the diagnosis of injuries with "undetermined" causes. A back of the envelope calculation suggests that if the series had been measured in the same way

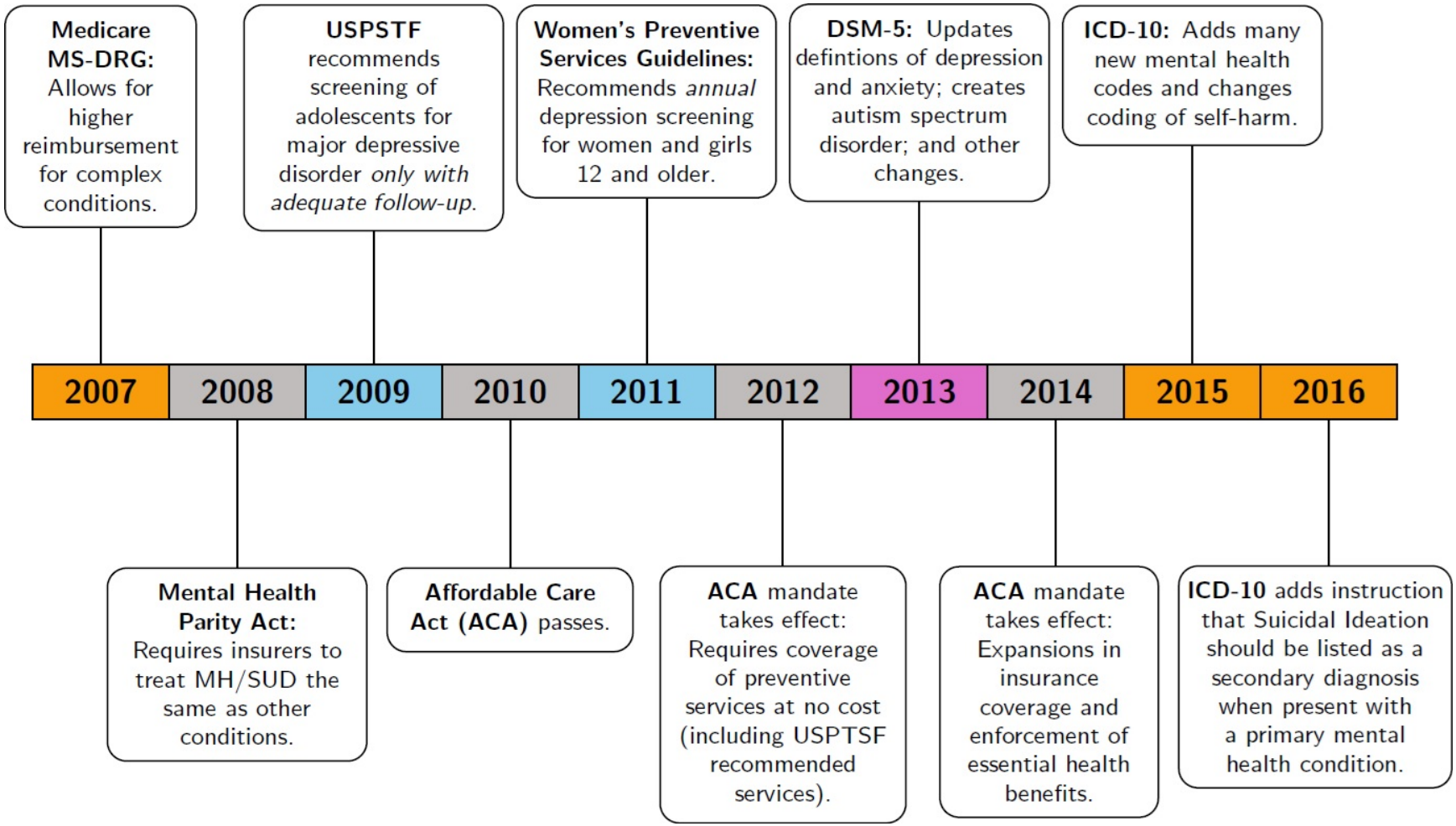
over time, ED visits for self-harm would have increased by approximately 50% instead of the observed 71% increase in Figure 4b.

Another striking finding is that mental health visits, ED visits for self-harm, and suicides among 10-19-year-olds, had 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.[17]

These comparisons suggest that what we can learn from the ED data is that child mental health has been deteriorating over time, but not by the alarming magnitudes suggested by a 233% 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, or our back-of-the-envelope calculation of a true 50% increase in ED visits for self-harm, though both those measures may be affected by reductions in underlying stigma as well as by any changes in the propensity to seek mental health care in the ED over time.

[17] See publicly available data on CDC Wonder.

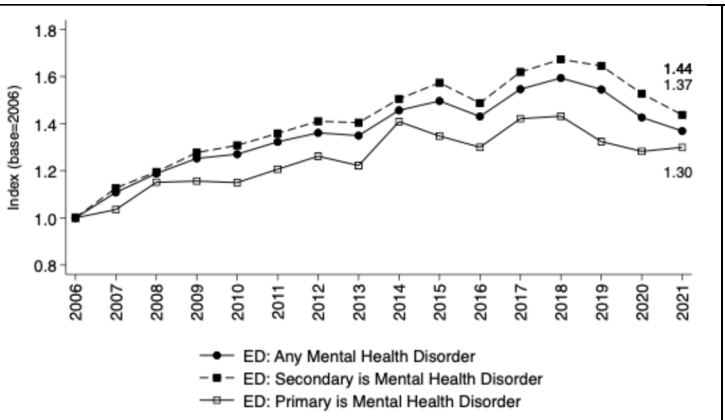
Figure 1: Regulatory factors influencing ED mental health diagnoses.



