

Adverse Childhood Experience of Hospital Patients

Adverse Childhood Experiences (ACEs) are potentially traumatic events that occur in a child's life before the age of 18. ACEs also include aspects of a child's environment that may undermine bonding, safety, and stability. These experiences can have a significant impact on a child's development, well-being, and health outcomes later in life. Studies have consistently reported associations between ACEs and increased risks to physical health and mental health. The greater the number of ACE exposures, the greater the risk to health outcomes.

This study reviews New Jersey hospital patients' data over the 2016-2023 period to isolate ACEs for information they provide on adult health status. The study revealed: 1) There are disparities in ACEs experienced by race/ethnicity and gender; 2) There are differences in physical, mental health and substance misuse experiences of patients who had experienced ACEs compared with those who had not experienced ACEs; 3) The data consistently show that patients with ACEs were associated with worse health outcomes compared with others, and that the share of patients with ACEs within most health indicators is trending up over time.

Literature Review

ACEs include emotional, physical, or sexual abuse and household dysfunction during childhood which may be expressed as verbal abuse, physical abuse, contact sexual abuse, a battered mother, household substance abuse, household mental illness, incarceration of household members, and parental separation or divorce (Brown, Anda, Felitti et al, 2010)¹. Then the list of items included may continue to be refined as more knowledge is acquired through research.

Although several efforts have been made to assess outcomes of ACEs through retrospective reviews of data (Henkhaus, Gonzales, and Buntin, 2022) as well as prospective studies (Brown et al., 2010; Dawid, Patalay and Lacey, 2021), the most common form of getting information has been through primary population surveys. Primary population surveys for such types of study may have their own problems including recall bias and lack of clarity to explain what constituted an adverse experience.

A recent study by Swedo et al. (2023) using 2011-2020 Behavioral Risk Factor Surveillance System (BRFSS) data estimated that nationally, about two-thirds of U.S. adults reported at least one ACE compared to 62% in New Jersey. Women, adults in the age group 25–34, non-Hispanic American Indian or Alaska Native adults, non-Hispanic multiracial adults, adults with less than a high school education, and the unemployed or unable to work had the highest ACEs.

In a study that examined the relationship between ACEs and inequities in adult health care access, Miller-Cribbs et al. (2016) concluded that childhood adversity is correlated with poor adult health outcomes. They found that the more individuals experience ACEs, the more likely they will be to have challenges in accessing health care in adulthood, to be in medical debt, to

¹ CDC (<https://www.cdc.gov/aces/about/index.html>) expresses ACEs as “experienced violence, abuse, or neglect, witnessing violence in the home or community, having a family member attempt or die by suicide, substance use problems, mental health problems, instability due to parental separation, or instability due to household members being in jail or prison”.

lack health insurance, to have gaps in coverage, and to have lower health literacy. Adult health problems Miller-Cribbs et al found as related to childhood adversity include hypertension and obesity. A paper by Merrick et al (2019), using 2015-2017 Behavioral Risk Factor System Survey (BRFSS), found that 15.6% of adults reported four or more types of ACEs. ACEs were significantly associated with poorer health outcomes, health risk behaviors, and socioeconomic challenges. Using meta-analysis of 96 articles that assessed health outcomes associated with the ACEs in the CDC-Kaiser ACE scale, Petrucci et al. (2019) concluded that exposure to multiple ACEs is associated with a wide variety of outcomes.

Scott et al (2021) conducted a systematic review that examined the association between ACEs and blood pressure in women living in the United States. Of the studies that used a self-reported history of hypertension, 60% of them obtained significant associations with ACEs, compared with only 30% of the studies that had objective blood pressure data. Though the self-reported data points to some exaggeration of the association between ACEs and hypertension, 30% of the studies with objective blood pressure measures suggests that ACEs are an important concern for adult health.

Much of the discussion on ACEs assumes that individuals are routinely assessed for symptoms or indications when patients seek help from doctors. To assess that, Maunder et al. (2020) studied the effect of physicians' knowledge and practices regarding screening adult patients for ACEs through a survey and found that only 27.3% of the survey responders reported that they routinely screen for ACEs. The survey further found that 91.3% of psychiatrists reported screening for ACEs "routinely" compared with only 66.3% of family physicians. Further, 77.1% of other specialists reported screening for ACEs only "when indicated" or "never or not usually." Maunder et al. concluded that enhancing knowledge about ACEs' negative influence on physical illness may increase screening. In another study, McBain et al. (2023) made a systematic review on the effect of ACE training, screening, and response in primary care. The authors established that implementing ACEs screening in primary care settings can be challenging. However, although primary care providers have the potential to address ACEs and mitigate their effects, evidence on the impact of ACEs training, screening, and response in primary care is limited.

