

Adverse Childhood Experiences and Household Food Insecurity: Findings From the 2016 National Survey of Children's Health



Dylan B. Jackson, PhD,¹ Mariana Chilton, PhD, MPH,² Kecia R. Johnson, PhD,³
Michael G. Vaughn, PhD^{4,5}

Introduction: Research has linked adverse childhood experiences to a host of negative health outcomes. The present study examines the link between individual and cumulative adverse childhood experience exposure and household food insecurity in a recent, nationally representative sample of children, and whether parent self-rated well-being attenuates these associations.

Methods: Data from the 2016 National Survey of children's Health were analyzed in 2018 ($n=50,212$). Information concerning children's exposure to multiple forms of adversity, household availability of food, and parent self-rated well-being were available in the data. Multinomial logistic regression was performed to analyze the data.

Results: Findings suggest that the accumulation of adverse childhood experiences is associated with higher odds of food insecurity, with stronger associations between adverse childhood experience accumulation and moderate-to-severe food insecurity. Compared with no adverse childhood experience exposure, exposure to 3 or more adverse experiences corresponded to an 8.14-fold increase in the RR of moderate-to-severe food insecurity. Self-rated parent physical and mental well-being partially attenuated these associations.

Conclusions: Policies aimed at minimizing adverse childhood experience exposure among children may have important collateral benefits in the form of reduced household hunger. Existing nutrition assistance programs may be enhanced by linking children and families to programs that bolster parent and child well-being; addressing community and family violence; and providing support for caregivers to prevent abuse, hardship, and exposure to the criminal justice system.

Am J Prev Med 2019;57(5):667–674. © 2019 American Journal of Preventive Medicine. Published by Elsevier Inc. All rights reserved.

INTRODUCTION

Adverse childhood experiences (ACEs), which typically encompass various forms of family dysfunction, child abuse, and child neglect,¹ have recently captured the attention of policymakers, practitioners, and scholars.^{2,3} Research suggests that ACEs are quite common, with recent estimates indicating that by adulthood approximately 62% of individuals have experienced at least one form of adversity.⁴ Cumulative ACE exposure has been linked to a wide array of deleterious outcomes, including physical and mental health problems, such as type 2 diabetes, obesity, depression, internalizing and externalizing behaviors, and attention-deficit

hyperactivity disorder.^{5–10} It has become evident that the trauma of such childhood adversities, especially as they

From the ¹Department of Criminal Justice, College of Public Policy, University of Texas at San Antonio, San Antonio, Texas; ²Dornsife School of Public Health, Drexel University, Philadelphia, Pennsylvania; ³Department of Sociology, Mississippi State University, Starkville, Mississippi; ⁴School of Social Work, College for Public Health and Social Justice, St. Louis University, St. Louis, Missouri; and ⁵Graduate School of Social Welfare, Yonsei University, Seoul, Republic of Korea

Address correspondence to: Dylan B. Jackson, PhD, Department of Criminal Justice, College of Public Policy, University of Texas at San Antonio, 501 W. Cesar E. Chavez Boulevard, San Antonio TX 78207.

E-mail: dylan.jackson@utsa.edu.

0749-3797/\$36.00

<https://doi.org/10.1016/j.amepre.2019.06.004>

accumulate within families, constitutes a public health crisis that requires targeted community-based action, careful screening procedures, and a focus on policymaking that is trauma informed.¹¹

An emergent body of research suggests that ACEs may also be closely related to food insecurity or diminished or unreliable household availability of adequate, nutritious food.^{12–18} Findings at the nexus between ACEs and household food insecurity are consistent with research linking ACEs to both economic hardship and poor health,^{8–10} which have already been shown to be strongly correlated.^{19–23} In particular, caregivers who experience adversities are more likely to report diminished mental and physical well-being.^{23–25} Poor parental well-being, moreover, is a potent predictor of household food insecurity,¹⁹ and a key explanatory factor linking economic hardship and cumulative ACE exposure among children.²⁶ Thus, it is possible that any linkage between the accumulation of ACEs and household food insecurity is wholly or partly explained by parent mental and physical well-being, although the directionality of these relationships is often difficult to identify. Even so, caregiver physical and psychological ailments, which tend to co-occur with accumulated childhood adversities,^{23–25} may greatly inform associations between individual and cumulative ACEs and food insecurity. Despite this possibility, the potential role of parent's perceived physical and mental well-being in these associations is often overlooked. Furthermore, the empirical literature to date is largely circumscribed to studies examining isolated adversities^{14,23} and studies using local or regional samples.^{12–14,17} The objective of the present study is to assess the following: (1) associations between cumulative ACE exposure and levels of household food insecurity among a recent, nationally representative sample of children and their families and (2) whether parent perceptions of physical and mental well-being attenuate these associations.

