



Child and Adolescent Health in the United States: The Role of Adverse and Positive Childhood Experiences

Elizabeth Crouch^{1,2} · Elizabeth Radcliff¹ · Kevin Bennett³ · Monique J. Brown^{4,5} · Peiyin Hung¹

Accepted: 31 October 2023 / Published online: 6 November 2023
© The Author(s), under exclusive licence to Springer Nature Switzerland AG 2023

Abstract

Background Adverse childhood experiences (ACEs) have been associated with poorer health from childhood into adulthood. There has been limited prior research examining the associations between positive childhood experiences (PCEs) and health among children.

Objective The present study examines the association between PCEs and child health, controlling for ACE counts, using a nationally representative sample.

Participants and Setting : The data for this study came from the 2019–2020 National Survey of Children’s Health and were limited to children six years of age or older with complete demographic information and information on ACEs, PCEs, and child health (n = 46,913).

Methods Bivariate analyses between PCEs, ACEs, child/adolescent characteristics, or caregiver’s characteristics and child/adolescent health were examined using Pearson’s Chi-square tests, weighted to produce nationally representative distributions. Multivariable regression models were used to examine the association between selected PCEs and good health, controlling for whether a child had two or more ACEs.

Results In adjusted analyses, children who experienced any of the following PCEs had a higher odds of good health, compared to children who did not experience each type of these PCEs: after school activities (aOR 1.85; 95% CI 1.11–3.09), resilient family (aOR 2.22; 95% CI 1.45–3.41), supportive neighborhood (aOR 1.56; 95% CI 1.01–2.41), and connected caregiver (aOR 1.84; 95% CI 1.22–2.77).

Conclusions Examining and understanding PCEs and how they are associated with child health is a unique opportunity to guide more targeted policies and intervention efforts. Efforts to provide PCEs in schools, homes, and communities may help to reduce health inequities early in childhood.

Keywords Adverse Childhood Experiences · Positive Childhood Experiences · Health · Trauma

✉ Elizabeth Crouch
crouchel@mailbox.sc.edu
Elizabeth Radcliff
radclife@mailbox.sc.edu
Kevin Bennett
kevin.bennett@uscmed.sc.edu
Monique J. Brown
brownm68@mailbox.sc.edu
Peiyin Hung
hungp@mailbox.sc.edu

² Rural and Minority Health Research Center, Arnold School of Public Health, 220 Stoneridge Drive, Suite 204, Columbia, SC 29210, USA
³ School of Medicine, Department of Family and Preventive Medicine, University of South Carolina, 3209 Colonial Dr., Columbia, SC 29203, USA
⁴ Department of Epidemiology and Biostatistics, Arnold School of Public Health, Columbia, SC 29208, USA
⁵ South Carolina SmartState Center for Healthcare Quality, University of South Carolina, Discovery I, Suite 408, 915 Greene Street, Columbia, SC 29208, USA

¹ Department of Health Services Policy and Management, Arnold School of Public Health, University of South Carolina, Discovery Building Suite 345, Columbia, SC 29201, USA

Introduction

Current research in childhood experiences have examined both adverse childhood experiences (ACEs), which include experiences of household abuse, neglect, and dysfunction, as well as positive childhood experiences (PCEs), which include safe and supportive relationships and environments for children to work, grow, and play (Felitti et al., 1998; Sege & Harper Browne, 2017). ACEs have been associated with risky behaviors and poorer physical and mental health outcomes from childhood into adulthood (Shonkoff & Garner, 2012). In contrast, PCEs have been shown to mitigate, moderate, or reduce the effects of ACEs, and can help to build resilience among both individuals and communities (Cheong et al., 2017; CDC, 2013; Poole et al., 2017).

ACEs primarily occur within the household, while PCEs occur both within the household, and also within the community, in schools, churches, and volunteer organizations (Biglan et al., 2017). PCEs can be best described using the Healthy Outcomes Positive Experiences framework (Sege & Harper Browne, 2017), which uses four groupings to categorize PCEs: (1) nurturing, supportive relationships, (2) safe, stable environments, (3) constructive social engagement, and (4) development of social and emotional competencies (Sege & Harper Browne, 2017). PCEs have also been demonstrated to improve healthy social emotional development in both children and adolescents (Biglan et al., 2017; Cheong et al., 2017; Poole et al., 2017).