Antoniou et al. (2023) reviewed documents that explored the effect of adverse childhood experiences on chronic pain and major depression in adulthood through a systematic review and meta-analysis. They concluded that ACEs have been linked to increased multimorbidity, including chronic pain and major depressive disorder (MDD). Further, their study showed that neuroimaging studies have identified functional and structural brain abnormalities in patients with MDD or chronic pain who have been exposed to ACEs, and that childhood maltreatment is associated with altered brain function and structure in individuals with MDD and chronic pain syndromes.

Ahn (2024) argues that there is a correlation between adversities faced in childhood and adulthood with later life psychiatric and cognitive decline. Analyzing data from nearly 3,500 individuals over 24 years, the study concluded that even a single instance of childhood adversity can heighten the risk of mental illness, while adult adversities are linked to both psychiatric disorders and cognitive deterioration. Ahn further estimates that nearly 40% of individuals experience childhood adversity, with the rate growing to almost 80% for adulthood adversity, significantly affecting mental and cognitive health.

A study by Finkelhor (2020) shows a mixed picture of trends in ACEs from the 20th century who documented that several indicators such as parental death, parental illness, sibling death, and poverty had multi-decade declines while parental divorce, parental drug abuse and parental incarceration had multi-decade increases. It remains to be seen if the trend observed by Finkelhor would hold true post COVID-19.

Data

This study examined socio-demographic differences of selected health status indicators between those who have ACEs and those who had no ACEs among patient populations. In addition, short-term trends are presented for their implications. We expect that the findings in this study will raise awareness on the importance of properly documenting ACEs among patients through administrative data such as hospital discharges.

The study used the 2016-2023 database obtained through the New Jersey Hospital Discharge Data Collection System. The database contains the International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM) diagnosis codes. The database, which is primarily designed for billing purposes, contains up to 25 diagnosis and up to 25 procedure codes on each patient. In addition, each patient record contains social and demographic information to help examine disparities by sex, age, race/ethnicity, and other factors.

Method

ICD-10-CM codes were reviewed for indications of experiences such as emotional, physical, or sexual abuse, household dysfunction during childhood which may be expressed as any number of ways including verbal abuse, physical abuse, contact sexual abuse, a battered mother, household substance abuse, household mental illness, incarceration of household members, and parental separation or divorce while still young (Brown, Anda, Felitti et al, 2010). With the help of a coding expert, the ICD-10-CM codes were associated with one of the 10 items of the ACE questionnaire (aceresponse.org). The data was then analyzed using the SAS software program (SAS V9.4), summary measures derived, results exported into Excel tables to further study disparities by demographics, and trends tracked by year.

Following Ahn (2024), who argued that even one adverse childhood experience would have important health implications later in life, we classified the 18 or older patients who have one or more ACEs compared with those who had no ACEs as our key variable for analysis. Though the focus of the study is mostly on inpatients, we provided separate charts for outpatients when some indicators are suspected to be captured in greater frequency among outpatients².

Limitations

ICD-10-CM codes do not specifically identify the age when the ACE event happened except that the patient experienced them while young. It is also known that the extent to which patients are assessed for ACEs may vary by provider and by year. Thus, some of the observed disparities and trends may in part be reflections of such variations.