METHODS

Study Sample

Data from the 2016 National Survey of Children's Health (NSCH) were analyzed in the year 2018 for the purposes of the present study.²⁷ The [Appendix](#) (available online) contains more information concerning the sample and how missing data were handled. This study was approved by the IRB of the University of Texas at San Antonio.

Measures

The 2016 NSCH included one item that asked primary caregivers about the extent to which household foods were not sufficient for residents, in terms of quality or amount. Several recent studies have employed items that distinguish between mild food insecurity (i.e., where household residents sometimes rely on low-cost

foods and consume imbalanced meals) and moderate-to-severe food insecurity (i.e., where residents report occasional to frequent experiences of hunger).^{28–30} Regardless of the details of measurement, single-item indicators, similar to the item employed in the 2016 NSCH, have been validated as useful proxy measures for food insecurity.^{31,32}

In the 2016 NSCH, primary caregivers were asked: *which of these statements best describes the food situation in your household in the past 12 months?* Response options included the following: (1) *we could always afford to eat good nutritious meals*, (2) *we could always afford enough to eat but not always the kinds of food we should eat*, (3) *sometimes we could not afford enough to eat*, and (4) *often we could not afford enough to eat*. In accordance with recent studies, a distinction was made between households that lacked access to enough food and those that, despite having a sufficient amount of food, lacked access to nutritious food.^{30,33,34} Therefore, respondents who reported that they could sometimes or often not afford enough to eat were designated as experiencing moderate-to-severe food insecurity (4.38% of sample; $n=2,199$), capturing the type of food insecurity that indicates not having enough to eat. Respondents who reported that they could always afford enough to eat, but could not always afford to purchase nutritious foods, were designated as experiencing mild food insecurity (21.32% of sample; $n=10,705$). Lastly, respondents who reported being consistently able to afford good, nutritious meals were designated as being food-secure (74.3% of sample; $n=37,308$).

Eight measures of ACEs were employed, which have been utilized in recent research on the link between ACEs and maternal and child health.³⁵ As was the case with prior iterations of the NSCH, these items were selected and tested on the basis of the original adult ACE study (the Behavioral Risk Factor Surveillance Survey ACE Module). Still, modifications were made through an extensive technical expert panel process and review.³⁶ These measures are based solely on caregiver reports, as primary caregivers were first asked: *to the best of your knowledge, has (CHILD) EVER experienced any of the following?* Then, various forms of childhood adversity were listed, including the following:

1. *parent or guardian divorced or separated;*
2. *parent or guardian died;*
3. *parent or guardian served time in jail;*
4. *saw or heard parents or adults slap, hit, kick, or punch one another in the home;*
5. *was a victim of violence, or witnessed violence, in the neighborhood;*
6. *lived with anyone who was mentally ill, suicidal, or severely depressed;*
7. *lived with anyone who had a problem with alcohol or drugs; and*
8. *treated or judged unfairly because of his or her race or ethnic group.*

After this statement, primary caregivers were given the option to indicate *yes*, that the child had experienced this form of adversity, or *no*, that the child had not experienced this form of adversity. Each ACE was examined as an independent variable in a subset of analyses. The cumulative effect of ACEs on household food insecurity was also explored. In these models, respondents were categorized as experiencing none of the ACEs (68.56% of the sample; $n=34,426$), experiencing 1 of the ACEs (18.07% of the sample; $n=9,073$), experiencing 2 of the ACEs (6.70% of the sample; $n=3,364$), or experiencing 3 or more of the ACEs (6.67% of the

sample; $n=3,349$). Though the rates of ACE exposure in the present study are lower than those of justice-involved youth,³⁷ they are similar to rates of ACE exposure in prior studies examining nationally representative samples of youth.⁷

The secondary hypothesis of the current study pertained to the relationship between ACEs and household food insecurity and posited that the well-being of parents may, at least in part, explain this relationship. Two items pertaining to parent self-rated well-being were available in the 2016 NSCH. The first item asked the respondent parent: *in general, how is your physical health?* Response options included the following: (1) *excellent*, (2) *very good*, (3) *good*, (4) *fair*, and (5) *poor*. Similarly, respondent parents were also asked: *in general, how is your mental or emotional health?* Response options also included the following: (1) *excellent*, (2) *very good*, (3) *good*, (4) *fair*, and (5) *poor*. Ultimately, because of the ordering of the response options, with higher numerical responses indicating lower well-being, these items were labeled as “low parent self-rated physical well-being” and “low parent self-rated mental well-being,” and were included in a subset of models examining the robustness of the key hypothesized association between ACEs and household food insecurity. The [Appendix](#) (available online) provides a full list of covariates.

