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## Research article

# Associations of neighborhood disorganization and maternal spanking with children's aggression: A fixed-effects regression analysis<sup>☆</sup>

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## ABSTRACT

This study employed fixed effects regression that controls for selection bias, omitted variables bias, and all time-invariant aspects of parent and child characteristics to examine the simultaneous associations between neighborhood disorganization, maternal spanking, and aggressive behavior in early childhood using data from the Fragile Families and Child Wellbeing Study (FFCWS). Analysis was based on 2,472 children and their mothers who participated in Wave 3 (2001–2003; child age 3) and Wave 4 (2003–2006; child age 5) of the FFCWS. Results indicated that higher rates of neighborhood crime and violence predicted higher levels of child aggression. Maternal spanking in the past year, whether frequent or infrequent, was also associated with increases in aggressive behavior. This study contributes statistically rigorous evidence that exposure to violence in the neighborhood as well as the family context are predictors of child aggression. We conclude with a discussion for the need for multilevel prevention and intervention approaches that target both community and parenting factors.

## 1. Introduction

Research increasingly recognizes that support from communities and families is necessary to ensure the well-being of children (Gershoff & Grogan-Kaylor, 2016; Leventhal & Brooks-Gunn, 2000; McDonnell, Ben-Arieh, & Melton, 2015). Building from a developmental ecological framework (Bronfenbrenner, 2005) as well as social disorganization theory (Wilson, 1987), studies provide strong evidence concerning the inter-relationships between neighborhood disadvantage, harsh and punitive parenting practices, and adverse child outcomes (Afifi et al., 2017; Kohen, Leventhal, Dahinten, & McIntosh, 2008; Ma & Grogan-Kaylor, 2017). However, a recurrent debate is the extent to which such associations are potentially attributable to unobserved confounding variables, which account for the selection of families into particular neighborhoods and potentially predict both neighborhood characteristics and parenting behaviors (Baumrind, Larzelere, & Cowan, 2002; Grogan-Kaylor, 2005b; Sampson et al., 2002). The present study examines the joint effects of neighborhood disorganization and maternal corporal punishment (CP) using fixed effects regression, a statistically rigorous approach that addresses many of the limitations in prior research. Our analysis used a longitudinal model that controlled for selection bias, omitted variables bias, and time-invariant aspects of reciprocal parent-child relations that may confound the effects of neighborhood conditions and parenting behavior on children (Grogan-Kaylor, 2005b; Wooldridge, 2010).

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## 2. Neighborhood disorganization and child behavior

Substantial evidence exists that there is a discernable link between neighborhood conditions and adverse outcomes in early childhood, independent of parent and family influences (Kohen et al., 2008; Ma & Grogan-Kaylor, 2017). Indicators of neighborhood conditions include factors such as socioeconomic characteristics (e.g., neighborhood poverty), structural characteristics (e.g., deteriorated physical conditions of neighborhood environment), and social processes (e.g., low neighborhood collective efficacy, high rates of crime and violence). Social disorganization theory asserts that concentrated poverty and residential instability exert effects on the breakdown of local institutions, which in turn predicts local crime and delinquency (Wilson, 1987). Researchers following this perspective further explain that disorganized neighborhoods with high levels of structural disadvantage lack neighborhood collective efficacy, which is the capacity of neighborhoods to form supportive relationships among residents and to regulate residents' behaviors to maintain social order (Sampson, Raudenbush, & Earls, 1997). Research has suggested that impoverished neighborhood structure and the lack of sufficient positive neighborhood process are associated with less willingness of adults to intervene when they see problematic behavior, as well as less sharing of parenting responsibilities. Subsequently, the lack of collective responsibility for children in a neighborhood contributes to less optimal outcomes for children (Kohen et al., 2008; Krishnakumar, Narine, Roopnarine, & Logie, 2014; Ma & Grogan-Kaylor, 2017; Sampson et al., 1997).

A predominant concern in this literature has been the extent to which omitted variables and differential selection biases may account for the observed neighborhood effects on children (Sampson et al., 2002). That is, families from certain backgrounds, and parents who engage in harsh and punitive parenting, may “choose” (or, have no viable alternatives to) neighborhoods with characteristics that permit or facilitate these behaviors. Variables such as unobserved aspects of a family's socio-economic status (e.g., earnings and income from relatives, inheritances and other financial capital from family, or unmeasured aspects of a family's earning potential that are not usually assessed in surveys) may predict the selection of families into neighborhoods, as well as subsequent child behaviors (Sampson et al., 2002). Another potential omitted variable is that of genetic predisposition, in that observed neighborhood effects on child outcomes are possibly attributable to a genetic heritage shared by parents and their child (Caspi, Taylor, Moffitt, & Plomin, 2000). Thus, unobserved confounding factors might plausibly be associated with both neighborhood conditions as well as the behavioral outcomes of children. These possible confounds are not assessed in most existing neighborhood research, which raises questions concerning the interpretation of neighborhood effects.

## 3. Parental corporal punishment (CP) and child behavior

CP is a parenting practice of particular concern. CP is used by about 70% of U.S. parents (Gershoff & Grogan-Kaylor, 2016; Zolotor, Theodore, Runyan, Chang, & Laskey, 2011). Compelling evidence has demonstrated the negative effects of parental spanking, which is the most widely used form of CP, on child development (see reviews by Gershoff, 2002; Gershoff & Grogan-Kaylor, 2016). However, there is debate regarding the degree to which the observed relationships between CP and child behavior may be due to unobserved confounding variables (Baumrind et al., 2002; Larzelere et al., 2017). For example, other elements of parenting style that are correlated with but distinct from use of CP, such as the use of verbal threats, shaming, and poor parental anger management, may account for the observed associations among parental use of CP and negative child outcomes. Such associations may also be possibly explained by neurobiological factors, e.g., genetic influences related to dysregulated emotional temperament and aggression in children, which may be associated with the types of child behaviors that elicit more frequent use of parental CP (Ma & Grogan-Kaylor, 2017) or genetic factors associated with parents' use of CP (Belsky & van IJzendoorn, 2017; Lee, Brooks-Gunn, McLanahan, Notterman, & Garfinkel, 2013).

