



Published in final edited form as:

Acad Pediatr. 2020 July ; 20(5): 600–608. doi:10.1016/j.acap.2020.02.012.

The Association of Adverse Childhood Experiences with Anxiety and Depression for Children and Youth, 8 to 17 Years of Age

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Abstract

Objective: To determine the prevalence of anxiety and depression and examine their association with adverse childhood experiences (ACEs) among children and adolescents ages 8-17 years old.

Methods: Using data from the 2016-2017 National Survey of Children's Health (NSCH), we conducted a cross-sectional study design with a total sample of 39,929. Our exposure and outcome variables included caregiver report of 9 ACE exposures and current anxiety or current depression. Survey sampling weights and SAS survey procedures were implemented to produce nationally representative results.

Results: Our study found that 9% of children had current anxiety while 4% had current depression. Multivariate analysis concluded that all ACE measures were associated with significantly higher odds of both anxiety and depression. Children exposed to four or more ACEs had higher odds of anxiety (aOR:1.7; 95% CI 1.4-2.1) and depression (aOR: 2.2; 95% CI 1.7-2.9) than children with exposure to less than four ACEs. Assessment of the outcomes of anxiety and depression separately showed differential impacts of ACE exposures as associations were stronger with depression for almost all ACE categories.

Conclusions: Our study demonstrates a differential association between ACEs and anxiety and depression. Thus, highlighting the importance of assessing the impact of ACEs on internalizing behaviors separately. These findings are significant for pediatric providers as diagnosis and treatment for mental health disorders are a vital component of pediatric care and further supports the American Academy of Pediatrics recommendation to screen for ACEs.

Keywords

Adverse childhood experiences; internalizing behaviors; anxiety; depression; pediatrics

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Conflicts of Interest: The authors declare no conflict of interest.

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Introduction

Adverse childhood experiences (ACE's) include early adversities of abuse, neglect, and experiences of trauma among people under the age of 18.¹ Estimates show that nearly half of all children in the United States have experienced at least 1 ACE.² Exposure to ACEs have been consistently associated with poor mental health outcomes in adulthood such as substance abuse, depression, anxiety, and suicidal attempts.^{3,4} The enduring mental health implications of ACE exposures can be attributed to permanent changes in brain structure and development due to prolonged activation of the stress response.⁵ Seminal research on stress and children's health posits the stress response occurs when there's an imbalance between environmental demands and a person's coping skills.⁶ While the association of ACE's and poor mental health has been widely studied among adults, the relationship between ACE's and childhood mental health are less understood.

In the United States, almost half of adolescents have a mental health disorder.⁷ The Agency for Healthcare Research and Quality (AHRQ) found mental disorders are among the top five most costly childhood health conditions.⁸ In addition, evidence shows that children and youth exposed to ACEs have an increased risk for emotional and mental conditions as well as learning, attention, and behavioral problems.⁹⁻¹² Two of the most common mental illnesses, anxiety and depression, are increasing among children and early onset of such conditions often become chronic or relapsing.^{13,14} Among children, anxiety and depression are typically classified as internalizing behaviors to describe mood disorders in contrast to externalizing behaviors such as attention deficit/hyperactivity disorder (ADHD) for behavioral conditions.¹⁵ Mood disorders during childhood can interfere with normal brain development and social functioning while increasing the risk of suicide, one of the leading causes of death among adolescents.¹⁶⁻¹⁸ Only recently have researchers began to analyze the short-term impacts of ACE's on internalizing behaviors among children and youth.