Statistical Analysis

First, demographic characteristics of the sample were presented. Second, bivariate patterns between ACEs and food insecurity were examined by calculating the proportion of children experiencing various degrees of food insecurity (i.e., none versus mild versus moderate-to-severe) by the extent of their exposure to ACEs. After establishing the nonrandomness of cumulative ACE

exposure, the association between ACEs and children’s exposure to household food insecurity was re-examined using multivariate, multinomial logistic regression. Although the primary focus of the current study was on the accumulation of ACEs and their association with both mild and moderate-to-severe household food insecurity, a separate set of estimates for individual ACEs was also included. Finally, a set of ancillary analyses explored whether the association between cumulative ACEs and food insecurity was attenuated when parent self-rated mental and physical well-being were taken into account. Thus, the current analysis of these cross-sectional data was multifaceted to enable a robust testing pattern of the associations between ACEs and food insecurity among this large, nationally representative sample.

The multinomial logistic regression models employed in the present study examined the predicted percentage change in the level of food insecurity (i.e., none versus mild versus moderate-to-severe) for a 1-unit change in the ACE variable being examined. For the cumulative ACE measure, estimates are relative to the reference category of no ACE exposure; for individual ACEs, a 1-unit change simply entails exposure to that particular ACE relative to no exposure. All analyses were conducted in Stata, version 15.1. To account for the complex survey design, sample weights that adjust for nonresponse, probability of selection, and the demographic distribution of the target population were employed.³⁸

RESULTS

The analysis began with the presentation of select participant characteristics by history of cumulative ACE

Table 1. Select Participant Characteristics by History of Cumulative ACE Exposure

Characteristics, %	Full sample	ACE			
		None (68.56%)	1 ACE (18.07%)	2 ACEs (6.70%)	3+ ACEs (6.67%)
Child characteristics and household demographics					
Child age, years, mean (SD)	9.38 (0.02)	8.51 (0.03)	10.92 (0.05)	11.54 (0.08)	11.82 (0.08)
Child sex (male=1)	51.26	51.43	51.55	51.10	49.46
White	70.34	73.47	66.64	63.62	64.65
Black	6.12	4.34	9.00	10.34	8.66
Hispanic	11.00	9.73	12.70	13.90	13.98
Other race/ethnicity	12.54	12.46	11.66	12.14	12.71
Married, 2-parent household	69.90	90.79	33.17	22.72	11.96
Cohabiting, 2-parent household	4.73	3.32	7.20	8.84	8.63
Other family structure	25.37	5.89	59.63	68.44	79.41
Parental education, mean (SD)	3.47 (0.00)	3.57 (0.00)	3.32 (0.01)	3.18 (0.02)	3.08 (0.02)
Below poverty line	9.17	6.29	12.71	17.48	22.01
Low income	15.60	12.97	19.31	23.21	25.45
Moderate income	31.17	30.89	32.46	31.41	30.29
High income	44.06	49.85	35.53	27.89	22.26
Parental employment	76.64	77.52	78.22	74.07	66.29
Nutrition assistance	12.82	8.62	17.05	24.37	30.69
Parent self-rated well-being, mean (SD)					
Low parent self-rated mental well-being	1.85 (0.00)	1.71 (0.00)	2.02 (0.01)	2.22 (0.02)	2.40 (0.02)
Low parent self-rated physical well-being	2.05 (0.00)	1.93 (0.00)	2.21 (0.01)	2.38 (0.02)	2.59 (0.02)

ACE, adverse childhood experience.

exposure (Table 1). Notably, representation of nearly all the participant characteristics included in the study varied by level of ACE exposure. After exploring differences in sample demographics by degree of ACE exposure, the proportion of children experiencing various degrees of food insecurity (i.e., none versus mild versus moderate-to-severe) by degree of ACE exposure was calculated in an effort to establish a bivariate relationship that does not yet account for covariates (Figure 1). The findings illustrated that, whereas 81% of children exposed to none of the ACEs were raised in food-secure homes, only 45% of the children exposed to 3 or more ACEs were raised in food-secure homes (chi-squared=2,900; $p<0.001$). Conversely, both mild and moderate-to-severe food insecurity became more common as the number of ACEs increased. For instance, whereas 17% of children exposed to none of the ACEs were raised in homes characterized by mild food insecurity, 38% of the children exposed to 3 or more ACEs were raised in homes characterized by mild food insecurity (chi-squared=1,300; $p<0.001$). The difference was even larger for moderate-to-severe food insecurity, with its likelihood increasing by a factor of 8.5 (i.e., from 2% to 17%) among children experiencing 3 or more ACEs relative to children experiencing none (chi-squared=1,800; $p<0.001$).

