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Neighborhood Poverty and Adverse Childhood Experiences over the First 15 Years of Life

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Abstract

This study examines the relationship between neighborhood-level poverty and the likelihood of adverse childhood experiences (ACEs) across the first 15 years of a child's life. Using data from six waves of the Fragile Families and Child Wellbeing Study ($n = 4,898$), we employ Poisson and logit regression to examine the extent to which neighborhood-level poverty is associated with increased likelihood of ACEs. We find that above and beyond the impact of individual-level economic hardship, neighborhoods with high levels of poverty (between 20 and 39.9% residents living under the federal poverty level) and concentrated poverty (greater than 40% of residents living under the federal poverty level) at the time of birth are associated with an increased number of ACEs reported by age 15. Further, living in a neighborhood with concentrated poverty at the time of birth is associated with an increased likelihood of experiencing 4 or more ACEs.

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Recent national studies highlight that children born into disadvantaged communities experience worsened health conditions (Clarke et al., 2013) and lower social and economic mobility throughout the life course (Alvarado, 2018). Although a variety of familial and structural factors serve to limit children's mobility, high levels of adverse childhood experiences (ACEs) may play a central role. Childhood experiences provide a foundation for health, learning, and behavior (Ports et al., 2020). Although some adversity is expected in a normal life trajectory, exposure to frequent and prolonged adversity may result in toxic stress that disturbs healthy cognitive and psychosocial developmental processes (Ports et al., 2020; Shonkoff, 2016). While the types of exposures classified as ACEs remain debated (Finkelhor et al., 2013; Mersky et al., 2017), measures commonly include exposure to family violence or maltreatment and other forms of family dysfunction. ACEs, which are measured at the individual or family level, are strongly influenced by the broader social environment.

In this study, we examine the relationship between neighborhood-level poverty at the time of a child's birth and the number of ACEs experienced over the first 15 years of life. Understanding this relationship can help inform prevention and intervention efforts that aim to reduce health and well-being disparities observed among this nation's children and youth.

Background and Literature Review

Adverse Childhood Experiences

Adverse childhood experiences (ACEs) are a significant public health concern due to their high prevalence and associations with deleterious short- and long-term outcomes in later life. A recent meta-analysis estimated that total annual costs attributable to ACEs were about $748 billion in North America alone (Bellis et al., 2019).

Initially developed to study interrelated risks and generate insights into the origins of disorder and disease (Felitti et al., 1998; Mersky et al., 2017), the original ACEs framework included seven adverse childhood experiences: emotional, physical, and sexual abuse; violence against the mother; and living with household members who were substance abusers, mentally ill (including suicidal), or ever imprisoned (Felitti et al., 1998). In recent estimates, more than 61% of adults reported that they had experienced at least one type of ACE during childhood, and almost 1 in 6 reported having experienced four or more types of ACEs (Merrick et al., 2018). ACEs are also interrelated: experiencing one ACE increases the likelihood of experiencing additional ACEs (Dong et al., 2004; Lanier et al., 2018). Further, different forms of ACEs have shared risk factors (Brown et al., 1998; Dong et al., 2004; Soares et al., 2015; Thornberry et al., 2014).

Although ACEs occur in all social classes, having parents of low-socioeconomic status is associated with higher risk of ACEs (Lacey et al., 2020; Liming, 2019; Metzler et al., 2017; Steele et al., 2016; Walsh et al., 2019). The 2011–2012 National Survey of Child Health showed that on average, the poorest children experience twice as many ACEs as children in the highest income stratum (Slopen et al., 2016).

Not only are ACEs more prevalent within low-income families, they are also associated with deleterious outcomes net of the effects of poverty (Mersky et al., 2017). Moreover, poverty adversely affects children's development in part due to effects on ACEs, including harsh or neglectful parenting behavior and parent mental health (Conger et al., 1994; Newland et al., 2013; Warren & Font, 2015). The overlap of poverty and ACEs has led some to assert that poverty is itself an ACE (Hughes & Tucker, 2018). Some reformulations of ACEs scales include measures of poverty (Crouch et al., 2019; Finkelhor et al., 2013, 2015; Laditka & Laditka, 2018; Lanier et al., 2018; Mersky et al., 2017). However, poverty is different from many other psychosocial adversities used in the original scale, such as maltreatment and mental health or substance abuse problems (Lacey et al., 2020).

There are also substantial racial and ethnic disparities in the prevalence of ACEs (Sacks & Murphey, 2018). Nationally, one in three Black children report experiencing two or more ACEs, compared to only one in five White children. Additionally, 60% of White children report no ACEs, compared with 49% of Hispanic children and 39% of Black children (Sacks & Murphey, 2018). Racial disparities reflect, in part, socioeconomic factors but may also persist independent of SES due to factors such as increased stress or racially biased treatment within social systems.

