

The Role of Childhood Neglect and Childhood Poverty in Predicting Mental Health, Academic Achievement and Crime in Adulthood

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Abstract This study examines the roles of childhood neglect and childhood poverty (family and neighborhood) in predicting Posttraumatic Stress Disorder (PTSD), Major Depressive Disorder (MDD), academic achievement, and crime in young adulthood. Using existing data from a prospective cohort design study, 1,005 children with documented histories of neglect ($N = 507$) and matched controls ($N = 497$) were interviewed in young adulthood (mean age 29). Official criminal histories were also used to assess outcomes. Data were analyzed using logistic and ordinary least squares regressions and hierarchical linear modeling (HLM) to control for neighborhood clustering. Results from HLM revealed that childhood neglect and childhood family poverty uniquely predicted PTSD and adult arrest, MDD was predicted only by childhood family poverty, and a significant interaction between childhood family poverty and childhood neighborhood poverty predicted academic achievement for the control group only. Childhood neglect, childhood family poverty, and childhood neighborhood poverty each contribute to poor outcomes later in life. While interventions should be developed for neglected children to prevent negative outcomes, the current findings suggest that it is also important to consider the ecological context in which these children are growing up.

Keywords Childhood neglect · Poverty · Crime · Posttraumatic stress disorder · Major depressive disorder · Academic achievement

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Introduction

Neglect is the most common type of child maltreatment, accounting for 59% of cases reported to Child Protective Services in the United States (US Department of Health And Human Services 2009). However, despite its prevalence, childhood neglect is understudied relative to other types of maltreatment. Indeed, this phenomenon has been labeled the “neglect of neglect” (Wolock and Horowitz 1984) and individual scholars and advisory panels have called attention to the need for more research on child neglect (McSherry 2007; National Research Council 1993; Trickett and McBride-Chang 1995).

More than any other type of child maltreatment, past research has reported that child neglect is positively related to poverty (Berger 2004; Brown et al. 1998; Chaffin et al. 1996; Coulton et al. 2007; Drake and Pandey 1996; Jones and McCurdy 1992; Theodore et al. 2007; Zuravin 1989). Furthermore, both neglect (Hildyard and Wolfe 2002) and poverty (Brooks-Gunn et al. 1995) are associated with negative outcomes for children across multiple important domains of functioning. One review of the influences of ecological factors on child maltreatment (Zielinski and Bradshaw 2006) noted a number of studies on the impact of poverty on rates of neglect, but few studies assess whether poverty and neglect exert unique influences on child development, whether one is more important than the other, or whether they interact.

The current study aims to fill this gap by examining the roles of childhood neglect and childhood poverty in predicting mental health, academic achievement, and crime in a sample of documented cases of child neglect and matched controls. Our underlying conceptual model is based on an ecological approach that stresses the importance of studying the individual in the context of the broader environment

in which he or she functions (Belsky 1980; Garbarino 1977). We base our work on a modified ecological approach (Widom 2000), viewing the developing child as embedded within a family, a school, a community, and a neighborhood and recognizing the need to consider contextual factors in understanding outcomes for maltreated children. Finally, the model assumes that behavior is complex and multiply determined by characteristics of the individual, family, and neighborhood and/or community.

Outcomes for Neglected Children

The longitudinal literature on the long-term (adult) consequences for neglected children is limited. In a review, Trickett and McBride-Chang (1995) noted that there is little information about the adult status of neglected children. Using the same dataset as this study to examine long-term consequences of maltreatment in general, Widom and colleagues have reported that neglected children as adults scored lower on tests of IQ and reading ability compared to controls (Perez and Widom 1994) and were at higher risk for prostitution (Widom and Kuhns 1996), delinquency and violent behavior (Maxfield and Widom 1996), Posttraumatic Stress Disorder (PTSD) (Widom 1999), and Major Depressive Disorder (MDD) (Widom et al. 2007). However, none of these previous publications has focused exclusively on the consequences of childhood neglect and none has examined neglect in relation to poverty. In a longitudinal community-based study of children, Johnson and colleagues (Johnson et al. 1999, 2000) found elevated rates of symptoms of personality disorders among neglected children when they were assessed in young adulthood and increased risk of MDD among neglected compared to non-neglected participants.

A different approach has been to assess neglected children while controlling for poverty indicators. These studies found that childhood neglect remains a significant predictor of delinquency and criminal behavior, overall school performance, language and reading abilities, school absences, school grades, suspensions, and drop-out rates, after controlling for at least one poverty indicator (Bright and Jonson-Reid 2008; Kendall-Tackett and Eckenrode 1996; Kutz et al. 1993; Leiter and Johnsen 1994, 1997; Mersky and Reynolds 2007; Reyome 1993; Schuck and Widom 2005; Wodarski et al. 1990). Children who were both neglected and poor were found to be at greater risk for delinquency and criminal behavior than non-poor neglected children (Bright and Jonson-Reid 2008; Mersky and Reynolds 2007; Schuck and Widom 2001), suggesting that childhood poverty and childhood neglect interact in determining outcomes. Zingraff et al. (1993) found that

childhood neglect was not related to adolescent delinquency, when accounting for family poverty.