In addition, researchers have argued that there may be a different relationship between infrequent CP and adverse child outcomes than there is between frequent CP and adverse child outcomes (Larzelere et al., 2017). This stream of reasoning has suggested that the harms of CP may diminish, or even disappear when it is used occasionally. Evidence against this argument has been found in studies that disaggregated the effects of varying frequencies of CP on child behavior. Using indicator variables, researchers found similar associations of both infrequent and frequent use of CP with negative outcomes, such that the negative effects of CP on children strengthened when it was used more frequently (Grogan-Kaylor, 2004; Ma & Grogan-Kaylor, 2017; Zolotor, Theodore, Chang, Berkoff, & Runyan, 2008).

Many aspects of culture, tradition, and other contexts inform parenting behavior and its influence on children. Prior studies have found consistent associations of CP with negative child outcomes across different cultures (Gershoff, Lansford, Sexton, Davis-Kean, & Sameroff, 2012), countries (Lansford et al., 2005), and perceptions of normativeness of CP (Gershoff et al., 2010). Nevertheless, few studies (e.g., Grogan-Kaylor, 2005b) have used statistical approaches that account for the full scope of sociocultural factors in the relations between CP and child behavior.

## 4. The current study

Guided by Bronfenbrenner's (2005) ecological framework as well as by social disorganization theory (Wilson, 1987), the primary research question of this study was to concurrently investigate the effects of broader ecological and contextual influences (i.e., neighborhood disorganization) and parental influence (i.e., parental spanking) on the development of early childhood aggressive behavior. Consistent with prior studies that have shown direct neighborhood and parent effects on child behavior, we hypothesized that neighborhood disorganization, as indicated by the lack of neighborhood collective efficacy, higher levels of neighborhood violence and deteriorated structural conditions, as well as maternal use of CP, would predict aggression in young children (Ma, 2016;

Ma & Grogan-Kaylor, 2017). We focused on the development of early childhood aggression before children enter elementary school. Prior studies have largely focused on school-age children and adolescents (e.g., Foster & Brooks-Gunn, 2009), in part because older children are exposed to neighborhood conditions and structures via schools and peers, whereas in comparison, younger children are potentially less directly exposed to neighborhood conditions via these structures. Thus, our study attempts to discern whether neighborhood conditions exert a unique effect on the development of early behavior problems in children age five or younger.

Given persistent concerns regarding the role of confounding and omitted variables described earlier (Baumrind et al., 2002; Larzelere et al., 2017), our study used fixed effect regression analysis. This analytic method makes use of repeated measures in longitudinal data and essentially allows every participant in a study to serve as their own statistical control (e.g., Stock & Watson, 2003; Wooldridge, 2010). Thus, our analysis eliminates all potential time-invariant confounding variables that may have an effect on child aggression, such as child’s sex, genetic characteristics and temperament of the child and parent, as well as family characteristics such as race and ethnicity. Another strength of our analysis is the statistical control for the time-invariant aspects of broader sociocultural influences, such as traditions and norms that were present at the beginning of the study period. We are aware of only one prior study that has used fixed effects regression model to examine the relationship of parents’ use of CP with increases in child behavior problems, while accounting for perceived neighborhood context (Grogan-Kaylor, 2005b). Grogan-Kaylor (2005b) found that the relationship between parental spanking and poorer child outcomes persisted even in the presence of the stronger statistical controls afforded by fixed effects regression. We aim to advance and extend this literature by including measures of neighborhood structures and social processes in the analysis.

In addition, the statistical model herein also controls for parental functioning (i.e., maternal depression and warmth) that prior literature has identified as having associations with the use of CP and child aggression (Lee, Altschul, & Gershoff, 2013). Recognizing the important transactional and reciprocal influences of the parent-child relationship, we also controlled for socio-demographic characteristics at the child, parent, family, and neighborhood levels that may have confounding relationships with our predictors and outcome. Fig. 1 presents the conceptual model of this study.

## 5. Method

### 5.1. Data and sample

The data for this study were obtained from the Fragile Families and Child Well-being Study (FFCWS), a birth cohort study of 4,898 families and their children. Using stratified random sampling, the FFCWS oversampled children born to unmarried parents between 1998–2000. Mothers were randomly selected to participate in the FFCWS immediately after their focal child’s birth in 75 hospitals in 20 large U.S. cities with populations over 200,000 (Reichman, Teitler, Garfinkel, & McLanahan, 2001). The in-person core survey at baseline interviewed the parents in the hospitals (Wave 1;  $n = 4,898$ ), followed by phone interviews that were conducted when the children were age 1 (Wave 2;  $n = 4,270$ ), age 3 (Wave 3;  $n = 4,140$ ), age 5 (Wave 4;  $n = 4,055$ ), and age 9 (Wave 5;  $n = 3,515$ ). Mothers who participated in Wave 3 and Wave 4 core surveys were invited to take part in the In-Home Longitudinal Study of Pre-School Aged Children (In-Home study hereafter). Based on a subset of the core survey sample, the add-on In-Home study consisted of an in-home assessment and a parent survey ( $n = 3,288$  at Wave 3 and  $n = 3,024$  at Wave 4). Mothers who refused to participate in the in-home assessment completed only the parent survey of the In-Home study via the phone. Our analysis was conducted on 2,472 families who participated in both Wave 3 and Wave 4 In-Home studies (either in-person or over the phone) that collected information on the outcome of our study and who had valid data on Census Tract, our neighborhood proxy, at Wave 4 available. Independent

