**National and State-level Prevalence of Adverse Childhood Experiences in the US: National Survey of Children’s Health 2016-2020**

Background

Adverse childhood experiences (ACEs) are traumatic events such as abuse, neglect, or violence exposure that one experiences during childhood. Prior studies have used single year survey data to estimate ACEs prevalence. We expand on this prior work to provide more accurate and reliable estimates of the prevalence of ACEs exposure in the US and across states.

Objectives

To (i) estimate the prevalence of ACEs exposure among US children, overall and by age, sex, and racial/ethnic groups, and (ii) assess state-level prevalence of ACEs exposure

Methods

We used 5-year combined data from National Survey of Children’s Health (NSCH) from 2016-2020 (Unweighted N = 174,551; Weighted N = 73,222,987). Nine ACEs (parental divorce, parental death, economic hardship, household incarceration, household substance abuse, household mental illness, domestic violence witness, neighborhood violence witness, and racial/ethnic discrimination) were studied. The prevalence estimates of 4+ ACEs exposure were calculated and compared across subgroups and states.

Results

The national prevalence of 4+ ACEs was 5.41% [95% CI: 5.17%, 5.65%]. There was an age gradient with higher prevalence among older children. The prevalence did not differ by sex. Non-Hispanic Blacks and non-Hispanic others had the highest prevalence of ACEs, followed by Hispanics, non-Hispanic Whites, and non-Hispanic Asians. States with the highest prevalence included Arkansas, Montana, New Mexico, and states with the lowest prevalence included New York, New Jersey, Massachusetts. Parental divorce and economic hardship were the most common types of ACEs.

Conclusion

The study provides updated national and state-level prevalence of ACEs exposure among US children.

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**Introduction**

Adverse childhood experiences, or ACEs, refer to the traumatic events that occur during childhood, particularly around 0-17 years. [1] Negative childhood experiences have become more prevalent in the US in the current years. [2]. The consequence of ACE is very harmful in terms of physical and mental health [3][4], adult behavior [5], safety [6], and workplace inefficiency [7]. In terms of physical and mental health, ACE links with sleep disorders [8], heart diseases [9], liver disease [10], neural deformation [11], etc. In terms of mental health, the consequence is far more adverse, leading to trauma [12], hallucination [13], paranoia [14], adult criminality [15], and more.

Because of the adverse nature of ACE, many studies have been done so far. The studies try to find out the pattern between various demographic factors and the prevalence of multiple forms of ACE, such as violence exposure [16, 17], abuse [18], neglect [19], etc., and then assess the aftereffects of ACE.

To the best of our knowledge, the studies done so far have multiple limitations. First, a holistic analysis of all or at least most of the ACE forms is not studied in a single study. Therefore, the severity comparison of the forms of ACE is yet to be understood. Secondly, the analysis of the comparison of various ACE forms over different years is even rarer to find out. Thus, the pattern of various ACE forms over other demographic groups concerning time is still unknown. Thirdly, the prior studies cover either a particular state or the whole nation for their results, but no studies compare the severity of the state and the national level.

To overcome such limitations of the ACE study, in this paper, we have presented a multi-year, multi-form ACE prevalence study on both state and national levels. The main objectives of this study are to estimate the prevalence of ACEs exposure among US children overall. By age, sex, and racial/ethnic groups, assess state-level vs. national-level prevalence of ACEs exposure and extend this study to a multi-year comparison.

In this paper we aim to (i) assess prevalence of the adverse childhood experiences in the US, overall and by age, sex, and racial/ethnic groups, and (ii) assess state-level prevalence of the ACEs

