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# Neighborhood-Level Social Processes and Substantiated Cases of Child Maltreatment

**Beth E. Molnar**,
Northeastern University

**Robert M. Goerge**,
University of Chicago

**Paola Gilsanz**,
Harvard School of Public Health

**Andrea Hill**,
The University of Washington Tacoma

**SV Subramanian**,
Harvard School of Public Health

**John K. Holton**,
Concordia University Chicago

**Dustin T. Duncan**,
New York University School of Medicine

**Elizabeth D. Beatriz**, and
Northeastern University

**William R. Beardslee**
Children's Hospital Boston and Harvard Medical School

## Abstract

Child maltreatment is a preventable public health problem. Research has demonstrated that neighborhood structural factors (e.g. poverty, crime) can influence the proportion of a neighborhood's children who are victims of maltreatment. A newer strategy is the identification of potentially modifiable social processes at the neighborhood level that can also influence maltreatment. Toward this end, this study examines neighborhood-level data (maltreatment cases substantiated by Illinois' child protection agency, 1995–2005, social processes measured by the Project on Human Development in Chicago Neighborhoods, U.S. Census data, proportions of neighborhoods on public assistance, and crime data) that were linked across clusters of contiguous, relatively homogenous Chicago, IL census tracts with respect to racial/ethnic and

Correspondence concerning this article should be addressed to Dr. Beth E. Molnar, Bouvé College of Health Sciences, Northeastern University, 360 Huntington Ave, M/S 310 INV, Boston, MA 02115. Contact: b.molnar@neu.edu.

socioeconomic composition. Our analysis—an ecological-level, repeated cross-sectional design utilizing random-intercept logit models— with a sensitivity analysis using spatial models to control for spatial autocorrelation – revealed consistent associations between neighborhood social processes and maltreatment. Neighborhoods higher in collective efficacy, intergenerational closure, and social networks, and lower in disorder had lower proportions of neglect, physical abuse, and sexual abuse substantiated cases, controlling for differences in structural factors. Higher collective efficacy and social network size also predicted a lower proportion of substance-exposed infants. This research indicates that strategies to mobilize neighborhood-level protective factors may decrease child maltreatment more effectively than individual and family-focused efforts alone.

**Keywords**

Child maltreatment; Neighborhood factors; Social processes; Multilevel; Protective factors; Prevention

Experiencing child maltreatment is associated with mental, physical, social and economic consequences impacting individuals, families and communities across the life course (Dante. Cicchetti & A., 1994; Dante Cicchetti & Lynch, 1993; Garbarino, 1993; Turner, Finkelhor, & Ormrod, 2010). While research has long pointed to parent and child characteristics as significant components of understanding this complex problem, a growing number of studies have identified neighborhood characteristics as an overlooked aspect of program planning (Coulton, Crampton, Irwin, Spilsbury, & Korbin, 2007; Coulton, Korbin, & Su, 1999; Garbarino & Sherman, 1980; Molnar, Buka, Brennan, Holton, & Earls, 2003; Zuravin, 1989). Promising community-level interventions are beginning to emerge (McDonell, Ben-Arieh, & Melton, 2015). Identifying characteristics that can strengthen communities offers promising avenues for further prevention of child maltreatment.

The goal of this study is to identify potentially modifiable neighborhood characteristics that may prevent child maltreatment. We examined the associations between four neighborhood social processes (*Collective Efficacy*, *Intergenerational Closure*, *Neighborhood Social Networks*, and *Social and Physical Disorder*) and reported child maltreatment proportions in Chicago, Illinois from 1995 through 2005. We present results for these social process factors while controlling for neighborhood differences in poverty, unemployment, violent crime and other structural factors.

## Understanding Child Maltreatment: Ecological Perspectives

Research on ecological perspectives considers conditions in the environments where children are developing, whether or not they have these individual and family-level risks. These conditions shape relationships and interactions between youth and their caregivers, recognizing that human relationships do not exist in a vacuum. The Bioecological Theory of Human Development (Bronfenbrenner, 2005) guided hypotheses for this study, as it provides a basis for examining a variety of contexts (e.g. school, peer groups, neighborhoods, etc.) that comprise social life, where the contexts affect individual behavior and behaviors affect contexts reciprocally (Bronfenbrenner, 2005).

Multiple individual and family characteristics associated with child maltreatment have been identified by researchers. For example, in families of low socioeconomic status and/or with parental unemployment the risk of physical abuse is three times higher, and the risk of neglect is seven times higher (Sedlak et al., 2010). Other child and family-level risk factors for child maltreatment include children who have special needs, have contact with child welfare agencies, and families where parental substance abuse problems and mental illness exist (Bartholet, Wulczyn, Barth, & Lederman, 2011; Sedlak et al., 2010).

A number of studies have explored ways that neighborhood characteristics influence different aspects of child health (Brooks-Gunn, Berlin, Leventhal, & Fuligni, 2000; Sellstrom & Bremberg, 2006), including maltreatment (Coulton et al., 2007; Coulton et al., 1999; Freisthler & Maguire-Jack, 2015; Garbarino & Sherman, 1980; Molnar et al., 2003; Zuravin, 1989). Studies of child maltreatment have consistently found that neighborhood structural factors, such as poverty (Coulton et al., 2007; Coulton et al., 1999; Freisthler, Merritt, & LaScala, 2006; Zuravin & Taylor, 1987), housing stress and instability (Ernst, 2000; Fromm, 2004; Manabe, 2004; Warren & Font, 2015; Zuravin, 1989), childcare burden (Coulton et al., 1999), substance availability (Freisthler, Gruenewald, Remer, Lery, & Needell, 2007; Freisthler, Needell, & Gruenewald, 2005), residential density (Zuravin, 1986) and immigrant concentration (Molnar et al., 2003), have an effect on maltreatment.

Although it has been hypothesized that, beyond structural factors, neighborhood *social* processes affect child maltreatment, there has been little research to support this. An early study focused on understanding why neighborhoods that were identical in socioeconomic status had different rates of child maltreatment. The authors described neighborhoods with higher maltreatment rates as “socially impoverished”, characterized by “needy” families competing for scarce social resources (Garbarino & Sherman, 1980). Neighborhood social impoverishment has been posited to influence child maltreatment in three significant ways: (1) Need among residents inhibits sharing behaviors; (2) A dearth of positive role models reinforces inappropriate and inadequate behaviors; and (3) A lack of intimate and confident interactions inhibits nurturance and feedback (Garbarino & Barry, 1997).