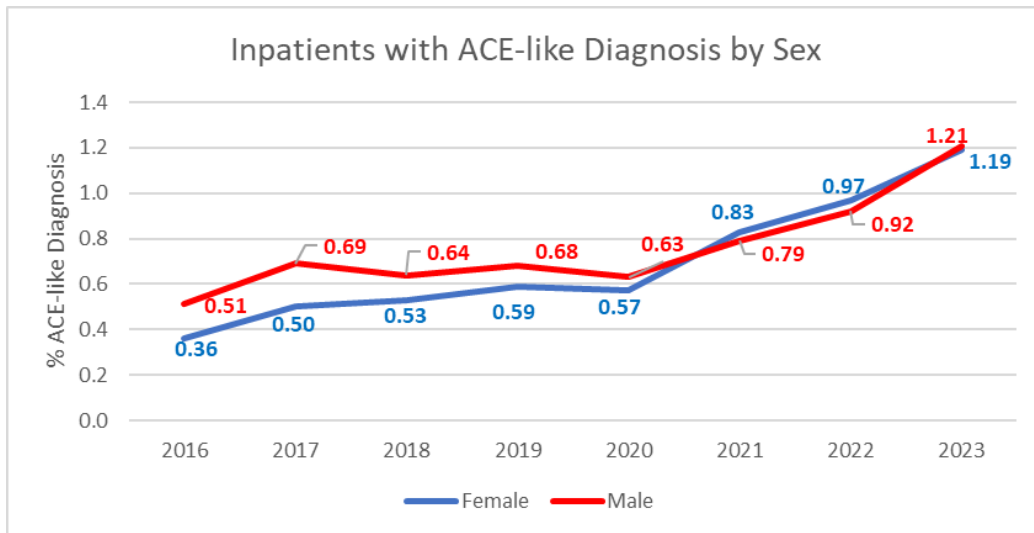
Findings

The following charts and tables show disparities as well as trends over time between those who have ACEs compared to others who have no ACEs. When describing differences between groups, no statistical tests were made beyond showing the magnitudes in each year.

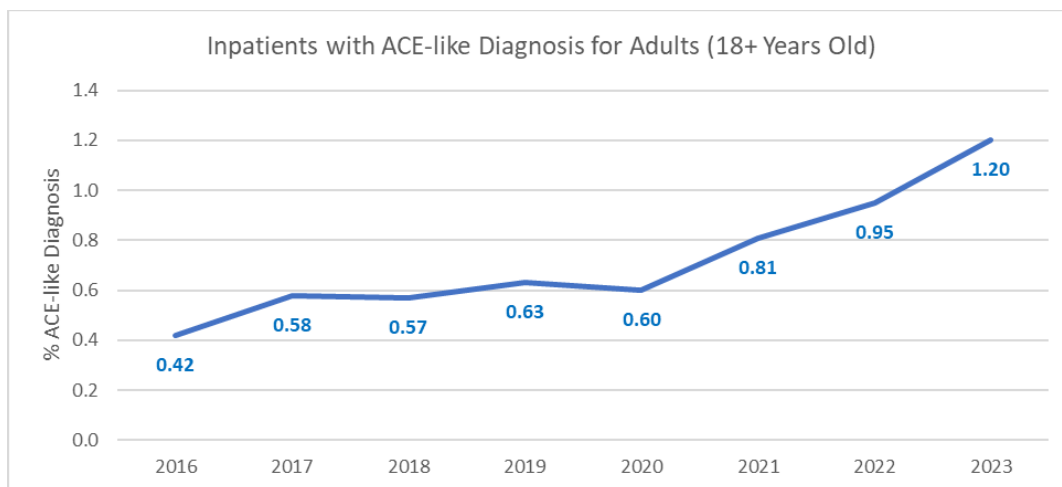
ACE by Sex, Age and Race/Ethnicity

Data show that the percent of inpatients with ACEs has been increasing between 2016 and 2023 both for males and females and that males have higher percent with ACEs compared with females through 2020. The patterns by sex appear to have been reversed after 2020 where the relative magnitudes of females with ACEs tended to be higher compared with males.

² The ACE Questionnaire where Diagnoses Codes were mapped to is provided in Appendix A and the diagnoses codes are available upon request.

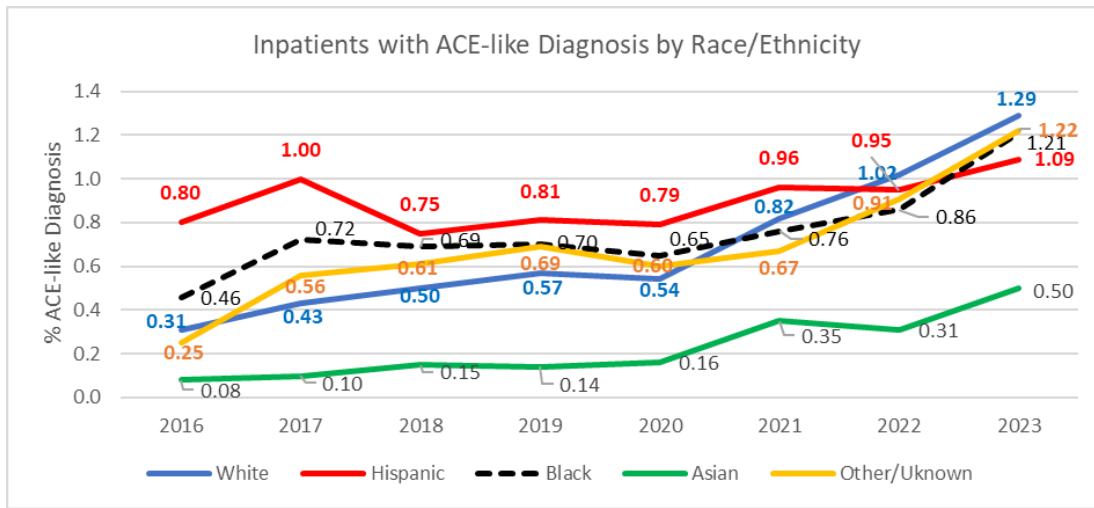


By age, the percentage of inpatients with ACEs has been increasing since 2016 showing a faster increase post 2021.