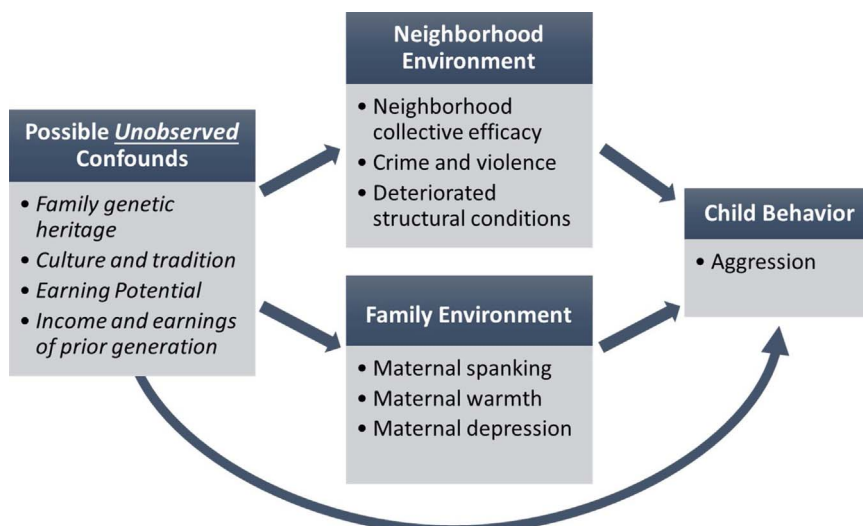


Fig. 1. Conceptual Model of the Study.

sample *t*-tests showed that participants in the current study reported more frequent use of spanking in the past year, were living in Census Tracts with lower median household income, and had older children at Wave 4 compared with non-participants. No significant differences were found in any other variables between study participants and non-participants.

Missing data did not exceed 5% on any study variable, except for deteriorated neighborhood conditions and maternal warmth that were assessed based on interviewer observations during the In-Home studies. The amount of missing cases for deteriorated neighborhood conditions was 34% at Wave 3 and 27% at Wave 4. Maternal warmth was missing in 34% of the analysis sample at Wave 3 and in 18% at Wave 4. The majority of these missing cases were families who refused the interviewer assessments of the Wave 3 and Wave 4 In-Home studies and only completed the phone surveys of the In-Home studies. To account for missing data, we employed a Multiple Imputation through Chained Equations procedure in Stata 14 for the full analytic sample (StataCorp, 2015). Multiple Imputation improves statistical accuracy of estimates and eliminates the inherent biases in estimates based on complete cases only (e.g., Dong & Peng, 2013). Also, the amount of missing data does not raise a concern in Multiple Imputation if the proportion of missing cases does not exceed 50% in large samples (Royston, 2004; Schafer & Graham, 2002). Thus, we imputed missing values for 20 data sets using the non-missing values from all study variables. Following standard procedure, results were then averaged across all 20 regression models to provide a final single set of estimates. Sensitivity analysis (not shown) that compared results from the imputed data to results from complete cases showed minimal differences.

## 5.2. Measures

### 5.2.1. Child aggressive behavior

Aggressive behavior at child age 3 (Wave 3;  $\alpha = .86$ ) and age 5 (Wave 4;  $\alpha = .86$ ) was measured using the Child Behavior Checklist (CBCL) during the In-Home studies. Mothers rated their child's behavior based on 15 items from the CBCL/2-3 (Achenbach, 1992) at Wave 3 and 20 items from the CBCL/4-18 at Wave 4 (0 = *not true*, 1 = *somewhat or sometimes true*, or 2 = *very true or often true*). Responses to the items at each Wave were then averaged into a composite score with higher values indicating higher levels of aggressive behavior. Example items included "Child is defiant", "Child hits others", and "Child gets in fights" at Wave 3 and "Child is cruel, bullies and shows meanness to others", "Child destroys his/her own things", and "Child physically attacks people" at Wave 4. Prior literature that used the CBCL/2-3 and CBCL/4-18 found significant stability over time in early behavior problems (Gray, Indurkha, & McCormick, 2004).

### 5.2.2. Neighborhood disorganization

Neighborhood disorganization was represented by three constructs: (1) neighborhood collective efficacy, (2) crime and violence, and (3) deteriorated structural conditions in neighborhood that were administered during the In-Home study at Wave 3 (child age 3). At Wave 4 (child age 5), neighborhood collective efficacy was assessed in the core survey while the other two constructs were measured in the In-Home study. Neighborhood collective efficacy and crime and violence were mother's self-report on their perception of their neighborhood conditions. Deteriorated structural conditions of the respondent's neighborhood were rated based on interviewer observations.

**5.2.2.1. Neighborhood collective efficacy.** Neighborhood collective efficacy was measured by two subscales from the Project on Human Development in Chicago Neighborhoods (PHDCN)—Informal Social Control and Social Cohesion and Trust—at Wave 3 and Wave 4 (Sampson et al., 1997). Both subscales consisted of five Likert-type questions that were averaged to compute a composite measure of neighborhood collective efficacy, with higher values indicating higher levels of neighborhood collective efficacy (Wave 3;  $\alpha = .86$ , Wave 4;  $\alpha = .87$ ). The Informal Social Control subscale asked mothers about the likelihood of their neighbors intervening on the following statements such as, "Children were skipping school and hanging out on a street corner", "Children were showing disrespect to an adult", and "Fight broke out in front of their house". The Social Cohesion and Trust subscale asked mothers how strongly they agreed on their neighborhoods' level of cohesion and trust. Example items were, "People are willing to help their neighbors" and "People in this neighborhood can be trusted". Mothers' responses to these two subscales were coded with a 5-point response category at Wave 3 and a 4-point response option at Wave 4. To match these different rating options, the neutral response option in the 4-point scale at Wave 3 (a score of 3 = *neither likely/unlikely* and *neither agree/disagree*) was removed and the remaining values were transformed using a proportional linear transformation (Leung, 2011). Specifically, a score of 2 was replaced with 1.75, 3 with 2.5, 4 with 3.25, and 5 with 4 to transform the 5-point scale into a 4-point scale.

**5.2.2.2. Crime and violence.** Crime and violence in neighborhoods was measured during the Wave 3 and Wave 4 In-Home assessments using mother's self-report on their experience of and exposure to violence in the past year. The seven items in this construct were derived from "My Experience of Violence Interview" by Buka, Selner-O'Hagan, Kindlon, and Earls (1997), which asked the respondents how many times they saw someone else get hit, slapped, punched, or beaten up by someone; were hit, slapped, punched, or beaten up by someone; saw someone else get attacked by someone with a weapon, like a knife or bat; were attacked by someone with a weapon; saw someone else get shot at by someone; were shot at by someone; and saw someone get killed because of violence by someone (0 = *never*, 1 = *once*, 2 = *2–3 times*, 3 = *4–10 times*, 4 = *more than 10 times*). The mean score of these items indicated the level of neighborhood crime and violence (Wave 3;  $\alpha = .72$ , Wave 4;  $\alpha = .74$ ).