Coulton et al. (2007) presented a model of the development of maltreatment employing structural factors *and* social processes. The model posits that neighborhood structural characteristics (e.g. rates of poverty, racial segregation, unemployment) influence neighborhood social processes (e.g. collective efficacy), and that their balance results in differing outcomes. One notable individual-level study tested this model in the Fragile Families and Child Wellbeing (FFCWS) study of 20 U.S. cities. They found that individual-level perceived negative neighborhood social processes, comprised of social disorder measures and reverse coding of the collective efficacy scale used in this study, affected parenting stress, which, in turn, affected risk of physical abuse and neglect perpetration (Guterman, Lee, Taylor, & Rathouz, 2009). More recently, Freisthler (2015) found that neighborhood social disorder predicted higher rates of physical abuse controlling for structural factors. Additional testing of Coulton et al.’s (Coulton et al., 2007) model regarding the dual influences of structural factors and social processes on levels of maltreatment is warranted and is the focus of the current study.

## Collective Efficacy

An extension of Bandura's concept of self-efficacy (1995), collective efficacy is a group's shared belief in their capabilities to succeed at given tasks (Sampson, 2003). Its measurement combines social control: neighbors' capacity to regulate behavior of other residents according to desired goals, and social cohesion: the dimension of mutual trust and solidarity among neighbors (Sampson, Raudenbush, & Earls, 1997). Mounting empirical evidence suggests that collective efficacy has a protective influence over violent behavior including lower rates of community violence (Ahern et al., 2013; J. Morenoff, Sampson, & Raudenbush, 2001; Sampson et al., 1997), lower rates of youths bearing firearms (Molnar, Miller, Azrael, & Buka, 2004), reduced aggressive and delinquent behaviors in youths (Browning, Gardner, Maimon, & Brooks-Gunn, 2014; Molnar, Cerda, Roberts, & Buka, 2008), lower intimate partner violence (Browning, 2002), less adolescent suicidal behavior (Maimon, Browning, & Brooks-Gunn, 2010), lower adolescent dating violence (Jain, Buka, Subramanian, & Molnar, 2010; Rothman et al., 2011) and less frequent physical abuse (Freisthler & Maguire-Jack, 2015).

## Intergenerational Closure

Intergenerational closure refers to the extent which parents know the neighborhood's children, and the parents of their children's friends (Sampson, Morenoff, & Earls, 1999). While new as a potential protective factor for child maltreatment, Coleman and others (James S. Coleman, 1988; J.S. Coleman, 1990) postulate that by generating greater social support for children and shared norms about childrearing within a community, academic achievement increases. Evidence of this was found both by Coleman and two U.S. longitudinal studies (Carbonaro, 1998; Glanville, Sikkink, & Hernandez, 2008).

## Neighborhood Social Networks

The availability of neighborhood social networks—an indicator of social ties, is another social process that is associated with better health, though studies of its impact on child maltreatment are scarce. Social epidemiological research has shown associations between social networks and positive mental and physical health outcomes(Berkman, 1982; Berkman, Glass, Brissette, & Seeman, 2000), as well as social attachments and healthy child development (Bowlby, 1988). Two studies have explicitly identified a relationship between social ties and child maltreatment: Vinson et al. compared two neighborhoods in Western Sydney, Australia with different child maltreatment rates and found that the area with higher abuse rates had weaker social ties between families and their larger social networks (Vinson, Baldry, & Hargreaves, 1996). Molnar et al. (2003) found an association between living in a neighborhood where families had larger social networks and lower reports of self-reported parent-to-child physical aggression among Hispanic families in Chicago, IL (Molnar et al., 2003). Adding to the evidence, a principal element of the Strong Communities intervention was to strengthen neighborhood social networks and overall the intervention was associated with lower rates of maltreatment (Kimbrough-Melton & Melton, 2015).

## Perceived Physical and Social Disorder

Perceived physical and social disorder is the fourth neighborhood-level social process in this study potentially related to child maltreatment. Wilson and Kelling's (1982) *Broken Windows Theory* posits that public incivilities, such as broken windows, fuel a breakdown of caring behavior in a community, leading to increased crime and decreased safety of residents (Sampson & Raudenbush, 2004; Wilson & Kelling, 1982). Physical disorder is "the deterioration of urban landscapes, for example, graffiti on buildings, abandoned cars, broken windows, and garbage in the streets" (Sampson & Raudenbush, 1999). Social disorder is "behavior usually involving strangers and considered threatening, such as verbal harassment on the street, open solicitation for prostitution, public intoxication, and rowdy groups of young males in public" (Sampson & Raudenbush, 1999). Such neighborhood conditions represent exposure to "toxic stress" and may erode social cohesion and social support for children and families (Gau, Corsaro, & Brunson, 2014; Shonkoff & Garner, 2012). Regarding maltreatment, a recent study in California found that neighborhood social disorder was positively related to reports of more frequent physical abuse (Freisthler & Maguire-Jack, 2015). In a query of nationally representative data from Spain, Gracia and Herrero (2006) found higher perceived social disorder was associated with a reduced likelihood to report child physical abuse to the police, which may affect rates of reporting.

## Neighborhood Social Processes, Structural Factors and Child Maltreatment

Many studies have identified associations between neighborhood-level structural factors and child maltreatment (Coulton et al., 2007; Freisthler et al., 2006); however, there is a dearth of research on maltreatment and neighborhood social processes that also take structural factors into account. To address this gap, we employed an ecological-level, repeated cross-sectional design to test the associations between maltreatment and both social processes and structural factors in Chicago neighborhoods. We controlled for differences in the rate of maltreatment by sex and age (U.S. Department of Health and Human Services, 2015). We examined three neighborhood social processes (collective efficacy, intergenerational closure, social networks) that we hypothesized would be associated with lower proportions of child victims of maltreatment in neighborhoods because of their potential to provide increased support for families under stress. We also examined whether higher social and physical disorder would be associated with higher proportions of child victims of maltreatment in neighborhoods, given the evidence that neighborhood disorder increases stress on families. The multivariate, multilevel models include neighborhood structural factors, testing Coulton et al.'s (Coulton et al., 2007) model regarding the dual influences of neighborhood-level structural factors and social processes on maltreatment. The goal of this research is the identification of potentially modifiable social processes that can be promoted as neighborhood-level child maltreatment prevention strategies, regardless of levels of poverty and crime.

## Methods

The study design is an ecological-level, repeated cross-sectional study. While this methodology does not give a longitudinal examination of these associations, it allows

adjustment for time trends. The study design adjusts for age group and sex differences over time in population rates of maltreatment. We used multilevel statistical procedures (Goldstein, 2010; Subramanian, Duncan, & Jones, 2001) in order to model complex variance structures at multiple levels, described below in greater detail. These models estimate the relationship between child maltreatment and neighborhood social processes, conditional on age, sex and time-trend variations (fixed effects) and census tract structural factor variations (random effects). We also tested for effects of spatial autocorrelation via a sensitivity analysis.