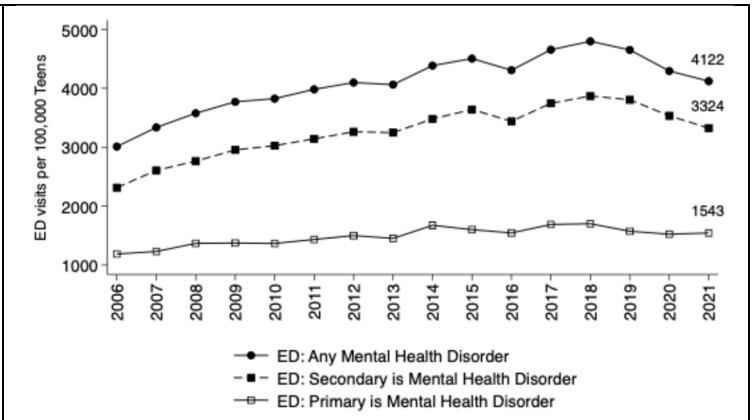
Notes: Color code indicates changes in screening guidelines, coding rules, diagnostic standards, and insurance coverage.

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

a. Growth



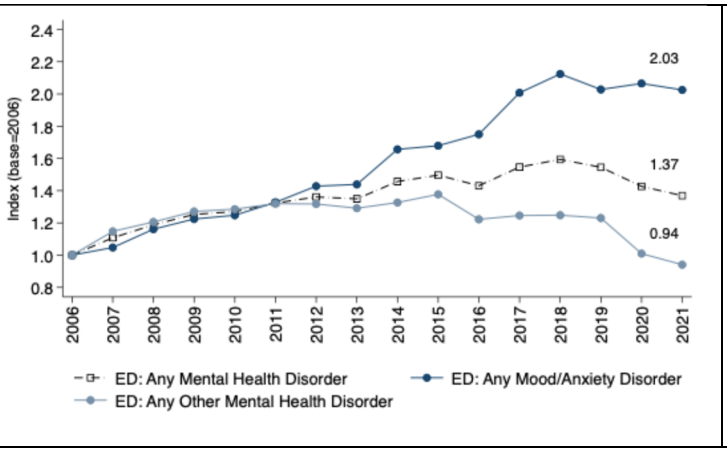
b. Rate



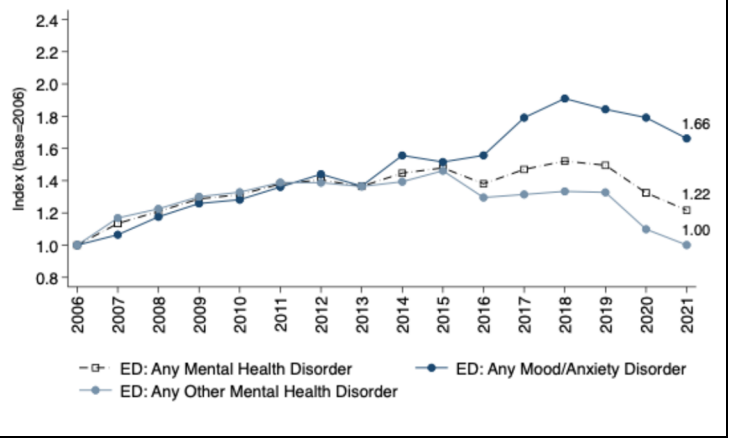
Notes: This figure presents the growth and rate of emergency department (ED) visits with a primary or secondary mental health diagnosis. Panel (a) shows the growth of primary, secondary, and any mental health diagnoses relative to their 2006 levels. Panel (b) displays the rate per 100,000 teens for ED visits with a primary, secondary, and any mental health diagnosis. 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