Limitations of ACEs Conceptualization

Despite the utility of the ACEs framework for conceptualizing children's early experiences, criticisms of the original ACEs framework are numerous. The initial selection of items in the ACEs measure was not based on a systematic process of measurement theory and population testing, thus leading to interest in exploring different ACEs measures with more diverse samples (Mersky et al., 2017). For instance, measures of ACES have expanded to include items related to racism, bullying, witnessing violence, living in an unsafe neighborhood, having a history of living in foster care (Cronholm et al., 2015), economic adversity and poverty (Finkelhor et al., 2015), physical neglect and emotional neglect, prolonged parental absence, death of parent or sibling, frequent peer victimization, and violent crime victimization (Mersky et al., 2017). The multifaceted natures of the experiences, numerous definitions of these constructs, and associated high financial and social costs make the research both complex and essential (Gabrielli & Jackson, 2019).

Typically, ACEs research utilizes retrospective self-reported surveys among adult populations, which introduces the potential for recall bias that may skew results (Hardt & Rutter, 2004; Reuben et al., 2016). Although prospective measurement is generally preferable, it is challenging for ACEs given ethical constraints on interviewing children about potentially traumatic events or ongoing abuse. In addition, children's reports may be unobtainable due to developmental issues and their ability to report (Briere & Briere, 1992; Knight et al., 2000; Melchert, 1996; Shaffer et al., 2008; Williams, 1994). More recent studies have examined ACEs through secondary data analysis, coupling together items that measure the experiences, though not through a specific ACEs questionnaire (Hunt et al., 2016; Wang & Maguire-Jack, 2018), allowing for prospective measurement.

Neighborhoods and ACEs

ACEs are disproportionately higher in impoverished neighborhoods (Baglivio et al., 2017; Lewer et al., 2019; Wolff et al., 2018). However, resource-rich neighborhoods tend to serve as a protective factor in reducing ACEs exposure (Baglivio et al., 2017). In 2018, almost 24 million Americans lived in high-poverty neighborhoods (areas with at least 30% of the residents living in poverty), including 8.9 million residents who were themselves impoverished (Benzow & Fikri, 2020). High-poverty neighborhoods tend to be racially segregated, with high rates of crime and disorder and lower-quality public services (Sampson et al., 1997). Community disadvantage has also been linked to higher rates of crime and incarceration (Damm & Dustmann, 2014; Wolff et al., 2015).

The growing literature indicates the significant role of neighborhood context with respect to negative life experiences, consistent with the ACEs paradigm, beyond neighborhood violence, crime, and incarceration (Wolff et al., 2018). Neighborhood context has profound influence on families, in terms of safety, resource availability, job prospects, social capital, walkability, norms, and interactions between neighbors. For instance, numerous scholars have investigated community factors in the context of child maltreatment (Coulton et al., 2007; Freisthler et al., 2006; Maguire-Jack, 2014; McLeigh et al., 2018; Molnar et al., 2016). Overall, neighborhood impoverishment (most often measured by percentages of residents below the poverty line, on public assistance, female-headed families, residents unemployed, vacant housing units, median family income, proportion under various cut-offs for income) is consistently associated with child maltreatment, net of individual influences on child maltreatment (Maguire-Jack, 2014). Similar patterns are found with physical and/or sexual intimate partner violence (Beyer et al., 2015). The research also shows that the community context matters for substance abuse and mental health in general (Barnes et al., 2013; Hill & Maimon, n.d.; Tucker et al., 2012). Neighborhood context may also influence the likelihood of individuals becoming involved with the criminal justice and child welfare systems. There has been significant growth in the imprisoned population in the USA, and this growth has been concentrated among low-income minority males who live in impoverished neighborhoods (Clear, 2007). Further, children in high-poverty neighborhoods are more likely to be placed in foster care than those in more affluent neighborhoods (Lotspeich et al., 2020).

Living in poverty can exacerbate familial stress and dysfunctions, thereby impeding normal and healthy development for exposed children (Choi et al., 2019; Steele et al., 2016). Moreover, children who live in poverty are more likely to be exposed to a high number of ACEs (≥ 3 adverse experiences; (Anda et al., 2010; Child Trends, 2013), highlighting the role of inequality and economic disadvantage in the continual accumulation of risk throughout childhood development. The relationships among the timing of impoverishment, ACEs, and child outcomes has not been extensively explored. One study found that children who were living in poverty at age three had a greater number of accumulated ACEs and worse behavioral outcomes but did not examine the role of poverty at birth (Choi et al., 2019), limiting our ability to understand the lasting impacts of being born into poverty on cumulative

risk across the lifespan. Another study found that ACEs mediated the relationship between neighborhood disadvantage and adolescent behavioral outcomes and social skills, but examined ACEs at ages 3 and 5 only (Wang et al., 2020).