## Outcome Variables: Substantiated, Unique Victims of Maltreatment 1995–2005

Outcome data were annual counts of four types of substantiated/indicated maltreatment victims (neglect, sexual abuse, physical abuse, and substance-exposed infants) from 1995 through 2005, in the city of Chicago, Illinois. These counts are “unique” children, meaning that a child was only counted the first time they were reported each year and was only recorded for the first type of maltreatment reported for that child in that year. Substantiated (termed “indicated” by Illinois) victims are those who were both the subject of a report of maltreatment to the Illinois Department of Children and Family Services (DCFS) and where credible evidence of maltreatment was found during a DCFS investigation of their case.

In 2013, data from the state of Illinois revealed that 40.4 unique children per 1000 received a Child Protective Services (CPS) response in 2013. At 9.8 per 1000 children, Illinois’ rate of substantiated cases was similar to the national rate of 9.1. These data identify neglect as the most frequent type of maltreatment in Illinois (77.8% of unique victims), followed by physical abuse (26.2%), and sexual abuse (17.9%). For overall maltreatment, the female rate of 10.2 per 1000 was higher than the male rate of 9.4 per 1000 in 2013 in Illinois. Rates are highest among children less than 1 year of age (23.9 per 1000) and decrease linearly with the lowest (3.4 per 1,000) among 17-year olds (U.S. Department of Health and Human Services, 2015).

The Chapin Hall Center for Children at the University of Chicago obtained counts of substantiated victims of maltreatment among unique children and geocoded them. The rate of geocoding was high at 93.7%. The Chapin Hall Center also calculated Chicago population estimates for 5-year age groups using the shift-share method of interpolation to determine denominators (Swanson & Tayman, 2012). Derived from the U.S. Census’ mid-year population estimates (Goerge, Dilts, Yang, Wasserman, & Clary, 2007) and disaggregated by 5-year age groups, sex of the child, and year, these estimates were used to create age group/sex-specific proportions of each type of maltreatment for every populated census tract in Chicago for each year from 1995 through 2005. Census tract proportions were then aggregated into age group/sexspecific proportions for each neighborhood cluster (NC), which are described below.

## Predictor Variables: Neighborhood Social Processes

Predictor variables—neighborhood social processes—were derived from (1) The Project on Human Development in Chicago Neighborhoods (PHDCN) 1995 Community Survey (Earls & Buka, 1997), and (2) A replication of this survey conducted by the Chicago Community

Adult Health Study (CCAH) in 2001–2 (J. D. Morenoff et al., 2007). Using data from the 847 populated Chicago census tracts, the PHDCN study identified 343 neighborhood clusters (NCs) of roughly 8,000 residents each, and grouped them by characteristics of racial/ethnic composition, socioeconomic status, family structure, and housing density. Household interviews to assess key neighborhood dimensions were conducted with on average 20 residents aged 18 and over that were randomly selected from each NC (Sampson et al., 1997). This clustered sampling method and a 75% response rate yielded a final sample size of 8,782 participants. The 2001–2 CCAH replication (N=3105, response rate 72%) used sampling methods identical to those used in the PHDCN study (J. D. Morenoff et al., 2007). Data for all scales were aggregated to the NC level. Unconditional three-level hierarchical linear models were used to adjust for missing item responses for each of the neighborhood social process scales, controlling for systematic response bias within neighborhoods (Raudenbush & Sampson, 1999).

**Collective Efficacy—**The first neighborhood social process was operationalized via the measurement of ten separate items (Figure 1, Column 1): Five of these items measured informal social control and five items measured social cohesion. In a previous study, the neighborhood-level reliability of the collective efficacy scale (indicating its ability to distinguish levels of the scale between neighborhoods) was estimated at 0.80 for neighborhoods with a sample size of 20 raters (Sampson et al., 1997). We averaged data from the two waves (PHDCN and CCAH) to represent the range of 1995–2002. Econometric work demonstrated that these constructs remained stable across both waves of the surveys; the NC-level reliability for collective efficacy in the aggregated data set with the two waves was 0.83(Sampson, 2012; Savitz & Raudenbush, 2009).

**Intergenerational Closure—**The second neighborhood social process was measured via five items representing the extent to which families know each other's children in a neighborhood (Fig. 1, Col. 2). The neighborhood-level reliability of this scale was estimated previously at 0.74 (Sampson et al., 1999).

**Neighborhood Social Network—**The third neighborhood social process was measured by having respondents report the total number of friends and relatives they have living nearby (Fig. 1, Col. 3). A study using this scale as part of a larger scale of social support and sociability estimated its reliability at 0.60 (Browning & Cagney, 2003).

**Physical and Social Disorder—**The final neighborhood social process in our query was measured by asking respondents to assess the severity of five neighborhood characteristics (Fig. 1, Col. 4). The neighborhood-level reliability for this scale was estimated at 0.89 (Raudenbush & Sampson, 1999).

### Covariate Variables: Neighborhood Structural Characteristics

Annual measures of child poverty in neighborhoods—including the percentages of children living under the federal poverty line, receiving food stamps (SNAP), and those receiving Temporary Assistance to Needy Families (TANF) for each year of the study – were calculated using yearly (1995–2005) estimates from the U.S. Census Bureau's Small Area

Income and Poverty Estimates program (SAIPE). These measures were used to account for annual differences in the socioeconomic indicators of neighborhood clusters that could confound the relationships between neighborhood social processes and child maltreatment rates. Additionally, the percentage change of Hispanic children each year, also taken from the U.S. Census Bureau's Small Area Income and Poverty Estimates program (SAIPE), was considered to account for rapid changes in the numbers of Hispanic families moving into and around Chicago during the time period under study (Goerge et al., 2007). Geocoded counts of homicides and robberies for 1995 through 2005 (obtained from the Chicago Police Department) were included to account for differences in community violence between neighborhood clusters. The rate of geocoding of homicides was high (93–94% for each year) and moderate for robberies (83–85%).

## Statistical Analysis

The Level 1(*i*) units of analysis contained the yearly age group-sex specific proportions of each type of maltreatment for each NC for each cluster following methodology described previously (Subramanian et al., 2001). The final sample at Level 1(*i*) was comprised of 30,184 observations. These proportions, which represent eleven years of data, were nested in Level 2(*j*), comprised of 847 census tracts. These census tracts were nested in Level 3(*k*), comprised of the PHDCN neighborhood clusters, or NC's (N=343). Structural characteristics of NC's for each year, and NC-level independent variables (see Figure 2 for multilevel data structure) were included in Level 3(*k*). SAS Version 9.3 (Inc, 2011) was used for all data management and descriptive analyses. Multilevel analyses were performed using the MLwiN program (Rasbash et al., 2000; Rasbash, Browne, Healy, Cameron, & Charlton, 2012).