The overall patterns by race-ethnicity follow similar trend lines as sex and age patterns. However, we observe important differences by race/ethnicity with Hispanics having the highest percentage with ACEs through 2020-2021, and Asians having the lowest percentages with ACEs compared with others. In particular:

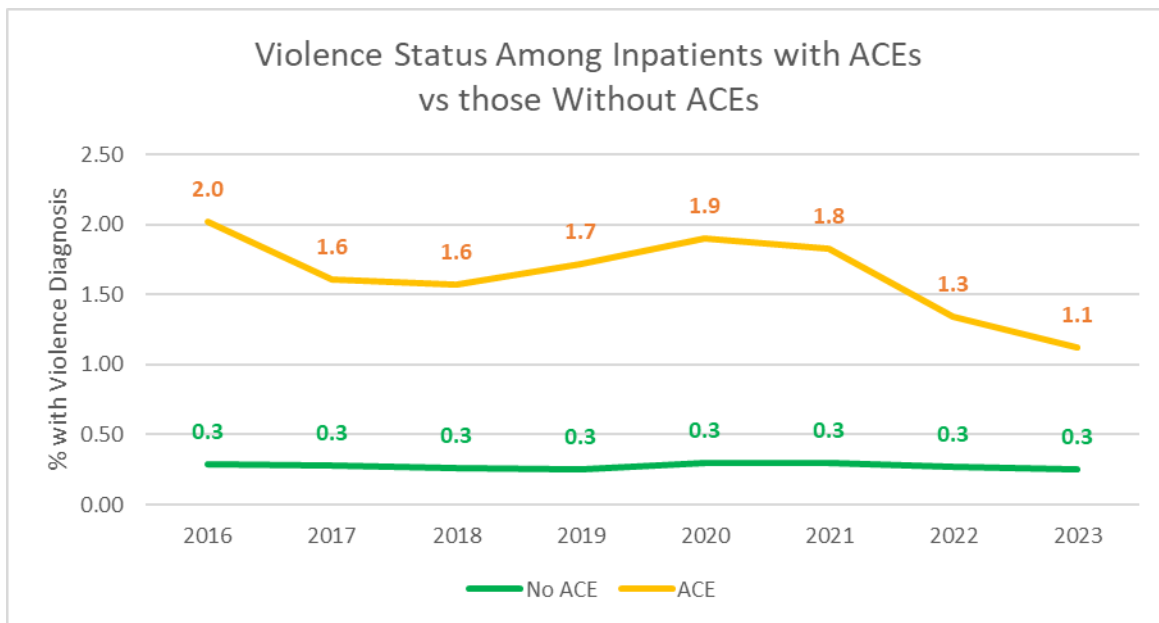
- Since 2020, there has been an increase in ACEs across all race/ethnicities.
- Hispanics have consistently higher percentages of ACEs through 2021 compared to other race/ethnicities, peaking at 1.0% in 2017.
- Whites, Blacks and other/unknown race/ethnicities have seen a surge in ACEs since 2020.
- Whites represent the largest percentage of ACEs in 2023 (1.29%).
- Asians have the lowest percentages with ACEs compared with others.