Prior research has investigated the association between ACEs and internalizing behaviors cumulatively through ACE scores and by the type of ACE exposure.^{19,20} During middle childhood, an ACE score of four or greater was associated with 7.3 higher odds of anxiety or depression compared to those with less than four ACEs.¹⁹ Additionally, children and youth ages 6-17 with higher ACE scores were three times more likely to experience anxiety or depression and four times more likely to report a comorbid history of both internalizing behaviors.²⁰ However, each type of ACE does not equally impact health and ACE score analyses limits the ability to do targeted prevention efforts.²¹ A few studies have examined the association of specific ACE exposures and internalizing behaviors but findings are inconsistent. For example, Hunt et al. found that only poor caregiver mental health and exposure to domestic violence significantly increased the odds of internalizing behaviors (1.6 and 1.8, respectively).¹⁹ Compared to a study by Lew & Xian which determined all ACE exposure types, except economic hardship, were significantly associated with internalizing behaviors.²⁰

Only a small number of studies have examined whether ACE exposure type differentially impacts the outcomes of anxiety and depression among children and youth. Anxiety and depression can occur as a comorbidity but the symptoms as well as causes for each can

differ and therefore associations with ACE exposures may also have distinctions.¹³ Adolescents faced with environmental discord, such as a single-parent household or residential instability, are known to have a higher risk for depression and greater odds of developing psychotic symptoms.^{22,23} However, these evaluations were limited to older adolescents and did not assess the impact on anxiety symptomology. Significant research has examined the impact of ACE exposure on reported anxiety among adults but this associational outcome during childhood and adolescence is less understood.^{24,25}

Previous studies examining internalizing behaviors and ACEs during childhood either did not assess anxiety and depression separately or did not address specific types of ACE exposures. In addition, the American Academy of Pediatrics (AAP) recommends that pediatricians screen for ACEs which have been associated with internalizing behaviors and therefore empirically-derived information is needed.^{19,20,26} Our study fills this gap in the literature by providing recent, nationally representative estimates of anxiety and depression for ages 8-17 and evaluates their association with specific ACE exposures. Furthermore, we examine the relationship between both cumulative ACE exposure and ACE exposure type with the outcomes of anxiety and depression separately among youth.

Methods

The study sample was drawn from the 2016-2017 National Survey of Children's Health (NSCH) which is a mail and online survey conducted by the Data Resource Center for Child and Adolescent Health (DRC) to assess children's health and wellbeing. To be included in the survey, caregivers must reside in a household with at least one child between the ages of 0 and 17 at the time of the interview. If the caregiver had more than one child, a single child was chosen at random by the NSCH to be the subject of the interview. Further information on the NSCH's sampling strategy can be found on the Data Resource Center website.²⁷ A total of 71,811 surveys were completed for 2016 and 2017 with approximately 1,400 surveys per state. Complex survey weights permit analytic results to be nationally representative. Both years were combined by the NSCH Data Resource Center for the final dataset. The survey response rate was 40.7% for 2016 and 37.4% for 2017.

To examine the association between ACE exposures and anxiety and depression, multiple ACE measures were included for analysis. The nine ACE exposures measured by the NSCH are outlined in Table 1. For our analysis, we examined the data by ACE count (including nine survey questions) and by ACE category (where some of the nine survey questions were collapsed). ACE counts were individually tabulated and then collapsed into less than 4 ACEs or 4 or more ACEs. This cut point has been demonstrated to be a valid threshold for outcomes among children using various ACE screening tools.^{9,12} However, we also conducted a sensitivity analysis to further examine this cut point. Based on prior literature, we grouped low prevalence ACE events into categories.²⁸ Witnessing household violence and being a victim of neighborhood violence or witnessing neighborhood violence were combined into exposure to violence. Also, household mental illness, parental or guardian incarceration, and household substance abuse were combined into household dysfunction.

For assessment of health conditions among children of survey caregivers, the NSCH inquires about 26 health conditions including anxiety and depression through survey question, “Has a doctor ever told you this child has...”. If the caregiver answered yes, a secondary question “If yes, does this child CURRENTLY have this condition?” is answered. For the outcome measure of anxiety and depression, we restricted to only cases of current anxiety and current depression to possibly reduce the temporal limitations of the cross-sectional study design.