Next, to address potential confounding of the association between ACEs and food insecurity, the association between the accumulation of ACEs and children's exposure to household food insecurity was estimated using multivariate, multinomial logistic regression models that accounted for child characteristics and household demographics (Table 2). Although covariates were suppressed to conserve space, the analyses revealed that cohabiting, two-parent household (+), parental education (–), each

of the income categories (e.g., high income [–]), and nutrition assistance (+) were consistently and significantly associated with both mild and moderate-to-severe food insecurity. However, child age, gender, and race, in addition to parental employment, were not consistently predictive of household food insecurity. Furthermore, the results indicated that, relative to children with no history of ACEs, children with a history of ACEs (and a greater number of ACEs) appeared to be at significantly higher risk of residing in a food insecure household. Specifically, compared to children with no history of ACEs, the risk of mild household food insecurity (relative to food security) was 3.70 times higher among children exposed to 3 or more ACEs (95% CI=2.96, 4.63; $p<0.001$). Additionally, exposure to 3 or more ACEs (relative to none) was associated with an 8.14-fold increase in the risk of moderate-to-severe household food insecurity (relative to food security; 95% CI=5.75, 11.52; $p<0.001$). Even so, experiencing only one ACE (relative to none) still corresponded to significant increases in the risk of both mild (RRR=1.65; 95% CI=1.39, 1.97; $p<0.001$) and moderate-to-severe (RRR=2.16; 95% CI=1.60, 2.91; $p<0.001$) household food insecurity. Results displayed in Table 2 also indicated that the general pattern of statistically significant results held for most individual ACEs, with the exception of parent death. Robustness checks also revealed that employing a count measure of ACEs did not alter the substantive findings. The Appendix (available online) provides results of additional ancillary analyses.

Finally, a subset of analyses examining the degree to which parent self-rated well-being attenuated associations between ACE exposure and the different forms of food insecurity was performed (Table 3). Broadly speaking, evidence of a notable degree of attenuation emerged.

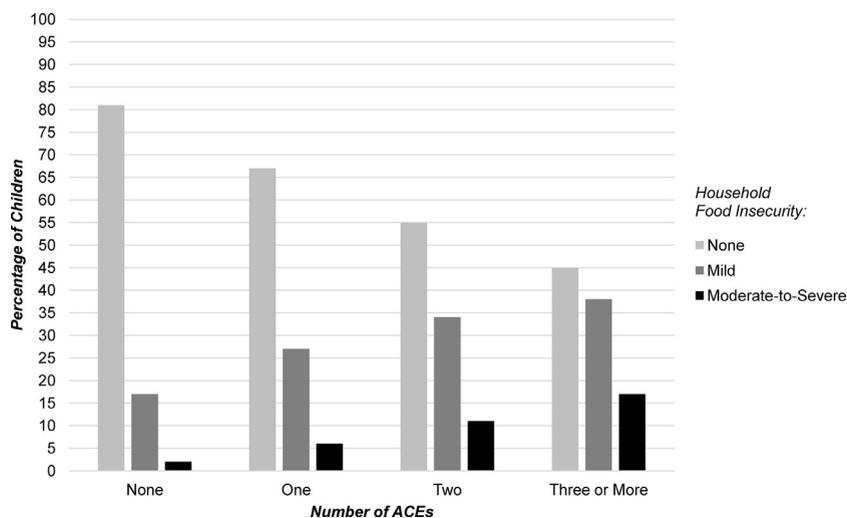


Figure 1. The percentage of food insecure households by number of ACEs. ACE, adverse childhood experience.

Table 2. The Association Between ACEs and Household Food Insecurity^a

Variable	Household food insecurity	
	Mild RRR (95% CI)	Moderate-to-severe RRR (95% CI)
Cumulative ACEs		
1 ACE	1.65 (1.39, 1.97)	2.16 (1.60, 2.91)
2 ACEs	2.18 (1.73, 2.74)	3.39 (4.33, 4.93)
3+ ACEs	3.70 (2.96, 4.63)	8.14 (5.75, 11.52)
Individual ACEs		
Parents divorced/separated	1.61 (1.35, 1.92)	2.01 (1.56, 2.59)
Parent died	0.80 (0.62, 1.04)	0.68 (0.47, 1.01)
Parent in jail	1.81 (1.48, 2.21)	2.41 (1.81, 3.20)
Witnessed physical violence in the home	2.39 (1.96, 2.93)	3.79 (2.83, 5.07)
Victim of or witnessed violence in the neighborhood	2.18 (1.66, 2.85)	3.33 (2.36, 4.69)
Lived with mentally ill/suicidal person	1.77 (1.75, 2.06)	3.61 (2.79, 4.68)
Lived with someone with drug/alcohol problem	2.17 (1.85, 2.56)	4.02 (3.08, 5.24)
Experienced unfair treatment because of race/ethnicity	2.62 (1.94, 3.55)	3.99 (2.59, 6.16)

Note: Boldface indicates statistical significance ($p < 0.05$).