The models employed in this study were developed in four stages: (1) A null three level model with no predictors; (2) Baseline models built using a backwards selection process to choose significant structural characteristics as covariates and included demographic variables of year, age group and sex; (3) Models with neighborhood social processes and demographics; and (4) Full models including selected structural characteristics, demographics, and neighborhood social processes, added individually to baseline models (high collinearity between the four independent variables (0.4 to 0.7) necessitated this individual testing.) The models allowed for associations between independent variables and each type of child maltreatment, conditional on the relationship between child maltreatment and age group and sex within each NC. The final baseline model included the average values centered around the grand mean for the following neighborhood characteristics: Percent of children with families receiving Temporary Assistance to Needy Families (TANF), percent living below the poverty line, and number of robberies or homicides. The backwards selection process resulted in homicide counts being a better structural variable to represent neighborhood crime in the models predicting substance-exposed infants than robbery counts, which was a better variable for the other three maltreatment types. This multilevel modeling process was replicated for each form of child maltreatment, and for each of the four neighborhood social processes.

We estimated relationships between neighborhood social processes and maltreatment across these cells by entering the age group-sex cell characteristics for each of the eleven years as fixed effects with the residual NC-level variation in structural characteristics centered around the grand mean as random effects. The predictor variables were an average of two data collection time points and were entered as fixed effects. Indicator variables for each year of the study, for female sex, and for each age group were included to specify the fixed-part of the model. Examining each form of maltreatment separately, random intercept logit models estimated the effect of neighborhood social processes on the proportion of maltreatment (πijk), controlling for structural covariates and demographics, for each age group-sex specific cell following this equation:

$$\begin{aligned}\text{logit}(\pi_{ijk}) = {} & \beta_{0jk}\text{constant} + \beta_{jk}\text{years96} - 2005 + \beta_{ijk}\text{sex} + \beta_{ijk}\text{age groups} + \\ & + \beta_{k}\text{welfare(TANF)} + \beta_{k}\text{pov rate} + \beta_{k}\text{robberies/homicides} + \beta_{k}\text{social process}\end{aligned}$$

We ran diagnostic tests for spatial autocorrelation, i.e. interdependencies among observations in variables that exhibit a pattern in values due to proximity between adjacent neighborhood clusters (Bailey & Gatrell, 1995; LeSage & Pace, 2009; Waller & Gotway, 2004; Ward & Gleditsch, 2008), to determine whether it biased our results. We examined the residuals of the multilevel models for each form of child maltreatment for spatial dependence using the Global Moran's I with row-standardized Queens contiguity spatial weights (Duncan et al., 2014; Duncan, Kawachi, White, & Williams, 2013). For models with evidence of spatial dependence, we also ran a spatial lag model to compare with its corresponding multilevel model (Bailey & Gatrell, 1995; LeSage & Pace, 2009; Waller & Gotway, 2004; Ward & Gleditsch, 2008).

## Results

### Descriptive Results: Age Group and Sex

Table 1 displays descriptive results for the distribution of rates of substantiated child maltreatment by demographics, neighborhood structural characteristics, and neighborhood social resources. Consistent with data collected by CPS, the highest rate was neglect (6.51 cases per 1,000 children). Physical abuse followed at 1.47 cases per 1,000, and sexual abuse at 0.82 per 1,000. Although cases of substance-exposed infants are expected only among infants, cases appear in in older age groups if cases were substantiated later. The neglect rate decreased as the age group increased. Higher rates of child sexual abuse were found among females compared with males and the opposite for physical abuse. Most striking are differences by structural characteristics, especially for neglect: For example, neighborhoods with the lowest percentage of families receiving TANF benefits had a rate of neglect of 6.2 cases per 1,000 compared with 42.2 cases per 1,000 in neighborhoods with the highest percentage of TANF recipients. Rates for the other three types of maltreatment followed a similarly linear pattern for both receipt of TANF and for living below the poverty line. Neighborhoods with greater numbers of robberies and homicides had higher rates of all types of maltreatment.

### Descriptive Results: Bivariate Associations

Regarding the four neighborhood social processes, there were clear patterns in the bivariate results in the expected directions (Table 1). Neighborhoods with the higher collective efficacy had increasingly lower rates of neglect (13.02 per 1,000 for quartile 3 compared to 7.10 per 1,000 for quartile 4). This gradient pattern held true for substance-exposed infants as well (7.4 cases per 1,000 for quartile 3 compared to 3.8 cases per 1,000 for quartile 4). Rates of physical and sexual abuse rates presented more of a dichotomy: Higher collective efficacy quartiles 3 and 4 had similar rates to each other, and quartiles 1 and 2 had higher rates than those. For intergenerational closure, the neighborhoods in the highest quartile showed the largest difference in neglect rates from the other three – 12.3 cases per 1,000, compared with 26 cases per 1,000 for both quartiles 1 and 2. Analysis revealed that neighborhoods with more physical and social disorder had higher rates of all four types of child maltreatment – in particular, neglect (from 8.2 per 1,000 in the least disordered neighborhoods to 37.3 per 1,000 in the most) and substance-exposed infants (from 4.1 per 1,000 to 16.1 per 1,000).

### Multivariate, Multilevel Results: Structural Factors

Table 2 presents the results of multivariate, multilevel models. Included for each model are odds ratios representing the odds of a change in the proportion of maltreatment cases (out of the population) associated with one standard deviation increase in each independent variable and 95% confidence intervals. As expected, structural factors were strongly associated with each of the outcomes in our base models, which were adjusted for year, age group, and sex (Table 2, Column 1). Percentages of neighborhood clusters receiving TANF were associated with all four maltreatment outcomes, ranging from an odds ratio of 1.35 (95% C.I.: 1.07, 1.71) for child sexual abuse to an odds ratio of 5.24 (95% C.I. 3.22, 8.53) for substance-exposed infants. The percentage of children living in poverty in a neighborhood cluster was even more strikingly associated with maltreatment rates, with odds ratios ranging from 3.89 (95% C.I. 1.17, 12.97) (substance-exposed infants) to 9.37 (95% C.I. 5.45, 16.13) (neglect). Neighborhood cluster counts of robberies and homicides were also associated with all four maltreatment outcomes.