The Current Study

The current study seeks to fill gaps in the literature concerning the relevance of early poverty for cumulative ACEs risk through childhood and into adolescence. Although previous work has explored the impact of neighborhood poverty at birth through early childhood outcomes, the long-term effects of neighborhood-level poverty on the risk of ACEs through adolescence have not been addressed. Understanding the impact of neighborhood at the time of birth on children's risk for ACEs at age 15 is critical for informing prevention and early intervention efforts. Research indicates that early childhood experiences and contexts impact outcomes across the lifespan, though the role of neighborhood poverty on cumulative adversity has not been extensively researched above and beyond family poverty and circumstance. This study examines whether neighborhood poverty at birth predicts the accumulation of ACEs over the first 15 years of a child's life. The primary research question is: Is neighborhood poverty at birth associated with the cumulative number of ACEs, and the probability of experiencing four or more ACEs, by age 15? We also consider whether patterns of association are consistent across three subcategories of ACEs (family violence and maltreatment, family dysfunction and loss, and systems involvement). Because systems involvement ACEs, such as parent incarceration and involvement with child protective services (CPS) or foster care, require institutional (rather than, or in addition to, familial) acts, assessing these categories separately provides some insight into the extent to which patterns of systems involvement are consistent with other ACEs.

Methods

Data and Sample This study uses data from the Fragile Families and Child Wellbeing Study (FFCWS), a study intended to examine outcomes for children in families who may be experiencing a variety of hardships. The FFCWS is a birth cohort study of 4898 children born in 20 large urban cities across the USA. Unmarried mothers were oversampled, resulting in a significant proportion of lower income and racial minority families. Mothers and fathers were interviewed at the time of the child's birth, and again at focal child ages 1, 3, 5, 9, and 15. Data collection is ongoing (for additional FFCWS design description, see Reichman et al., 2001). For the current study, we focus on data from all six of the currently available waves. We include all 4898 children in the analytic sample. Missing data were handled using multiple imputation with chained equations, with 10 imputed datasets (Allison, 2002; Graham et al., 2007; Rubin, 1987; Schafer & Graham, 2002).

Measures

Independent Variables Our key predictor variable of interest was neighborhood poverty, based on the poverty level of the census tract in which the child was born (i.e., neighborhood at baseline interview). We grouped neighborhood poverty into three categories, using two cut-points found to be relevant for negative outcomes in prior literature, 20% and 40% (U.S. Department of Housing and Urban Development, 2011). *Low-poverty neighborhoods* were those in which < 20% of residents were under the federal poverty level (FPL); *high-poverty neighborhoods* were those with 20–39.9% of residents under the FPL; and *concentrated poverty neighborhoods* were those where at least 40% of residents fell under the FPL.

Dependent Variables Exposure to adverse childhood experiences was the key outcome of interest. Consistent with the original ACEs study (Felitti et al., 1998), we assessed imprisonment of a parent, parental mental health issues, parental substance use, physical child abuse, emotional child abuse, and parents experiencing intimate partner violence. The FFCWS did not include any measures of child sexual abuse. In addition to these original ACEs, we also included child neglect, involvement with child protective services, spending time in foster care, having an absent parent, parent divorce or separation, and death of a parent. Table 1 includes details on all of the ACE measures used in this study. We assessed the cumulative number of ACEs over all six waves of data, such that if the ACE was reported at any (or multiple) wave(s), the child had a "1" for that particular ACE. Consistent with previous literature, we assessed the number of ACEs and whether the child had 4 or more ACEs, which has been found to be an important threshold for negative outcomes (Felitti et al., 1998). In alternative models, we break the ACEs into three categories: family violence and maltreatment (physical abuse, emotional abuse, neglect, and intimate partner violence), family dysfunction and loss (parental mental health problems, parental substance use, parental separation, parental absence, and parental death), and systems involvement (child protective services, foster care, and criminal justice system involvement).

Control Variables We used a set of control variables that are related to the likelihood of experiencing ACEs. *Child race* was included as a series of dummy variables for Black, Hispanic, "other race," or multiracial, with White as the comparison group. *Maternal education* was assessed at the time of the birth of the child and measured dichotomously indicating whether the mother had a high school education or more. *Child sex* was included with a dichotomous measure indicating whether the child was biologically male at the time of birth. *Maternal age* was measured continuously at the time of the child's birth. *Economic hardship* at child age one was assessed as a count of the number of 12 hardships the mother reported experiencing in the past year (e.g., "evicted from your home or apartment for not paying rent or mortgage" and "Did you stay at a shelter, in an abandoned building, an automobile or any other place not meant for regular housing even for one night?"). Finally, we controlled for the city of the interview, using a series of dummy variables.