**Methods**

**Data**

We used data from the National Survey of Children's Health (NSCH). The NSCH is a mail-based and web-based nationally representative sample survey of civilian, non-institutionalized children aged 0-17 years by the US Census Bureau and sponsored by the Maternal and Child Health Bureau of the Health Resources and Services Administration (MCHB HRSA). The NSCH collects data on health and well-being of children and adolescents including access to care, and family and neighborhood/community characteristics from all 50 states and the District of Columbia (DC). The NSCH uses a complex weighted survey design to allow for representative sample of US children. A child is randomly selected from a household after household screener (which identifies household with at least one child between the ages of 0–17), and a parent/adult caregiver with knowledge of the child’s health and health care fills out the topical questionnaire. The survey has been used to provide national-level estimates of several child health indicators. By combining multiple years of data (2 or 3 years), the survey can be used to provide reliable state-level estimates. Since 2016, the NSCH has been conducted yearly. Additional information regarding the survey and sample methodology can be found on the Data Resource Center for Child & Adolescent Health website (DRC) (<http://www.childhealthdata.org/learn/NSCH>). We combined five years of survey data from 2016 to 2020 for this study. The unweighted sample size and the population represented by the sample for each NSCH survey year is shown in Table 1.

**ACEs measures**

The NSCH collects information on nine types of ACEs. This includes the five items that make up the conventional household dysfunction domain of the ACEs from the original ACE study – household mental illness, household substance abuse, household incarceration, witnessing domestic violence, and parental divorce. The four additional items include parental death, economic hardship, racial/ethnic mistreatment, and witnessing neighborhood violence. These additional items were developed by a Technical Expert Panel based on a review of life course stressors on children’s lives (). Over the course of years, the literature on ACEs have expanded to capture the community contexts and social stressors which has been described as expanded ACEs (). The specific questions in the NSCH are available in the Appendix Table 1. All ACEs items except economic hardship have a ‘Yes/No’ dichotomous response options, and the measures/wording of questions were consistent across the study years. For economic hardship item, there was changes in the wording of the question from 2018 (Appendix Table 1); however, the response options were the same --. never, rarely, somewhat often, and very often. A response of ‘somewhat often’ or ‘very often’ were coded as having an ACE. In 2020 NSCH, a new item was included under ACEs that asks whether children aged 6-17 years were treated or judged unfairly due to sexual orientation or gender identity. This item is not included in this study. The NSCH also does not collect information on two conventional domains of ACEs – experience of abuse (physical, sexual, or psychological) and experience of neglect (physical or emotional).

**Analysis**

We present 5-year estimates of the prevalence of adverse childhood experiences in the US and 50 states, overall and by age, sex, and race/ethnicity. Multi-year data were used to improve precision of state-level estimates and subgroup analyses (). To adjust for gender and race/ethnicity distributions of children in the United States, as well as to adjust for nonresponses, all analyses used survey sampling weights, cluster, and [stratum](https://www.sciencedirect.com/topics/social-sciences/stratum) as instructed by the NSCH codebook. A combined 2016-2020 survey weight was created by dividing each individual survey weight by number of years combined so that the estimates are based on average midpoint population (). Additional information on the analysis of multiple years of NSCH data is available on the DRC website ().

We first summarized the age, sex, and race/ethnicity distribution of respondents for each year and combined. Then, using the combined 2016-2020 data, we calculated weighted proportion for all individual ACEs. By summing the dichotomous responses of nine ACEs items, we created a cumulative ACEs score. ACEs scores range from 0 to 9, with higher scores indicating exposure to greater number of adversities. Based on the ACEs literature, we present weighted proportion of children with ACEs scores of ≥1, ≥2 and ≥4 (). We then presented mean ACEs score, and weighted proportion of 1+, 2+ and 4+ ACEs along with corresponding 95% confidence intervals by respondent characteristics. We used forest plot to visualize prevalence of 4+ ACEs in each of the 50 states and DC. To infer significant differences in means and proportions between groups, we use rule of eye and compare 95% CIs of two coefficients to see if they overlap. If the CIs do not overlap, then the p-value comparing the two groups is at least below the level of significance i.e., ≤0.01. This method is sufficiently accurate when sample size for each group is at least 10, and when the two intervals do not differ in width by more than a factor of 2 ().

All analyses were conducted using R v4.0.3 software. This study was designated as exempt by the [name] institutional review board.

In addition to age, sex, and race/ethnicity, we also present estimated weighted proportions of 4+ ACEs by annual household income, employment status, educational attainment, sexual orientation, and four geographical regions- classified by the U.S. Census Bureau as our supplementary analyses.