^aModels pertaining to cumulative ACE exposure and individual ACE exposure are calculated separately. Models include the following covariates: child age, child sex, child race/ethnicity (i.e., black, Hispanic, other, with white as the reference category), parent marital status, cohabitation, parent's highest educational attainment, income-to-poverty ratio (i.e., low income, moderate income, high income, with poor [below the poverty line] as the reference category), parent's employment status (employed at least 50/52 weeks in the year), and nutrition assistance (i.e., a measure of WIC or SNAP assistance in the past 12 months).

ACE, adverse childhood experience; SNAP, Supplemental Nutrition Assistance Program; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children.

Table 3. The Role of Parent Self-Rated Physical and Mental Well-Being in Attenuating Associations Between Cumulative ACE Exposure and Household Food Insecurity^a

Cumulative ACEs	Household food insecurity	
	Mild ^b (SE)	Moderate-to-severe ^b (SE)
Parent self-rated mental and physical well-being excluded		
1 ACE	0.504 (0.089)	0.770 (0.153)
2 ACEs	0.778 (0.117)	1.221 (0.191)
3+ ACEs	1.310 (0.114)	2.100 (0.177)
Parent self-rated physical well-being included		
1 ACE	0.405 (0.093)	0.666 (0.156)
2 ACEs	0.647 (0.126)	1.110 (0.197)
3+ ACEs	1.121 (0.121)	1.894 (0.179)
Attenuation, %		
1 ACE	19.64	13.51
2 ACEs	16.84	9.09
3+ ACEs	14.43	9.81
Parent self-rated mental well-being included		
1 ACE	0.354 (0.094)	0.569 (0.158)
2 ACEs	0.524 (0.126)	0.911 (0.206)
3+ ACEs	1.035 (0.121)	1.694 (0.181)
Attenuation, %		
1 ACE	29.76	26.10
2 ACEs	32.65	25.39
3+ ACEs	20.99	19.33

Note: Boldface indicates statistical significance ($p < 0.05$).

^aModels include all covariates.

^bUnstandardized coefficient.

ACE, adverse childhood experience.

For instance, in the case of mental well-being, attenuation analyses indicated that 19.33%–32.65% of the association between ACE exposure and food insecurity was explained by lower parent self-rated mental well-being. Attenuation was slightly less pronounced for parent self-rated physical well-being, ranging from 9.09% to 19.64%. Still, associations between ACE exposure and household food insecurity remained statistically significant even after accounting for parent self-rated well-being, indicating only partial attenuation.

DISCUSSION

Results show that reports of ACEs (e.g., witnessing domestic violence, having a parent in jail, experiencing discrimination) are strongly associated with household food insecurity. Additionally, the greater the number of ACEs, the more likely the household is to report both mild and moderate-to-severe food insecurity. Still, the findings reveal that, despite being somewhat less impactful than a multiplicity of ACEs, exposure to a single ACE is also significantly associated with an elevated risk of household food insecurity. These findings build on previous research showing a strong association between caregiver reports of ACEs during their own childhood and severity of household food insecurity.¹⁷ The present study also employs a recent, nationally representative sample of families with children, thereby extending and corroborating prior research. Findings also reinforce the interconnectedness of ACE exposure, food insecurity, and parent mental and physical well-being suggested in prior literature,^{18–25} further buttressing the need to consider the overlap of these processes when developing effective interventions for both household food insecurity and ACEs such as abuse, neglect, poor parental mental health, and incarceration.^{39,40}

Broadly speaking, the present results point to the need for expanded nutrition assistance programs that are trauma informed, and, therefore, move beyond simple assessments of nutrient intake, disordered eating patterns, and financial risk or need.^{11,40} Nutrition assistance remains a limited form of intervention to address the issue of food insecurity, and may not adequately reduce food hardships among families exposed to a high number of ACEs. The present findings suggest that food insecurity interventions must go beyond nutrition assistance to address exposure to ACEs, and that existing nutrition assistance programming may be more effective at reducing food hardship if integrated with approaches that link families to programs that address community and family violence and provide economic and socioemotional supports for caregivers to prevent abuse, hardship, and exposure to the criminal justice system. Indeed,

addressing exposure to ACEs through such comprehensive and two-generation approaches that simultaneously help caregivers and children will likely improve health and development over the life course.⁴¹