Table 1 ACE measures

ACE	Operationalization
Family violence and maltreatment	
Physical abuse	Assessed using a subset of the physical assault scale from the Conflict Tactics Scale – Parent Child Version (Straus et al., 1998) at focal child ages 3, 5, 9, and 15. These questions were asked of the parent participating in the primary caregiver interview, and questions were asked about the parent completing it as well as the secondary caregiver
	At child ages 3, 5, and 9, five questions were asked (e.g., "how often in the past year did you hit the child on the bottom with something like a belt, hairbrush, a stick or some other hard object") with possible response options including "it never happened," "once," "twice," "3–5 times," "6–10 times," "11–20 times," "more than 20 times," and "it has happened before but not in the past year." Responses that were "3–5 times" or greater were coded as a "1" for physical abuse
	At age 15, the primary caregiver was asked only one of the five physical abuse questions "How often in the past year did you hit or slap the child" with response options of "never," "sometimes," or "often." Responses that were greater than "never" were coded as "1" for physical abuse
	At ages 9 and 15, focal children were also asked "How often in the past year did your mother/father/parent's partner spank or hit you?" with response options of "never," "sometimes," or "often." Responses that were greater than "never" were coded as "1" for physical abuse
Emotional abuse	Assessed using a subset of the psychological aggression scale from the Conflict Tactics Scale – Parent Child Version (Straus et al., 1998) at focal child ages 3, 5, 9, and 15. These questions were asked of the parent participating in the primary caregiver interview, and questions were asked about the parent completing it as well as the secondary caregiver
	At child ages 3, 5, and 9, five questions were asked (e.g., "How often in the past year did you threaten to spank the child but did not actually do it") with possible response options including "it never happened," "once," "twice," "3–5 times," "6–10 times," "11–20 times," "more than 20 times," and "it has happened before but not in the past year." Responses that were "11–20 times" or greater were coded as a "1" for emotional abuse
	At age 15, the primary caregiver was asked only one of the five emotional abuse questions "How often in the past year did you shout, yell, scream, swear, or curse at the child" with response options of "never," "sometimes," or "often." Responses that were "often" were coded as "1" for emotional abuse
	At ages 9 and 15, focal children were also asked "How often in the past year did your mother/father/parent's partner shout, yell, scream, swear, or curse at you?" with response options of "never," "sometimes," or "often." Responses that were "often" were coded as "1" for emotional abuse

Table 1 (continued)

ACE	Operationalization
Intimate partner violence	Assessed using a subset of questions from the revised Conflict Tactics Scale 2 (Straus et al., 1996) at child ages 1, 3, 5, and 9. A set of 7 questions (e.g. "withholds money, makes you ask for money, or takes your money")were asked of mothers about the biological father and their current partner at child age 1. At child ages 3, 5, and 9, fathers were also asked about the actions of the biological mother. Response options included "never," "sometimes", or "often." Responses of more than "never" were coded as "1" for intimate partner violence
Neglect	Assessed using a subset of the neglect scale from the Conflict Tactics Scale – Parent Child Version (Straus et al., 1998) at focal child ages 3, 5, and 9. These questions were asked of the parent participating in the primary caregiver interview, and questions were asked about the parent completing it as well as the secondary caregiver
	At child ages 3, 5, and 9, five questions were asked (e.g., "How often in the past year were you too drunk or high to care for the child") with possible response options including "it never happened," "once," "twice," "3–5 times," "6–10 times," "11—20 times," "more than 20 times," and "it has happened before but not in the past year." Responses that were more than "never" were coded as a "1" for neglect
Family dysfunction and loss	
Parent divorce or separation	We examined whether the biological mother and biological father were married or cohabiting at focal child age 1, 3, 5, 9, and 15
	If they were married or cohabiting at a previous wave and were no longer married or cohabiting at a subsequent wave, children were assigned a "1" for parental separation at the subsequent wave
Death of a parent	If the biological mother or biological father reported that the other had died
Absent parent	At ages 1, 3, 5, 9, and 15, absent parent was assessed as a "1" if the father was reported as "unknown," or the parent reported that the child had not seen the other parent in the past 30 days, or at age 15 either parent or the child had reported that the child had not seen one or both of the parents in the past 30 days
Parental mental health issues	Measured by the Composite International Diagnostic Interview (Andrews & Peters, 1998), with "1" indicating that either the mother or father met conservative diagnostic criteria for depression at focal child age 1, 3, 5, 9, or 15, or met diagnostic criteria for generalized anxiety disorder at focal child age 1 or 3

Table 1 (continued)