Outcomes for Children Living in Poverty

Poverty has been studied using a variety of approaches (Brooks-Gunn et al. 1995), from neighborhood characteristics to individual-level indicators of material and social capital resources. However, assessments are complicated by interactions among contextual and individual indicators of poverty (Sherman 1994).

Similar to neglect, poverty is linked to delinquency, academic achievement deficits, and mental health consequences (Concoran et al. 1992; Hsieh and Pugh 1993; Kessler and Cleary 1980). Growing up in a poor household and/or poor neighborhood may predispose a child to experience more traumas (Paxton et al. 2004) and to have fewer resources to buffer the negative impact of traumatic experiences, which in turn may contribute to a range of difficulties (Brooks-Gunn et al. 1995).

Two types of studies have examined associations between poverty and delinquency: those examining outcomes in aggregate units, such as neighborhoods, and those examining individual outcomes. Based on a meta-analysis of 34 studies, Hsieh and Pugh (1993) found a positive association between aggregate assessments of poverty or income inequality and violent crime. Similarly, Sampson et al. (2002) reviewed the literature on neighborhood influences on a range of outcomes and concluded that neighborhood poverty and crime are positively related. Research on individuals tends to reach similar conclusions. Longitudinal studies have found that individuals who grew up in poor neighborhoods, as compared to those growing up in wealthier neighborhoods, are more likely to engage in violent and non-violent juvenile delinquency (De Coster et al. 2006; Sampson and Laub 1994). However, with the exception of Sampson and Laub (1994), most of the individual level studies focus on juvenile and not adult crime.

Analyses from the Panel Study of Income Dynamics revealed that, with the increase of income inequality from 1970 to the 1990s, the educational gap between the wealthy and the poor also increased (Duncan et al. 1998; Mayer 2001) and that welfare receipt rates were negatively related to educational attainment (Concoran et al. 1992). Furthermore, both contextual (neighborhood rates of welfare receipt) and individual poverty levels (number of years a family spent below the poverty line) were associated with educational attainment of young adults (Haveman and Wolfe 1994). Other studies report similar negative relations between neighborhood poverty and educational outcomes in adulthood (Datcher 1982). Aggregate data from eight cross-sectional studies showed that indicators of

socio-economic status (in this case, current income) were negatively related to psychological distress in adults (Kessler and Cleary 1980) and income was negatively related to depression in adults (Kessler and Neighbors 1986).

In sum, both childhood neglect and childhood poverty are related to negative long-term criminal (Maxfield and Widom 1996; Sampson et al. 2002), academic (Duncan et al. 1998; Perez and Widom 1994) and mental health outcomes (Johnson et al. 2000; Kessler and Neighbors 1986; Widom et al. 2007). However, because poverty and neglect often co-occur (Sedlak and Broadhurst 1996), it has been difficult to parse out their independent or interactive effects. Acknowledging the importance of poverty, some studies of childhood neglect have controlled for poverty using a range of techniques (Kendall-Tackett and Eckenrode 1996; Leiter and Johnsen 1994; Schuck and Widom 2005; Wodarski et al. 1990). However, to our knowledge, no studies have systematically examined the unique effects of childhood neglect and childhood family poverty and childhood neighborhood poverty on long-term outcomes or have examined whether childhood neglect and childhood neighborhood and family poverty interact to predict outcomes in adulthood.

Current Study

The purpose of the current study is to examine the effects of childhood neglect and childhood family and neighborhood poverty on PTSD, MDD, academic achievement, and crime assessed in young adulthood. The data were drawn from a prospective cohort design study of neglected children and matched controls. We asked the following four questions: (1) Does childhood neglect predict PTSD, MDD, academic achievement, and crime? (2) Do childhood family poverty and childhood neighborhood poverty predict PTSD, MDD, academic achievement, and crime? (3) Are childhood neglect and childhood family and neighborhood poverty unique predictors of PTSD, MDD, academic achievement, and crime (that is, even when controlling for the other predictors)? (4) Do childhood neglect and childhood family and neighborhood poverty interact to predict PTSD, MDD, academic achievement, and crime?

Method

Procedure

The data used here are from a large research project based on a prospective cohort design study in which abused and/or neglected children were matched with non-victimized

children and followed prospectively into young adulthood (Widom 1989a). Because of the matching procedure, the subjects are assumed to differ only in the risk factor: that is, having experienced childhood abuse or neglect. Since it is not possible to randomly assign subjects to groups, the assumption of equivalency for the groups is an approximation.