Demographic information collected from the caregiver included child age, sex, and race/ethnicity; caregiver’s relation to child, education level, insurance type; and family poverty/income level. All demographics were assessed for outcome prevalence estimates and as possible confounders. Demographic variables are potential confounders of both ACE exposures and mental health outcomes among children.¹⁰ A child’s age is an important predictor of the exposures and outcomes as ACE’s accumulate with age and anxiety and depression are more common for older children.¹⁰ For child sex, boys have been found to have a higher odds of witnessing neighborhood violence compared to girls and studies have found higher rates of emotional, mental, or behavioral conditions among boys.^{10,29} Insurance type is an important confounder as it would impact a child’s diagnosis of anxiety or depression and reporting by the caregiver. Additionally, a variable identifying children with a special health care needs was included as a possible confounder of anxiety and depression. To identify the presence of a special health care need, the NSCH uses a screening tool to ask the caregiver five questions regarding the utilization of prescription medication, functional limitations, elevated health services use, specialized therapy, and ongoing emotional, developmental, or behavioral conditions. If a caregiver reported ‘Yes’ to any one of these five questions, the NSCH flagged the child as having special healthcare needs.³⁰ Lastly, caregiver mental health was included as it may impact likelihood of ACE exposure and contribute a genetic component to mental health outcomes of children.

During 2016 and 2017, the NSCH conducted 71,811 interviews which were eligible for inclusion in our study. We excluded 27,191 children of caregivers that were less than 8 years old (n=44,620). Since children less than 8 years old are unable to articulate their own feelings, clinicians must rely on caregiver accounts of child behavior and therefore screenings and diagnostic procedures differ compared to those for older ages.³¹ We also excluded 4,691 children of caregivers that either did not answer survey questions related to anxiety and/or depression or did not respond to questions regarding ACE exposures, with a final sample size of 39,929 children.

Analyses were conducted for two outcome variables, current anxiety and current depression, to assess childhood mental health. The independent exposure variables included: ACE count, parental divorce/separation, economic hardship, exposure to violence, and household dysfunction. Sample characteristics and ACE exposure variables were presented for the total study population and stratified by current anxiety and depression. Both analyses were performed using PROC SURVEY FREQ and chi square analysis. Next, bivariate and multivariate logistic regression models were conducted through PROC SURVEY LOGISTIC predicting current anxiety and current depression. Lastly, a sensitivity analysis was conducted to assess the ACE count threshold of 4 by predicting current anxiety and current depression using logistic regression models with increasing bivariate ACE count exposures.

Logistic regression results are presented as crude and adjusted odds ratios with wald confidence intervals. Variables that had statistically significant Pearson chi-square p-values ($p < .01$) when predicting anxiety and depression (Table 2) were included for confounder adjustment.

To account for the complex survey design of NSCH, survey design features (sampling weights, cluster, and stratum) were used with SAS survey procedures to produce results nationally representative results. As specified by the NSCH, results are reported in terms of the child rather than for the parent or caregiver, even in cases where the question refers to the caregiver or family. The guidance is based upon the NSCH population weights which are designed to reflect the child population rather than the population of caregivers or families.²⁷ All analyses were conducted using statistical software SAS 9.4 (SAS Institute, Cary, NC) and with a significance level of $p < .01$ to account for the large sample. This study was approved by the [name concealed for review] institutional review board as exempt.

Results

Descriptive statistics show almost equal proportions for child gender (51%, 49% for male and female, respectively) and the age categories 8-10 years old and 11-13 years old while 14-17 years old was most common (31%, 30%, and 40% for ages 8-10, 11-13, and 14-17, respectively, Table 2). Over half of the study sample reported a race/ethnicity of non-Hispanic white (52%), 25% of caregivers reported Hispanic and 13% of caregivers reported non-Hispanic black. Based on responses to the CSHCN screener, nearly one-quarter of caregivers reported their child had a special healthcare need (24%). The majority of children had their mother as their primary caregiver (65%), a caregiver with excellent, very good, or good mental health (77%), and at least some college education (70%). Of note, 17% of caregivers did not report caregiver mental health and 6% of children did not have health insurance.