### Multivariate, Multilevel Results: Social Processes

The full models revealed significant differences in rates of neglect, physical abuse, and sexual abuse associated with all four neighborhood-level social processes, when structural factors and demographics were included (Table 2, Columns 2–5). These results represent the impact that a one-standard deviation change in each neighborhood social process has on the average change in the odds of each type of maltreatment, across all neighborhood clusters, across the eleven years of the study. Reductions in the odds of neglect ranged from 10% (OR=0.90, 95% C.I. 0.83, 0.97) associated with a one standard deviation increase in neighborhood network size, to 20% (OR=0.80, 95% C.I. 0.72, 0.88) associated with increased collective efficacy. Changes in the odds of physical abuse in neighborhood clusters ranged from an 8% reduction associated with a one standard deviation increase in intergenerational closure (OR=0.92, 95% C.I. 0.86, 0.97) or neighborhood social network size (OR=0.92, 95% C.I. 0.87, 0.98) to a 17% reduction associated with increased collective

efficacy (OR=0.83, 95% C.I. 0.77, 0.90). Although less robust, a relationship between neighborhood social processes and the odds of infant substance-exposure is evident—a one standard deviation increase in collective efficacy was associated with 17% lower odds (OR=0.93, 95% C.I. 0.70, 0.98), while an increase in neighborhood social network size was associated with 13% lower odds (OR=0.87, 95% C.I. 0.77, 0.98). Concomitantly, we found each standard deviation of perceived physical and social disorder to be associated with higher odds of neglect (OR=1.27, 95% C.I. 1.10, 1.46), physical abuse (OR=1.21, 95% C.I. 1.10, 1.33) and sexual abuse (OR=1.24, 95% C.I. 1.12, 1.37).

We detected spatial autocorrelation in the multilevel regression residuals for all four outcomes (range in Global Moran's I=0.03 to 0.15, all $p<0.01$). Spatial regression models tested the associations of neighborhood social processes and maltreatment in each of our sixteen models. In these spatial lag multivariate models, all four neighborhood social processes were significantly associated with the outcomes of neglect, physical abuse and substance-exposed infants. However, the association between each of the social processes and child sexual abuse was no longer significant (results not shown), suggesting these results were potentially biased by the presence of spatial autocorrelation, or non-random error structure due to location of neighborhood clusters close to other NCs.

We examined each of our models with and without structural factors, which revealed differing strengths of associations but no changes in direction (results without not shown). There was attenuation of the effects of the neighborhood social factors on child maltreatment rates in some models, as well as strengthening of the associations in others, which provided support for Coulton et al.'s model (2007) that both are important determinants of neighborhood levels of child maltreatment reports.

## Discussion

We found that child maltreatment rates are lower in neighborhoods with higher levels of positive social processes and lower levels of social and physical disorder. Our results support previous findings that structural factors play an important role in child maltreatment, but we also found evidence that neighborhood social processes are associated with child maltreatment beyond structural differences. When we accounted for spatial autocorrelation between neighborhoods, our results stayed consistent for neglect, physical abuse and substance-exposed infants, but not for sexual abuse.

The current study furnishes a valuable step in explicating the relationship between neighborhood social processes and structural characteristics on child maltreatment rates. Past reviews of neighborhood studies of child maltreatment (Coulton et al., 2007; Freisthler et al., 2006) linked structural characteristics of neighborhoods (e.g. socioeconomic status, crime) to rates of child maltreatment. This study's findings of consistent associations between social processes and three types of child maltreatment after accounting for neighborhood structural characteristics provide empirical support for Coulton et al.'s (2007) theorization that social processes influenced the effects of such structural characteristics. This study marks progress towards identifying potentially modifiable neighborhood characteristics to prevent child maltreatment.

The current study builds on Garbarino and Barry's (1997) work: Our findings identify neighborhood social processes that support all three of their proposed mechanisms (inhibition of sharing, lack of positive models, lack of intimate interactions) through which social impoverishment affects child maltreatment. Regarding the inhibition of sharing, we found that having a larger neighborhood social network of relatives and friends nearby, and having neighbors who get to know the neighborhood children and parents of their children's friends were associated with lower odds of maltreatment. Garbarino and Barry's (1997) proposition arguing that lack of positive role models normalizes inappropriate and inadequate behavior is supported by our observed association between higher social and physical disorder and increased odds of maltreatment. Finally, because all of the neighborhood social processes we examined involve the building up of social fabric, including increasing neighbors' confidence that collective action will make a difference (collective efficacy), our findings provide evidence in support of Garbarino and Barry's (1997) third mechanism—that collective efficacy's protective effect may represent overcoming of a lack of intimate and confident interactions. Thus, our findings support the argument that strengthening and increasing neighborhood social processes and decreasing physical and social disorder will reduce social impoverishment and better protect children from abuse and neglect.

Earlier works and the current study raise a vital, albeit difficult to answer, question: How can we decrease neighborhood social and physical disorder, and strengthen and increase neighborhood social processes? One approach to doing that is to improve neighborhood structural characteristics – which are clearly linked to maltreatment – through anti-poverty and neighborhood improvement programs. A national program creating "Promise Neighborhoods," modeled after the Harlem Children's Zone that works to support children in Harlem, New York to end multigenerational poverty(Nicholas et al., 2005; Tough, 2008), is currently evaluating whether it will improve child development, health and well-being by "creating nurturing environments" in distinct neighborhoods (Komro, Flay, & Biglan, 2011). Violence prevention programs, especially those focused on reducing youth violence, have come up with a multitude of innovative ideas such as Crime Prevention Through Environmental Design (CPTED), which theorizes that proper design and effective use of public spaces leads to reduced crime (Marzbali, Abdullah, Razak, & Tilaki, 2012; Taylor & Harrell, 1996). Our finding that physical and social disorder is related to higher rates of child maltreatment suggests that such strategies may be effective.

The science of reducing child maltreatment by increasing neighborhood social processes is very new to the field. One program explicitly tried to increase collective efficacy to prevent child maltreatment: *Strong Communities* in South Carolina. Its evaluation found that challenging a community to mobilize around the goal of child protection produced very strong community engagement (Berman, Murphy-Berman, & Melton, 2008; Kimbrough-Melton & Campbell, 2008; Murphy-Berman, Berman, & Melton, 2008). After five years of follow-up, they found several small but significant improvements in the intervention community relative to a comparison community, including greater support and help giving, higher collective efficacy, improved parenting practices by neighbors. They also found reduced child injuries related to maltreatment and fewer substantiated cases of maltreatment

in children under the age of 10 (McDonell et al., 2015). Notably, the *Strong Communities* intervention showed greater communitylevel mobilization in low-resource communities than in high-resource communities, although child maltreatment rates for children under the age of 6 were reduced in both types of communities (McLeigh, McDonell, & Melton, 2015). Programs that work at the neighborhood level on increasing and concentrating services for families have been found to be effective at reducing maltreatment as well (Daro & Dodge, 2009; Prinz, Sanders, Shapiro, Whitaker, & Lutzker, 2009).