**Results**

The distribution of age, sex and race/ethnicity were similar across survey years. A total of 174,551 children and adolescents aged 0-17 years (weighted N = 73,222,987) were analyzed. Across all survey years and combined 2016-2020 period, the mean age of the participants was approximately 8.6 years (SD=5.1). About 32% were five years or younger and 34% were between 6 and 11 years of age. About 49% were females. In terms of race/ethnicity distribution, 51% were non-Hispanic White, 25% were Hispanic, 13% were non-Hispanic Black, and 5% were non-Hispanic Asian (Table 1).

Table 1: Age, sex, and race/ethnicity distribution of the participants by year of survey

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | NSCH -- year of survey | | | | | NSCH 2016-2020 |
| 2016 | 2017 | 2018 | 2019 | 2020 |
| N, unweighted | 50,212 | 21,599 | 30,530 | 29,433 | 42,777 | 174,551 |
| N, weighted | 73,350,040 | 73,424,383 | 73,433,138 | 73,133,076 | 72,774,300 | 73,222,987 |
| Age in years, mean (SD) | 8.60 (5.15) | 8.61 (5.16) | 8.64 (5.16) | 8.66 (5.15) | 8.69 (5.14) | 8.64 (5.15] |
| Age <= 5 years | 32.32% | 32.27% | 32.12% | 32.10% | 31.98% | 32.20% |
| Age 6 to 11 years | 33.85% | 33.87% | 33.81% | 33.57% | 33.37% | 33.70% |
| Age 12 to 17 years | 33.83% | 33.86% | 34.07% | 34.33% | 34.65% | 34.10% |
| Female | 48.94% | 48.87% | 48.89% | 48.87% | 48.89% | 48.90% |
| Male | 51.06% | 51.13% | 51.11% | 51.13% | 51.11% | 51.10% |
| Hispanic | 24.54% | 24.94% | 25.24% | 25.64% | 25.67% | 25.20% |
| Non-Hispanic White | 51.89% | 50.96% | 50.51% | 50.21% | 50.06% | 50.73% |
| Non-Hispanic Black | 12.71% | 13.40% | 13.37% | 13.29% | 13.29% | 13.21% |
| Non-Hispanic Asian | 4.52% | 4.65% | 4.75% | 4.52% | 4.62% | 4.61% |
| Non-Hispanic Other | 6.34% | 6.05% | 6.14% | 6.34% | 6.36% | 6.24% |

Note: Percentages presented in the table are weighted percentages.

Parental/guardian divorce or separation (%) and economic hardship (%) were the most prevalent types of ACEs the children and adolescents had exposure to. About % of children had lived with someone who had a problem with drugs or alcohol, and % of children had lived with someone who was mentally ill, suicidal, or depressed. Similarly, % of children had lived with parent or guardian who served time in jail, and % of children had seen or heard parents or adults slap, hit, kick, punch one another in the home. Less than five percent of children were treated or judged unfairly because of his or her race or ethnic group (%), were a victim of violence or witnessed violence in the neighborhood (%) or had a parent or guardian who died (%) (Figure 1).

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Figure 1: Prevalence of different ACEs among US children and adolescents, 2016-2020

Table 2 shows the mean number of ACEs, and the prevalence of 1+, 2+, and 4+ ACEs for overall sample, and by age group, sex, and race/ethnicity. The mean number of ACEs experienced by children was 0.81 [95% CI: 0.80, 0.82]. The prevalence of 1+, 2+ and 4+ ACEs were 43.2% [95% CI: 42.7%, 43.7%], 18.9% [95% CI: 18.5%, 19.3%] and 5.41% [95% CI: 5.17%, 5.65%] respectively.