Prior research has extensively examined the association between ACEs and poorer physical and mental health among children, including higher rates of anxiety and depression among children and adolescents (Elmore & Crouch, 2020; Elmore et al., 2020). Many researchers have examined other health outcomes with ACEs, such as chronic pain and dental health, for example (Groenewald et al., 2020; Bright et al., 2015). A few studies examined the associations of both ACEs and PCEs with adult health, finding that PCEs are protective for poor health outcomes (Crandall et al., 2019; Bethell et al., 2019). More recent studies examining relationships between PCEs, ACEs, and physical and mental health either had small sample sizes of adults (Novilla et al., 2022), were not based in the United States (Kuhar & Kocjan, 2021) or looked at how ACEs and PCEs affect adult family health (Daines et al., 2021). However, there has been limited prior research examining the associations between different PCEs categories and health among children and adolescents.

The present study examines the association between PCEs, and child health, controlling for ACE counts, using a nationally representative sample of children ages six to seventeen years of age. We hypothesize that children with more PCEs will be more likely to be in good health, controlling

for multiple ACEs. The findings from this study may be instructive for child welfare advocates and policy makers as they intervene in communities with programming that promotes PCEs among children and adolescents.

Methods

The data for this study came from the 2019–2020 National Survey of Children’s Health (NSCH), which is a nationally representative mail and online survey administered by the Data Resource Center for Child and Adolescent Health (DRC). The NSCH asks caregivers who reside in a household with at least one child between the ages of 0–17 to answer questions about the demographics, health, and experiences of the child. Further information on both the selection and sampling methodology of the NSCH can be found on the DRC website (childhealthdata.org). The 2019–2020 NSCH had a total of 72,210 surveys that were completed, with the sample further restricted to children six years of age or older ($n=51,895$), and those with complete demographic information and information on ACEs, PCEs, and child health ($n=46,913$, Table 1).

The dependent variable, child health status, which asks caregivers “In general, how would you describe this child’s health?” had five responses that were collapsed into good health (excellent, very good, or good health) and poor health (fair or poor health) based on prior literature, which also made it possible to look at bivariate and logistic regression analyses with this outcome (Elmore & Crouch, 2020; Elmore et al., 2020). The nine ACEs measured by the NSCH include parental separation or divorce, parental death, witnessing household violence, witnessing neighborhood violence, household mental illness, household incarceration, household substance abuse, racial/ethnic mistreatment, and economic hardship (Table 2). From the ACE questions asked, the type and number of ACEs can be determined, but not the frequency or severity of any particular ACE. Thus, ACE exposure variables were collapsed into counts of individuals reporting two or more ACEs, or less than two ACEs, as designated by the NSCH.

Seven questions from the NSCH were used to measure the four PCE categories — (1) nurturing, supportive relationships, (2) safe, stable environments, (3) constructive social engagement, and (4) development of social and emotional competencies — as established by prior research (Sege & Harper Browne, 2017; Crouch et al., 2021). For the category *being in nurturing and supportive relationships*, NSCH questions regarding mentorship, family resilience, and family communication were utilized. In order to quantify mentorship, caregivers of the child are asked “other than you or other adults in your home, is there at least one

Table 1 Characteristics of respondents to the 2019–2020 National Survey of Children’s Health, in total and stratified by health, n=46,913

Characteristic	All (Col %)	Good health (Col %)	Poor health (Col %)	P value
<i>Characteristics of Child, row %</i>				
Sex of Child		98.3	1.7	
Male	51.0	51.1	43.4	0.084
Female	49.0	48.9	56.6	
Age of Child				< 0.0001
6–12 years old	58.1	58.3	50.0	
13–17 years old	41.9	41.7	50.0	
Race/Ethnicity of Child				< 0.0001
Non-Hispanic White	51.4	51.8	32.5	
Non-Hispanic Black	12.8	12.5	25.5	
Hispanic	25.1	24.9	34.3	
Non-Hispanic Other	10.7	10.8	7.6	
Special Health Care Needs, Yes	23.7	22.8	75.9	< 0.0001
<i>Characteristics of Household</i>				
Primary Language				0.0964
Not English	13.6	14.4	21.3	
Caregiver Education				< 0.0001
Less than high school or high school	28.6	28.2	51.0	
Some college or more	71.4	71.8	49.0	
Family Structure				< 0.0001
2 parents, currently married	65.3	46.6	65.6	
2 parents, not currently married	7.1	12.6	7.0	
Single parent	22.4	28.1	22.3	
Other	5.2	12.6	5.1	
Federal Poverty Level (FPL)				< 0.0001
0–99% FPL	16.8	16.4	38.0	
100–199% FPL	21.6	21.5	29.4	
200–399% FPL	29.9	30.1	21.7	
400% FPL or above	31.7	32.0	10.8	
Health Insurance				< 0.0001
Public Only	27.5	27.1	49.1	
Private Only	59.7	60.2	28.7	
Public and Private	4.6	4.4	13.9	
Not Insured/Unspecified	8.3	8.3	8.3	