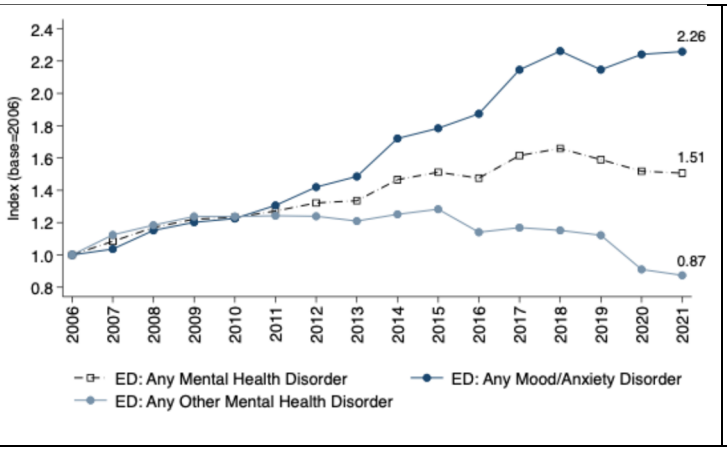
a. All



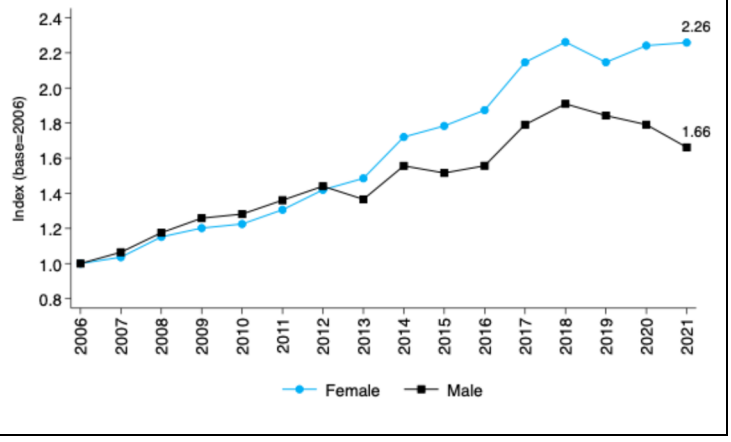
b. Males



c. Females



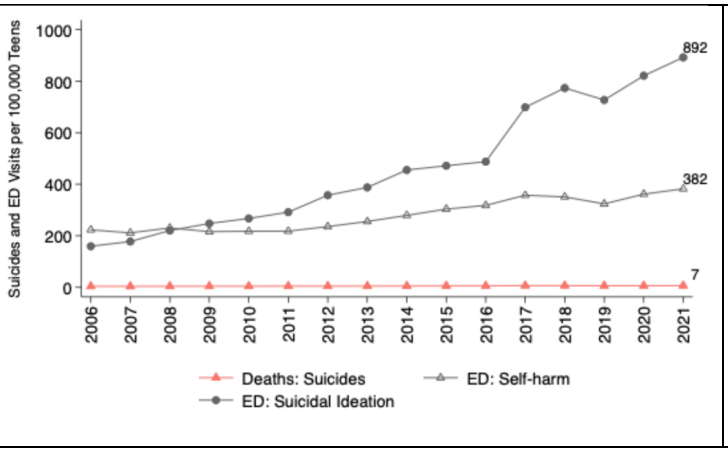
d. All – Mood/Anxiety disorder by sex



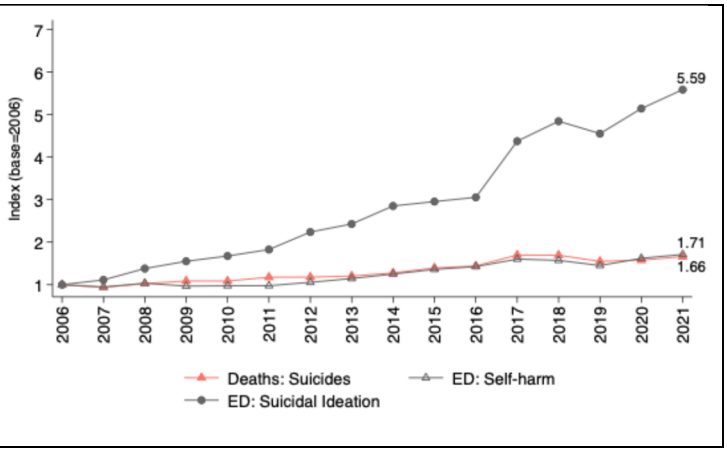
Notes: This figure presents the growth of emergency department (ED) visits involving mental health disorders relative to 2006 levels. The four panels represent different demographic breakdowns: panel (a) for all teens combined, panel (b) for males, panel (c) females, and panel (d) focuses on ED visits 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