Limitations

Strengths of this study are that the 2016 NSCH is representative of the U.S. population and captures current family experiences with food hardship and simultaneous ACEs. This study is limited, however, in that it is cross-sectional and therefore cannot determine the causal direction of the relationship between adversity and food insecurity. Still, as the ACE measures are lifetime reports, and the item pertaining to food insecurity references the 12 months before the survey, it is likely that in many instances, the ACEs being referred to occurred before the 12 months before the survey. Even so, this causal order cannot be verified with these data. Some recent research, moreover, suggests that household food insecurity may precede and influence subsequent childhood adversities, particularly family violence.^{15,18} Other research, however, finds evidence of family violence preceding food insecurity,²³ and forms of adversity in broader ecologic contexts (e.g., exposure to community violence) may indeed trickle down to the household and affect the food environment.⁴² Therefore, it is likely that a more nuanced, reciprocal relationship exists between these risk factors that cannot currently be teased apart given the format of the 2016 NSCH data. Despite this limitation, additional research into common risk factors that may explain part of the association between ACEs and food insecurity is needed in an effort to reduce both ACEs and food insecurity. A related limitation that cannot be avoided with these data pertains to memory or recall issues and caregiver awareness of or willingness to report children's exposure to adversity, which may compromise measurement validity of the ACE measures to an unknown degree.

CONCLUSIONS

The results of the present study show that ACEs have strong associations with increased food insecurity and that food insecurity becomes more severe as ACEs accumulate. This relationship, moreover, appears to be partially explained by parental mental and physical well-being. In an effort to build upon the current findings, scholars should consider future research that focuses on the effectiveness of targeted interventions that address food insecurity and ACEs simultaneously, and that assesses the effectiveness of existing two-generation programs on reducing food insecurity. Overall, findings indicate a close connection between ACEs and food

insecurity, suggesting that policies must extend beyond the provision of nutrition assistance and integrate programming that addresses intersecting adversities, such as family and community violence, incarceration, and discrimination.

ACKNOWLEDGMENTS

No financial disclosures were reported by the authors of this paper.

SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at <https://doi.org/10.1016/j.amepre.2019.06.004>.