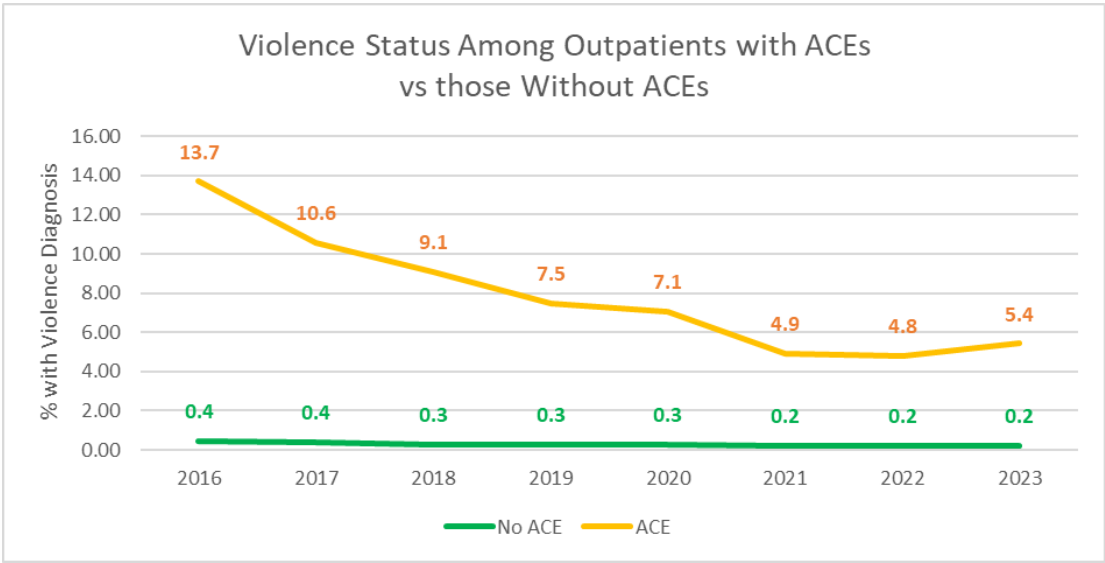


ACE and Violence

The study explored whether any relationship is suggested between ACEs and violence among patients, specifically patients who had a diagnosis of tendencies toward violence. For that, the 18+ patient population was classified into two groups: those patients who had any violence diagnosis and those who had no violence diagnosis. Because some violence diagnosis codes may be reported in greater frequency among outpatients, the study assessed the ACE-to-violence association within patient types.

The data consistently shows that among patients with no ACEs (No ACE/Violence), the percent with violence diagnosis was significantly lower both among inpatients and outpatients compared with patients with ACEs (ACE/Violence).