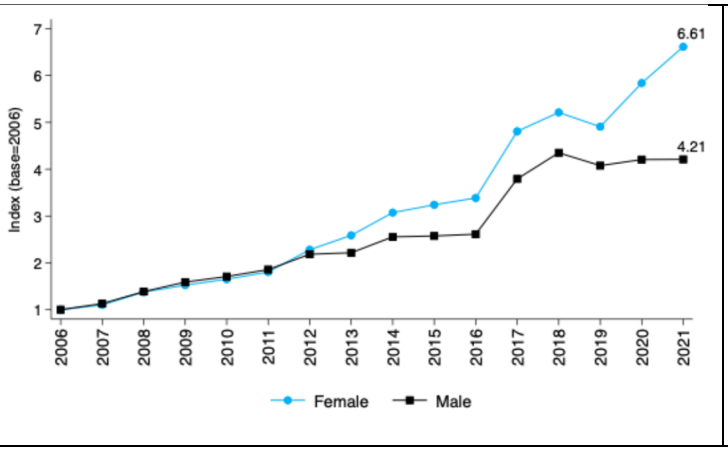
a. Prevalence of suicidal behaviors



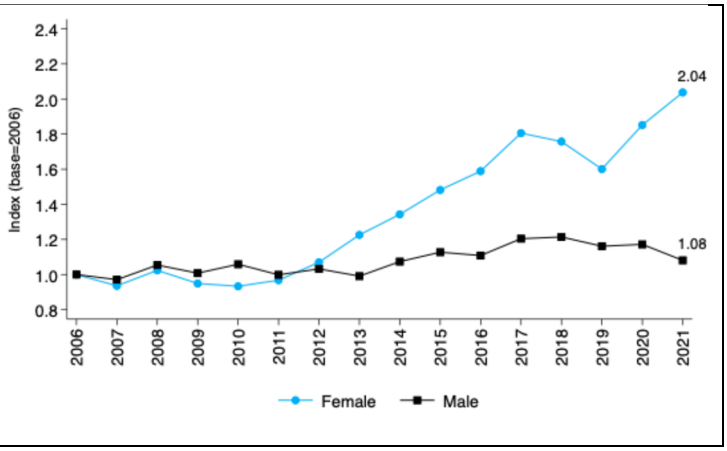
b. Growth of suicidal behaviors



c. ED visits involving suicidal ideation by sex

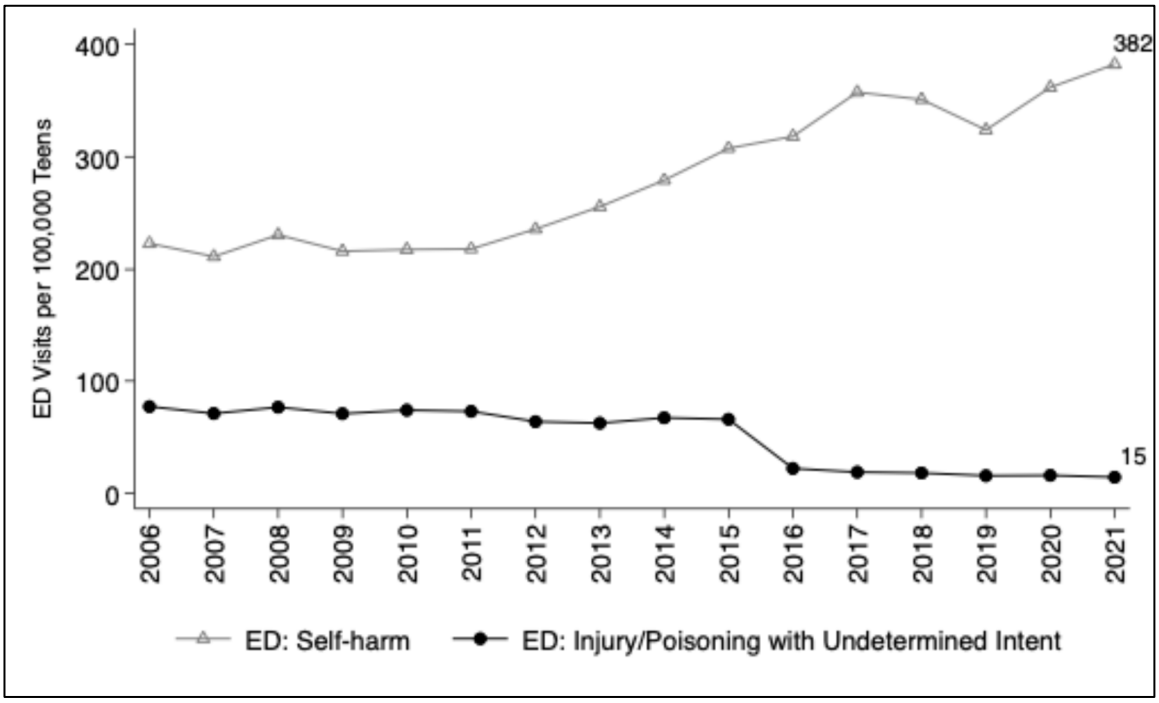


d. ED visits involving self-harm by sex



Notes: This figure presents trends for suicidal behaviors using the CDC WONDER Multiple Cause of Death database and ED visits from the Nationwide Emergency Department Sample. Panel (a) presents the prevalence of suicidal behaviors measured as deaths by suicide, emergency department (ED) visits for self-harm, and ED visits for suicidal ideation. We use 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.

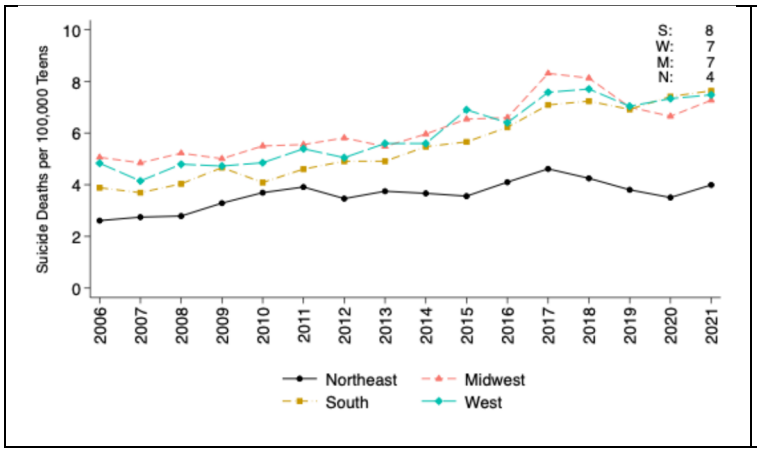
Figure 5: ED visits involving undetermined intent injury or self-harm