Age group showed a graded relationship with ACEs exposure, with higher age groups experiencing significantly greater number of ACEs. Those aged 12-17 years had the highest prevalence of 4+ ACEs (8.1%; 95% CI: 7.6%, 8.6%), followed by 6-11-year-olds (5.8%; 95% CI: 5.4%, 6.3%) and ≤5-year-olds (2.1%, 95% CI: 1.9%, 2.4%). There was no significant difference in prevalence of ACEs between males and females. Non-Hispanic Black had the highest mean ACEs score, followed by Non-Hispanic Other and Hispanic. The prevalence of 4+ ACEs was also significantly higher among Non-Hispanic Black (7.9%; 95% CI: 7.0%, 8.9%) and Non-Hispanic Other (9.1%; 95% CI: 8.0%, 10.1%) compared to Non-Hispanic White (4.8%; 95% CI: 4.6%, 5.0%) and Hispanic (5.2%; 95% CI: 4.6%, 5.9%). Non-Hispanic Asian had the lowest prevalence (0.92%; 95%CI: 0.48%, 1.58%) (Table 2).

[Add a paragraph from appendix, summary of each ACE item by age, sex, race/ethnicity]

Table 2: Prevalence of 1+, 2+ and 4+ ACEs among US children and adolescents, NSCH 2016-2020

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Mean ACEs score [95% CI] | 1+ ACEs  [95% CI] | 2+ ACEs  [95% CI] | 4+ ACEs  [95% CI] |
| All | 0.81 [0.80, 0.82] | 43.2 [42.7, 43.7] | 18.9 [18.5, 19.3] | 5.41 [5.17, 5.65] |
| Age ≤ 5 years | 0.48 [0.46, 0.50] | 35.7 [34.7, 36.6] | 9.95 [9.35, 10.58] | 2.11 [1.86, 2.39] |
| Age 6 to 11 years | 0.85 [0.82, 0.88] | 44.0 [43.1, 45.0] | 20.1 [19.4, 20.9] | 5.82 [5.38, 6.30] |
| Age 12 to 17 years | 1.08 [1.05, 1.11] | 49.4 [48.5, 50.3] | 26.1 [25.3, 26.8] | 8.08 [7.61, 8.57] |
| Female | 0.81 [0.79, 0.83] | 43.4 [42.6, 44.2] | 19.0 [18.4, 19.6] | 5.42 [5.08, 5.78] |
| Male | 0.81 [0.79, 0.83] | 43.0 [42.2, 43.7] | 18.8 [18.2, 19.3] | 5.39 [5.06, 5.73] |
| Hispanic | 0.84 [0.80, 0.88] | 44.7 [43.2, 46.2] | 19.3 [18.2, 20.5] | 5.24 [4.63, 5.88] |
| Non-Hispanic White | 0.72 [0.71, 0.73] | 41.0 [40.4, 41.5] | 16.7 [16.3, 17.2] | 4.80 [4.56, 5.04] |
| Non-Hispanic Black | 1.14 [1.10, 1.19] | 51.2 [49.6, 52.9] | 27.8 [26.4, 29.3] | 7.92 [7.04, 8.87] |
| Non-Hispanic Asian | 0.32 [0.28, 0.35] | 31.7 [29.7, 33.7] | 6.02 [5.02, 7.13] | 0.92 [0.48, 1.58] |
| Non-Hispanic Other | 1.08 [1.02, 1.14] | 46.9 [45.2, 48.6] | 25.5 [24.0, 27.0] | 9.07 [8.03, 10.19] |

Figure 2 shows the prevalence of 4+ ACEs and 95% CIs among children across states. The dotted line represents the prevalence of 4+ ACEs in the US. Among states, Arkansas had the highest prevalence of 4+ ACEs (%), and New Jersey had the lowest prevalence (%). Other states with significantly higher prevalence of 4+ ACEs than the national prevalence were Montana (%), Wyoming (%), New Mexico (%), Oklahoma (%), West Virginia (%), Alaska (%), Arizona (%), Mississippi (%), Kentucky (%), Maine (%), Ohio (%), Wisconsin (%), South Dakota (%), Idaho (%), Tennessee (%), Missouri (%), Indiana (%), Kansas (%), and Colorado (%). Similarly, states with prevalence of 4+ ACEs significantly lower than the national prevalence were New York (%), Massachusetts (%), Maryland (%), California (%), Hawaii (%), New Hampshire (%), and Connecticut (%).