REFERENCES

- Dube SR, Felitti VJ, Dong M, Chapman DP, Giles WH, Anda RF. Childhood abuse, neglect, and household dysfunction and the risk of illicit drug use: the adverse childhood experiences study. *Pediatrics*. 2003;111(3):564–572. <https://doi.org/10.1542/peds.111.3.564>.
- Hughes K, Bellis MA, Hardcastle KA, et al. The effect of multiple adverse childhood experiences on health: a systematic review and meta-analysis. *Lancet Public Health*. 2017;2(8):e356–e366. [https://doi.org/10.1016/s2468-2667\(17\)30118-4](https://doi.org/10.1016/s2468-2667(17)30118-4).
- Shonkoff JP. Capitalizing on advances in science to reduce the health consequences of early childhood adversity. *JAMA Pediatr*. 2016;170(10):1003–1007. <https://doi.org/10.1001/jamapediatrics.2016.1559>.
- Merrick MT, Ford DC, Ports KA, Guinn AS. Prevalence of adverse childhood experiences from the 2011–2014 Behavioral Risk Factor Surveillance System in 23 states. *JAMA Pediatr*. 2018;172(11):1038–1044. <https://doi.org/10.1001/jamapediatrics.2018.2537>.
- Hunt TK, Slack KS, Berger LM. Adverse childhood experiences and behavioral problems in middle childhood. *Child Abuse Negl*. 2017;67:391–402. <https://doi.org/10.1016/j.chiabu.2016.11.005>.
- Björkenstam E, Björkenstam C, Jablonska B, Kosidou K. Cumulative exposure to childhood adversity, and treated attention deficit/hyperactivity disorder: a cohort study of 543 650 adolescents and young adults in Sweden. *Psychol Med*. 2018;48(3):498–507. <https://doi.org/10.1017/s0033291717001933>.
- Brown NM, Brown SN, Briggs RD, Germán M, Belamarich PF, Oyeku SO. Associations between adverse childhood experiences and ADHD diagnosis and severity. *Acad Pediatr*. 2017;17(4):349–355. <https://doi.org/10.1016/j.acap.2016.08.013>.
- Heerman WJ, Krishnaswami S, Barkin SL, McPheeters M. Adverse family experiences during childhood and adolescent obesity. *Obesity (Silver Spring)*. 2016;24(3):696–702. <https://doi.org/10.1002/oby.21413>.
- Huang H, Yan P, Shan Z, et al. Adverse childhood experiences and risk of type 2 diabetes: a systematic review and meta-analysis. *Metabolism*. 2015;64(11):1408–1418. <https://doi.org/10.1016/j.metabol.2015.08.019>.
- Flaherty EG, Thompson R, Dubowitz H, et al. Adverse childhood experiences and child health in early adolescence. *JAMA Pediatr*. 2013;167(7):622–629. <https://doi.org/10.1001/jamapediatrics.2013.22>.
- Hecht AA, Biehl E, Buzogany S, Neff RA. Using a trauma-informed policy approach to create a resilient urban food system. *Public Health Nutr*. 2018;21(10):1961–1970. <https://doi.org/10.1017/s1368980018000198>.
- Chilton M, Knowles M, Bloom SL. The intergenerational circumstances of household food insecurity and adversity. *J Hunger Environ Nutr*. 2017;12(2):269–297. <https://doi.org/10.1080/19320248.2016.1146195>.
- Chilton M, Knowles M, Rabinowich J, Arnold KT. The relationship between childhood adversity and food insecurity: ‘It’s like a bird nesting in your head’. *Public Health Nutr*. 2015;18(14):2643–2653. <https://doi.org/10.1017/s1368980014003036>.
- Chilton MM, Rabinowich JR, Woolf NH. Very low food security in the USA is linked with exposure to violence. *Public Health Nutr*. 2014;17(1):73–82. <https://doi.org/10.1017/s1368980013000281>.
- Jackson DB, Lynch KR, Helton JJ, Vaughn MG. Food insecurity and violence in the home: investigating exposure to violence and victimization among preschool-aged children. *Health Educ Behav*. 2018;45(5):756–763. <https://doi.org/10.1177/1090198118760683>.
- Knowles M, Rabinowich J, De Cuba SE, Cutts DB, Chilton M. “Do you wanna breathe or eat?": parent perspectives on child health consequences of food insecurity, trade-offs, and toxic stress. *Matern Child Health J*. 2016;20(1):25–32. <https://doi.org/10.1007/s10995-015-1797-8>.
- Sun J, Knowles M, Patel F, Frank DA, Heeren TC, Chilton M. Childhood adversity and adult reports of food insecurity among households with children. *Am J Prev Med*. 2016;50(5):561–572. <https://doi.org/10.1016/j.amepre.2015.09.024>.
- Helton JJ, Jackson DB, Boutwell BB, Vaughn MG. Household food insecurity and parent-to-child aggression. *Child Maltreat*. 2019;24(2):213–221. <https://doi.org/10.1177/1077559518819141>.
- Melchior M, Caspi A, Howard LM, et al. Mental health context of food insecurity: a representative cohort of families with young children. *Pediatrics*. 2009;124(4):e564–e572. <https://doi.org/10.1542/peds.2009-0583>.
- Seligman HK, Laraia BA, Kushel MB. Food insecurity is associated with chronic disease among low-income NHANES participants. *J Nutr*. 2010;140(2):304–310. <https://doi.org/10.3945/jn.109.112573>.
- Stuff JE, Casey PH, Szeto KL, et al. Household food insecurity is associated with adult health status. *J Nutr*. 2004;134(9):2330–2335. <https://doi.org/10.1093/jn/134.9.2330>.
- Whitaker RC, Phillips SM, Orzol SM. Food insecurity and the risks of depression and anxiety in mothers and behavior problems in their preschool-aged children. *Pediatrics*. 2006;118(3):e859–e868. <https://doi.org/10.1542/peds.2006-0239>.
- Hernandez DC, Marshall A, Mineo C. Maternal depression mediates the association between intimate partner violence and food insecurity. *J Womens Health*. 2014;23(1):29–37. <https://doi.org/10.1089/jwh.2012.4224>.
- Letourneau N, Dewey D, Kaplan BJ, et al. Intergenerational transmission of adverse childhood experiences via maternal depression and anxiety and moderation by child sex. *J Dev Orig Health Dis*. 2019;10(1):88–99. <https://doi.org/10.1017/s2040174418000648>.
- Taylor CA, Guterman NB, Lee SJ, Rathouz PJ. Intimate partner violence, maternal stress, nativity, and risk for maternal maltreatment of young children. *Am J Public Health*. 2009;99(1):175–183. <https://doi.org/10.2105/ajph.2007.126722>.
- Liming KW. Examining the differing effects of economic hardship and poor maternal wellbeing on cumulative exposure to adverse childhood experiences. *J Child Adolesc Trauma*. In press. <https://doi.org/10.1007/s40653-018-0230-z>.
- Ghandour RM, Jones JR, Lebrun-Harris LA, et al. The design and implementation of the 2016 National Survey of children’s Health. *Matern Child Health J*. 2018;22(8):1093–1102. <https://doi.org/10.1007/s10995-018-2526-x>.
- Bocquier A, Vieux F, Lioret S, Dubuisson C, Caillavet F, Darmon N. Socio-economic characteristics, living conditions and diet quality are associated with food insecurity in France. *Public Health Nutr*. 2015;18(16):2952–2961. <https://doi.org/10.1017/s1368980014002912>.
- Huang J, Barnidge E. Low-income children’s participation in the National School Lunch Program and household food insufficiency. *Soc Sci Med*. 2016;150:8–14. <https://doi.org/10.1016/j.socscimed.2015.12.020>.
- Lee SE, Song YJ, Kim Y, Choe J, Paik HY. Household food insufficiency is associated with dietary intake in Korean adults. *Public*