ACE	Operationalization
Parental substance use	Assessed through questions regarding alcohol and illicit drug use at focal child ages 1, 3, 5, 9, and 15. At focal child ages 1, 3, 5, 9, and 15, if the mother reported any use of illicit drugs in the past 30 days, drug use was assigned a "1." At focal child age 1, if the mother reporting having five or more drinks in one day at least once in the past month, problematic alcohol use was assigned a "1." At subsequent waves, problematic alcohol use was assessed as a "1" if the mother or father reported "Yes" that drinking or being hung over had interfered with their work at school, a job, or home at least once in the past year Substance use was assigned a "1" if either problematic alcohol use or drug use had a value of "1."
Systems involvement	
Parent incarceration	At child ages 1, 3, 5, and 9 based on whether the mother or father was in jail or prison at the time of the interview or reported any involvement in jail or prison since the time of the birth of the child. This included both direct measures (e.g., "have you spent any time in jail") and indirect measures (e.g., "Why was the child separated from you for more than two weeks") with a response of "in jail." At age 15, parents were asked whether either parent had spent any time in jail or prison since the age 9 interview
Involvement with child protective services	At child ages 5, 9, and 15, the primary caregiver was asked whether they had any contact with child protective services related to the focal child since the child was born, or since the last interview
Time in foster care	At ages 1, 3, 5, 9, and 15, if the child was reported to be in foster care at the time of the interview

Analysis

We produced all models using Stata version 16 (StataCorp, 2019). Using *mi estimate*, we first ran a Poisson model estimating the relationship between neighborhood poverty at the time of birth and a count measure of ACEs by child age 15. For ease of interpretation, we report exponentiated coefficients, interpreted as incidence rate ratios. We then ran a logistic regression model, estimating the relationship between neighborhood poverty at the time of birth and a dichotomous measure of ACEs at child at 15, representing 4 or more ACEs. For ease of interpretation, we use odds ratios.

We then ran a series of post-hoc analysis to assess the consistency of our findings. We re-operationalized our ACEs variable into three measures of ACEs subtypes: (1) violence and maltreatment-related ACEs, (2) family dysfunction and loss-related ACEs, and (3) systems-related ACEs. Each ACE type was

operationalized as a dichotomous measure of whether the child had experienced any of that type of ACE. We then ran a series of logit models with these three ACE variables as outcomes.

Results

Sample Description Sample demographics for the full sample and by neighborhood poverty level are shown in Table 2. Across the full sample, the average neighborhood poverty rate was 19%, with 57.22% of the sample born into low-poverty neighborhoods (<20% in poverty); 35% born into high-poverty neighborhoods (20–39.9% in poverty); and 8% of children born into concentrated poverty neighborhoods (≥40% in poverty).

About 44% of the sample was Black, 23% Hispanic, 16% White, 15% were multiracial, and 2% "other race." Just over half of the children in the sample were male, and 65% of mothers had a high school education or more. On average, mothers reported experiencing about 1 economic hardship at focal child age 1, and mothers were approximately 25 years of age.

Of note, Black children constituted 74% of children born into concentrated poverty neighborhoods, versus 55% of children born into high-poverty and 33% of children born into low-poverty neighborhoods. In contrast, White children comprised 25% of those born in low-poverty neighborhoods, but less than 5% and 1% of children in high-poverty and concentrated poverty neighborhoods, respectively. Hispanic children were overrepresented in high-poverty neighborhoods but underrepresented in concentrated poverty neighborhoods. Multiracial and other race children were underrepresented in both high-poverty and concentrated poverty neighborhoods.

Description of ACEs Rates of ACEs, in aggregate and by type, are shown in Table 3. In the full sample, children experienced 4.66 ACEs on average, with

Table 2 Sample demographics, mean (SD) or %

	Full sample N=4898	Neighborhood poverty		
		Low N=2792	High N=1709	Concentrated N=397
White	15.93%	25.01%	4.52%	0.63%
Black	44.15%	33.12%	55.41%	73.95%
Hispanic	22.90%	21.72%	26.76%	14.69%
Other race	1.99%	2.82%	0.94%	<0.01%
Multi-racial	15.03%	17.33%	12.25%	10.70%
Male child	52.20%	52.77%	51.70%	50.13%
Maternal education: high school or more	65.27%	71.65%	57.70%	52.55%
Age 1 # of economic hardships (range 0–12)	1.02 (0.02)	0.95 (0.03)	1.12 (0.04)	1.06 (0.08)
Mother age (in years)	25.28 (0.09)	25.89 (0.12)	24.57 (0.14)	23.98 (0.30)

Table 3 Adverse childhood experiences through age 15, by neighborhood poverty at birth; mean (SD) or %