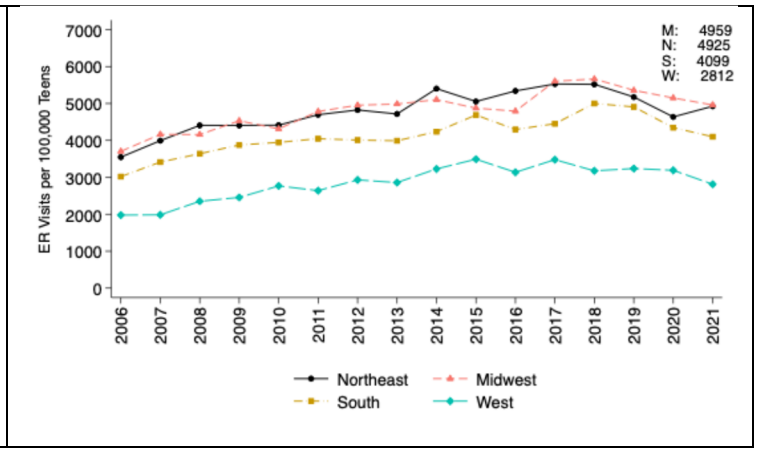
Notes: This figure presents the rate of emergency department (ED) visits for undetermined injury and self-harm. Rates were calculated using data from the Nationwide Emergency Department Sample (NEDS) and population counts from the 2010 U.S. Census.

Figure 6: Deaths by suicide and ED visits involving mental health disorders or suicidal behaviors by region

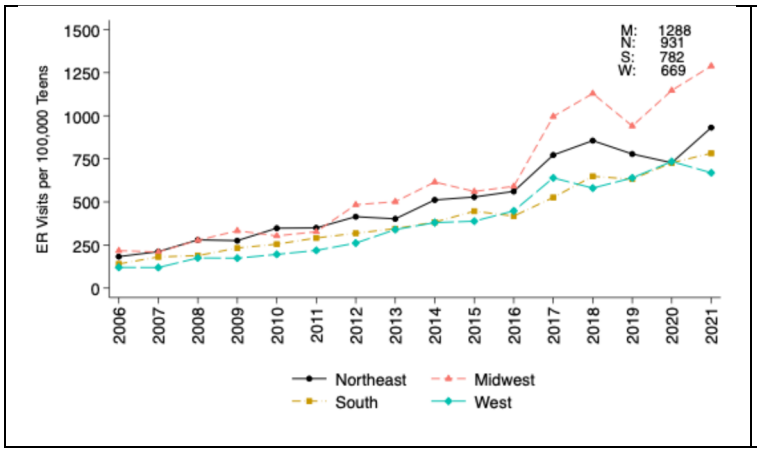
a. Deaths by suicide



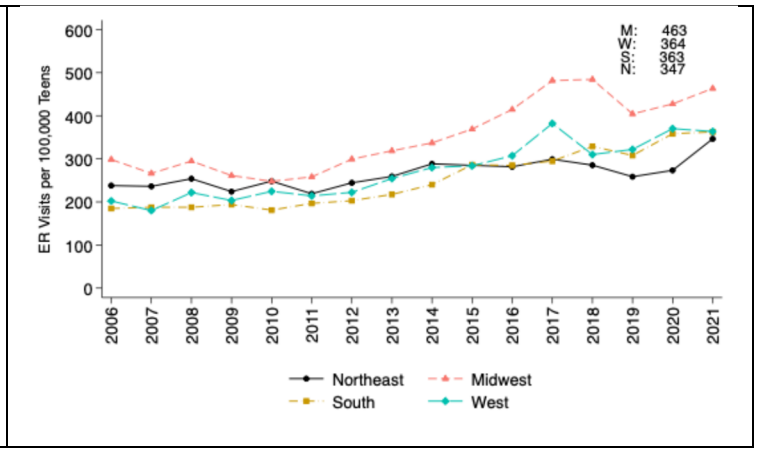
b. ED visits involving at least one mental health disorder