### Limitations

The findings and implications of the current study are limited by reliance on data derived from only those cases of child maltreatment victimization that have been officially reported and substantiated by child protection workers. This limitation is significant, as administrative data submitted to, investigated by, and substantiated by CPS agencies are subject to numerous sources of bias (Bartholet et al., 2011; Drake et al., 2011; Fallon et al., 2010). Studies have estimated that between half and four fifths of victims are never brought to the attention of the CPS system (Sedlak et al., 2010). Given previous evidence of the impact of alcohol outlets on child maltreatment rates, it is a limitation that we did not have data to include this as a structural factor (Freisthler et al., 2007). Another limitation is that there could be residual confounding of the main effect relationships that could bias the results due to the rate of geocoding of neighborhood robberies. Finally, as described above, there was evidence that the results where child sexual abuse was the outcome were potentially biased by the presence of spatial autocorrelation, suggesting that there could be adjacent neighborhood clusters influencing the associations we found there.

### Conclusions and Implications

Our findings support efforts to increase and strengthen neighborhood-level social processes as potentially effective strategies for decreasing child maltreatment. Further intervention research should continue to test approaches that combine strengthening of neighborhood-level social processes with improvements in the structural characteristics of neighborhoods. Such efforts may be particularly powerful as part of a tripartite approach—combined with individual-level evidence-based interventions such as home visiting and parenting education. Taken together, the importance of preventing child maltreatment, and the promising empirical evidence on the significance of neighborhood contexts, indicate that further exploration and pursuit of efforts to strengthen neighborhood social processes is a fruitful direction for efforts to prevent child maltreatment.

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| Neighborhood Social Processes Measurement Scales | | | | Neighborhood Structural Covariates |
|---|---|---|---|---|
| ***Collective Efficacy***<br>*Informal Social Control*: How likely is it that neighbors could be counted on to intervene if:<br>• Children were skipping school and hanging out on street corners?<br>• Children were spray-painting graffiti?<br>• A child was showing disrespect to an adult?<br>• A fight occurred or someone was being beaten/threatened?<br>• Local fire station was to be closed by the city because of budget cuts?<br>*Social Cohesion*: How strongly do you agree or disagree that:<br>• Neighbors are willing to help each other?<br>• Neighborhood is close knit?<br>• People can be trusted?<br>• People don't generally get along with each other? (Reverse coded)<br>• People share the same values?<br>Reliability to distinguish between neighborhoods with 20 raters (0.80), with 50 or more raters (0.91), and aggregated (0.83).<br>(Sampson, 2012) | ***Intergenerational Closure***<br>• Parents in this neighborhood know their children's friends<br>• Adults in this neighborhood know who the local children are<br>• There are adults in this neighborhood that children can look up to<br>• Parents in this neighborhood generally know each other<br>• You can count on adults in this neighborhood to watch out that children are safe and don't get in trouble<br><br>Reliability to distinguish between neighborhoods: 0.74<br>(Sampson et al., 1999) | ***Neighborhood Social Networks***<br>• How many of your relatives or in-laws live in your neighborhood?<br>• How many friends do you have in your neighborhood?<br><br>Reliability to distinguish between neighborhoods: 0.60<br><br>(Browning & Cagney, 2003) | ***Physical and Social Disorder***<br>Presence of:<br>• Litter<br>• Graffiti<br>• Vacant or deserted houses<br>• Drinking in public<br>• Selling or using drugs<br><br>Reliability to distinguish between neighborhoods: 0.89<br><br>(Raudenbush & Sampson, 1999) | • % of children living under federal poverty line<br>• % of children receiving food stamps (SNAP)<br>• % of children receiving Temporary Assistance to Needy Families (TANF)<br>• % change of Hispanic children<br>• Counts of homicides and robberies |

**Figure 1.**
Neighborhood-Level Measurements and Scales

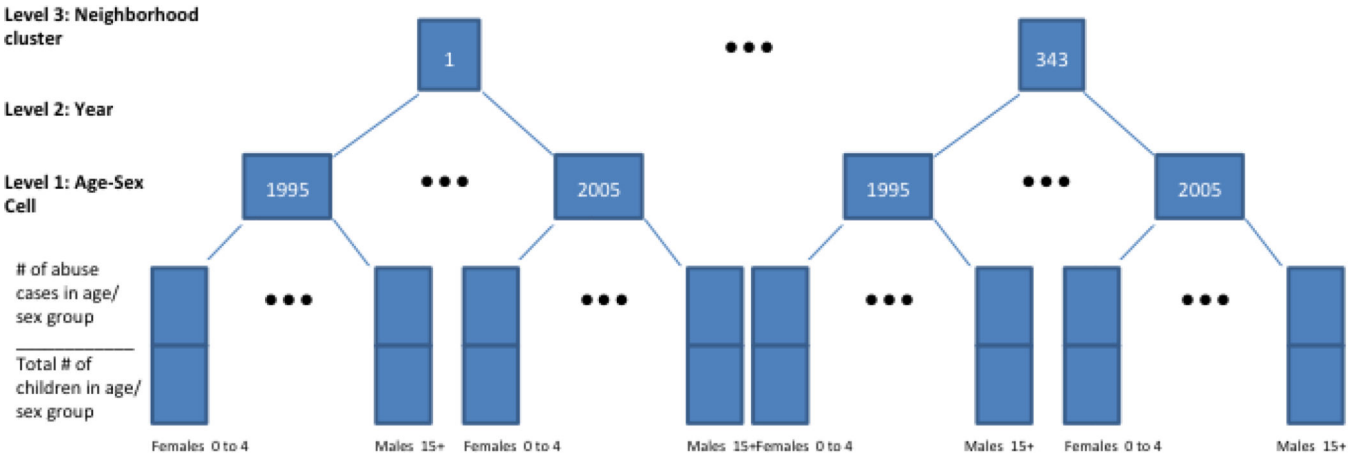


**Figure 2.**

Three-Level Data Structure Of Age Group And Sex-Specific Proportions Of Maltreatment Victims (N=30,184) In The Population (I) Within Years Of Data Collection (N=11), Within Neighborhood Clusters (N=343)

*Child Abuse Negl*. Author manuscript; available in PMC 2017 January 01.