Cases were drawn from the records of county juvenile and adult criminal courts in a metropolitan area in the Midwest during the years 1967 through 1971. The rationale for identifying the maltreated group was that their cases were serious enough to come to the attention of the authorities. Only court-substantiated cases of child maltreatment were included. Cases were restricted to those in which the children were less than 11 years of age at the time of the abuse or neglect incident. In this paper, we focus only on neglected children. Neglect cases reflected a judgment that the parents' deficiencies in childcare were beyond those found acceptable by community and professional standards at the time. These cases represented extreme failure to provide adequate food, clothing, shelter, and medical attention to children. Excluded from the sample were court cases that represented: (1) adoption of the child as an infant; (2) "involuntary" neglect only (usually resulting from the temporary institutionalization of the legal guardian); (3) placement only (where there was no indication of neglect but the need to find a home for the child); or (4) failure to pay child support.

A critical element of the design involved the selection of a comparison group, matched with the maltreated sample on the basis of age, sex, race/ethnicity, and approximate family social class during the time period under study. Matching for approximate family social class was important in this study because it is theoretically plausible that any relation between child abuse and neglect and subsequent outcomes may be confounded with or explained by social class differences. It is difficult to match exactly for social class because higher income families could live in lower social class neighborhoods and vice versa. The matching procedure used here is based on a broad definition of social class that includes neighborhoods in which children were reared and schools they attended. Similar procedures, with neighborhood school matches, have been used in studies of schizophrenics (Watt 1972) to match approximately for social class. The control group establishes the base rates of pathology we would expect in a sample of adults from comparable circumstances who did not come to court attention in childhood as victims of neglect.

Where possible, two matches were found to allow for loss of comparison group members. Any comparison group child with an official record of abuse or neglect was

eliminated, regardless of whether the record was before or after the period of the study. This occurred in 11 cases.

Children who were under school age at the time of the neglect were matched with children of the same sex, race, date of birth (± 1 week), and hospital of birth through the use of county birth record information. For children of school age, records of more than 100 elementary schools for the same time period were used to find matches with children of the same sex, race, date of birth (± 6 months), class in elementary school during the years 1967 through 1971, and approximate home address. We were not able to find matches for some neglected children because: (1) date of birth information was missing for the neglected child; (2) the neglected child was born outside the county and/or state; (3) the elementary school that the child attended had closed since 1971 and class registers were not available; and (4) the school was not integrated at the time and a same race match could not be found. Overall, there were matches for 76% of the neglected children.

Initially, we examined official criminal histories for the entire sample of maltreated children and compared them to those of the matched comparison group ($N = 1,575$) (Widom 1989a). For this paper, we use data from the second phase of the study which involved tracing, locating, and interviewing these individuals an average of 22.30 years later ($SD = 2.10$). Two-hour in-person interviews that included a series of structured and semi-structured questionnaires and rating scales were conducted between 1989 and 1995 obtaining information about cognitive, intellectual, emotional, psychiatric, social and interpersonal functioning.

The interviewers were blind to the purpose of the study, to the participants' group membership, and to the inclusion of a maltreated group. Similarly, the subjects were blind to the purpose of the study and were told they had been selected to participate as part of a large group of individuals who grew up in that area in the late 1960s and early 1970s. After being provided with a description of the study, subjects signed a consent form acknowledging that they were participating voluntarily. Institutional Review Board approval was obtained for the procedures involved in this study. For those individuals with limited reading ability, the consent form was read and, if necessary, explained verbally.

Of the original sample of 1,575 (908 abused and/or neglected individuals and 667 controls), 1,307 subjects (83.00%) were located and 1,196 interviewed (76.00%). Of the people not interviewed, 43 were deceased (prior to interview), 8 were incapable of being interviewed, 268 were not found, and 60 refused to participate (a refusal rate of 3.80%). There were no significant differences between the interviewed sample ($N = 1,196$) and the original sample ($N = 1,575$) in terms of demographic

characteristics (gender, race, or current age) or group status (neglect versus comparison group).

Participants

Only participants who had a history of childhood neglect or were in the control group and were White or Black (not of Hispanic origin) were included in the present analyses ($N = 1,004$). Individuals who reported being of Hispanic origin ($N = 59$, 5.60%) were excluded from these analyses because their small numbers make it difficult to generalize to Hispanics. The majority of the neglect group (88.40%, $N = 446$) had a documented case of neglect only and the remaining 11.60% had experienced one or more types of abuse in addition to their neglect. The sample here has a mean age of 29.14 ($SD = 3.84$), 47.30% are female, and 35.50% are Black. There were no differences between the controls and neglected group on race and gender. However, those in the control group were 8 months older than the neglected participants ($t = -2.47$, $p < .05$). On average, the participants completed 11.49 ($SD = 2.20$) years of school and the median occupational level (Hollingshead 1975) for the groups was semiskilled workers, with only 6.60% of the overall sample in the managerial/professional category. Thus, the sample is skewed toward the lower-end of the socio-economic spectrum.