For the total study sample, 9% had current anxiety and 4% had current depression and the proportions were similar for boys and girls (Table 2). Significant differences were found for the following characteristics for both anxiety and depression: age, race/ethnicity, presence of a special healthcare need, caregiver's relation to child, caregiver mental health, and insurance type. Both anxiety and depression were most common for ages 14-17 (11%, 7%, respectively) and among children with a special healthcare need (27%, 14%, respectively). While anxiety was most common for non-Hispanic white children (11%), non-Hispanic white and non-Hispanic black children were equally likely to have depression (5%). For caregiver mental health, those with fair or poor were most likely to experience anxiety (24%) and depression (12%) but those who did not respond to the survey question were also more likely to experience anxiety (12%) or depression (7%) compared to those who reported excellent, very good, or good mental health. One important socioeconomic factor, family poverty level, was not found to be associated with anxiety but was a significant correlate for depression. Children with a family income of 0-99% Federal Poverty Level were most likely to have current depression (6%) while those with family income 400% Federal Poverty Level of above were the least likely (3%).

Among the study population, 8% of children experience 4 or more ACE's when assessed cumulatively including all nine ACE exposures (Table 3). Parental divorce/separation and economic hardship were fairly common among the study population (31%, 25%, respectively). For witness to violence, 9% of children were a victim of neighborhood violence or witnessed neighborhood violence and/or witnessed domestic violence. Household dysfunction was reported for 20% of children which included any exposure to household substance abuse, household mental illness, and/or parental or guardian incarceration.

Preliminary analysis using chi square tests, showed that all ACE measures were associated with current anxiety and current depression among children ages 8-17. Children who experienced four or more ACEs were more likely to have current anxiety (21% vs. 9%, Table 4) and current depression (14% vs. 3%) compared to those with less than four. Children who experienced parental divorce/separation and economic hardship were more likely to experience both anxiety and depression compared to those without exposure. For witnessed violence, 18% with exposure had current anxiety and 12% had current depression and among those with household dysfunction, 18% had anxiety while 10% had depression.

After adjusting for confounders, exposure to all ACE measures were associated with significantly higher odds of both anxiety and depression. Compared to children exposed to less than four ACEs, children exposed to four or more ACEs had higher odds of anxiety (aOR: 1.7; 95% CI 1.4-2.1) and depression (aOR: 2.2; 95% CI 1.7-2.9). For types of ACE exposures, economic hardship had the strongest association with anxiety (aOR: 1.8, 95% CI 1.5-2.2) and witnessing violence had the strongest association with depression (aOR: 2.2, 95% CI 1.7-2.9). Compare to children not exposed to parental separation/divorce, children exposed to parental separation/divorce had a higher odds of anxiety (aOR: 1.3, 95% CI 1.1-1.6) and depression (aOR: 1.8, 95% CI 1.4-2.3). Lastly, children exposed to household dysfunction had a higher odds of experiencing anxiety (aOR: 1.8, 95% CI 1.5-2.1) and depression (aOR: 2.1, 95% CI 1.7-2.7) compared to those not exposed to household dysfunction.

By comparing ACE count exposure thresholds through our sensitivity analysis, we found that exposure to even 2 or more ACEs significantly increased the odds of current anxiety (aOR: 1.8, 95% CI 1.5-2.2) and current depression (aOR: 2.6, 95% CI 2.0-3.3) among children ages 8-17 (Table 5). A slight increase in the odds of both anxiety and depression were found as the number of ACE exposures increased. However, after adjustment for confounders, the associations remained relatively stable even as the number of ACEs increased from 2 to 6.

Discussion

The current study provides recent estimates of anxiety and depression among ages 8-17 and evaluates their relationship with ACE exposures. We assessed both the types of ACEs and counts of ACEs, as both ways are informative for mitigating the immediate and long-term impacts of ACEs. We found that 9% of children had current anxiety and 4% had current

depression. Our study findings are higher than a previous study using the 2011-2012 NSCH data among a similar age group which found 3% had depression and 4% had anxiety.²⁹