**Table 1**

Rates of Child Maltreatment Cases[1 2] By Demographic, Structural And Social Process Characteristics

| Characteristic | | Neglect Rate | Physical Abuse Rate | Child Sexual Abuse Rate | Substance-Exposed Infants Rate |
|---|---|---|---|---|---|
| ***Total Sample*** | | 6.51 | 1.47 | 0.82 | 1.31 |
| ***Age Group*** | **Birth to 4** | 10.07 | 1.60 | 0.42 | 4.43 |
| | **5 to 9** | 7.06 | 1.67 | 1.03 | 0.03 |
| | **10 to 14** | 4.60 | 1.44 | 1.07 | 0.03 |
| | **15 to 18** | 2.23 | 0.90 | 0.73 | 0.05 |
| ***Sex*** | **Females** | 6.55 | 1.40 | 1.35 | 1.29 |
| | **Males** | 6.47 | 1.53 | 0.30 | 1.32 |
| ***Structural Characteristics of Neighborhood*** | | | | | |
| **% Neighborhood receiving TANF (Range 0 % −3.98%)** | | | | | |
| | Quartile 1 (wealthiest - lowest %) | 6.20 | 0.73 | 0.69 | 2.93 |
| | Quartile 2 | 10.07 | 0.73 | 0.76 | 3.36 |
| | Quartile 3 | 23.75 | 1.83 | 1.07 | 10.80 |
| | Quartile 4 | 42.20 | 2.79 | 2.15 | 19.54 |
| **% Neighborhood < poverty line (Range 0% − 0.92 %)** | | | | | |
| | Quartile 1 (wealthiest - lowest %) | 7.83 | 0.76 | 0.80 | 3.60 |
| | Quartile 2 | 11.73 | 1.30 | 0.83 | 6.69 |
| | Quartile 3 | 23.66 | 1.37 | 1.10 | 8.53 |
| | Quartile 4 | 39.02 | 2.65 | 1.93 | 17.84 |
| **% Change in Hispanic Population (Range 0% − 5076.18%)** | | | | | |
| | Quartile 1 (lowest %) | 40.21 | 2.47 | 2.01 | 19.17 |
| | Quartile 2 | 18.55 | 1.65 | 1.21 | 9.53 |
| | Quartile 3 | 11.74 | 1.07 | 0.71 | 4.36 |
| | Quartile 4 | 12.06 | 0.90 | 0.76 | 3.76 |
| **Counts of Robberies in Neighborhood (Range 0.39 – 86.91)** | | | | | |
| | Quartile 1 (lowest %) | 7.46 | 0.65 | 0.53 | 2.83 |
| | Quartile 2 | 19.55 | 1.72 | 1.11 | 9.34 |
| | Quartile 3 | 26.76 | 1.55 | 1.37 | 10.97 |

| Characteristic | | Neglect Rate | Physical Abuse Rate | Child Sexual Abuse Rate | Substance-Exposed Infants Rate |
|---|---|---|---|---|---|
| | Quartile 4 | 28.49 | 2.15 | 1.66 | 13.50 |
| **Counts of Homicides in Neighborhood (Range 0 to 5.73)** | | | | | |
| | Quartile 1 (lowest %) | 5.88 | 0.53 | 0.61 | 2.67 |
| | Quartile 2 | 17.33 | 1.97 | 0.99 | 8.01 |
| | Quartile 3 | 31.97 | 1.67 | 1.34 | 12.61 |
| ***Neighborhood Social Processes*** | Quartile 4 | 27.79 | 1.91 | 1.75 | 13.60 |
| **Collective Efficacy (Range −2.64 to 3.11)** | | | | | |
| | Quartile 1 (lowest) | 35.50 | 2.29 | 1.69 | 14.46 |
| | Quartile 2 | 26.79 | 1.88 | 1.41 | 11.20 |
| | Quartile 3 | 13.02 | 0.98 | 0.73 | 7.24 |
| | Quartile 4 | 7.10 | 0.94 | 0.85 | 3.82 |
| **Intergenerational Closure (Range −3.09–4.06)** | | | | | |
| | Quartile 1 (lowest) | 25.56 | 1.84 | 1.16 | 9.36 |
| | Quartile 2 | 26.55 | 1.53 | 1.12 | 10.46 |
| | Quartile 3 | 18.03 | 1.18 | 1.32 | 9.84 |
| | Quartile 4 | 12.26 | 1.53 | 1.07 | 7.05 |
| **Physical and Social Disorder (Range −2.05 to 2.38)** | | | | | |
| | Quartile 1 (lowest) | 8.20 | 0.96 | 0.88 | 4.07 |
| | Quartile 2 | 12.19 | 0.58 | 0.95 | 6.67 |
| | Quartile 3 | 24.53 | 1.87 | 1.26 | 9.77 |
| | Quartile 4 | 37.32 | 2.66 | 1.58 | 16.15 |
| **Neighborhood Network Size (Range −2.30 to 4.36)** | | | | | |
| | Quartile 1 (smallest) | 26.84 | 2.29 | 1.53 | 10.07 |
| | Quartile 2 | 16.16 | 1.42 | 0.96 | 7.97 |
| | Quartile 3 | 21.54 | 0.96 | 1.45 | 10.28 |
| | Quartile 4 | 17.75 | 1.41 | 0.74 | 8.35 |

[1] Cases per 1,000 children

[2] Aggregated across the years 1995 through 2005, in Chicago, IL (n=343 neighborhood clusters)

## Table 2

Associations Between Neighborhood Structural Factors/Social Processes And Rates Of Substantiated Cases Of Child Maltreatment In Chicago, IL 1995–2005*