Bold indicates statistical significance at p<0.05, calculated from Pearson’s Chi-square tests

adult in this child’s school, neighborhood, or community who knows this child well and who he or she can rely on for advice or guidance?” If the response was yes, the child was deemed as being in nurturing, supportive relationships. To measure family resilience, the NSCH family resilience composite measure was used, which asks the question: “when your family faces problems, how often are you likely to do each of the following? (1) talk together about what to do, (2) work together to solve our problems, (3) know we have strengths to draw on, and (4) stay hopeful even in difficult times.” The following response choices were options: none

Table 2 Adverse and Positive Childhood Experiences (PCE) reported by respondents to the 2019–2020 National Survey of Children’s Health, in total and stratified by health, n=46,913

Characteristic	All	Good health (%)	Poor health (%)	P value
<i>Adverse Childhood Experiences</i>				
Parent or guardian divorced or separated	28.3	28.1	38.9	0.0069
Parent or guardian died	3.8	3.3	7.4	< 0.0001
Parent or guardian served time in jail	8.3	8.2	17.2	< 0.0001
Saw or heard parents or adults slap, hit, kick, punch one another in the home	6.5	6.2	20.4	< 0.0001
Was a victim of violence or witnessed violence in neighborhood	5.4	5.2	17.2	< 0.0001
Lived with anyone who was mentally ill, suicidal, or severely depressed	9.9	9.8	18.6	< 0.0001
Lived with anyone who had a problem with alcohol or drugs	10.6	10.3	28.1	< 0.0001
Treated or judged unfairly because of his or her race or ethnic group	6.6	6.5	16.1	< 0.0001
Economic Hardship: Hard to cover basics like food or housing	14.5	14.1	35.2	< 0.0001
Count of ACEs: 2 or more ACEs	22.6	22.2	46.6	< 0.0001
<i>Positive Childhood Experiences</i>				
After school activities	78.3	78.7	53.5	< 0.0001
Community volunteer	40.8	40.9	37.4	0.5157
Guiding mentor	88.1	88.2	81.4	0.0138
Connected caregiver	63.2	63.7	38.1	< 0.0001
Safe neighborhood	65.3	65.6	49.2	0.0004
Supportive neighborhood	55.9	56.3	34.5	< 0.0001
Resilient family	83.4	83.8	61.3	< 0.0001

Notes: P values were calculated from Pearson’s Chi-square tests; **Bold** indicates statistical significance at p<0.05, calculated from Pearson’s Chi-square tests

of the time, some of the time, most of the time, or all of the time. When caregivers answered most or all of the time to all four items, the child was considered to live in a household with family resilience.

For the category of *living and developing in safe, stable, equitable environments*, we used the following NSCH questions referring to the neighborhood and community in which the family lived “To what extent do you agree with these statements about your neighborhood or community... 1) people in this neighborhood help each other out, 2) we watch out for each other’s children in this neighborhood, and 3) when we encounter difficulties, we know where to go for help in our community.” Response outcomes include five levels: definitely agree, somewhat agree, somewhat

disagree, or definitely disagree. If caregivers reported “definitely agree” to at least one of the items above and “somewhat agree” or “definitely agree” to the other two items, children were categorized as living in a supportive neighborhood. In order to measure whether a child resided in a safe neighborhood, the following question was used: “To what extent do you agree with these statements about your neighborhood or community... the child is safe in our neighborhood.” A response of “definitely agree” was categorized as the child living in a safe neighborhood.

Opportunities for constructive social engagement were measured using questions on after-school activities and volunteerism. Caregivers were surveyed: “During the past twelve months, did this child participate in a sports team or did he or she take sports lessons after school or on weekends? Any clubs or organizations after school or on weekends? Any other organized activities or lessons, such as music, dance, language, or arts?” Children who had participated in one or more extracurricular activities were categorized as participating in an after-school activity. Whether a child had volunteered was measured using the following: “During the past twelve months did the child participate in any type of community service or volunteer work at school, place of worship, or in the community?” If the answer to this was “yes”, the child was recorded as having volunteered in their community, school, or church.

Learning social and emotional competencies was quantified using the NSCH question “how well can you and this child share ideas or talk about things that really matter?” Response choices encompassed the following: very well, somewhat well, not very well, or not very well at all. These responses were then divided into two categories: (1) very well or (2) somewhat well to not very well or not very well at all.