Measures

PTSD and MDD

The National Institute of Mental Health (NIMH) Diagnostic Interview Schedule—Revised (Robins et al. 1989) (DIS-III-R) was used to assess lifetime PTSD and MDD diagnoses according to DSM-III-R criteria (American Psychiatric Association 1987). The DIS-III-R is a highly structured interview schedule designed for use by lay interviewers. Field interviewers received a week of study-specific training and successfully completed practice interviews before beginning the study interviews. Field interviewer supervisors recontacted a random 10% of the respondents for quality control. Frequent contacts between field interviewers and supervisors were held to prevent interview drift, to monitor quality, and to provide continuous feedback. Adequate reliability for the DIS has been reported (Robins et al. 1981). Although the DSM-III-R is not the most recent version of the DSM, the criteria for these disorders are substantially the same as in DSM-IV. Thirty-one percent ($N = 156$) of neglected participants and 20.30% ($N = 101$) of the controls met the criteria for a diagnosis of PTSD. One quarter (25.00%, $N = 127$) of the neglected participants and 20.90% ($N = 104$) of the controls met the criteria for MDD.

Crime

Records from three levels of law enforcement (local, state, and federal) agencies were searched for arrests during 1987–1988 (Widom 1989b) and again in 1994 (Maxfield and Widom 1996). Official criminal history information was used because it is a reliable assessment of serious offending (Geerken 1994) and does not suffer some of the limitations of self-report information. A dichotomous (yes/no) crime variable for history of arrest was used. Almost half of the neglected group (48.90%, $N = 248$) and 36.00% ($N = 179$) of the controls had been arrested as an adult.

Academic Achievement

A composite assessment of academic achievement was created based on the participants' report of highest grade of school completed and assessments of IQ and reading ability during the 1989–1995 interviews when the participants were approximately age 29 (see Perez and Widom 1994). IQ is measured by the Quick Test (Ammons and Ammons 1962), an easily administered measure of current level of verbal intelligence where the subject can point to a picture on a card. Quick Test scores correlate highly with WAIS full scale (.79–.80) and verbal (.79–.86) IQs (Dizzione and Davis 1973). Reading ability was measured by the Wide Range Achievement Test, 1984 Revised edition (WRAT-R) (Jastak and Wilkinson 1984). Internal consistency estimates of the WRAT-R range from .96 to .99. Concurrent validity with other achievement and ability tests ranges from the high .60s to .80s. The composite score was created by standardizing the three measures of academic achievement to a mean of zero and a standard deviation (SD) of 1 and averaging them. Participants had to have at least two of the three measures in order to have a composite score (97.70% of the sample), maximizing the utility of available information. The resulting academic achievement composite is normally distributed $M = 0$, $SD = .03$ with no skew ($skew = -.28$). It should be noted that a score computed by averaging standardized variables does not necessarily have the same distribution as the components.

Childhood Family Poverty

Prior studies of family poverty have used two different approaches—a single criterion (e.g. public assistance receipt, Eckenrode et al. 1993) or multiple separate variables (e.g. parental income and welfare receipt, Bright and Jonson-Reid 2008). However, neither approach permits us to capture the range of information about childhood poverty characterizing our sample and to use all of the data we have available. Thus, to assess whether the childhood of our

participants was impoverished, a composite variable was developed using responses to questions administered during the 1989–1995 interview (cf. Schuck and Widom 2005). The childhood family poverty variable represented the average of two social (i.e., maternal and paternal levels of education) and four material (family's welfare receipt when the participant was a child, paternal and maternal employment, and growing up in a single-parent household versus living with two parents until 18 years of age) poverty indicators. For inclusion in the analyses, at least two assessments of childhood family poverty were required: 955 people (95% of the sample) had data on at least two and 762 (76.00%) had data on at least four of six childhood family poverty variables. The childhood family poverty variables were standardized and averaged across the number of variables for which each participant had data. The resulting composite is distributed $M = .04$, $SD = .02$ with a slight skew towards higher family poverty levels ($skew = 5.87$).

Neighborhood Poverty

To determine whether participants were raised in poor neighborhoods, data from the 1970 U.S. Census were examined (cf. Schuck and Widom 2005). Children were coded into a census tract based on their 1967–1971 address. The 1,004 participants originated from 141 census tracts. Because of the way cases and controls were selected and matched, many participants came from the same neighborhoods (census tracts) and, therefore, had the same data values for the neighborhood poverty variable. Six variables were used in the analysis to create the childhood neighborhood poverty composite: percent of families in the tract living on public assistance, below the poverty line, in single-parent homes, in the same house for at least 5 years, and in owner-occupied homes, and percent of people with at least a college degree. All of the variables were coded in the direction of higher numbers indicating more poverty and then the scores were standardized ($M = 0$, $SD = 1.00$). Most (98.60%) of the tracts had information on all six variables of interest and two tracts (1.40%) were missing three variables. For the composite score, an average of the standardized indicators was calculated for each tract. The resulting composite is distributed $M = -.01$, $SD = .05$ with minimal skew towards higher poverty levels ($skew = 1.55$).

Data Analysis

We examined the data for assumptions of linearity, homoscedasticity, and independence prior to analysis. Information about the intercorrelations among the variables is presented in Table 1. Logistic regressions were used for categorical variables and Ordinary Least Squares (OLS) regressions for the continuous variable with childhood

neglect and childhood family poverty predicting each outcome, while controlling for covariates (participants' race, gender and age) to control for any non-equivalence in the groups. We used SPSS version 18.