c. ED visits involving suicidal ideation



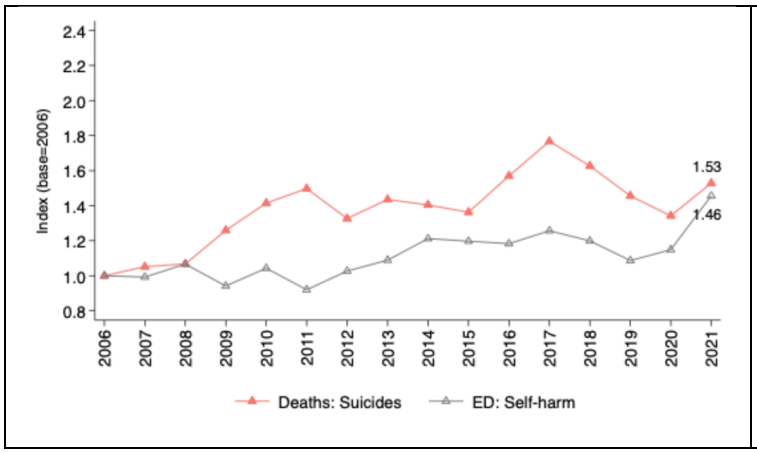
d. ED visits involving self-harm



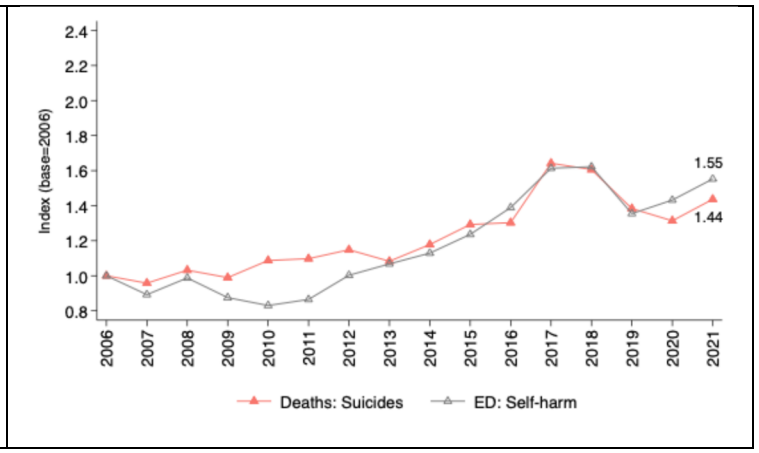
Notes: This figure presents trends in suicide rates, emergency department (ED) visits with a mental health disorder code, ED visits with a suicidal ideation code, and ED visits with a self-harm code across the four U.S. regions: Northeast, Midwest, South, and West. Rates were calculated using data from the Nationwide Emergency Department Sample (NEDS) and population counts from the 2010 U.S. Census.