**5.2.2.3. Deteriorated structural conditions.** An index for deteriorated structural conditions in the neighborhood was created by averaging nine interviewer-reported items during the Wave 3 ( $\alpha = .81$ ) and Wave 4 ( $\alpha = .80$ ) In-Home assessments. This construct

captured information on the environmental conditions (e.g., broken glass, large ditches, alcohol/drug paraphernalia, garbage/litter) and exterior conditions (e.g., peeling paint, damaged walls, broken windows) of respondents' homes and immediate environments (1 = *yes*, 0 = *no*).

### 5.2.3. Maternal spanking

Mother's response on their past year's use of spanking was measured during the Wave 3 and Wave 4 In-Home assessments. Mothers were asked the following question from the Conflict Tactics Scale (CTS) when the focal child was 3 and 5 years of age (Straus, Hamby, Boney-McCoy, & Sugarman, 1996), "How many times in the past year did you spank your child on the bottom with your bare hand?" (0 = *this has never happened*, 1 = *once*, 2 = *twice*, 3 = *3–5 times*, 4 = *6–10 times*, 5 = *11–20 times*, 6 = *more than 20 times*, 7 = *yes but not in the past year*). In the present study, responses to this variable were recoded into a five-level ordinal variable to represent a more intuitive frequency of mother's spanking in the past year. As this item asked mother's use of spanking in the "past year", the last response option (7 = *yes but not in the past year*) was recoded to 0. The final categories of this variable were 0 = *never*, 1 = *once or twice*, 2 = *3–10 times*, 3 = *11–20 times*, 4 = *more than 20 times*.

### 5.2.4. Maternal warmth

During the In-Home assessments at Wave 3 (age 3) and Wave 4 (age 5), interviewers observed mother-child interactions and reported mother's warmth using the Warmth/Responsivity subscale of the Home Observation for Measurement of the Environment (HOME) Inventory (Caldwell & Bradley, 1984). Mother's warmth at age 3 was the average of five questions (0 = *no*, 1 = *yes*), for example: "Parent spontaneously praised the child at least twice" and "Parent conveyed positive feelings toward the child through her tone of voice" ( $\alpha = .72$ ). Mother's warmth at age 5 was the average of nine items such as: "Parent encourages child to contribute to conversation during visit" and "Parent helps child demonstrate some achievement or mentions a particular skill, strength, or achievement during visit" ( $\alpha = .80$ ).

### 5.2.5. Maternal depression

The Composite International Diagnostic Interview-Short Form (CIDI-SF), Section A (Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998) assessed mother's self-reported depression during the core interviews at Wave 3 (age 3;  $\alpha = .97$ ) and Wave 4 (age 5;  $\alpha = .98$ ) based on eight items. Mothers were identified as suffering from clinical levels of depression if they endorsed the diagnostic screening question, "In the past year, have you felt sad or depressed for 2 weeks or more in row?", and two or more additional questions on depressive symptoms (e.g., felt tired out/low on energy, felt down or worthless, thought about death) (0 = *no*, 1 = *yes*). Mothers with a score of 3 or higher on this 8-point-scale were classified as having depression.

### 5.2.6. Child demographics

Age of child was a continuous variable that represented the focal child's age in months at the time of the Wave 3 and Wave 4 core studies.

### 5.2.7. Maternal and family demographics

Mothers reported their age in years, relationship status with the child's father (1 = *married*, 2 = *cohabiting*, 3 = *not married or cohabiting*), and their family's annual household income during the Wave 3 and Wave 4 core interviews. Annual household income was assessed using the following question, "Thinking about your income and the income of everyone else who lives with you, what was your total household income before taxes in the past 12 months?"

### 5.2.8. Neighborhood demographic characteristic

Median neighborhood income from the 2000 U.S. Census represented the median household income of the Census Tract in which the mother resided at the time of the Wave 3 and Wave 4 interviews.

## 5.3. Analysis strategy

Our analytic strategy was based upon the use of fixed effects regression for longitudinal data (Wooldridge, 2010). When used with longitudinal repeated measures data, fixed effects regression analyzes the effects of the predictors that change over time on the outcome. Statistically speaking, fixed effects regression models estimate a unique individual specific intercept parameter which provides control for both the observed time varying covariates as well as all time invariant characteristic of study subjects, whether those characteristics are observed or unobserved (Grogan-Kaylor, 2005b; Wooldridge, 2010). Our model was:

$$y_{it} = \beta_0 + \beta_1 \text{corporal punishment}_{it} + \sum \beta_j \text{neighborhood}_{jt} + \sum \beta_k \text{covariates}_{kt} + u_{0i} + e_{it}$$

Here  $y_{it}$  represented the child aggression score for child  $i$  at time  $t$ .  $\beta_0$  was an intercept term, while  $\beta_1$  was the regression parameter associated with parental use of CP at time  $t$ . The  $\beta_j$ 's were a set of  $j$  regression parameters associated with neighborhood characteristics while the  $\beta_k$ 's were a set of  $k$  regression parameters associated with the other  $k$  covariates.  $u_{0i}$  was estimated as a unique regression intercept for each study family  $i$ , while  $e_{it}$  represented a measurement specific error term for family  $i$  at time  $t$ .