Because participants are nested within census tracts, the assumption of independence is violated. Hierarchical linear modeling (HLM) was used to assess the role of childhood neighborhood poverty because HLM specifically accounts for nested data. MPlus version 5 was utilized for these analyses, with techniques recommended for model building (Muthen and Muthen 1998–2004). To determine whether childhood neighborhood poverty was predictive of outcomes, HLM was run for each outcome with childhood neighborhood poverty as the sole between-level predictor with covariates as within-level predictors. Maximum Likelihood Robust estimator was used in all HLM analyses.

To assess whether childhood neglect, childhood family poverty and childhood neighborhood poverty predicted outcomes uniquely, all three predictors (as well as the covariates) were included in the same model. Within-level predictors included participant-level characteristics of childhood neglect, childhood family poverty, and covariates. Childhood neighborhood poverty was a level 2, between-level predictor. Random intercepts were estimated.

To assess interactions, random slopes were estimated to determine whether the relations between childhood neglect and childhood family poverty and outcomes varied by childhood neighborhood poverty. To assess whether the relations between neighborhood poverty and family poverty and outcomes differed depending on whether the child had experienced neglect, a comparison model that allowed parameters to vary by group was estimated and compared to the original model. To estimate between-level effects (childhood neighborhood poverty) on within-level (childhood family poverty) slopes separately for control and neglect groups, groups were allowed to vary by neighborhood (Muthen L., 2009, 16 Dec 2009, personal communication). This type of HLM modeling, Two-Level Mixture Analysis, does not allow both intercepts and slopes to be estimated and thus does not provide an intercept coefficient for Level-1 predictors.

As HLM with categorical outcomes and HLM mixed models (when estimating separate parameters for control and neglect groups) with random slopes are relatively new procedures, few indices are available to assess model fit (Muthen 2009). Comparative fit indices [Log likelihood difference testing, Akaike Information Criterion (AIC) and Bayes Information Criterion (BIC)] are used in the current study in order to compare relative fit of the models. With the continuous outcome of academic achievement, standard fit indices were available for the original model but not for the comparison model which required by-group parameter estimation.

Table 1 Intercorrelation matrix (N = 1,004) with 95% confidence intervals

	1	2	3	4	5	6	7
1. Neglect	1.00						
2. Academic achievement	-.33*** (-.35 to -.31)	1.00					
3. PTSD diagnosis	.12*** (.09 to .15)	-.06 (-.09 to -.03)	1.00				
4. MDD diagnosis	.05 (.02 to .08)	-.00 (-.03 to .03)	.34*** (.31 to .37)	1.00			
5. Crime	.15*** (.12 to .18)	-.25*** (-.28 to -.23)	.03 (0 to .06)	.01 (-.02 to .04)	1.00		
6. Childhood family poverty	.21*** (.18 to .24)	-.37 (-.40 to -.34)	.13*** (.10 to .16)	.07* (.04 to .10)	.10*** (.07 to .13)	1.00	
7. Childhood neighborhood poverty	.12*** (.09 to .15)	-.27*** (-.30 to -.24)	.04 (.07 to .01)	-.01 (-.04 to .02)	.14*** (.11 to .17)	.31*** (.28 to .34)	1.00

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; (95% confidence intervals)

Results

Does Childhood Neglect Predict PTSD, MDD, Academic Achievement, and Crime?

Childhood neglect significantly predicted three of the four outcomes. Table 2 shows that neglected children were more likely to be diagnosed with PTSD (OR = 1.78, $p < .001$) and arrested (OR = 1.87, $p < .001$) and to have lower scores on academic achievement ($\beta = -.32$, $p < .001$). Neglect did not significantly predict MDD (OR = 1.27, $p > .10$).

Do Childhood Family Poverty and Childhood Neighborhood Poverty Predict PTSD, MDD, Academic Achievement, and Crime?

Table 2 also shows that childhood family poverty significantly predicted having a lifetime diagnosis of PTSD (OR = 1.62, $p < .001$), being arrested (OR = 1.62, $p < .001$), and academic achievement ($\beta = -.37$, $p < .001$), but only marginally predicted MDD (OR = 1.28, $p < .10$). Childhood neighborhood poverty significantly predicted PTSD ($b = .25$, $p < .05$), being arrested ($b = .32$, $p < .05$), and academic achievement ($b = -.37$, $p < .001$). No association was found between childhood neighborhood poverty and MDD ($b = .04$, $p > .10$).

Are Childhood Neglect and Childhood Family and Neighborhood Poverty Unique Predictors of PTSD, MDD, Academic Achievement, and Crime?

Tables 3 (PTSD, MDD, and crime) and 4 (academic achievement) show the results of HLM analyses examining the extent to which childhood neglect and childhood family and neighborhood poverty each predict outcomes, even when controlling for the other predictors.