Covariates included in the model were chosen based on Bronfenbrenner’s Ecological Systems Theory, a social-ecological framework which examines the development of a child using the child’s immediate environment (home, school, peers), influences between the immediate environments and indirect influences on environment, and the larger social cultural environment (Bronfenbrenner, 1979). The following covariates were selected for our analyses: child age, sex, race/ethnicity, and if the child had special health care needs. Race/ethnicity was self-reported by the caregiver and used the NSCH groupings: non-Hispanic White, non-Hispanic Black, Hispanic, and Multiracial/Other non-Hispanic. To identify whether a child had special health care needs, the NSCH special health care needs indicator was used, which is a 5-item tool of reported use of prescription medication, functional limitations, elevated use of services, specialized therapy, and ongoing developmental, emotional, or behavioral conditions. Special healthcare needs was

defined as whether a child was reported to have at least one special healthcare need.

Additional covariates included characteristics of the caregiver such as the primary language spoken in the household, the highest level of educational attainment of a caregiver in the household, family structure, poverty/income status, and health insurance status. Primary language spoken in the home included English or not English. Educational attainment was dichotomized into less than or equal to a high school degree/GED or at least some college education or more. Family structure had four categories: two parents currently married, two parents not currently married, single parent, and other. Poverty/income level included the following: 0–99% of the federal poverty level (FPL), 100–199% FPL, 200%–399 FPL, and 400% FPL or above. Health insurance categories were public, private, public and private, and not insured/unspecified.

Descriptive statistics were used to calculate weighted frequencies and proportions for each variable. Bivariate analyses between PCEs, ACEs, child/adolescent characteristics, or caregiver’s characteristics and child/adolescent health were examined using Pearson’s Chi-square tests, weighted to produce nationally representative distributions. P-values < 0.05 were deemed statistically significant. As instructed by NSCH guidelines, the results of the NSCH are discussed in terms of the children (childhealthdata.org). Despite the fact that only 1.7% of unweighted children had poor health, we were able to compare children with poor health to good health due to the weighting of the sample, per the NSCH guidelines. Multivariable regression models were used to examine the association between selected PCEs and good health, controlling for whether a child had two or more ACEs. The appropriate survey sampling weights, cluster, and strata were used as instructed by the NSCH.

Analyses were conducted using the statistical software SAS. This study was approved as exempt by the relevant institutional review board.

Results

Survey Participant Characteristics

Just over 50% of the sample was male (51.0%), non-Hispanic White (51.4%), and six to twelve years in age (58.1%, Table 1). Nearly a quarter (23.7%) of children had special healthcare needs. Fewer than 14% of children in the sample (13.6%) did not speak English as their primary language. Over 70% of children resided with a caregiver who had some college or more (71.4%), with 65.3% of children living with two parents who were currently married. Nearly a third of children lived at 400% or above the federal poverty

level (31.7%) and 16.8% lived below the federal poverty level. More than a quarter of children (27.5%) had public health insurance.

Just under 2% (1.7%) of children were reported as being in poor health, with 98.3% of children reported as having good health. Characteristics significantly associated with health status included age of the child, special healthcare needs, race/ethnicity, caregiver education, family structure, federal poverty level, and health insurance. Children who were Hispanic, had special healthcare needs, and had public health insurance were more likely to report fair or poor health ($p < 0.0001$).

Bivariate Analyses

Children with poor health experienced every ACE at a higher rate than children with good health, with each type of ACE significantly associated with fair or poor health ($p < 0.01$, Table 2). For example, 20.4% of children with poor health saw domestic violence in the home (saw or heard parents slap, hit, kick, or punch one another in the home), compared to 6.2% of children with good health ($p < 0.0001$). Among children with poor health, 46.6% had experienced two or more ACEs, compared to 22.2% of children with good health ($p < 0.0001$).

The majority of children had experienced each PCE, with each PCE category above 50%, except for community volunteerism (Table 2). We hypothesize that less than 50% of children had experienced the PCE of community volunteerism, as volunteerism, while possible starting at age 6 on, may be less common among younger children and become more common as children age into adolescent. Children with poor health experienced each type of PCE at a lower rate than children with good health ($p < 0.01$), with the exception of community volunteerism and guiding mentor. We hypothesize that the occurrence of both having a guiding mentor and community volunteerism may be lower in general for younger children, which may be why there were not differences with those two PCEs. Just over one third of children with poor health (34.5%) resided in a supportive neighborhood, compared to 56.3% of children with good health ($p < 0.0001$).