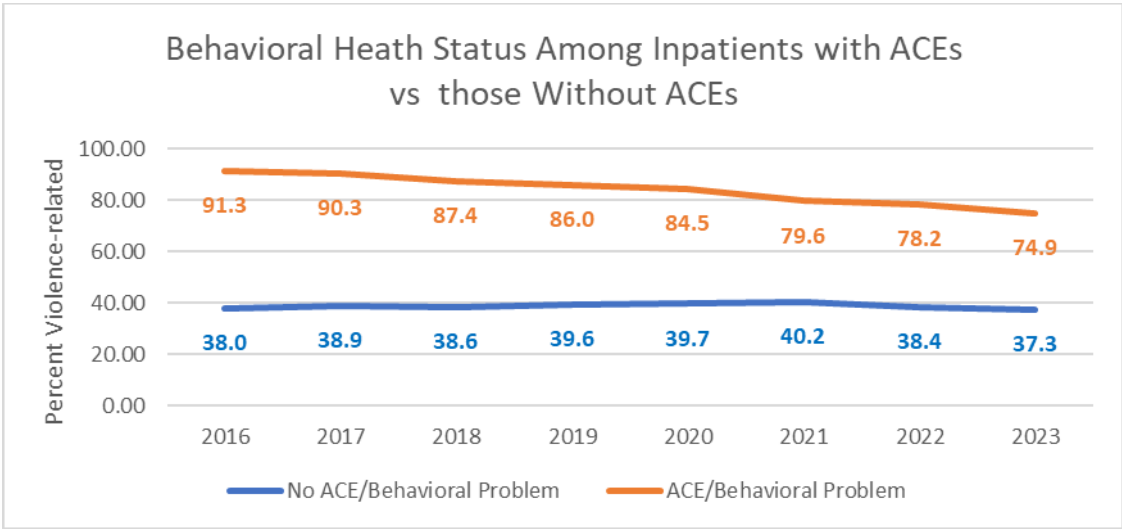


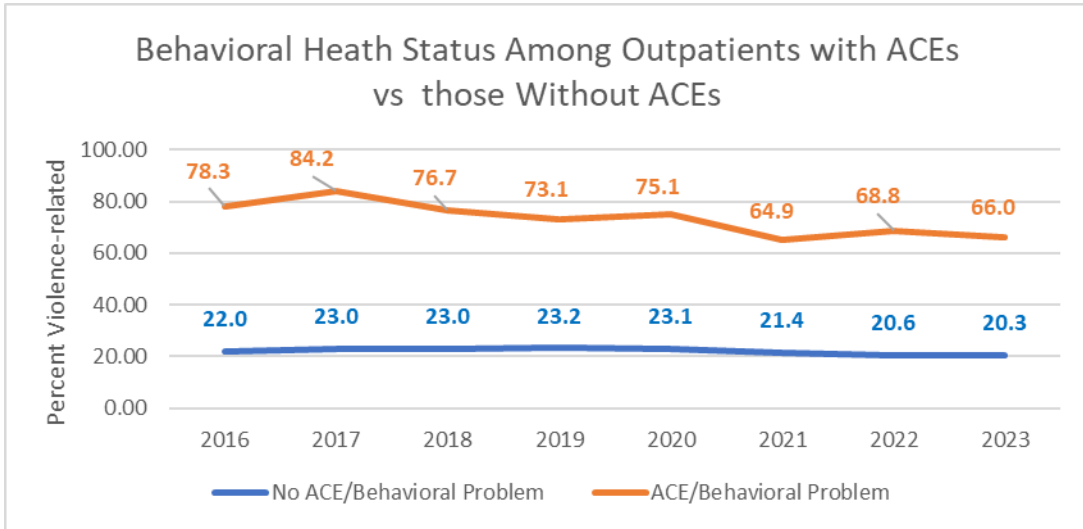


The share of inpatients with ACEs associated with violence was declining until 2017 after which it rose through 2021 but declined after 2021. Comparatively, the share of violence among outpatients continued to decline through 2022 and shows a slight uptick in 2023.

ACE and Behavioral Health Problems

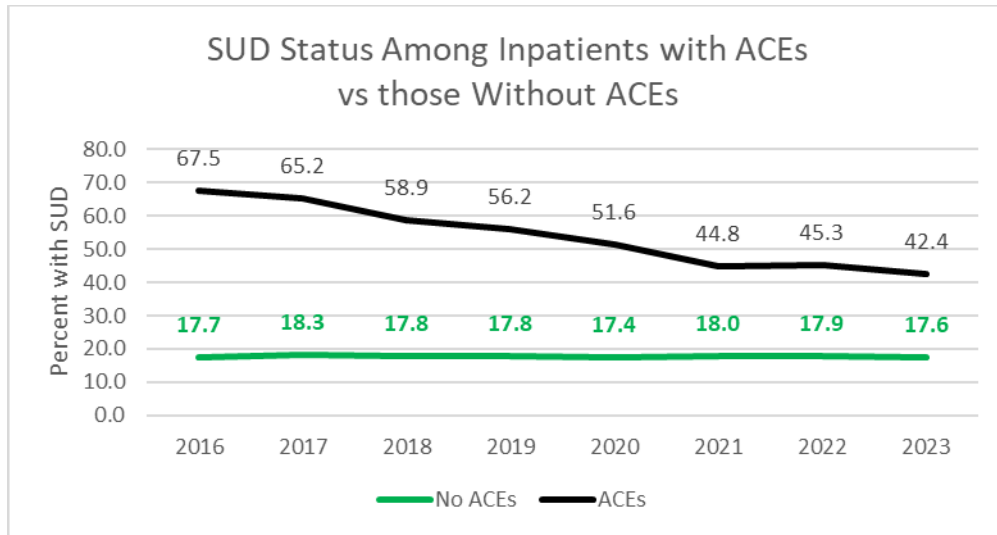
The study also examined the relationship between patients with behavioral problem with ACEs versus those with no ACEs. Among inpatients, those with ACEs were substantively more likely to be diagnosed with the presence of violence (higher percent) compared with those without ACEs. For example, in 2023, 37.3% of inpatients with no ACEs but had behavioral problems (No Ace/Behavioral Problem) were diagnosed with violence compared with 74.9% of similar inpatients with ACE (ACE/Behavioral Problem). Among outpatients, the percentages identified with violence were 20.6% and 66.6%, respectively. The disparity was consistent among patients with depressive disorders as well. This suggests that having ACEs was associated with higher levels of violence among patients with behavioral problems. It is also important to note that the impact of ACEs on violence was consistent year after year.