Exposure to ACEs was common among the study population as 8% experienced 4 or more ACEs with parental divorce/separation being the most prevalent type, which are both consistent with previous studies.^{10,28} Assessment of both types of ACEs and counts of ACEs showed similar results of an increasing odds of anxiety and depression. Thus, this suggests that ACE exposure may influence mental health during childhood and adolescence, not just later in adulthood.¹⁹⁻²² Of note, aside from economic hardship, all ACE exposures were found to have a stronger association with depression than anxiety. The largest difference in association was found for exposure to violence as the odds of depression were 0.6 times higher than the odds for anxiety. Therefore, our findings highlight the importance of assessing the association of ACE exposure and internalizing behaviors separately. This distinction may allow future researchers to identify potential explanations for the differential associations between ACEs and the outcomes of anxiety and depression.

Implications for Policy and Practice

The pediatric provider audience may benefit from the findings of this study as diagnosis and treatment for mental health disorders among youth are an important component of pediatric care. As demonstrated, internalizing behaviors are common among youth and research suggests they may interfere with normal social functioning while increasing the risk of suicide.^{13,17} Therefore, it's important pediatric professionals screen for anxiety and depression. In addition, we found that many youth may have limited access to mental health specialists as 6% of youth did not have health insurance and 25% experienced economic hardship. Thus, primary care physicians represent the best hope for appropriate diagnosis and treatment among these high-risk individuals. In 2018, the Guidelines for Adolescent Depression in Primary Care (GLAD-PC) was published to address barriers to mental health services and improve identification of depression among youth.³² For anxiety, the AAP recommends the use of standardized anxiety tools to aid in the assessment of anxiety symptoms for diagnoses.³³ While pediatric providers are essential to diagnose anxiety and depression, yearly visits also provide an opportunity to identify ACE exposures through screening tools.

As mentioned, the AAP recommends that pediatricians screen for ACEs which have been associated with anxiety and depression. To support trauma-informed pediatric care practices, the AAP has developed the Resilience Project which provides clinical ACE screening tools for children and adolescents.²⁶ In coordination with the Maternal and Child Health Bureau, the initiative also developed a "Trauma Toolbox for Primary Care" that was designed to educate professionals on ACEs and the process for asking families about ACE exposure.²⁶ Findings from our study suggest that ACE screening items may even be predictive of anxiety and depression among children and adolescence. This relationship between ACEs and internalizing behaviors may insinuate the possibility of coordinated pediatric screening practices.

Strengths and Weaknesses

Our study is subject to a few limitations. First, since data on ACE exposure is collected through caregivers, the NSCH doesn't include questions related to neglect and physical, emotional, or sexual abuse. Also, depending if the answers were provided by a parent or guardian, the report of ACE exposures may be underreported or overreported. Next, while we restricted our outcome measure to current mental conditions to reduce the bias of temporality, whether the exposure or outcome occurred first cannot be answered with this study. Additionally, non-response bias of our measured variables could cause underestimation or overestimation of our findings. Also, secondary data analysis is subject to selective participation which could be related to both outcomes measures and ACE exposures. For example, if a caregiver's child has depression or one of their family members has a drug abuse problem, they may be less likely to participate compared to those without. Lastly, an important limitation of any cross-sectional study is the inability to form causal inferences and conclusions.

While adding to the current literature of short-term mental health outcomes among children exposed to ACE's, our study also has many strengths. Since the NSCH was developed to be nationally representative of the U.S non-institutionalized youth population, our results are highly generalizable with the exception of institutionalized children. To our knowledge, the NSCH is the first population based study of children to address the prevalence of anxiety, depression, and ACE's. We also utilized the 2016-2017 NSCH, a combined data set of two survey rounds, thus providing a large sample size and allowing for analysis of conditions with low prevalence. Lastly, the use of interviews with the caregivers of children to assess ACE exposure provides more timely information to shape intervention efforts than retrospective interviews during adulthood about childhood exposures.

Conclusions

Estimates show that nearly half of all children in the United States have both experienced at least 1 ACE and have a mental health disorder.^{2,13} The findings of this study suggest a possible recent increase in anxiety and depression among ages 8-17 and demonstrates an association between ACEs and both internalizing behaviors. Furthermore, differential impacts of ACEs on anxiety and depression were found highlighting the importance of assessing the causes of internalizing behaviors separately. The findings of this study may contribute to improved screening efforts for anxiety and depression as well as prevention efforts to reduce the prevalence of ACEs among youth.