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Figure 2: Proportion of children and adolescents with 4 or more ACEs in the US States

**Discussion**

[Summary and interpretation of main findings]

[Comparison to prevalence from past studies]

[Implications of the findings]

[What this study adds]

[Limitations]

**References**

**Appendix**

A

|  |  |  |
| --- | --- | --- |
| **ACE item** | **NSCH question** | **Response options** |
| Parental divorce | To the best of your knowledge, has this child EVER experienced any of the following? *Parent or guardian divorced or separated* | * Yes * No |
| Parental death | To the best of your knowledge, has this child EVER experienced any of the following? *Parent or guardian died* | * Yes * No |
| Household incarceration | To the best of your knowledge, has this child EVER experienced any of the following? *Parent or guardian served time in jail* | * Yes * No |
| Witnessing domestic violence | To the best of your knowledge, has this child EVER experienced any of the following? *Saw or heard parents or adults slap, hit, kick, punch one another in the home* | * Yes * No |
| Witnessing neighborhood violence | To the best of your knowledge, has this child EVER experienced any of the following? *Was a victim of violence or witnessed violence in their neighborhood* | * Yes * No |
| Household mental illness | To the best of your knowledge, has this child EVER experienced any of the following? *Lived with anyone who was mentally ill, suicidal, or severely depressed* | * Yes * No |
| Household substance abuse | To the best of your knowledge, has this child EVER experienced any of the following? *Lived with anyone who had a problem with alcohol or drugs* | * Yes * No |
| Racial mistreatment | To the best of your knowledge, has this child EVER experienced any of the following? *Treated or judged unfairly because of their race or ethnic group* | * Yes * No |
| Economic hardship | SINCE THIS CHILD WAS BORN, how often has it been very hard to cover the basics, like food or housing, on your family’s income?\* | * Never * Rarely * Somewhat often * Very often |

\* The wording of the item prior to NSCH 2018 was as follows ‘SINCE THIS CHILD WAS BORN, how often has it been very hard to get by on your family’s income – hard to cover the basics like food or housing?’

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Age vs cumulative #ACEs

Gender by age interaction

Age by race/ethnicity

Step 1:

Baseline information will be compared across exposures i.e., between those who experienced ACEs and those who did not experience ACEs using chi-square tests for categorical and ANOVAs for continuous variables.

Step 2:

Similarly, baseline information will be compared between those who died and those who are alive to test for unadjusted associations with outcome. The percentage of respondents within each ACE category will also be tabulated by mortality status.

Step 3:

A univariate Cox proportional hazard model will be developed to examine whether exposure to ACEs is associated with overall survival.

Step 4:

Unadjusted survival curves will then be plotted from the univariate Cox model stratified by ACE score categories.

Step 5:

Multivariable Cox proportional hazard models will be constructed. At first stage, demographic variables, including age, sex, and race/ethnicity will be included in the model. Then, demographic variables and socio-economic variables will be added to the model. The final model will include demographic variables, socio-economic variables, and comorbidities. Cox proportional hazards regression models will be used to calculate all-cause mortality. Exposure to ACEs will treated as time-invariant variable, with Wave I interview date as the beginning of the study in which ACEs are reported.

Univariate and multivariable survey Cox regression models will be used to estimate the hazard ratio for ACEs, adjusting for demographic variables including age, gender, race, education, marital status, household income, and comorbidity variable.

The unadjusted and adjusted Cox proportional hazard models will be run with no ACEs as the reference category.

Adjusted hazard ratios and 95% CIs will be reported.

Cox proportional hazards regression models will be used to estimate hazard ratios (HRs) and 95% CIs, adjusted for baseline sociodemographic, economic, and behavioral risk factors. Models will evaluated for the full cohort and stratified by age, sex and race. variations in survival with performer type, and in cause of mortality with exposure to adverse childhood experiences.