PTSD

When all three predictors were entered simultaneously into the PTSD model, two remained highly significant: childhood neglect (OR = 1.68, $p < .01$) and childhood family poverty (OR = 1.52, $p < .01$). In contrast, the effect of childhood neighborhood poverty became non-significant ($b = .05$, $p > .10$). Thus, childhood neglect and childhood family poverty variables had significant unique effects on PTSD, whereas childhood neighborhood poverty did not.

MDD

In the full model with all three predictors, the effect of childhood family poverty on MDD became significant (OR changed from 1.28, $p < .10$ to 1.37, $p < .05$), whereas the effects for childhood neglect (OR = 1.18, $p > .10$) and childhood neighborhood poverty ($b = -.12$, $p > .10$) were not significant. Thus, childhood family poverty was the only significant unique predictor of MDD.

Crime

With all three predictors in the model predicting arrest, two remained significant: childhood neglect (OR = 1.73, $p < .01$) and childhood family poverty (OR = 1.41, $p < .05$). In contrast, childhood neighborhood poverty became non-significant. Thus, childhood neglect and childhood family poverty variables were significant unique predictors of crime, whereas childhood neighborhood poverty did not explain additional variance.

Academic Achievement

In the full model, childhood neglect, childhood family poverty, and childhood neighborhood poverty were all significant ($p < .001$) predictors of academic achievement. Thus, all three childhood factors (neglect, family poverty,

Table 2 Childhood predictors of PTSD, MDD, arrest, and academic achievement

	Odds ratio (95% CI)			Academic achievement
	PTSD diagnosis	MDD diagnosis	Arrest	Beta coefficient
Childhood neglect	1.78 (1.78 to 2.40)***	1.27 (.94 to 1.71)	1.87 (1.43 to 2.46)***	-.32***
Family poverty	1.62 (1.24 to 2.10)***	1.28 (.98 to 1.67) [†]	1.62 (1.27 to 2.07)***	-.37***
<i>B</i> (standard error)				
Neighborhood poverty	.25* (.11)	.04 (.13)	.32* (.13)	-.37*** (.06)

Regressions were conducted separately for each predictor (childhood neglect, childhood family poverty and childhood neighborhood poverty) with covariates of age, race, and gender

CI confidence interval, PTSD posttraumatic stress disorder, MDD major depressive disorder, *Diagnosis* lifetime diagnosis, *B* unstandardized coefficient

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; [†] $< .10$

Table 3 Diagnoses of posttraumatic stress disorder (PTSD), major depressive disorder (MDD) and arrests as predicted by childhood neglect, family and neighborhood poverty in hierarchical linear modeling analyses

Fixed and random effects	Odds ratio (95% CI)		
	PTSD diagnosis	MDD diagnosis	Arrest
<i>Fixed effects</i>			
Level 1			
Neglect (neglect = 1)	1.68 (1.20 to 2.34)**	1.18 (.83 to 1.68)	1.73 (1.22 to 2.44)**
Family poverty	1.52 (1.12 to 2.06)**	1.37 (1.00 to 1.86)*	1.41 (1.05 to 1.88)*
<i>B (95% CI)</i>			
Level 2			
Neighborhood poverty on outcome	.05 (–.23 to .33)	–.12 (–.44 to .19)	.11 (–.19 to .42)
<i>Random effects</i>			
Level 2			
Thresholds/intercept	1.90 (1.50 to 2.67)***	1.72 (1.27 to 2.16)***	–1.03 (–2.24 to .18)*
Residual variance	.02	.15	.04
<i>Fit statistics</i>			
AIC	989.96	965.11	1,102.14
BIC	1,028.43	994.60	1,140.63
Number of participants	905	908	908
Number of neighborhoods	141	141	141

Age, race and gender are entered as covariates in the model but are not shown in the table. Family poverty and neighborhood poverty are centered around their grandmean (mean calculated across all clusters)

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

and neighborhood poverty) contributed uniquely and significantly to the prediction of academic achievement.

Do Childhood Neglect and Childhood Family and Neighborhood Poverty Interact to Predict PTSD, MDD, Academic Achievement, and Crime?

For PTSD, MDD and crime, the original models that allowed the intercept to vary by childhood neighborhood poverty (described above and as shown in Table 3) were the most parsimonious. Slope variation to assess whether the relations between childhood neglect and childhood family poverty and PTSD, MDD and crime varied by neighborhood and/or allowing parameters to vary by groups (control and neglect) did not improve the models, indicating no interactions among these variables.

Slope variation to assess whether relations between childhood neglect and childhood family poverty varied by neighborhood in the prediction of academic achievement also did not improve the original model in the overall sample (Table 4). However, a comparison model, allowing parameters to vary by group (neglect and control) and allowing the relation between childhood family poverty and academic achievement to vary by neighborhood, fit the data significantly better than the original model and a

one-group (neglect and control together) version of the final model (not shown). In the final model, childhood neighborhood poverty had a significant negative effect on academic achievement in the control group ($b = -.24$, $p < .01$), but was not significant in the neglect group ($b = -.13$, $p < .10$). In addition, there was a significant interaction: childhood neighborhood poverty had a significant influence on the relation between childhood family poverty and academic achievement only in the control group ($b = .20$, $p < .001$). Figure 1 illustrates these findings. In low poverty neighborhoods, children in the control group performed better academically if they lived in a low poverty family than if they lived in a high poverty family. In high childhood poverty neighborhoods, level of childhood family poverty did not appear to make a difference for academic achievement.