Acknowledgments

Funding Source: This publication was made possible in part by Grant Number T32-GM081740 from NIH-NIGMS. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the NIGMS or NIH.

Abbreviations

ACE adverse childhood experience

aOR	adjusted odds ratio
CI	confidence interval
NSCH	National Survey of Children's Health
AAP	American Academy of Pediatrics

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What's New

There's evidence linking childhood ACE exposure to poor mental health during adulthood, yet limited research on outcomes among youth. The current study provides nationally representative estimates of anxiety and depression for ages 8-17 and evaluates their association with ACE exposures.

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Table 1.

ACE survey questions included in the 2016-2017 National Survey of Children's Health

NSCH survey questions	Adverse childhood experience measures	
<i>To the best of your knowledge, has this child experienced any of the following?</i>	<i>Nine ACEs included in ACE score</i>	<i>Four ACE Categories</i>
1. Parent or guardian divorced or separated?	Parental separation/divorce	Parental separation/divorce
2. Parent or guardian died	Parental death	
3. Parent or guardian served time in jail?	Parent or guardian incarceration	
4. Lived with anyone who was mentally ill, suicidal, or severely depressed?	Household mental illness	Household dysfunction
5. Lived with anyone who had a problem with alcohol or drugs?	Household substance use	
6. Saw or heard parents or adults slap, hit, kick, punch one another in the home?	Witnessed household violence	
7. Was a victim of violence or witnessed violence in the neighborhood?	Witnessed neighborhood violence or victim of neighborhood violence	Exposed to violence
8. Treated or judged unfairly because of his or her race or ethnic group?	Racial/ethnic mistreatment	
9. Hard to get by on family's income-hard to cover basics like food or housing?	Economic hardship	Economic Hardship

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Table 2.

Characteristics of caregivers to the 2016-2017 National Survey of Children's Health, in total and stratified by current anxiety and current depression, N=39,929

Characteristic	All (n=39929)	Current Anxiety ¹ (n=4524)		Current Depression ² (n=2105)	
	% ³	%	P ⁴	%	P
Total sample		9.2		4.0	
Sex of child			0.78		0.08
Male	51.4	9.1		3.7	
Female	48.6	9.3		4.4	
Age of child			<.01		<.01
8 to 10 years old	30.6	7.5		1.4	
11 to 13 years old	29.9	8.5		3.2	
14 to 17 years old	39.6	11.0		6.7	
Race/ethnicity of child			<.01		<.01
Non-Hispanic White	52.1	11.4		4.6	
Non-Hispanic Black	13.4	5.4		4.6	
Hispanic	24.8	7.4		2.7	
"Other" Non-Hispanic	9.7	7.4		4.0	
Child with special healthcare needs			<.01		<.01
Yes	23.9	27.4		14.0	
No	76.1	3.5		0.91	
Caregiver's relation to child			<.01		<.01
Mother	64.7	10.4		4.4	
Father	28.7	6.5		2.4	
Other	6.6	9.5		7.1	
Caregiver mental health			<.01		<.01
Excellent, very good, or good	76.6	7.4		2.8	
Fair or poor	6.1	24.2		11.7	
No response	17.3	11.7		6.9	
Insurance type			<.01		<.01
Public only	29.7	10.9		6.1	
Private only	59.2	8.1		2.9	
Public and private combination	4.8	18.5		6.7	
Currently uninsured	6.3	4.7		2.8	
Caregiver education			0.10		0.32
Less than high school/ high school diploma	30.0	8.3		4.3	
Some college or more	70.0	9.6		3.9	
Poverty/income Level			0.99		<.01
0-99% Federal Poverty Level	19.6	9.3		5.7	
100%-199% Federal Poverty Level	21.6	9.2		4.4	
200%-399% Federal Poverty Level	27.2	9.2		3.5	

Characteristic	All (n=39929)	Current Anxiety ¹ (n=4524)	Current Depression ² (n=2105)
400% Federal Poverty Level or above	31.5	9.2	3.3

¹Caregivers answered “Yes” to both questions for inclusion: “Has a health care provider ever told you this child has anxiety”, “If yes, does this child currently have this condition”

²Caregivers answered “Yes” to both questions for inclusion: “Has a health care provider ever told you this child has depression”, “If yes, does this child currently have this condition”

³Weighted percentages to account for survey design

⁴P-values were calculated using Chi-square analysis

Table 3.