DAG

Follow up

Although data on most of the ACE items is collected at Wave I, data on abuse, physical neglect, and household member incarceration are collected at Wave III or Wave IV. The start date of follow-up is the date the interview was conducted for Wave I. Follow-up time will be calculated as the difference between the baseline (Wave I) interview date and the date of death for decedents (n=540) (survival time) and as the difference between the baseline interview date and December 31, 2019, for those alive (*n*=20,205).

Follow-up time “at-risk period” starts after assessment of exposure. But because different ACE items (exposures) are measured at different Waves throughout I-IV, with some items such as abuse, and physical neglect assessed retrospectively in Wave III or IV. Participants are at risk of mortality from the beginning of the study. Participants remained in the cohort until death or censoring (loss to follow-up or the end of the study period).

As a robustness check, the data will be re-analyzed using propensity score models ([Morgan, 2001](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6123019/#R56); [Rosenbaum and Rubin, 1983](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6123019/#R69)). A logit model with dichotomized ACEs exposure (yes vs no) as the outcome variable will be run to obtain propensity score (predicted probability of being selected in the study) for each individual. The covariates for the model will include variables measured in the study that are associated with mortality outcome. Then, each individual will be provided weight of the inverse of the probability of treatment, also known as inverse probability of treatment weighing. The calculated weights will then be stabilized using proportions in the exposed and unexposed. Robust sandwich estimation of standard errors will be used to account for weights in the model. Inverse probability weighting (IPW) technique creates pseudo-population for analysis, and is often used to control for selection bias [**23**](https://obgyn.onlinelibrary.wiley.com/doi/10.1111/aogs.13319#aogs13319-bib-0023), [**24**](https://obgyn.onlinelibrary.wiley.com/doi/10.1111/aogs.13319#aogs13319-bib-0024).

IPW analysis does not address unknown or unmeasured factors that influence selection. IPW might, however, be particularly useful when exposure information is available for everyone (for example from registers or publicly available records) as the possible direct influence of exposure on selection can be adjusted using IPW but cannot be removed by adjusting for other covariates. Moreover, IPW techniques can also address situations such as the DAG to the left in Figure [**6**](https://obgyn.onlinelibrary.wiley.com/doi/10.1111/aogs.13319#aogs13319-fig-0006) because it does not require conditioning on C in the analysis, but rather creates a pseudo-population where C will no longer affect selection.

Cox proportional hazards regression will be used to estimate the risk of mortality from all causes at age ≤43 years. To examine cumulative risk effects, ACE scores will be analyzed as a continuous variable (0-11 ACEs) and as a categorical variable (0, 1, 2, 3, and 4+ ACEs) in Cox regression models. The hazard rate ratio for premature mortality will be calculated for ACE score of 1, 2, 3, and ≥4 compared to an ACE score of 0. Multivariable-adjusted models will be run to examine relationship between ACEs and premature death while controlling for potential confounders. The covariates will be checked for multicollinearity before including in the final models. The covariates will also be assessed for proportional hazards assumption using log-log survival curves. To control for violation of the PH assumption, the variables which violate PH assumption will be interacted with proportional hazard of death at each age. All confounders and exposure of interest variables will be fixed across time as they are measured at one time point during Wave I-IV.

There has been differential attrition by gender, age, socioeconomic status, urban residence, immigrant status and race across time, with higher response rates for female, younger, higher socioeconomic status, urban, native-born, and White respondents at Waves III and IV. These attrition patterns are consistent with most longitudinal cohort studies. Add Health response rates exceed other national studies with multiple year intervals between waves (e.g. National Survey of Families and Households 2001–03 wave had a 55% response rate; Midlife in the United States 2004–06 interview had a 75% retention rate).5,6

At each wave, Add Health analyzed whether patterns of attrition pose any bias to estimates of survey outcomes.7–10 In general, non-response analyses compare respondents and non-respondents on a range of demographic, health, behavioral and attitudinal indicators measured at baseline, and estimate the extent to which differences between respondents and non-respondents introduce bias in study results. Results indicated that total and relative biases, remaining after study estimates were adjusted with final sampling weights, were minimal and that the sample at each wave adequately represented the same population as the Wave I sample. Analysis of bias due to attrition at Wave IV indicated low rates of bias that rarely exceeded 1%, which is small relative to the 20% to 80% prevalence rates for most of the baseline indicators. Despite common patterns of attrition over time, the design strategy to re-interview the original Wave I cohort at each follow-up wave minimizes non-response bias and continues to adequately represent the original cohort of 7-12th graders in US schools in 1995.