Figure 7: Growth of suicide deaths and ED self-harm visits by region

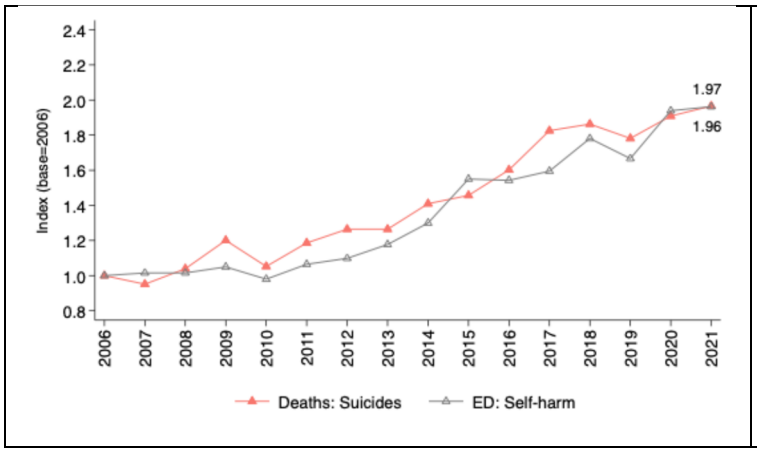
a. Northeast



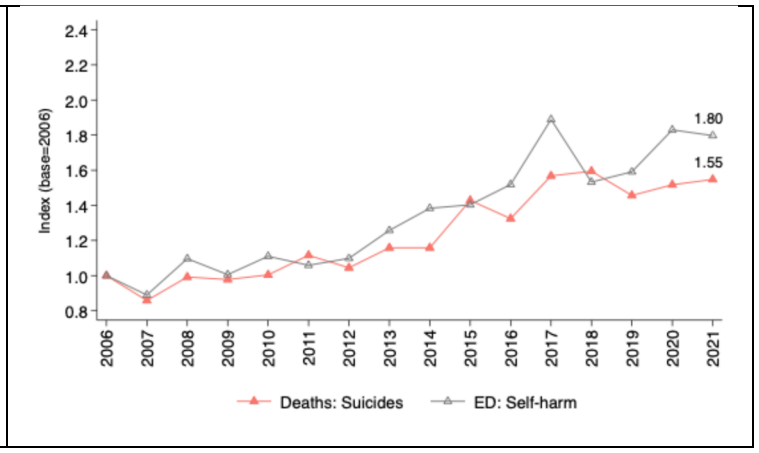
b. Midwest



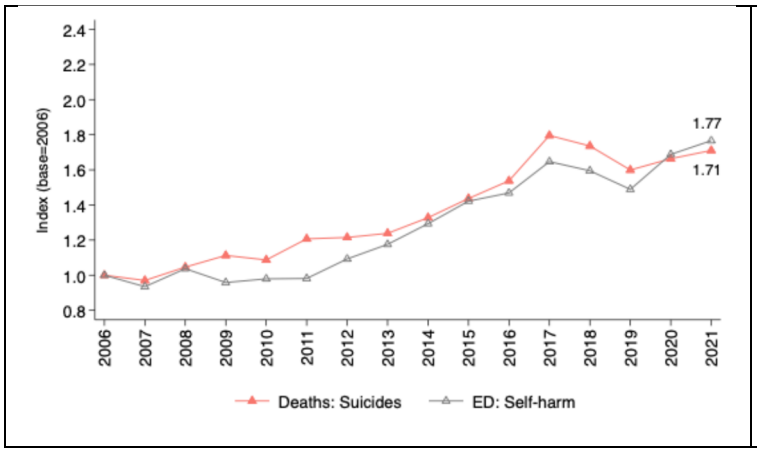
c. South



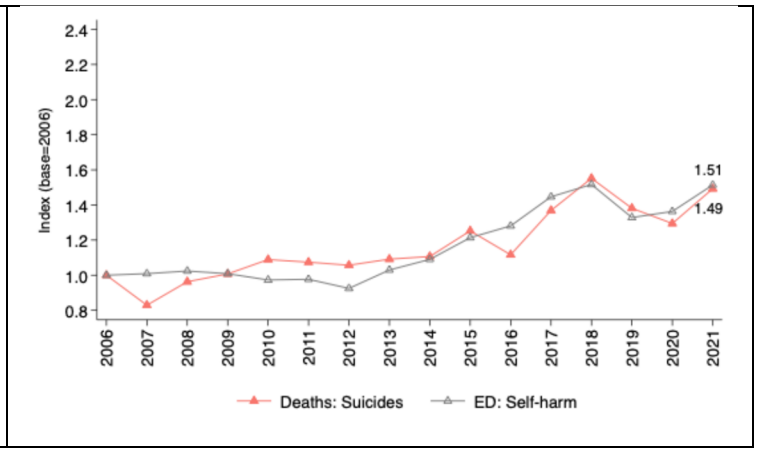
d. West



e. Urban



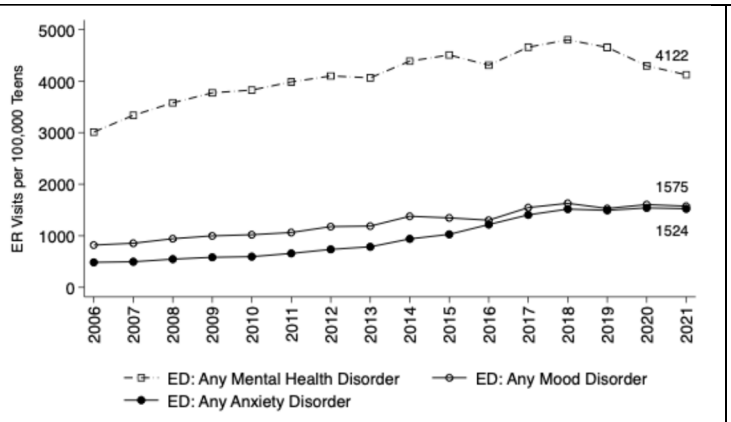
f. Rural



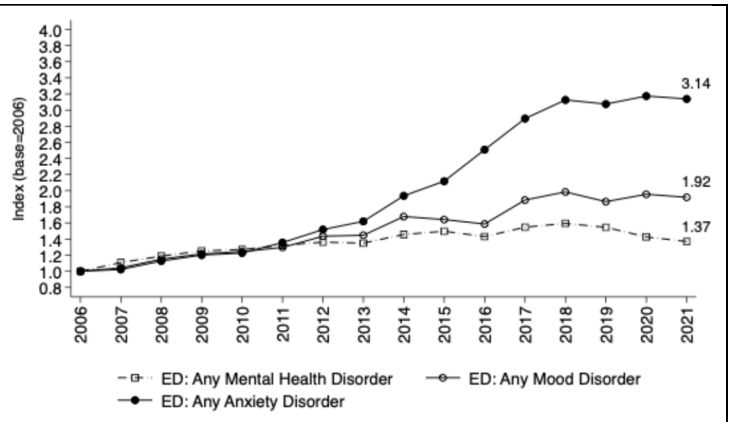
Notes: This figure presents the change in deaths by suicide and emergency department (ED) visits for self-harm across U.S. regions relative to 2006 levels. ED visit data were obtained from the NEDS, while suicide data were sourced from the CDC WONDER Underlying Cause of Death files.

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

a. Rates



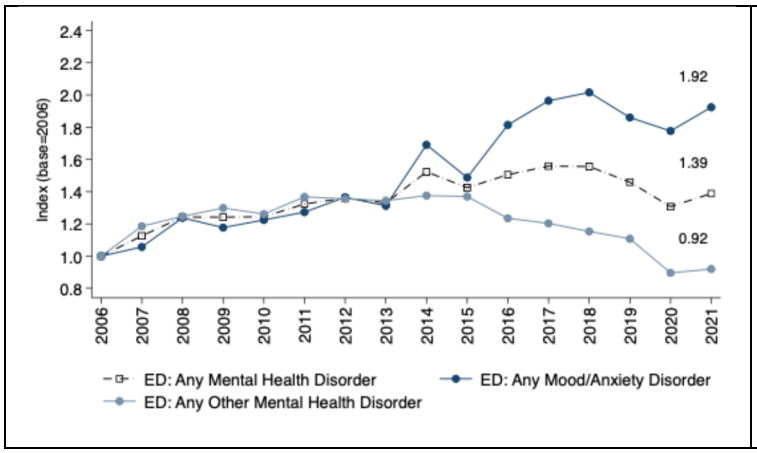
b. Growth



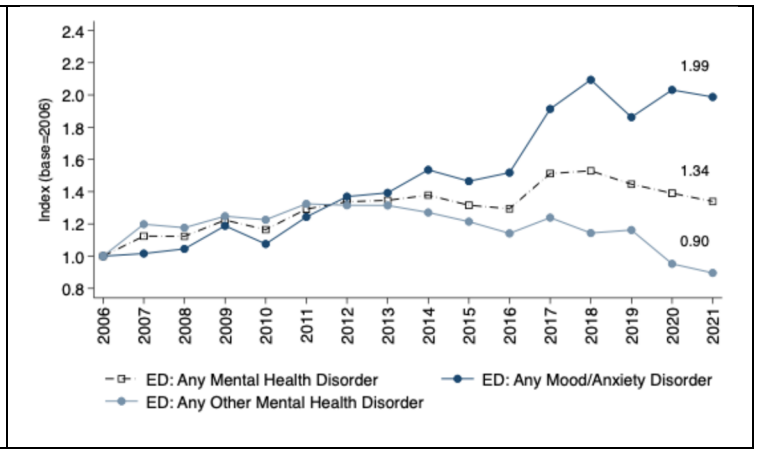
Notes: This figure presents trends in emergency department (ED) visits related to mental health diagnoses. Panel (a) displays the rate per 100,000 teens for ED visits with a mental health diagnosis, mood disorder, and anxiety disorder. Panel (b) shows the change relative to 2006 for these same categories, and using NEDS discharge weights.