Multivariable Regression Analyses

In adjusted analyses, adjusting for the race/ethnicity of the child, ACEs, sex of the child, age of the child, special healthcare needs of the child, primary language of the child, guardian education, family structure, poverty/income level, and health insurance type/status, children who experienced any of the following PCEs had a higher odds of good health, compared to children who did not experience each type

of these PCEs: after school activities (aOR 1.85; 95% CI 1.11–3.09), resilient family (aOR 2.22; 95% CI 1.45–3.41), supportive neighborhood (aOR 1.56; 95% CI 1.01–2.41), and connected caregiver (aOR 1.84; 95% CI 1.22–2.77; Table 3). Non-Hispanic Black children, as well as female children, children with special healthcare needs, and children without English as their primary language were less likely to experience good health, across all models. Furthermore, children residing below the federal poverty level and at 100–199% above the federal poverty level had a lower odds of reported good health, compared to children residing 400% or above the federal poverty level. Children with both public and private insurance were also less likely to experience good health, compared to children with just private insurance, across all models.

Discussion

While several studies have examined the relationship between ACEs and PCEs with adult health, this is the first study, to our knowledge, to use a nationally representative sample to analyze the relationship between PCEs and child and adolescent health, controlling for the count of ACEs a child has experienced (Crandall et al., 2019; Bethell et al., 2019). We found that without taking PCEs into account, a larger proportion of children with poor health had experienced each type of ACE than children with good health. Controlling for these health differences associated with ACEs, children who had experienced the following PCEs: after school activities, resilient family, supportive neighborhood, and connected caregiver, were all more likely to experience good health. This work expands upon prior work, examining PCEs and current child health, while prior work showed a positive association between PCEs and mental health in children (Poole et al., 2017), and adult health (Crandall et al., 2019). Prior work had been limited to small sample sizes of adults (Novilla et al., 2022), in other countries (Kuhar & Kocjan, 2021) and were focused on adult family health (Daines et al., 2021).

These findings have implications for the development and implementation of PCEs in communities. There are a number of ways to advocate for the implementation of PCEs among children involving family, school, and community relationships. After-school activities, which were significantly associated with good health, have previously been demonstrated to promote well-being among children (Durlak & Weissberg, 2007; Wright et al., 2010). Yet, for many children, after-school activities may be financially constraining for caregivers and households with limited financial resources. Programs that help provide affordable after-school activities may be one way to increase access to

Table 3 Associations of positive and adverse childhood experiences, and other child- and caregiver characteristics with child's health status among respondents to the 2019–2020 National Survey of Children's Health, n=46,913

	Adjusted Odds Ratios and 95% Confidence Interval of Reported Good Child Health by Each of the Following Positive Childhood Experience Types									
	Model 1		Model 2		Model 3		Model 4		Model 5	
	PE ^a	95% CI ^b	PE ^a	95% CI ^b	PE ^a	95% CI ^b	PE ^a	95% CI ^b	PE ^a	95% CI ^b
<i>Positive Childhood Experience</i>										
Yes	1.85	1.11–3.09	2.22	1.45–3.41	1.3	0.84–2.00	1.56	1.01–2.41	1.84	1.22–2.77
<i>Adverse Childhood Experiences</i>										
Two or more ACEs	1.62	0.99–2.63	1.42	0.90–2.23	1.5	0.95–2.37	1.46	0.88–2.44	1.46	0.93–2.31
No ACEs	<i>Referent</i>		<i>Referent</i>		<i>Referent</i>		<i>Referent</i>		<i>Referent</i>	
<i>Characteristics of Child</i>										
<i>Race-ethnicity</i>										
White, Non-Hispanic	<i>Referent</i>		<i>Referent</i>		<i>Referent</i>		<i>Referent</i>		<i>Referent</i>	
Black, Non-Hispanic	0.46	0.30–0.69	0.48	0.32–0.73	0.48	0.32–0.72	0.49	0.32–0.77	0.48	0.32–0.72
Hispanic	0.7	0.44–1.12	0.69	0.43–1.11	0.72	0.44–1.17	0.74	0.46–1.19	0.68	0.43–1.10
Other, Non-Hispanic	0.9	0.56–1.45	0.97	0.59–1.58	0.91	0.57–1.45	0.95	0.59–1.52	0.91	0.57–1.46
<i>Sex of Child</i>										
Male	<i>Referent</i>		<i>Referent</i>		<i>Referent</i>		<i>Referent</i>		<i>Referent</i>	
Female	0.59	0.42–0.85	0.61	0.43–0.88	0.62	0.44–0.89	0.62	0.44–0.88	0.59	0.42–0.85
<i>Age of Child</i>										
6 to 12 years old	<i>Referent</i>		<i>Referent</i>		<i>Referent</i>		<i>Referent</i>		<i>Referent</i>	
13 to 17 years old	0.8	0.54–1.17	0.85	0.58–1.24	0.8	0.53–1.18	0.81	0.55–1.19	0.85	0.58–1.23
<i>Special Health Care Needs</i>										
Yes	0.09	0.06–0.14	0.09	0.06–0.14	0.09	0.06–0.13	0.1	0.06–0.14	0.1	0.06–0.15
<i>Primary Language</i>										
Not English	0.49	0.26–0.92	0.52	0.28–0.95	0.49	0.26–0.92	0.49	0.26–0.91	0.52	0.28–0.96
<i>Characteristics of Caregiver/Household</i>										
<i>Guardian Education</i>										
High school diploma or less	0.65	0.42–1.02	0.62	0.40–0.98	0.6	0.38–0.96	0.6	0.38–0.96	0.62	0.39–0.98
Some college or more	<i>Referent</i>		<i>Referent</i>		<i>Referent</i>		<i>Referent</i>		<i>Referent</i>	
<i>Family Structure</i>										
Two parents, currently married	<i>Referent</i>		<i>Referent</i>		<i>Referent</i>		<i>Referent</i>		<i>Referent</i>	
Two parents, not currently married	0.87	0.45–1.71	0.81	0.43–1.55	0.84	0.44–1.63	0.86	0.45–1.64	0.81	0.42–1.56
Single parent	1.42	0.93–2.19	1.38	0.91–2.11	1.37	0.89–2.10	1.39	0.90–2.11	1.29	0.85–1.95
Other	0.87	0.53–1.42	0.89	0.54–1.45	0.83	0.50–1.36	0.81	0.49–1.33	0.84	0.51–1.37
<i>% Federal Poverty Level (FPL)</i>										
0–99% FPL	0.44	0.26–0.75	0.41	0.24–0.70	0.41	0.25–0.69	0.42	0.25–0.70	0.39	0.23–0.66
100–199% FPL	0.52	0.31–0.84	0.47	0.29–0.78	0.5	0.30–0.82	0.51	0.31–0.84	0.48	0.29–0.78
200–399% FPL	0.7	0.41–1.18	0.68	0.39–1.18	0.68	0.40–1.17	0.69	0.39–1.22	0.68	0.39–1.17