- Health Nutr.* 2016;19(suppl 6):1112–1121. <https://doi.org/10.1017/s1368980015002438>.
31. Alaimo K, Briefel RR, Frongillo EA Jr, Olson CM. Food insufficiency exists in the United States: results from the third National Health and Nutrition Examination Survey (NHANES III). *Am J Public Health.* 1998;88(3):419–426. <https://doi.org/10.2105/ajph.88.3.419>.
 32. Narain K, Bean-Mayberry B, Washington DL, Canelo IA, Darling JE, Yano EM. Access to care and health outcomes among women Veterans using Veterans Administration health care: association with food insufficiency. *Womens Health Issues.* 2018;28(3):267–272. <https://doi.org/10.1016/j.whi.2018.01.002>.
 33. Muldoon KA, Duff PK, Fielden S, Anema A. Food insufficiency is associated with psychiatric morbidity in a nationally representative study of mental illness among food insecure Canadians. *Soc Psychiatry Psychiatr Epidemiol.* 2013;48(5):795–803. <https://doi.org/10.1007/s00127-012-0597-3>.
 34. Vega SS, Hinojosa MS, Nguyen J. Using Andersen's Behavioral Model to predict participation in the Supplemental Nutrition Assistance Program (SNAP) among U.S. adults. *J Hunger Environ Nutr.* 2017;12(2):193–208. <https://doi.org/10.1080/19320248.2016.1255694>.
 35. Lanier P, Maguire-Jack K, Lombardi B, Frey J, Rose RA. Adverse childhood experiences and child health outcomes: comparing cumulative risk and latent class approaches. *Matern Child Health J.* 2018;22(3):288–297. <https://doi.org/10.1007/s10995-017-2365-1>.
 36. Child and adolescent health measurement initiative (CAHMI). National survey of children's health (NSCH). 2011–2012 NSCH: Child Health Indicator and Subgroups SAS Codebook, Version 1.0. http://childhealthdata.org/docs/nsch-docs/sas-codebook_2011-2012-nsch-v1_05-10-13.pdf. Published 2013. Accessed June 14, 2019.
 37. Baglivio MT, Epps N, Swartz K, Huq MS, Sheer A, Hardt NS. The prevalence of adverse childhood experiences (ACE) in the lives of juvenile offenders. *J Juv Justice.* 2014;3(2):1–17. https://www.prisonpolicy.org/scans/Prevalence_of_ACE.pdf.
 38. Danielson ML, Bitsko RH, Ghandour RM, Holbrook JR, Kogan MD, Blumberg SJ. Prevalence of parent-reported ADHD diagnosis and associated treatment among U.S. children and adolescents, 2016. *J Clin Child Adolesc Psychol.* 2018;47(2):199–212. <https://doi.org/10.1080/15374416.2017.1417860>.
 39. Shonkoff JP, Garner AS, Siegel BS. Committee on Early Childhood, Adoption, and Dependent Care, Section on Developmental and Behavioral Pediatrics. The lifelong effects of early childhood adversity and toxic stress. *Pediatrics.* 2012;129(1):e232–e246. <https://doi.org/10.1542/peds.2011-2663>.
 40. Booshehri LG, Dugan J, Patel F, Bloom S, Chilton M. Trauma-informed Temporary Assistance for Needy Families (TANF): a randomized controlled trial with a two-generation impact. *J Child Fam Stud.* 2018;27(5):1594–1604. <https://doi.org/10.1007/s10826-017-0987-y>.
 41. Garner AS, Shonkoff JP, Siegel BS, Committee on Early Childhood, Adoption, and Dependent Care, Section on Developmental and Behavioral Pediatrics. Early childhood adversity, toxic stress, and the role of the pediatrician: translating developmental science into lifelong health. *Pediatrics.* 2012;129(1):e224–e231. <https://doi.org/10.1542/peds.2011-2662>.
 42. Jackson DB, Johnson KR, Vaughn MG, Hinton ME. The role of neighborhoods in household food insufficiency: considering interactions between physical disorder, low social capital, violence, and perceptions of danger. *Soc Sci Med.* 2019;221:58–67. <https://doi.org/10.1016/j.socscimed.2018.12.013>.