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

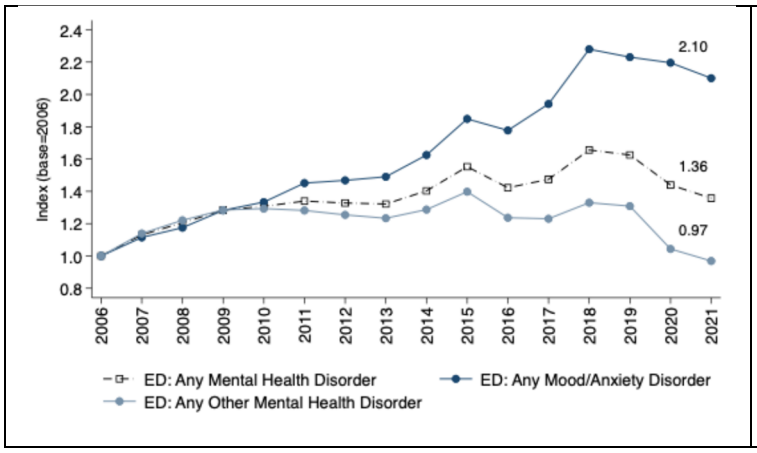
a. Northeast



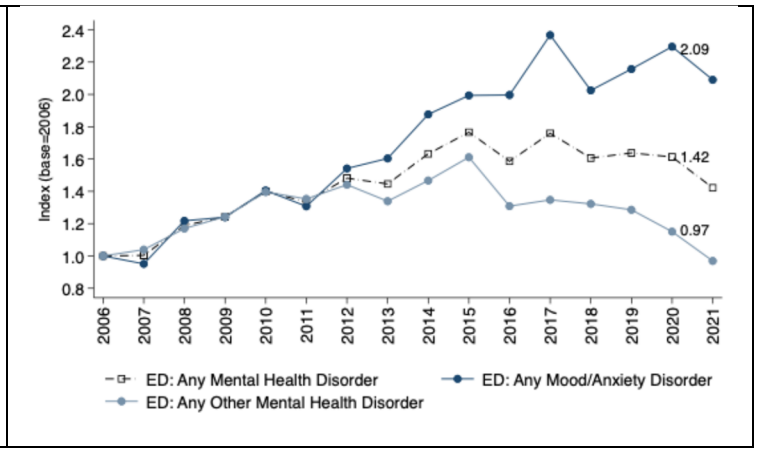
b. Midwest



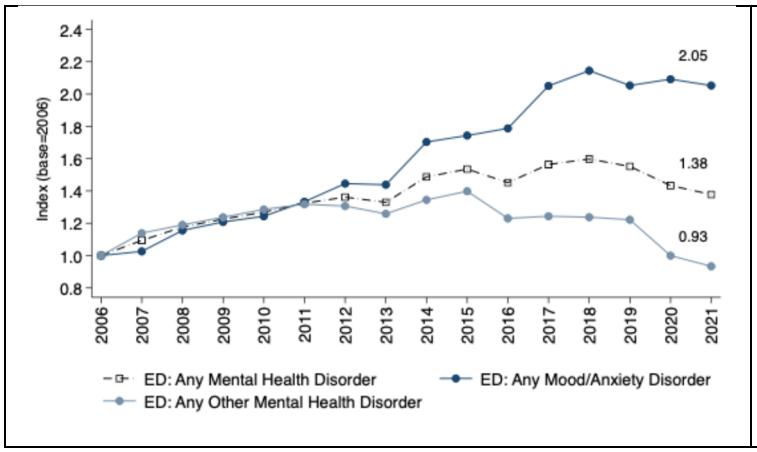
c. South



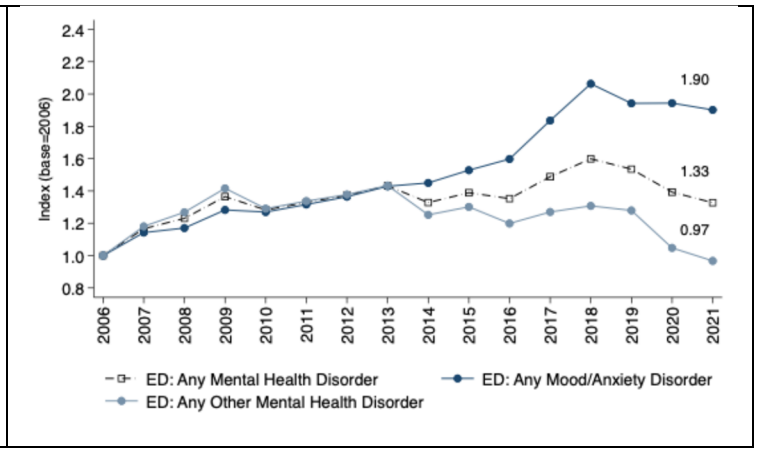
d. West



e. Urban



f. Rural



Notes: 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.

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