Types and numbers of ACEs reported by caregivers to the 2016-2017 National Survey of Children's Health, stratified by current anxiety and depression, N=39,929

ACE Exposure	All (n=39929)	Current Anxiety ¹ (n=4524)	Current Depression ² (n=2105)
	% ³	%	%
		p ⁴	P
Total sample		9.2	4.0
<i>ACE summary score</i> ⁵		<.01	<.01
Four or more	7.6	20.9	14.2
Less than 4	92.4	8.5	3.2
<i>ACE categories</i>			
Parental divorce/separation		<.01	<.01
Yes	30.7	12.5	7.0
No	69.3	7.7	2.7
Economic hardship ⁶		<.01	<.01
Yes	24.6	15.5	7.7
No	75.4	7.2	2.8
Exposure to violence ⁷		<.01	<.01
Yes	9.4	18.2	12.4
No	90.6	8.3	3.2
Household dysfunction ⁸		<.01	<.01
Yes	19.8	17.7	10.0
No	80.2	7.1	2.6

¹Caregivers answered "Yes" to both questions for inclusion: "Has a health care provider ever told you this child has anxiety", "If yes, does this child currently have this condition"

²Caregivers answered "Yes" to both questions for inclusion: "Has a health care provider ever told you this child has depression", "If yes, does this child currently have this condition"

³Weighted percentages to account for survey design

⁴P-values were calculated using Chi-square analysis

⁵ACE count includes all types of ACEs collected by survey: parental separation/divorce, parental death, household incarceration, witness household violence, witnessed neighborhood violence, household mental illness, household substance use, racial/ethnic mistreatment, and economic hardship

⁶Economic hardship coded as Yes for an answer of "Somewhat often/very often" to "since this child was born, how hard has it been to get by on your family's income-hard to cover basics like food or housing". Responses of "never/rarely hard" were coded as No

⁷Exposure to violence includes being a victim of neighborhood violence or witnessing neighborhood violence and/or witnessing household violence

⁸Household dysfunction includes household substance abuse and/or household mental illness and/or parent or guardian incarceration

Table 4.

Adjusted odds ratios and 95% Wald confidence intervals predicting current anxiety and depression by Adverse Childhood Experiences (ACEs) exposure, among caregivers to 2016-2017 National Survey of Children's Health survey, N=39,929

ACE Exposure	Current Anxiety ¹		Current Depression ²	
	cOR ³ (95% CI) ⁴	aOR ⁵ (95% CI)	cOR (95% CI)	aOR (95% CI)
Model 1:				
<i>ACE summary score</i> ⁶				
Four or more	2.9 (2.4-3.6)	1.7 (1.4-2.1)	5.0 (4.0-6.2)	2.2 (1.7-2.9)
Less than 4	<i>Referent</i>		<i>Referent</i>	
<i>ACE categories</i>				
Model 2:				
Parental divorce/separation				
Yes	1.7 (1.5-2.0)	1.3 (1.1-1.6)	2.7 (2.2-3.2)	1.8 (1.4-2.3)
No	<i>Referent</i>		<i>Referent</i>	
Model 3:				
Economic hardship ⁷				
Yes	2.4 (2.1-2.8)	1.8 (1.5-2.2)	2.8 (2.4-3.4)	1.6 (1.2-2.0)
No	<i>Referent</i>		<i>Referent</i>	
Model 4:				
Witnessed violence ⁸				
Yes	2.5 (2.1-3.0)	1.6 (1.2-2.0)	4.3 (3.5-5.4)	2.2 (1.7-2.9)
No	<i>Referent</i>		<i>Referent</i>	
Model 5:				
Household dysfunction ⁹				
Yes	2.8 (2.4-3.3)	1.8 (1.5-2.1)	4.2 (3.5-5.1)	2.1 (1.7-2.7)
No	<i>Referent</i>		<i>Referent</i>	