Table 3 (continued)

	Adjusted Odds Ratios and 95% Confidence Interval of Reported Good Child Health by Each of the Following Positive Childhood Experience Types									
	Model 1		Model 2		Model 3		Model 4		Model 5	
	After school activities		Resilient Family		Safe neighborhood		Supportive neighborhood		Connected Caregiver	
	PE ^a	95% CI ^b	PE ^a	95% CI ^b	PE ^a	95% CI ^b	PE ^a	95% CI ^b	PE ^a	95% CI ^b
≥ 400% FPL	<i>Referent</i>		<i>Referent</i>		<i>Referent</i>		<i>Referent</i>		<i>Referent</i>	
Health Insurance										
Public Only	0.92	0.47–1.80	0.82	0.44–1.51	0.86	0.45–1.61	0.86	0.46–1.61	0.85	0.45–1.56
Private Only	<i>Referent</i>		<i>Referent</i>		<i>Referent</i>		<i>Referent</i>		<i>Referent</i>	
Public and Private	0.49	0.25–0.99	0.47	0.24–0.93	0.46	0.24–0.89	0.47	0.24–0.90	0.48	0.24–0.96
Not Insured/ Unspecified	0.9	0.28–2.89	0.81	0.27–2.43	0.83	0.27–2.51	0.85	0.28–2.53	0.84	0.27–2.59

^a PE = Point Estimate

^b 95% CI = 95% Wald confidence intervals; **bold** indicates statistical significance at $p < 0.05$

PCEs (Cross et al., 2010). A successful example in Canada is the *Fusion Youth and Technology Centre*, a youth program which costs \$5.00 for a lifetime membership and has been demonstrated to build healthy relationships and well-being (Christie & Lauzon, 2014).

Residing with a connected caregiver and resilient family was also found to be significantly associated with good health in our study. This was an important finding, as recent literature on family resilience and child health was focused on the pandemic (Gayatri & Irawaty, 2022). Programming that can help caregivers and parents support their children, such as the *Strengthening Families Program (SFP)*, is one way to build these two PCEs. The SFP has been demonstrated to both increase parental knowledge of child development, as well as build positive relationships and social capital among family members (Harper Browne, 2016).

Finally, children with supportive neighborhoods had a higher odds of good health. This is demonstrative that community and systems level initiatives are vital to the promotion of PCEs. The *Safe Environment for Every Kid (SEEK)* program, for example, has been used to connect families visiting their primary health care provider with referrals and community supports (Dubowitz et al., 2009). In 2020, a new program titled *Thriving Families, Safer Children: A National Commitment to Well-Being* was announced as a collaboration between the U.S. Children's Bureau, Casey Family Programs, and Prevent Child Abuse America[®], which aims to develop equitable community systems for families and children to grow (Casey Family Programs, n.d.).