	Full sample N=4898	Neighborhood poverty		
		Low N=2792	High N=1709	Concentrated N=397
Cumulative measures				
Count of aces (range 0–12)	4.66 (0.04)	4.52 (0.04)	4.87 (0.06)	5.23 (0.11)
4 or more aces	67.78%	63.68%	72.03%	78.60%
Categories and individual items				
Family violence and maltreatment				
Physical abuse	75.03%	73.54%	76.15%	80.79%
Emotional abuse	75.28%	74.16%	75.95%	80.29%
Neglect	27.97%	27.15%	28.57%	31.19%
Intimate partner violence	43.73%	44.84%	42.63%	40.54%
Family dysfunction and loss				
Parent mental health problem	45.41%	42.84%	48.28%	51.34%
Parent substance abuse	37.41%	35.96%	38.77%	41.75%
Parent separation	44.64%	43.51%	45.94%	47.15%
Parent death	9.75%	9.87%	9.31%	10.78%
Parent absent	48.13%	41.74%	55.51%	61.63%
Systems involvement				
Parent incarceration	37.95%	33.15%	42.91%	50.61%
Foster care	2.29%	1.59%	3.02%	4.19%
Child protective services investigation	18.36%	16.80%	19.92%	22.64%

68% of children having 4 or more ACEs by age 15. The most common ACEs were physical abuse and emotional abuse; each was experienced by more than 75% of the sample. The least common ACEs were parent death (10%) and foster care (2%).

Children born into low-poverty neighborhoods had lower ACE scores (4.52) than children born into high-poverty (4.87) or concentrated poverty (5.23) neighborhoods. Approximately 6 in 10 children born into low-poverty neighborhoods experienced four or more ACEs, compared with 7 in 10 for high-poverty neighborhoods and 4 in 5 in concentrated poverty neighborhoods. Rates of individual ACEs were generally higher among children born into high-poverty and concentrated poverty neighborhoods than children born into low-poverty neighborhoods. However, differences across groups were in the reverse direction (lower rates in the higher poverty neighborhoods) for intimate partner violence, and differences in rates of parent death were very small.

Count of ACEs In the Poisson model (Table 4), we found that, compared to children born into low-poverty neighborhoods, children in high-poverty neighborhoods have a rate of ACEs 1.04 times greater (95% CI: 1.01, 1.08), and children

Table 4 Regression models for total ACEs and four or more adverse childhood experiences by age 15

	Count of ACEs (Poisson model)		Four or more ACEs (logit model)	
	Incidence rate ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
Neighborhood poverty (reference = low)				
High	1.04*	1.01, 1.08	1.18	0.99, 1.40
Concentrated	1.09**	1.04, 1.15	1.51*	1.09, 2.09
Child race (reference = white)				
Black	1.16***	1.10, 1.21	2.20***	1.76, 2.75
Hispanic	0.98	0.92, 1.04	1.03	0.78, 1.29
Multiracial	1.15***	1.09, 1.21	1.99***	1.53, 2.58
Other	0.83*	0.70, 0.99	0.70	0.38, 1.29
Child is male	1.01	0.98, 1.04	0.99	0.86, 1.16
Maternal education: high school or more	0.94***	0.91, 0.97	0.77**	0.64, 0.92
Age 1 # of economic hardships	1.07***	1.07, 1.08	1.43***	1.35, 1.52
Maternal age	0.99***	0.98, 0.99	0.95***	0.93, 0.96

Models include city indicators (coefficients not shown)

$*p < 0.05$, $**p < 0.01$, $***p < 0.001$

born in concentrated poverty neighborhoods have a rate of ACEs 1.09 times greater (95% CI: 1.04, 1.15). The incidence rate of ACEs is 1.16 times greater (95% CI: 1.10, 1.21) among Black and 1.15 times great (95% CI: 1.09, 1.21) among multiracial children than White children. Rates of ACEs were lower among children whose mothers had at least a high school education and children with older mothers and higher among families that reported economic hardship.

Odds of Experiencing 4 or More ACEs Results of a logistic regression model predicting exposure to four or more ACEs are reported in Table 4; patterns of association are directionally consistent with findings reported in Table 3. Compared to children born into low-poverty neighborhoods, children born into concentrated poverty neighborhoods had 51% greater odds (95% CI: 1.09, 2.09) of experiencing four or more ACEs.

The odds of experiencing four or more ACEs were about twice as high for Black and multiracial children compared with White children. Consistent with Table 3, higher levels of economic hardship is associated with higher odds, and greater levels of maternal education and age are associated with lower odds, of four or more ACEs.

Subcategories of ACEs The logit models for each subgroup of ACEs (violence and maltreatment; family dysfunction; and systems involvement) revealed that

associations between neighborhood poverty and exposure to ACEs were largely driven by family dysfunction and systems involvement, rather than violence and maltreatment. Differences by neighborhood poverty, race, maternal education, and age were not statistically significant. Only two variables were significantly predictive of family violence and maltreatment ACEs: economic hardship and male gender.