¹Caregivers answered "Yes" to both questions for inclusion: "Has a health care provider ever told you this child has anxiety", "If yes, does this child currently have this condition"

²Caregivers answered "Yes" to both questions for inclusion: "Has a health care provider ever told you this child has depression", "If yes, does this child currently have this condition"

³Crude odds ratio

⁴95% CI = 95% Wald confidence intervals; **bold indicates significance at <.05 level**

⁵Adjusted for child and caregiver characteristics: race, age, relation to child, insurance, adult education, special health care needs, and caregiver mental health

⁶ACE count includes all types of ACEs collected by survey: parental separation/divorce, parental death, household incarceration, witness household violence, witnessed neighborhood violence, household mental illness, household substance use, racial/ethnic mistreatment, and economic hardship

⁷Economic hardship coded as Yes for an answer of “Somewhat often/very often” to “since this child was born, how hard has it been to get by on your family’s income-hard to cover basics like food or housing”. Responses of “never/rarely hard” were coded as No

⁸Exposure to violence includes being a victim of neighborhood violence or witnessing neighborhood violence and/or witnessing household violence

⁹Household dysfunction includes household substance abuse and/or household mental illness and/or parent or guardian incarceration

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Table 5.

Sensitivity Analysis of Adverse Childhood Experiences (ACEs) summary score predicting current anxiety and depression, among caregivers to 2016-2017 National Survey of Children's Health survey, N=39,929

ACE summary score ³	Current Anxiety ¹		Current Depression ²	
	cOR ⁴ (95% CI) ⁵	aOR ⁶ (95% CI)	cOR (95% CI)	aOR (95% CI)
Model 1:				
Two or more	2.6 (2.2-3.0)	1.8 (1.5-2.2)	4.5 (3.8-5.4)	2.6 (2.0-3.3)
Less than 2	<i>Referent</i>		<i>Referent</i>	
Model 2:				
Three or more	3.0 (2.5-3.5)	1.9 (1.6-2.4)	4.6 (3.8-5.6)	2.3 (1.8-2.9)
Less than 3	<i>Referent</i>		<i>Referent</i>	
Model 3:				
Four or more	2.9 (2.4-3.6)	1.7 (1.4-2.1)	5.0 (4.0-6.2)	2.2 (1.7-2.9)
Less than 4	<i>Referent</i>		<i>Referent</i>	
Model 4:				
Five or more	3.5 (2.7-4.5)	1.8 (1.3-2.3)	5.6 (4.3-7.4)	2.1 (1.5-3.0)
Less than 5	<i>Referent</i>		<i>Referent</i>	
Model 5:				
Six or more	3.2 (2.2-4.7)	1.5 (1.0-2.3)	6.2 (4.3-8.9)	2.3 (1.5-3.6)
Less than 6	<i>Referent</i>		<i>Referent</i>	

¹Caregivers answered "Yes" to both questions for inclusion: "Has a health care provider ever told you this child has anxiety", "If yes, does this child currently have this condition"

²Caregivers answered "Yes" to both questions for inclusion: "Has a health care provider ever told you this child has depression", "If yes, does this child currently have this condition"

³ACE count includes all types of ACEs collected by survey: parental separation/divorce, parental death, household incarceration, witness household violence, witnessed neighborhood violence, household mental illness, household substance use, racial/ethnic mistreatment, and economic hardship

⁴Crude odds ratio

⁵95% CI = 95% Wald confidence intervals; **bold indicates significance at <.05 level**

⁶Adjusted for child and caregiver characteristics: race, age, relation to child, insurance, adult education, special health care needs, and caregiver mental health