We also found that children of color, as well as children residing in poverty, were less likely to experience good health. Therefore, this discussion must encompass a discussion of a primary reason for variations in compositional characteristics by race and ethnicity: structural racism

(Bailey et al., 2017). Racism is reflected across many of the social determinants of health and is also reflected in the health experienced by children of color (American Public Health Association [APHA], 2020). The American Public Health Association has called out the massive disparities in health and health outcomes among people of color, compared to their white counterparts, proclaiming racism a public health crisis (APHA, 2020).

Strengths and Limitations

Limitations of this study include self-reporting of children's experiences by their caregivers. Caregivers may be overreporting PCEs, since these are socially desirable, and underreporting ACEs, which are socially undesirable. Both the PCEs and ACEs are limited to those that are collected in the NSCH, which do not encompass all possible ACEs or PCEs. Children and adolescents who are transient, undocumented, or residing in foster care families may be underrepresented in the NSCH, since the survey uses an address-based sampling approach. These factors may have contributed to either an over-reporting or under-reporting of ACE's and PCEs for this study. Therefore, the results must be interpreted with caution for generalizability.

This study also has several strengths, as it is the first study, to our knowledge, to examine the association between PCEs and child health. All analyses were conducted per instruction of NSCH to use survey sampling weights, cluster, and stratum as outlined in the NSCH codebook, which accounts for variable distribution and nonresponse. Finally, this study uses the most recent NSCH data, which may be beneficial for timely interventions and preventive efforts.

Conclusion

Examining and understanding PCEs and how they are associated with child health is a unique opportunity to guide more targeted policies and intervention efforts. Efforts to provide PCEs in schools, homes, and communities may help to reduce health inequities early in childhood. Further research could examine longitudinal studies to determine causality between PCEs and child health.

Declarations

Conflict of Interest The authors declare that they have no conflict of interest.