In contrast, patterns of association for family dysfunction or loss ACEs and systems involvement ACEs were consistent with our main models. Being born into high-poverty or concentrated poverty neighborhoods was associated with sizable increases in the odds of family dysfunction ACEs (high poverty; OR = 1.34; $p < 0.05;$ concentrated poverty; OR = 2.13, $p < 0.01$) and systems involvement ACEs (high poverty; OR = 1.29; $p < 0.01$; concentrated poverty; OR = 1.71, $p < 0.001$) (Table 5). Patterns of association of race, maternal age, maternal education, and economic hardship with family dysfunction or loss and systems involvement ACEs are similar to those reported in our main models.

Discussion

This study investigated whether cumulative exposure to ACEs by age 15 could be predicted based on neighborhood poverty and family circumstances at birth. We confirmed that the rate of ACEs and the probability of experiencing four or more ACEs were higher among children born into high-poverty neighborhoods and, especially, concentrated poverty neighborhoods. Still, the magnitude of coefficients was relatively small, and subsequent analyses revealed that neighborhood poverty was more strongly predictive of family dysfunction, loss, and systems involvement (particularly, parent incarceration) than family violence and maltreatment. Yet, the rates of self-reported frequent harsh physical punishment and emotional abuse were far higher than rates of systems involvement or family dysfunction and loss and affected a majority of the sample, indicating these experiences – rather than being rare, are nearly ubiquitous. Indeed, each of the family violence and maltreatment and family dysfunction and loss ACEs – except for parent death – were more common than child welfare system involvement. This is consistent with other estimates of the relative rates of child maltreatment and child welfare system involvement (Font & Maguire-Jack, 2020). However, given that previous research indicates low agreement between parent-reported and child-reported physical discipline and abuse (Font & Cage, 2018; Font & Maguire-Jack, 2020) and that cumulative estimates of both CPS investigation and foster care placement are lower in this sample than indicated by national estimates (Yi et al., 2020), measurement error remains a concern in interpreting our findings. Given a resurgence of interest in understanding whether rates of contact with child welfare and criminal justice systems are disproportionate to the rates at which children experience meaningful threats in their familial environments, multiple-informant data on ACEs is sorely needed (Font & Maguire-Jack, 2020; Slack et al., 2003).

Table 5 Logit models for adverse childhood experiences subtypes

	Any family violence and maltreatment ACEs	Any family dysfunction and loss ACEs	Any systems involvement ACEs
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Neighborhood poverty (reference = low)			
High	1.06 (0.79, 1.42)	1.34 (1.06, 1.69)*	1.29 (1.11, 1.50)**
Concentrated	1.30 (0.71, 2.37)	2.13 (1.30, 3.49)**	1.71 (1.29, 2.26)***
Child race (reference = white)			
Black	1.41 (0.94, 2.11)	2.27 (1.71, 3.00)***	2.35 (1.89, 2.92)***
Hispanic	0.89 (0.55, 1.43)	0.93 (0.69, 1.26)	0.96 (0.73, 1.27)
Multi-racial	1.25 (0.78, 2.01)	2.19 (1.54, 3.12)***	1.62 (1.25, 2.08)***
Other	0.80 (0.31, 2.07)	0.54 (0.27, 0.83)*	0.51 (0.21, 1.26)
Child is male	1.40 (1.11, 1.76)**	0.86 (0.71, 1.02)	1.05 (0.91, 1.20)
Maternal education: high school or more	1.15 (0.87, 1.52)	0.80 (0.64, 0.98)*	0.61 (0.53, 0.71)***
Age 1 # of economic hardships	1.21 (1.08, 1.36)**	1.47 (1.35, 1.60)***	1.28 (1.22, 1.34)***
Maternal age	0.98 (0.96, 1.00)	0.95 (0.93, 0.96)***	0.93 (0.92, 0.94)***

Models include city indicators (coefficients not shown)

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Black children are grossly overrepresented among children born into concentrated poverty neighborhoods, both in this sample and across the United States. It is estimated that 70% of the Black residents of America's poorest neighborhoods are the descendants of those who resided there 40 years prior (Sharkey, 2013); their mobility inhibited both by ongoing racial discrimination in housing and employment and inadequate efforts to erode the legacy of de jure segregation. Whereas prior scholarly work has illuminated the implications for intergenerational mobility and wealth accumulation (Chetty et al., 2019), this study highlights possible linkages with family processes and, ultimately, child health and safety. Black children experienced higher rates of ACEs overall, and within the subcategories of family dysfunction and loss and systems involvement. Descriptive bivariate post-hoc analyses (see Appendix) indicate especially large disparities in physical abuse, neglect, parent separation, parent absence, parent incarceration, and foster care placement for Black children, compared with both White and Hispanic children. Infusing resources into the poorest neighborhoods, which are disproportionately Black, may be a necessary compliment to efforts to support individual families. Robust scientific evidence demonstrates the mental health benefits of moving to lower poverty neighborhoods (Leventhal & Brooks-Gunn, 2003); however, moving individual families is an arguably inefficient – and inherently limited – approach to improving the lives of families in distressed neighborhoods. However, given that improving neighborhood safety, schools, and business climate can lead to gentrification and displacement of vulnerable families, investments in under-resourced neighborhoods must be coupled with strategies to transition existing renters to homeownership and ensure long-term residents are positioned to benefit from those investments.