Discussion

Using a modified ecological approach (Widom 2000), the current study found that childhood neglect and childhood family and neighborhood poverty each separately predicted PTSD, crime, and academic achievement. These results are consistent with other literature (Brooks-Gunn et al. 1995;

Table 4 Academic achievement as predicted by childhood neglect, family and neighborhood poverty in hierarchical linear modeling analyses

Fixed and random effects	Academic achievement		
	Full model Full sample	Comparison model Neglect group	Control group
	<i>b</i> (95% CI)		
<i>Fixed effects</i>			
Level 1			
Neglect (neglect = 1)	-.39 (-.53 to -.24)***	NA	NA
Family poverty	-.35(-.45 to -.26)***	NA	NA
	<i>b</i> (95% CI)		
Level 2			
Neighborhood poverty on academic achievement	-.23 (-.34 to -.13)***	-.13 (-.28 to .02) [†]	-.24 (-.38 to -.10)**
Neighborhood poverty on slope of family poverty	NA	-.09 (-.33 to .15)	.20 (.05 to .33)***
<i>Random effects</i>			
Level 1			
Residual variance	.51 (.46 to .57)***	.52 (.46 to .58)***	.52 (.46 to .58)***
Level 2			
Thresholds/intercept of academic achievement	-.01 (-.12 to .11)	-.01 (-.16 to .18)	.00 (-.18 to .18)
Threshold/intercept of family poverty slope	NA	-.33 (-.48 to .18)***	-.37 (-.52 to -.21)***
Residual variance of academic achievement	.02 (-.01 to .05)	.02 (-.01 to .05)	.02 (-.01 to .05)
Residual variance of family poverty slope	NA	.04 (-.02 to .09)	.04 (-.02 to .09)
	Original model	Comparison model	
<i>Fit statistics</i>			
Chi square fit (df)	2.00 (1) <i>n.s.</i>	NA	
RMSEA	.03	NA	
CFI	.99	NA	
AIC	3,263.98	2,239.46	
BIC	3,307.27	2,326.04	
Log likelihood difference test	1,287.06***		
Number of participants	907	445	462
Number of neighborhoods	141	141	141

Race, gender, age covariates are controlled but not shown. Family poverty and neighborhood poverty are centered around their grandmean (mean calculated across all clusters). Comparison model estimated different parameters for control and neglect group

NA not applicable

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; [†] $< .10$

Eckenrode et al. 1993; Farrington 2002; Grogan-Kaylor and Otis 2003; Hsieh and Pugh 1993; Kessler and Neighbors 1986; Maxfield and Widom 1996; Perez and Widom 1994; Sullivan et al. 2006). Furthermore, even when controlling for each other and for neighborhood poverty, childhood neglect and childhood family poverty each increased risk for PTSD and being arrested. However, the effect of childhood neighborhood poverty on PTSD and arrest became non-significant when childhood neglect and family poverty were also included in the model, suggesting that neighborhood poverty did not contribute uniquely to these outcomes. These results reinforce the existing literature indicating that early adversity and unstable

environments, including poverty, increase a person's risk to develop PTSD symptoms (Gorman et al. 2002; Heim and Nemeroff 2002). Interestingly, our current findings do not provide support for theories on the relationship between poverty and crime that emphasize the role of neighborhoods as important risk factors (Shaw and McKay 1942; Wilson 1987).

Other specificity is suggested by our findings with regard to MDD. We found that only childhood family poverty predicted MDD, when childhood neglect and neighborhood poverty were included in the model. The current results add to the existing literature linking family poverty and depression (Goosby 2010; Heflin and Iceland

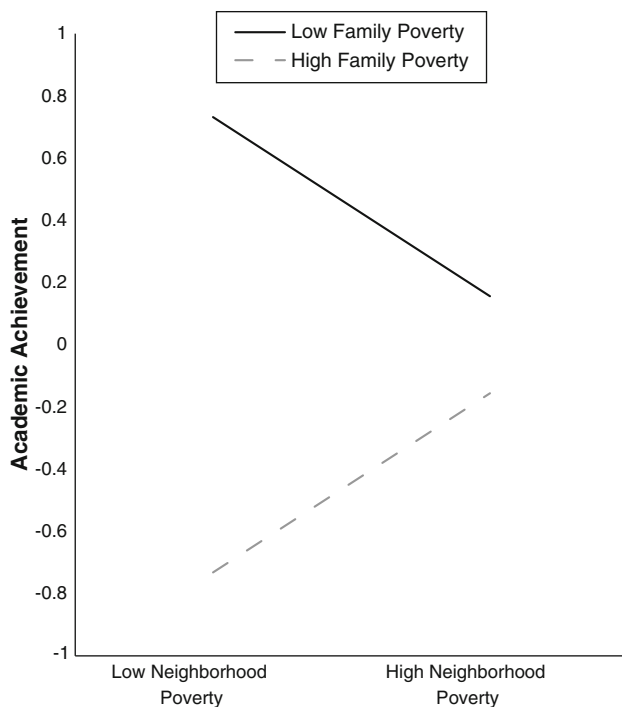


Fig. 1 Interaction of childhood family poverty and neighborhood poverty in the prediction of academic achievement in the control group. Low and high family and neighborhood poverty were computed using ± 1 Standard Deviation around the mean method