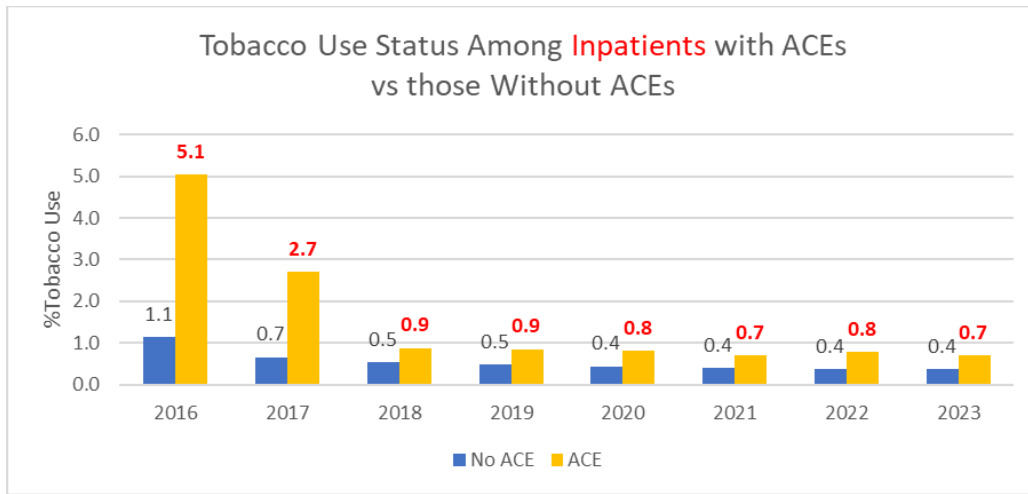


Substance Use Disorder and ACE

The data show that inpatients with ACEs had a much higher percentage with substance use disorder (SUD) than those without ACEs. Despite the decline in the percentage over time, large disparities exist by ACE status.



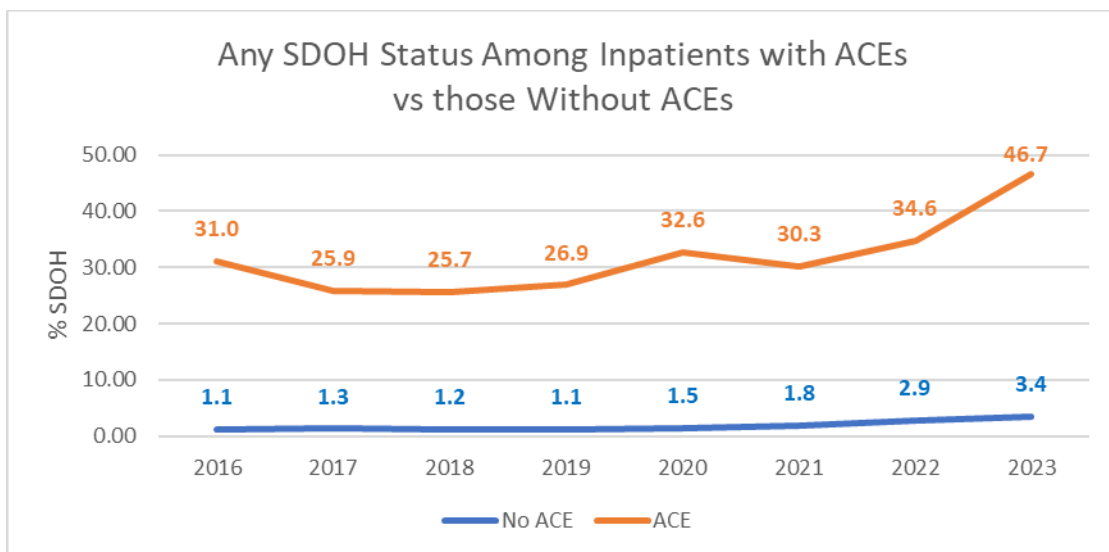
To single out smoking tobacco behavior among inpatients as an example, patients with ACEs had a much higher percent smoking tobacco compared to those without ACEs.



ACEs and Social Determinants of Health

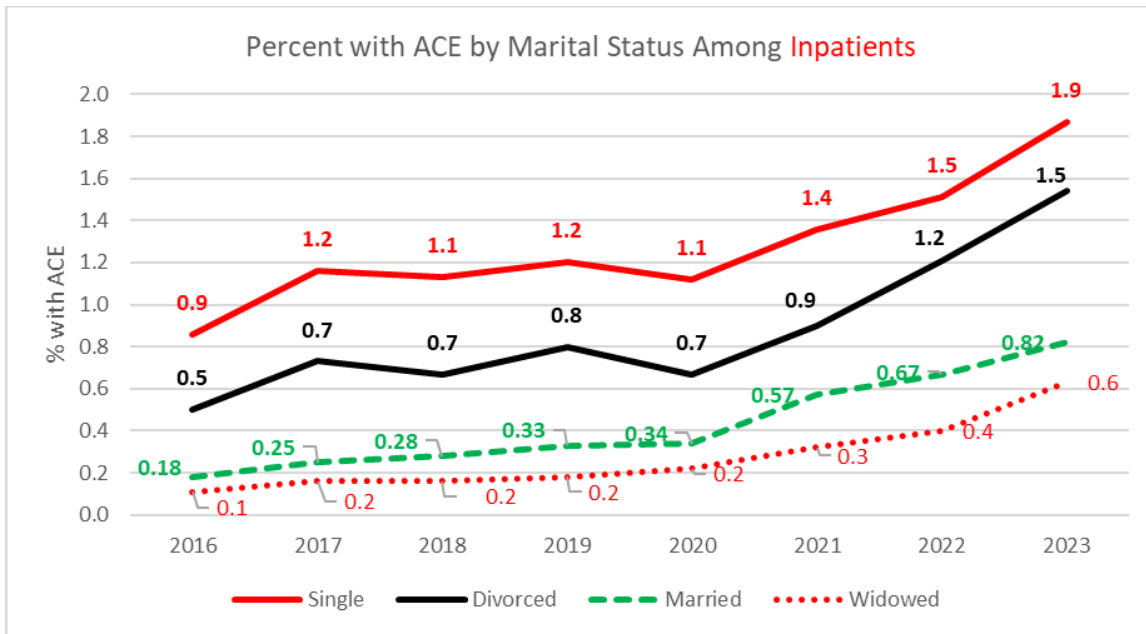
We examined additional social determinants of health (SDOH) indicators to assess disparities by ACE status. Although some SDOH indicators are under-reported because of recent implementation (or introduction) of some SDOH codes, the findings below are found to be informative.