Thus, the fixed effects coefficients in our analysis represented the change in a child's aggression score from their individual mean

**Table 1**  
Descriptive Statistics ( $n = 2,472$ ).

Variable	Age 3 ( <i>M</i> ( <i>SD</i> ) or %)	Age 5 ( <i>M</i> ( <i>SD</i> ) or %)	<i>p</i> value
<i>Child outcome</i>			
Aggressive behavior	0.65 (0.39)	0.54 (0.32)	<.001
<i>Neighborhood disorganization</i>			
Neighborhood collective efficacy	2.91 (0.70)	3.10 (0.65)	<.001
Crime and violence	0.18 (0.35)	0.17 (0.37)	0.180
Deteriorated structural conditions	0.11 (0.20)	0.11 (0.20)	0.785
<i>Maternal spanking (past year)</i>			
Never	1.68 (1.33)	1.43 (1.27)	<.001
Once or twice	27%	33%	
3–10 times	15%	17%	
11–20 times	34%	33%	
More than 20 times	10%	7%	
	14%	9%	
Maternal warmth	0.88 (0.22)	0.76 (0.28)	<.001
Maternal depression (%)	0.22 (0.41)	0.17 (0.38)	<.001
Yes	22%	17%	
No	78%	83%	
<i>Child demographics</i>			
Age (months)	35.26 (2.21)	61.11 (2.42)	<.001
<i>Mother's demographics</i>			
Age (years)	28.08 (6.01)	30.21 (6.01)	<.001
Relationship status	2.20 (0.87)	2.26 (0.90)	<.001
Married	30%	30%	
Cohabiting	20%	13%	
Not married or cohabiting	50%	57%	
Household income (\$)	34,763 (44,854)	36,690 (44,057)	<.01
<i>Neighborhood demographics</i>			
Median household income (\$)	36,205 (17,861)	37,664 (18,965)	<.001

Note. *p* values from paired sample *t*-tests.

aggression score over time (Allison, 2005). A strong advantage of the fixed effects regression approach is that by using within person variation only, it reduces biases related to omitted and confounding variables more effectively than ordinary least squares regression (Han & Grogan-Kaylor, 2013). At the individual child level, fixed effects regression considers all unmeasured confounds that are consistent over time, such as the level of child aggression that was present before the initial assessment, as well as time-invariant genetic characteristics and time invariant components of the emotional temperament of the child that may be linked to aggressive behavior (Ma & Grogan-Kaylor, 2017). Likewise, at the parent and family level, traits of parents and family history of aggression and depression that may have associations with the use of parental CP (Berlin et al., 2009), cultural influences, and selection processes leading families to reside in certain neighborhoods (Sampson et al., 2002) are controlled for in the analysis, yielding more rigorous statistical control for the proposed associations of neighborhood and parenting with changes in aggression within the same child over time. One disadvantage of the fixed effects regression approach is that because of the statistical control afforded by this method, parameter estimates for any time invariant characteristics of study participants, which is usually the case with gender and race, are not provided by the model.

## 6. Results

### 6.1. Descriptive and bivariate statistics

Table 1 shows descriptive characteristics of the study sample at Wave 3 (child age 3) and Wave 4 (child age 5) as well as results from *t*-tests that compared the mean values of each study variable at Wave 3 and Wave 4. The average level of CBCL Aggressive Behavior score was statistically higher at 0.65 and decreased to 0.54 as child age increased from 3 to 5 years ( $p < .001$ ). Significant differences were found in neighborhood collective efficacy between the two Waves such that mothers reported higher levels of neighborhood collective efficacy at child age 5 than age 3 ( $p < .001$ ). On average, mothers reported more frequent use of spanking in the past year when their child was age 3 than age 5 ( $p < .001$ ). The average level of maternal depression and maternal warmth was higher when children were younger ( $p < .001$ ).

**Table 2**  
Fixed Effects Regression Model Predicting Child Aggressive Behavior ( $n = 2,472$ ).

	Coefficient	Standard Error	p Value
<i>Neighborhood disorganization</i>			
Neighborhood collective efficacy	−0.003	0.009	.72
Crime and violence	0.065	0.017	< .001
Deteriorated structural conditions	−0.066	0.037	.08
Maternal spanking (past year): Never			
Once or twice	0.032	0.016	< .05
3–10 times	0.059	0.015	< .001
11–20 times	0.103	0.022	< .001
More than 20 times	0.154	0.022	< .001
Maternal warmth	−0.039	0.024	.10
Mother's depression	0.008	0.015	.59
<i>Child demographics</i>			
Age of child (months)	−0.002	0.002	.12
<i>Mother's demographics</i>			
Age of mother (years)	−0.016	0.019	.39
Relationship status: Married			
Cohabiting	0.029	0.027	.29
Not married or cohabiting	0.009	0.026	.73
Household income	0.000	0.000	.53
<i>Neighborhood demographics</i>			
Median household income	−0.000	0.000	.29
Constant	1.177	0.472	< .05

## 6.2. Fixed effects regression model

Results from fixed effects regression in Table 2 indicated that of the three constructs that represent neighborhood disorganization, only crime and violence in neighborhood was a significant predictor of child aggressive behavior ( $\beta = 0.065$ ,  $p < .001$ ). The positive relationship between neighborhood crime and violence and aggression held true even after controlling for neighborhood collective efficacy, deteriorated structural conditions, maternal spanking in the past year, maternal functioning, demographics, and time-invariant characteristics of the child and family including prior levels of aggressive behavior. All levels of maternal spanking in the past year were linked to higher levels of aggressive behavior, net of neighborhood conditions, covariates, and other characteristics of study participants that were consistent over time. The magnitude of this association was stronger as the frequency of maternal spanking in the past year increased. Compared to never spanking in the past year, even infrequent spanking (i.e., once or twice in the past year) was associated with higher aggressive behavior by 0.032 units ( $p < .05$ ). Mother's report of frequent spanking (i.e., more than 20 times in the past year) predicted higher levels of aggressive behavior by 0.154 units ( $p < .001$ ).

## 7. Discussion

The links between negative neighborhood influences and child behavior (Leventhal & Brooks-Gunn, 2000) and spanking and child behavior problems (Gershoff & Grogan-Kaylor, 2016) are well established in the literature. Yet, relatively few studies have considered the inter-relationships between neighborhood processes, parenting, and child behavior. The current study addresses this gap by simultaneously and separately considering both neighborhood and parenting influences on child behavior. Results support the hypotheses that neighborhood disorganization and maternal spanking contribute to the development of aggression in early childhood. The fixed effects regression model provides some of the strongest evidence to date showing the impact of neighborhood violence and maternal spanking on the development of early child aggression. We note that our findings are likely to be an under-estimate of the true causal effects of neighborhood violence and CP on aggression because fixed effects regression exploits only within-individual variance over time, while differences across individuals are not used in the estimates. Fig. 2 presents the significant predictors from the current analysis.