2009) and are also consistent with the family stress model which posits that material hardship is related to psychological distress (Mistry et al. 2002). In cross-sectional studies with children and adolescents, a positive association between childhood neighborhood poverty and MDD symptoms has been reported (Xue et al. 2005). It is not clear why we did not find that childhood neighborhood poverty increased a person's risk for an MDD diagnosis in this sample. One possibility is that the effect of childhood neighborhood poverty is more proximal, not long-term as assessed here, and this consideration would be worth further investigation. A second possibility is that the distribution of neighborhoods in this study is somewhat restricted, with relatively few cases at the highly advantaged end, and this may have contributed to our findings. A third possibility is that the differences in outcomes (depression symptoms versus a diagnosis of MDD) may have had an influence on the results.

Importantly, all three factors examined here (childhood neglect, childhood family poverty, and childhood neighborhood poverty) had significant negative effects on academic achievement, even when considered with the other factors in the model. However, we found a significant interaction indicating that childhood neighborhood poverty predicted academic achievement in conjunction with childhood family poverty only in controls. Childhood family poverty had a negative impact on academic

achievement for controls growing up in low poverty neighborhoods, but childhood family poverty did not show such an impact in high poverty neighborhoods. For the control children, the disparity between the child's family poverty and the level of poverty in the child's neighborhood played an important role in influencing the person's academic achievement, consistent with economic relative deprivation theory (Runciman 1966; Turley 2002) and with prior studies of community samples (Datcher 1982; Haveman and Wolfe 1994). It is noteworthy that child neighborhood poverty did not have a significant impact on academic achievement for individuals with histories of childhood neglect. One way to interpret these results is to speculate that the effect of *childhood neglect* by itself is so strong that living in an impoverished neighborhood or family does not contribute uniquely to risk for poor academic achievement. We know of no other studies that have examined childhood neighborhood by childhood family poverty interactions. It is also possible that other factors related to both poverty and childhood neglect not accounted for in this analysis, such as child disability (Bruhn 2003), might be important in understanding these relationships.

Examined from the perspective of the modified ecological model (Widom 2000), our findings highlight the importance of neighborhood, family and individual factors in affecting a person's risk for mental health and psychosocial outcomes. However, these three childhood characteristics—neglect, family poverty, and neighborhood poverty—appear to have different effects on long-term development. Child neglect and childhood family poverty are important contributors to risk for PTSD, crime, and academic achievement and seem to outweigh the influences of the neighborhood. However, childhood neighborhood poverty interacted with the other factors to predict academic achievement. Only childhood family poverty predicted MDD.

The current study helps to begin to disentangle some of the influences on the long-term consequences of childhood neglect. It has often been thought that the consequences of childhood neglect are primarily the result of growing up in poverty, not the neglect experience per se. Our findings show that childhood neglect has consequences of its own, distinct from poverty. This is the first paper, to our knowledge, to attempt to directly compare the contributions of childhood neglect and childhood family and neighborhood poverty in predicting long-term consequences across these important outcomes. Future research needs to consider the role of these "extra-individual" factors in understanding the developmental trajectories of neglected children and how changes in family poverty or neighborhood poverty over the life course may alter trajectories.

Despite several strengths, limitations should also be acknowledged. (1) Our findings are based on cases of childhood neglect drawn from official court records and, thus, most likely represent the most extreme cases processed in the system (Groeneveld and Giovannoni 1977). This means that these findings are not generalizable to unreported or unsubstantiated cases of child neglect (Widom 1989a). (2) Officially reported cases of child neglect are generally skewed toward the lower end of the socioeconomic spectrum. Thus, these findings cannot be generalized to neglect which occurs in middle- or upper class children and their families. Indeed, the consequences of neglect in the context of middle or upper class families may be manifest in ways quite different than for the children in the present study (Widom 2000). (3) These findings also represent the experiences of a group of neglected children during the late 1960s and early 1970s in the Midwest part of the United States. It is possible that children neglected at a later point in time or at present may manifest different consequences as a result of different responses to victimization (mandatory child abuse reporting laws) or to different forms of intervention.

The current study demonstrates that childhood neglect, childhood family poverty, and childhood neighborhood poverty each contribute to poor outcomes later in life. While interventions should be developed for neglected children to prevent negative outcomes, these findings suggest that it is also important to consider the ecological context in which these children are growing up.

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