References

- Bailey, Z. D., Krieger, N., Ag nor, M., Graves, J., Linos, N., & Bassett, M. T. (2017). Structural racism and health inequities in the USA: Evidence and interventions. *The Lancet*, *389*(10077), 1453–1463. [https://doi.org/10.1016/S0140-6736\(17\)30569-X](https://doi.org/10.1016/S0140-6736(17)30569-X).
- Bethell, C., Jones, J., Gombojav, N., Linkenbach, J., & Sege, R. (2019). Positive childhood experiences and adult mental and relational health in a statewide sample: Associations across adverse childhood experiences levels. *JAMA Pediatrics*, *173*(11), e193007–e193007. <https://doi.org/10.1001/jamapediatrics.2019.3007>.
- Biglan, A., Van Ryzin, M. J., & Hawkins, J. D. (2017). Evolving a more nurturing society to prevent adverse childhood experiences. *Academic Pediatrics*, *17*(7), S150–S157. <https://doi.org/10.1016/j.acap.2017.04.002>.
- Bright, M. A., Alford, S. M., Hinojosa, M. S., Knapp, C., & Fernandez-Baca, D. E. (2015). Adverse childhood experiences and dental health in children and adolescents. *Community Dentistry and Oral Epidemiology*, *43*(3), 193–199. <https://doi.org/10.1111/cdoe.12137>.
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Harvard University Press.
- Casey Family Programs, n.d. *Thriving Families Safer Children*. Retrieved November 5 (2021). from <https://www.casey.org/tag/thriving-families-safer-children/>.
- Centers for Disease Control and Prevention (2013). *Essentials for Childhood*. Retrieved November 5, 2021 from <https://www.cdc.gov/violenceprevention/childabuseandneglect/essentials/index.html>.
- Cheong, E. V., Sinnott, C., Dahly, D., & Kearney, P. M. (2017). Adverse childhood experiences (ACEs) and later-life depression: Perceived social support as a potential protective factor. *British Medical Journal Open*, *7*(9), e013228. <https://doi.org/10.1136/bmjopen-2016-013228>.
- Christie, S., & Lauzon, A. (2014). The role of after school-programs in promoting youth inclusion in rural and small communities: The case of the Fusion Youth and Technology Centre, Ingersoll, Ontario. *Journal of Rural and Community Development*, *9*(3), 157–175. <https://journals.brandonu.ca/jrcd/article/view/849>.
- Crandall, A., Miller, J. R., Cheung, A., Novilla, L. K., Glade, R., Novilla, M. L. B., Magnusson, B. M., Leavitt, B. L., Barnes, M. D., & Hanson, C. L. (2019). ACEs and counter-ACEs: How positive and negative childhood experiences influence adult health. *Child Abuse & Neglect*, *96*, 104089. <https://doi.org/10.1016/j.chiabu.2019.104089>.
- Cross, A. B., Gottfredson, D. C., Wilson, D. M., Rorie, M., & Connell, N. (2010). Implementation quality and positive experiences in after-school programs. *American Journal of Community Psychology*, *45*(3–4), 370–380. <https://doi.org/10.1007/s10464-010-9295-z>.
- Crouch, E., Radcliff, E., Merrell, M. A., Hung, P., & Bennett, K. J. (2021). Positive childhood experiences promote school success. *Maternal and Child Health Journal*, *25*(10), 1646–1654. <https://doi.org/10.1007/s10995-021-03206-3>.
- Daines, C. L., Hansen, D., Novilla, M. L. B., & Crandall, A. (2021). Effects of positive and negative childhood experiences on adult family health. *Bmc Public Health*, *21*, 1–8.
- Dubowitz, H., Feigelman, S., Lane, W., & Kim, J. (2009). Pediatric primary care to help prevent child maltreatment: The safe environment for every kid (SEEK) model. *Pediatrics*, *123*(3), 858–864. <https://doi.org/10.1542/peds.2008-1376>.
- Durlak, J. A., & Weissberg, R. P. (2007). *The impact of after-school programs that promote personal and social skills*. Collaborative for Academic, Social and Emotional Learning (CASEL). Retrieved November 5, 2021 from <https://casel.org/the-impact-of-after-school-programs-that-promote-personal-and-social-skills-2007/>.
- Elmore, A. L., & Crouch, E. (2020). The association of adverse childhood experiences with anxiety and depression for children and youth, 8 to 17 years of age. *Academic Pediatrics*, *20*(5), 600–608. <https://doi.org/10.1016/j.acap.2020.02.012>.
- Elmore, A. L., Crouch, E., & Chowdhury, M. A. K. (2020). The interaction of adverse childhood experiences and resiliency on the outcome of depression among children and youth, 8–17 year olds. *Child Abuse & Neglect*, *107*, 104616. <https://doi.org/10.1016/j.chiabu.2020.104616>.
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The adverse childhood experiences (ACE) study. *American Journal of Preventive Medicine*, *14*(4), 245–258. [https://doi.org/10.1016/S0749-3797\(98\)00017-8](https://doi.org/10.1016/S0749-3797(98)00017-8).
- Gayatri, M., & Irawaty, D. K. (2022). Family resilience during COVID-19 pandemic: A literature review. *The Family Journal*, *30*(2), 132–138.
- Groenewald, C. B., Murray, C. B., & Palermo, T. M. (2020). Adverse childhood experiences and chronic pain among children and adolescents in the United States. *PAIN Reports*, *5*(5), e839. <https://doi.org/10.1097/PR9.0000000000000839>.
- Harper Browne, C. (2016). The Strengthening Families Approach and Protective Factors Framework™: A pathway to healthy development and well-being. In C. J. Shapiro & C. Harper Browne (Eds.), *Innovative approaches to supporting families of young children* (p. 1–24). Springer International Publishing. https://doi.org/10.1007/978-3-319-39059-8_1.
- Kuhar, M., & Zager Kocjan, G. (2021). Associations of adverse and positive childhood experiences with adult physical and mental health and risk behaviours in Slovenia. *European Journal of Psychotraumatology*, *12*(1), 1924953.
- Novilla, L. K., Broadbent, E., Leavitt, B., & Crandall, A. (2022). Examining relationships between positive and adverse childhood experiences with physical and mental health indicators in a low-income adult sample. *Child Abuse & Neglect*, *134*, 105902.
- Poole, J. C., Dobson, K. S., & Pusch, D. (2017). Childhood adversity and adult depression: The protective role of psychological resilience. *Child Abuse & Neglect*, *64*, 89–100. <https://doi.org/10.1016/j.chiabu.2016.12.012>.
- Sege, R. D., & Harper Browne, C. (2017). Responding to ACEs with HOPE: Health outcomes from positive experiences. *Academic Pediatrics*, *17*(7), S79–S85. <https://doi.org/10.1016/j.acap.2017.03.007>.

- Shonkoff, J. P., & Garner, A. S. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*, *129*(1), e232–e246. <https://doi.org/10.1542/peds.2011-2663>.
- The American Public Health Association (2020). *Racism and health*. Retrieved November 5, 2021 from <https://www.apha.org/topics-and-issues/health-equity/racism-and-health>.
- Wright, R., John, L., Duku, E., Burgos, G., Krygsman, A., & Esposito, C. (2010). After-school programs as a prosocial setting for bonding between peers. *Child & Youth Services*, *31*(3–4), 74–91. <https://doi.org/10.1080/0145935X.2009.524461>.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.