| | Neglect | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Base Model | | | Collective Efficacy | | | Intergenerational Closure | | | Neighborhood Network Size | | | Physical and Social Disorder | | |
| **Neighborhood Structural Factors:** | OR | lower ci | upper ci | OR | lower ci | upper ci | OR | lower ci | upper ci | OR | lower ci | upper ci | OR | lower ci | upper ci |
| Neighborhood TANF Recipients | **2.63** | **1.87** | **3.70** | **2.64** | **1.97** | **3.53** | **2.78** | **2.05** | **3.77** | **2.68** | **1.96** | **3.66** | **2.66** | **1.89** | **3.76** |
| Neighborhood Child Poverty | **9.37** | **5.45** | **16.13** | **4.45** | **2.49** | **8.02** | **7.84** | **4.70** | **13.07** | **10.70** | **6.46** | **17.70** | **3.18** | **1.38** | **7.32** |
| Neighborhood Robbery Count | **1.01** | **1.01** | **1.02** | **1.01** | **1.00** | **1.01** | **1.01** | **1.01** | **1.01** | **1.01** | **1.01** | **1.01** | **1.01** | **1.00** | **1.02** |
| **Neighborhood Social Processes:** | | | | | | | | | | | | | | | |
| Collective Efficacy | -- | -- | -- | **0.80** | **0.72** | **0.88** | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Intergenerational closure | -- | -- | -- | -- | -- | -- | **0.89** | **0.82** | **0.96** | -- | -- | -- | -- | -- | -- |
| Neighborhood Network Size | -- | -- | -- | -- | -- | -- | -- | -- | -- | **0.90** | **0.83** | **0.97** | -- | -- | -- |
| Physical and Social Disorder | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | **1.27** | **1.10** | **1.46** |
| | **Physical Abuse** | | | | | | | | | | | | | | |
| | Base Model | | | Collective Efficacy | | | Intergenerational Closure | | | Neighborhood Network Size | | | Physical and Social Disorder | | |
| **Neighborhood Structural Factors:** | OR | lower ci | upper ci | OR | lower ci | upper ci | OR | lower ci | upper ci | OR | lower ci | upper ci | OR | lower ci | upper ci |
| Neighborhood TANF Recipients | **1.58** | **1.27** | **1.98** | **1.60** | **1.30** | **1.97** | **1.69** | **1.36** | **2.10** | **1.61** | **1.29** | **2.01** | **1.60** | **1.29** | **1.99** |
| Neighborhood Child Poverty | **7.38** | **5.12** | **10.65** | **3.80** | **2.47** | **5.84** | **6.00** | **4.13** | **8.73** | **7.78** | **5.43** | **11.16** | **3.12** | **1.82** | **5.36** |
| Neighborhood Robbery Count | **1.01** | **1.01** | **1.01** | **1.01** | **1.00** | **1.01** | **1.01** | **1.01** | **1.01** | **1.01** | **1.00** | **1.01** | **1.01** | **1.00** | **1.01** |

| **Neighborhood Social Processes:** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Collective Efficacy | -- | -- | -- | **0.83** | **0.77** | **0.90** | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Intergenerational closure | -- | -- | -- | -- | -- | -- | **0.92** | **0.86** | **0.97** | -- | -- | -- | -- | -- | -- |
| Neighborhood Network Size | -- | -- | -- | -- | -- | -- | -- | -- | -- | **0.92** | **0.87** | **0.98** | -- | -- | -- |
| Physical and Social Disorder | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | **1.21** | **1.10** | **1.33** |

**Child Sexual Abuse**

| | **Base Model** | | | **Collective Efficacy** | | | **Intergenerational Closure** | | | **Neighborhood Network Size** | | | **Physical and Social Disorder** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Neighborhood Structural Factors:** | OR | lower ci | upper ci | OR | lower ci | upper ci | OR | lower ci | upper ci | OR | lower ci | upper ci | OR | lower ci | upper ci |
| Neighborhood TANF Recipients | **1.35** | **1.07** | **1.71** | **1.35** | **1.09** | **1.66** | **1.44** | **1.16** | **1.77** | **1.36** | **1.09** | **1.70** | **1.40** | **1.11** | **1.77** |
| Neighborhood Child Poverty | **4.03** | **2.74** | **5.95** | **2.04** | **1.31** | **3.17** | **3.11** | **2.14** | **4.51** | **4.42** | **3.06** | **6.39** | **1.57** | **0.87** | **2.81** |
| Neighborhood Robbery Count | **1.01** | **1.00** | **1.01** | **1.00** | **1.00** | **1.01** | **1.00** | **1.00** | **1.01** | **1.00** | **1.00** | **1.01** | **1.00** | **1.00** | **1.01** |
| **Neighborhood Social Processes:** | | | | | | | | | | | | | | | |
| Collective Efficacy | -- | -- | -- | **0.82** | **0.76** | **0.88** | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Intergenerational closure | -- | -- | -- | -- | -- | -- | **0.87** | **0.82** | **0.93** | -- | -- | -- | -- | -- | -- |
| Neighborhood Network Size | -- | -- | -- | -- | -- | -- | -- | -- | -- | **0.91** | **0.85** | **0.96** | -- | -- | -- |
| Physical and Social Disorder | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | **1.24** | **1.12** | **1.37** |

**Substance Exposed Infants**

| | **Base Model** | | | **Collective Efficacy** | | | **Intergenerational Closure** | | | **Neighborhood Network Size** | | | **Physical and Social Disorder** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Neighborhood Structural Factors:** | OR | lower ci | upper ci | OR | lower ci | upper ci | OR | lower ci | upper ci | OR | lower ci | upper ci | OR | lower ci | upper ci |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Neighborhood TANF Recipients | **5.24** | **3.22** | **8.53** | **5.31** | **3.27** | **8.64** | **5.61** | **3.40** | **9.27** | **5.60** | **3.43** | **9.12** | **5.45** | **3.14** | **9.46** |
| Neighborhood Child Poverty | **3.89** | **1.17** | **12.97** | **3.35** | **1.23** | **9.13** | **5.05** | **2.06** | **12.39** | **6.65** | **2.88** | **15.36** | **3.81** | **0.98** | **14.72** |
| Neighborhood Homicide Count | **1.23** | **1.07** | **1.41** | **1.25** | **1.08** | **1.43** | **1.28** | **1.11** | **1.47** | **1.26** | **1.10** | **1.45** | **1.29** | **1.11** | **1.50** |
| **Neighborhood Social Processes:** | | | | | | | | | | | | | | | |
| Collective Efficacy | -- | -- | -- | **0.83** | **0.70** | **0.98** | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Intergenerational closure | -- | -- | -- | -- | -- | -- | 0.91 | 0.80 | 1.04 | -- | -- | -- | -- | -- | -- |
| Neighborhood Network Size | -- | -- | -- | -- | -- | -- | -- | -- | -- | **0.87** | **0.77** | **0.98** | -- | -- | -- |
| Physical and Social Disorder | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1.09 | 0.87 | 1.37 |

*Neighborhood level structural factors (TANF, child poverty and robbery/homicide counts) are each grand mean centered; **BOLD** indicates $p<0.05$ all models also control for age group (3 indicator variables referenced to the oldest age group males), and year (10 indicator variables referenced to the year 1995); reference groups across the structural measures were mean values for percentages of children whose families received Temporary Assistance to Needy Families (TANF), percentage of children living below federal poverty line, and for counts of neighborhood robberies (models of neglect, physical abuse, sexual abuse) or homicides (models of substance exposed infants only)