Although there is strong evidence of the confluence of neighborhood and parenting on negative outcomes during adolescence (e.g., Beyers, Bates, Pettit, & Dodge, 2003; Leventhal & Brooks-Gunn, 2000; Ma, Grogan-Kaylor, & Delva, 2016), a much smaller volume of research documents direct neighborhood effects on pre-adolescent children (e.g., Kohen et al., 2008; Ma & Grogan-Kaylor, 2017), such as in the current study. Contrary to the perception that young children are potentially less affected by extra-familial factors compared to adolescents, our results underscore the direct, adverse effects of living in disadvantaged neighborhoods on early child development even after controlling for parenting (Kohen et al., 2008; Ma, 2016; Ma & Grogan-Kaylor, 2017).

The measures of neighborhood employed in this study are particularly strong. Our neighborhood measures included structural indicators, such as income and deteriorated structural conditions of the neighborhood, as well as measures of social processes, such as neighborhood collective efficacy and crime and violence. The results of this study suggest that exposure to crime and violence are the

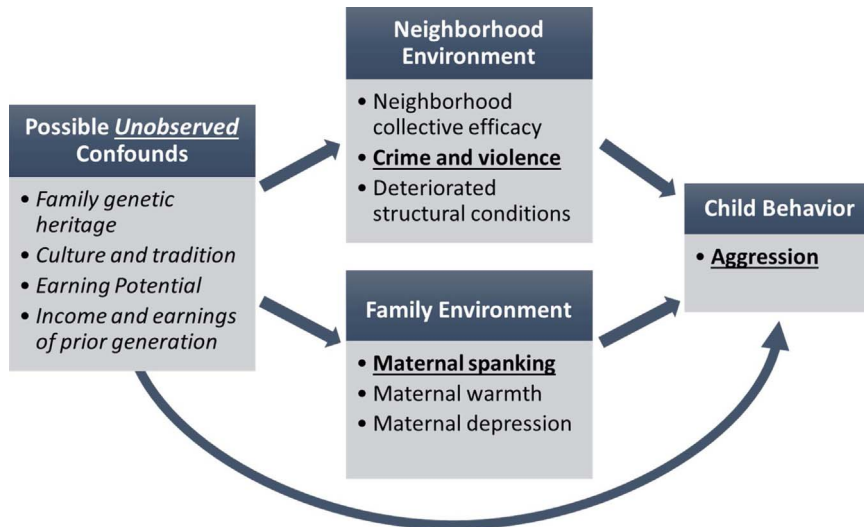


Fig. 2. Significant Predictors of Child Aggression Found in the Study.

specific neighborhood-level factors that should be targeted to reduce early child aggression (Foster & Brooks-Gunn, 2009). The statistical approach of this study lends more rigorous support for the developmental threats that neighborhood violence poses to child wellbeing than prior studies. Thus, creating a neighborhood environment that is free from crime and violence would be a crucial step to preventing aggressive behaviors in young children.

Social disorganization theory posits that neighborhood collective efficacy plays a specific role in reducing negative child behavior (Krishnakumar et al., 2014; Ma, 2016; Ma & Grogan-Kaylor, 2017). However, in the current study, neighborhood collective efficacy was not a significant predictor of early aggressive behavior. It is possible that the stronger statistical controls for selection bias and time-invariant characteristics of study participants may have contributed to the non-significant effect of neighborhood collective efficacy. The inclusion of multiple aspects of neighborhood social and structural processes (i.e., neighborhood crime and violence, deteriorated structural conditions, and income) may have yielded stronger and more appropriate statistical control in the model. Alternatively, it may be that there were between-individual, time invariant differences in neighborhood collective efficacy that were excluded by our statistical model, but that do contribute causally to children’s behavior problems.

Our results also indicate that parental spanking, a widely accepted and endorsed parenting practice in the U.S. (Gershoff & Grogan-Kaylor, 2016; Zolotor et al., 2011), predicts aggressive behavior even if it was used infrequently. The association of spanking with children’s aggressive behavior remained significant even after holding constant the effects of neighborhood as well as a range of covariates including mother’s warmth and depression. The results may shed light on the on-going question among parents and researchers about whether certain characteristics of the child such as highly sensitive temperament, earlier behavior problems including aggression, and genetic influences, as well as parental and family characteristics such as emotional well-being, cognitive functioning, cultural norms, and family values directly inform parents’ decision to physically discipline their children. The current study suggests that unobserved aspects of an individual’s genetic heritage are not responsible for explaining all of the variance in the relationship between spanking and child aggression. For example, our analysis found effects of parental spanking that could not be attributed to the role of time-invariant effects of any particular gene that may be simultaneously contributing to physical aggression in parenting, and aggression among their children (Patterson, Cheung, Mann, Tucker-Drob, & Harden, 2017). Our findings add more clear and rigorous evidence for the idea of parent effects, indicating that parental spanking indeed leads to adverse child behavior. In accord with the global discussion on children’s human rights to be free from any violence and degrading punishment including spanking (MacMillan & Mikton, 2017; United Nations Committee on the Rights of the Child, 2006), evidence clearly indicates that researchers and advocates would do well to advocate for changes in parental attitudes and behavior as well as in policy and legislation that reflect the awareness of the detrimental effects of spanking on child well-being (Gershoff, Lee, & Durrant, 2017; Grogan-Kaylor, Ma, & Graham-Bermann, 2017).