We estimated that 46.7% of patients with at least one ACE also have SDOH indicators compared with 3.4% of patients without ACE. Despite the recent emphasis to capture additional SDOH indicators which might have contributed to some of the rise in the percentage share, there is a significant difference in the percentage with SDOH indicators between those with ACEs and those without ACEs. For example, in 2017, of those without ACEs (NO ACE) 1.3% were identified with SDOH compared with 25.9% of those with ACE, for an absolute difference of 24.6%. By comparison, in 2023, the differential has grown even more to 3.4% and 46.7%, respectively, for an absolute difference of 43.3%.



Marital Status and ACE

The report explored the extent to which ACEs may have impacted marital status by examining trends among the single, married, divorced, and widowed. The data show that the percent with ACEs has been rising over time within each of the marital status categories with the speed of incline being faster post-2020 compared to earlier years, with spikes observed in the single and divorced populations. For any given year, the percent with ACEs is the highest among the single, followed by the divorced and then married. The widowed had the lowest percentage among marital groups though closer to the married in magnitude. As an example, in 2023, 1.9% of the single, 1.6% of the divorced, 0.82% of the married, and 0.6% of widowed people had at least one ACE. Judging from the high and fast rising percentages of the shares of patients with ACEs among the single and divorced, it appears that marital status is negatively impacted by ACEs.



Quantifying the Relationship of ACEs with Social and Health Indicators

As one measure of strength and direction of relationship, we used the correlation between ACEs and a host of indicators explored earlier in this report with a few more additions. The findings were strikingly similar on the signs of the correlation coefficients (i.e., whether they were correlated negatively or positively), and the corresponding statistical significance tests except for one indicator³. Violence, asthma, substance use disorder, overdose, tobacco use, mental health problems, and having any SDOH were positively correlated with having ACEs while age, chronic obstructive pulmonary disease Type 2 diabetes were negatively correlated with ACEs.

Consistent with the sharp rise in the percent of individuals identifying as single among inpatients with ACEs, the correlation between ACEs and the single marital status was positive as was the correlation with the divorced marital status.

³ Sex was not correlated with one plus ACEs but was negatively correlated with two or more ACEs. This may be purely due to the larger number of patients included in the one plus ACEs group compared with two or more ACEs.

Conclusions and Recommendations

This report explored whether ACEs could adequately be assessed on patients presenting to the hospital and whether patients assessed with ACEs exhibit disparities in health, social and demographic indicators. We were able to identify patients with ACEs and were also able to establish important differences in the social, health and demographic indicators by whether the patient experienced ACEs. Patients with ACEs were also more likely to have substance use disorders, to smoke tobacco, and to have SDOH problems. The percentages of patients with ACEs also varied by race/ethnicity, and marital status. This study concludes that (1) ACEs vary by race/ethnicity with the greatest percentage in 2023 reported by Whites (1.29%) followed by Blacks and Other/Unknown (1.21% each), (2) ACEs continued to increase over time among females and males, (3) ACEs by marital status were most observable among those with the marital statuses of single or divorced, and (4) a higher percentage of adult patients with ACEs were associated with violence and behavioral health problems compared with those who had no ACEs.

The findings suggest that providers should be educated on and make inquiries about ACEs when treating patients and that hospital discharge data could be a very useful resource to study the impacts of ACEs on population health.

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