Beyond large-scale community investments, which constitute primary prevention, our existing targeted and tertiary prevention systems are too often inefficient and late to respond and miss opportunities to prevent additional harm. For example, the child protective services system regularly encounters families facing substantial adversity but has resources to provide services only to the most at-risk families. More organized mechanisms for redirecting families who do not qualify for, or require, child protective services intervention, to relevant community-based supports are needed.

Efforts to identify and support the highest-risk children should start earlier. By the time children reach preschool or kindergarten, many have already experienced multiple ACEs (Hunt et al., 2016) – supporting community-based efforts to identify and offer support to children in high-risk environments earlier in life may also prevent, or mitigate the adverse effects of, ACEs. Many programs that could potentially support vulnerable children and families, such as Early Head Start and Head Start, remain unable to provide services to large majorities of eligible children and struggle to retain qualified teachers and staff (Child National Institute for Early Education Research, 2016; Trends, 2017). With adequate funding and rigorous quality standards, such programs may be able to prevent or mitigate the impacts of ACEs for at-risk children.

Limitations

The current study has several limitations that must be considered. First, regarding the dataset, the Fragile Families and Child Wellbeing Study includes a sample of 4898 families in large, urban cities across the United States. As such, the study may not be generalizable to non-urban areas. Additionally, they included an oversample of unmarried mothers, which further limits the representativeness of the data. Second, the ACE measures used within the current study were based on self-report by children and parents, which are subject to social desirability bias. Third, this study was focused on understanding one specific structural characteristic of neighborhoods, namely poverty. Prior work has demonstrated the importance of neighborhood process factors, such as neighborhood social cohesion (McLeigh et al., 2018). Future work should investigate the extent to which the longitudinal relationship found in the current study may be mediated by social cohesion. Fourth, the current study investigated the impact of neighborhood poverty at the time of the birth of a child, to examine differences in outcomes based on characteristics of the context at the time of birth. Families have different levels of mobility based on race, poverty, and other characteristics, and we do not track families' neighborhood residence over time. Family mobility is often within similarly disadvantaged neighborhoods; however, children who remain in disadvantaged neighborhoods throughout their childhood are likely to experience greater adversity than those who move to less disadvantaged neighborhoods. Fifth, the FFCWS dataset did not have a measure of child sexual abuse and this experience is therefore missing from our measure of ACEs. Finally, the current study used census tracts to proxy neighborhood, due to limitations within the data. Census tracts are commonly used to proxy neighborhood (Coulton et al., 2007), but are an imperfect measure. They are convenient because of the availability of administrative data at that unit, but they rarely map on to an individual's own perception of their neighborhood boundaries (Coulton et al., 2001).

Conclusion

Children are exposed to extremely high rates of adversity. Research has long indicated that these adversities carry substantial and long-lasting implications for children's health and wellbeing across the life course. And yet, we lack an organized framework for preventing adversity and mitigating its impacts. The findings of this study indicate that three-quarters of children born into the most impoverished neighborhoods will experience four or more ACEs by age 15; given the strong likelihood of underreporting, especially of family violence, this could even be an underestimate. Such statistics call for substantial investments in improving the opportunities available to children and parents in such neighborhoods. Public–private partnerships provide a potentially sustainable path for investments that target multiple domains of family life pertinent to risk of ACEs – education, labor, housing, health, and neighborhood climate.

Appendix

Table 6 Adverse childhood experiences by race/ethnicity

	White	Black	Hispanic	Multiracial
	Mean (SD) or %	Mean (SD) or %	Mean (SD) or %	Mean (SD) or %
Family violence and maltreatment				
Physical abuse	72.33%	82.59%	64.29%	75.09%
Emotional abuse	78.23%	80.59%	62.81%	77.56%
Neglect	20.22%	28.71%	31.20%	29.09%
Intimate partner violence	39.51%	38.50%	53.70%	46.26%
Family dysfunction and loss				
Parent mentally ill	44.06%	47.59%	38.33%	53.94%
Parent substance abuse	38.95%	40.29%	30.71%	40.47%
Parent separation	37.22%	48.40%	41.57%	49.30%
Parent death	8.79%	11.42%	7.18%	9.41%
Parent absent	26.67%	58.24%	41.78%	55.19%
Systems involvement				
Parent incarceration	23.39%	47.26%	32.26%	38.68%
Foster care	0.90%	3.31%	0.85%	2.76%
Child protective services investigation	15.75%	19.94%	14.92%	23.09%

Declarations

Conflict of Interest The authors declare no competing interests.

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