### 7.1. Study limitations

Several limitations of this study should be noted. A number of the measures in our analysis relied on mothers’ self-report, and mothers may have underreported problematic neighborhood conditions, their use of spanking, and their child’s misbehavior. However, our analysis was strengthened through the use of variables that were assessed by interviewers (i.e., deteriorated structural conditions of neighborhood and maternal warmth), and administrative data (i.e., neighborhood income from the 2000 Census). Another limitation is that the fixed effects model does not provide parameter estimates for time-invariant characteristics, such as mother’s education and race and ethnicity; thus, we are not able to directly estimate the association of these time-invariant factors with child behavior problems. Furthermore, there may be time-varying variables that were not considered in our model. For example,



additional neighborhood and family characteristics such as residential mobility may have confounding relationships with the findings from our fixed effects model. Finally, even though children are often spanked by other caregivers such as fathers, our study includes only maternal spanking (Lee, Taylor, Altschul, & Rice, 2013). Our rationale for the focus on maternal spanking was two-fold. First, we did not have comparable measures of parental warmth for fathers. Second, mothers use spanking and physical discipline more frequently than fathers (Lee, Altschul, & Gershoff, 2015); and when examining mothers' and fathers' spanking jointly, mothers' spanking—and not fathers' spanking—was associated with subsequent child aggression (Lee et al., 2015). Lastly, we note that more than two-thirds (70%) of the mothers in our study were not married to the child's father at Wave 4 because the FFCWS oversampled unmarried mothers.

## 7.2. Implications for policy and practice

Study results support the need for multifaceted neighborhood assessments that consider structural and processes-oriented aspects of neighborhood conditions in programs that serve young children with behavioral issues. Importantly, a broad tradition of research suggests that while parental *use* of different disciplinary strategies may differ across neighborhood and cultural contexts, the behavioral *outcomes* for children that result from parental use of spanking are likely to be similar across contexts (Gershoff et al., 2010; Grogan-Kaylor, 2005b).

Second, our findings suggest the importance of multilevel interventions that intervene at the level of both the family and the larger community for positive child outcomes. Multilevel models have been advanced by Raudenbush and Bryk (2002) and have been used to address predictors of child development at the neighborhood, parent, and family levels in a robust literature (Beyers et al., 2003; Grogan-Kaylor, 2005a; Krishnakumar et al., 2014; Ma & Grogan-Kaylor, 2017; Ma et al., 2016; Sampson et al., 1997; Vaden-Kiernan et al., 2010). Notably, findings from this research suggest that there are separate pathways from both the neighborhood context, and parenting behavior to child outcomes. Thus, any multilevel intervention that aims to promote child well-being would need to address violence exposure in the neighborhood and in the family. In such an intervention, one could conceive of a group level intervention where groups of parents meet together for several weeks to discuss effective non-physical disciplinary strategies. Simultaneously, one might imagine more community organizing efforts engaged in attempting to reduce crime and violence across a community as a whole, or public messaging campaigns designed to reduce parents' use of CP or to encourage positive parenting behaviors. As several researchers have pointed out (Berg, Coman, & Schensul, 2009; Trickett & Beehler, 2013), such multilevel interventions may bring with them significant challenges of how to coordinate and time the different phases of the intervention.

There are relatively few examples of multilevel intervention approaches that address parenting practices and spanking in particular (see review by Gershoff et al., 2017). The Positive Parenting Program, known as Triple P, is one example of a multilevel intervention approach that includes five levels, ranging from a universal component (e.g., public billboard messaging, television messaging) to an intensive component (e.g., group-based intervention for parents). Although Triple P does not directly address neighborhood mechanisms (e.g., intervention to reduce neighborhood violence), it is a multilevel intervention approach with studies showing that it improves parenting behaviors. For example, the universal components of Triple P that use community-based messaging have been shown to improve parenting outcomes. One study that examined effectiveness of a parenting informational television program in New Zealand found that it had positive impacts on parents' confidence in their own abilities (Sanders, Montgomery, & Brechman-Toussaint, 2000). A similar television program in the United Kingdom was found to decrease parents' stress and their use of coercive forms of discipline (Calam, Sanders, Miller, Sadhnani, & Carmont, 2008). Another multi-tiered implementation of Triple P that took place in 18 counties in South Carolina, with a component that used billboard messaging about child maltreatment, showed reductions in cases of child maltreatment and hospitalizations resulting from maltreatment (Prinz, Sanders, Shapiro, Whitaker, & Lutzker, 2009). A meta-analysis of the indicated prevention, group-based component of the program found that parents who participated in Triple P showed improvements in parenting behavior and in parents' feelings of competence (de Graaf, Speetjens, Smit, de Wolff, & Tavecchio, 2008).

## 8. Conclusion

The fixed effects regression model in this study found statistically rigorous evidence that higher levels of neighborhood crime and violence and more frequent use of maternal CP predicted increases in aggression among children in the ages 3 to 5. Most importantly, our use of fixed effects regression model addresses several potential methodological biases in prior literature including selection and omitted variables and thus, finds stronger evidence that adverse neighborhood conditions and physical discipline are in fact the *cause* of child misbehavior.

## References

- Achenbach, T. M. (1992). *Manual for the Child Behavior Checklist/2-3 and 1992 profile*. Department of Psychiatry: University of Vermont.
- Affifi, T. O., Ford, D., Gershoff, E. T., Merrick, M., Grogan-Kaylor, A., Ports, K. A., ... Bennett, R. (2017). Spanking and adult mental health impairment: The case for the designation of spanking as an adverse childhood experience. *Child Abuse & Neglect*. <http://dx.doi.org/10.1016/j.chiabu.2017.01.014>.
- Allison, P. A. (2005). *Fixed effects regression methods for longitudinal data using SAS*. SAS Institute Inc. [Retrieved from [https://www.sas.com/store/books/categories/usage-and-reference/fixed-effects-regression-methods-for-longitudinal-data-using-sas-/prodBK\\_58348\\_en.html](https://www.sas.com/store/books/categories/usage-and-reference/fixed-effects-regression-methods-for-longitudinal-data-using-sas-/prodBK_58348_en.html)].
- Baumrind, D., Larzelere, R. E., & Cowan, P. A. (2002). Ordinary physical punishment: Is it harmful? Comment on Gershoff (2002). *Psychological Bulletin*, 128(4), 580–589. <http://dx.doi.org/10.1037/0033-2909.128.4.580>.
- Belsky, J., & van IJzendoorn, M. H. (2017). Genetic differential susceptibility to the effects of parenting. *Current Opinion in Psychology*, 15, 125–130. <http://dx.doi.org/>