Table shells

Adverse mental health profiles differ based on ND characteristics. Identifying these burdens in subpopulations at increased risk may facilitate targeted prevention and intervention efforts through partnerships among agencies that serve ND populations to address the growing burden of mental health disorders

Table 1: Prevalence of mental and behavioral problems among children and adolescents by ACEs

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Overall  (%) | Depression (%) | Anxiety  (%) | OD  (%) | ADHD  (%) | Any MBP (%) |  |  |
| Unweighted N |  |  |  |  |  |  |  |  |  |
| Weighted N |  | # total children | # children with depression |  |  |  |  |  |  |
| Mean ACEs score |  |  |  |  |  |  |  |  |  |
| # ACEs category |  |  |  |  |  |  |  |  |  |
| 0 |  | % with no ACEs among total children | % with no ACEs among those with depression (or % depression among those with 0 ACEs) |  |  |  |  |  |  |
| 1 |  |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |
| 4+ |  |  |  |  |  |  |  |  |  |
| ACEs items |  |  |  |  |  |  |  |  |  |
| household mental illness |  |  |  |  |  |  |  |  |  |
| household substance abuse |  |  |  |  |  |  |  |  |  |
| household incarceration |  |  |  |  |  |  |  |  |  |
| witnessing domestic violence |  |  |  |  |  |  |  |  |  |
| parental divorce |  |  |  |  |  |  |  |  |  |
| parental death |  |  |  |  |  |  |  |  |  |
| witnessing neighborhood violence |  |  |  |  |  |  |  |  |  |
| economic hardship |  |  |  |  |  |  |  |  |  |
| racial/ethnic mistreatment |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Overall | MBP |  | No MBP |  | p-value (from Chi-square test) | uOR (95% CI) (from simple logistic regression) | aOR (95% CI) (from multivariate logistic regression) |
| Age, y |  |  | N | % (95% CI) | N | % (95% CI) |  |  |  |
| 3-5 y |  |  |  |  |  |  |  |  |  |
| 6-11 y |  |  |  |  |  |  |  |  |  |
| 12-17 y |  |  |  |  |  |  |  |  |  |
| Male |  |  |  |  |  |  |  |  |  |
| Race/ethnicity |  |  |  |  |  |  |  |  |  |
| Hispanic |  |  |  |  |  |  |  |  |  |
| Non-Hispanic White |  |  |  |  |  |  |  |  |  |
| Non-Hispanic Black |  |  |  |  |  |  |  |  |  |
| Non-Hispanic Asian |  |  |  |  |  |  |  |  |  |
| Other |  |  |  |  |  |  |  |  |  |
| # ACEs category |  |  |  |  |  |  |  |  |  |
| 0 |  |  |  |  |  |  |  |  |  |
| 1 |  |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |
| 4+ |  |  |  |  |  |  |  |  |  |
| ACEs items |  |  |  |  |  |  |  |  |  |
| household mental illness |  |  |  |  |  |  |  |  |  |
| household substance abuse |  |  |  |  |  |  |  |  |  |
| household incarceration |  |  |  |  |  |  |  |  |  |
| witnessing domestic violence |  |  |  |  |  |  |  |  |  |
| parental divorce |  |  |  |  |  |  |  |  |  |
| parental death |  |  |  |  |  |  |  |  |  |
| witnessing neighborhood violence |  |  |  |  |  |  |  |  |  |
| economic hardship |  |  |  |  |  |  |  |  |  |
| racial/ethnic mistreatment |  |  |  |  |  |  |  |  |  |

State-level prevalence of mental and behavioral problems among children with 4+ ACEs in the US (present as quartiles of at least 1 mental or behavioral problem (i.e., depression, anxiety problems, OD, or ADHD) in the total sample of children with 4+ ACEs (weighted estimate, XXXX) (5 figures)

Total sample

% children with 0, 1, 2, 3, 4+ ACEs

**Appendix A: Description of ACE Items in the Add Health study**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measure** | **Wave Assessed and Item Description** | **Original Response Range** | **Recoded Response** | **Prevalence** |
| *Abuse* |  |  |  |  |
| Emotional Abuse | Wave IV: “Before your 18th birthday, how often did a parent or other adult caregiver say things that really hurt your feelings or made you feel like you were not wanted or loved?” | 0 = never happened, 5 = more than 10 times | 0 = never or once, 1 = more than once | 37.3% |
| Physical Abuse | Wave IV: “Before your 18th birthday, how often did a parent or adult caregiver hit you with a fist, kick you, or throw you down on the floor, into a wall, or down stairs?” | 0 = never happened, 5 = more than 10 times | 0 = never or once, 1 = more than once | 12.5% |
| Sexual Abuse | Wave III: “Before 6th grade, how often had one of your parents or other adult care-givers touched you in a sexual way, forced you to touch him or her in a sexual way, or forced you to have sexual relations?”  Wave IV: “Before your 18th birthday how often had one of your parents or other adult care-givers touched you in a sexual way, forced you to touch him or her in a sexual way, or forced you to have sexual relations?” | 0 = never happened, 5 = more than 10 times | 0 = never at both waves, 1 = at least once | 7.6% |
| *Household Challenges* |  |  |  |  |
| Community Violence | Wave I: “During the past 12 months, how often did you see someone shoot or stab another person”  Wave I: “During the past 12 months, how often did someone pull a knife or gun on you”  Wave I: “During the past 12 months, how often did someone shoot or stab you”  Wave I: “During the past 12 months, how often did someone cut or stab you” | 0 = never, 2 = more than once | 0 = no exposure, 1 = any exposure | 18.2% |
| Substance Abuse in the Household | Parent Survey: “Does respondent’s biological mother currently have the following health problem: Alcoholism”  Parent Survey: “Does respondent’s biological mother currently have the following health problem: Alcoholism”  Wave I: “Are illegal drugs easily available to you in your home” | Parent Survey: Yes/No  Wave I: Yes/No | 0 = no, 1 = yes | 18.0% |
| Suicide exposure | Wave I: “Have any of your family members succeeded in committing suicide in the past 12 months?” | Yes/No | 0 = no, 1 = yes | 0.8% |
| Parental separation or divorce | Parent Survey: “What is your current marital status” | 1 = single, never married; 2 = married; 3 = widowed, 4 = divorced, 5 = separated | 0 = not divorced or separated; 1 = divorced or separated | 17.7% |
| Incarcerated household member | Wave IV: “(Has/did) your (biological mother/  biological father/mother figure/father figure) ever  (spent/spend) time in jail or prison?” | Yes/No | 0 = no parent or guardian incarcerated prior to age 18; 1 = Yes, parent or guardian incarcerated prior to age 18 | 11.6% |
| Parental death | *Parental death*, assessed at Waves 1 and 2, measured if respondents had experienced the death of either parent in childhood |  |  |  |
| *Neglect* |  |  |  |  |
| Emotional Neglect | Wave I: (average of relevant items):  Do you agree or disagree with the following statement?   * “Most of the time, your father is warm and loving toward you” * “Most of the time, your mother is warm and loving toward you” * “Overall, you are satisfied with your relationship with your father” * “Overall, you are satisfied with your relationship with your mother” * “You are satisfied with the way your mother and you communicate with each other.” * “You are satisfied with the way your father and you communicate with each other.” | 1 = strongly agree; 5 = strongly disagree | 0 = bottom 80% of low warmth; 1 = top 20% of low warmth | 24.9% |
| Physical Neglect | Wave III: “How often had your parents or other adult care-givers not taken care of your basic needs, such as keeping you clean or providing food or clothing?” | 0 = never happened, 5 = more than 10 times | 0 = never or once, 1 = more than once | 6.0% |