- 10.1016/j.copsyc.2017.02.021.
- Berg, M., Coman, E., & Schensul, J. J. (2009). Youth action research for prevention: A multi-level intervention designed to increase efficacy and empowerment among urban youth. *American Journal of Community Psychology*, 43(3-4), 345–359. <http://dx.doi.org/10.1007/s10464-009-9231-2>.
- Berlin, L. J., Ispa, J. M., Fine, M. A., Malone, P. S., Brooks-Gunn, J., Brady-Smith, C., et al. (2009). Correlates and consequences of spanking and verbal punishment for low-income white, african american, and mexican american toddlers. *Child Development*, 80(5), 1403–1420. <http://dx.doi.org/10.1111/j.1467-8624.2009.01341.x>.
- Beyers, J. M., Bates, J. E., Pettit, G. S., & Dodge, K. A. (2003). Neighborhood structure, parenting processes, and the development of youths' externalizing behaviors: a multilevel analysis. *American Journal of Community Psychology*, 31(1-2), 35–53. <http://dx.doi.org/10.1023/A:1023018502759>.
- Bronfenbrenner, U. (2005). *Making human beings human: Bioecological perspectives on human development*. Thousand Oaks: Sage.
- Buka, S. L., Selner-O'Hagan, M. B., Kindlon, D. J., & Earls, F. J. (1997). *The "My Exposure to Violence Interviews"; Administration and Scoring Manual* (Version 3). Boston, MA: Harvard School of Public Health.
- Calam, R., Sanders, M. R., Miller, C., Sadhmani, V., & Carmont, S.-A. (2008). Can technology and the media help reduce dysfunctional parenting and increase engagement with preventative parenting interventions? *Child Maltreatment*, 13(4), 347–361. <http://dx.doi.org/10.1177/1077559508321272>.
- Caldwell, B. M., & Bradley, R. H. (1984). *Home observation for measurement of the environment*. University of Arkansas at Little Rock.
- Caspi, A., Taylor, A., Moffitt, T. E., & Plomin, R. (2000). Neighborhood deprivation affects children's mental health: Environmental risks identified in a genetic design. *Psychological Science*, 11(4), 338–342.
- de Graaf, I., Speetjens, P., Smit, F., de Wolff, M., & Tavecchio, L. (2008). Effectiveness of the Triple P Positive Parenting Program on behavioral problems in children: A meta analysis. *Behavior Modification*, 32(5), 714–735. <http://dx.doi.org/10.1177/0145445508317134>.
- Dong, Y., & Peng, C.-Y. J. (2013). Principled missing data methods for researchers. *SpringerPlus*, 2. <http://dx.doi.org/10.1186/2193-1801-2-222>.
- Foster, H., & Brooks-Gunn, J. (2009). Toward a stress process model of children's exposure to physical family and community violence. *Clinical Child and Family Psychology Review*, 12(2), 71–94.
- Gershoff, E. T. (2002). Corporal punishment by parents and associated child behaviors and experiences: A meta-analytic and theoretical review. *Psychological Bulletin*, 128(4), 539–579. <http://dx.doi.org/10.1037/0033-2909.128.4.539>.
- Gershoff, E. T., & Grogan-Kaylor, A. (2016). Spanking and child outcomes: Old controversies and new meta-analyses. *Journal of Family Psychology*, 30(4), 453–469.
- Gershoff, E. T., Grogan-Kaylor, A., Lansford, J. E., Chang, L., Zelli, A., Deater-Deckard, K., & Dodge, K. A. (2010). Parent discipline practices in an international sample: Associations with child behaviors and moderation by perceived normativeness. *Child Development*, 81(2), 487–502.
- Gershoff, E. T., Lansford, J. E., Sexton, H. R., Davis-Kean, P., & Sameroff, A. J. (2012). Longitudinal links between spanking and children's externalizing behaviors in a national sample of white, black, hispanic, and asian american families. *Child Development*, 83(3), 838–843. <http://dx.doi.org/10.1111/j.1467-8624.2011.01732.x>.
- Gershoff, E. T., Lee, S. J., & Durrant, J. E. (2017). Promising intervention strategies to reduce parents' use of physical punishment. *Child Abuse & Neglect*, 71, 9–23. <http://dx.doi.org/10.1016/j.chiabu.2017.01.017>.
- Gray, R. F., Indurkha, A., & McCormick, M. C. (2004). Prevalence, stability, and predictors of clinically significant behavior problems in low birth weight children at 3, 5, and 8 years of age. *Pediatrics*, 114(3), 736–743. <http://dx.doi.org/10.1542/peds.2003-1150-L>.
- Grogan-Kaylor, A. (2004). The effect of corporal punishment on antisocial behavior in children. *Social Work Research*, 28(3), 153–162.
- Grogan-Kaylor, A. (2005a). Corporal punishment and the growth trajectory of children's antisocial behavior. *Child Maltreatment*, 10(3), 283–292.
- Grogan-Kaylor, A. (2005b). Relationship of corporal punishment and antisocial behavior by neighborhood. *Archives of Pediatrics & Adolescent Medicine*, 159(10), 938–942.
- Grogan-Kaylor, A., Ma, J., & Graham-Bermann, S. A. (2018). The case against physical punishment. *Current Opinions in Psychology*, 19, 22–27. <http://dx.doi.org/10.1016/j.copsyc.2017.03.022>.
- Han, Y., & Grogan-Kaylor, A. (2013). Parenting and youth psychosocial well-being in South Korea using fixed-effects models. *Journal of Family Issues*, 34(5), 689–715.
- Kessler, R. C., Andrews, G., Mroczek, D., Ustun, B., & Wittchen, H.-U. (1998). The World Health Organization Composite International Diagnostic Interview short-form (CIDI-SF). *International Journal of Methods in Psychiatric Research*, 7(4), 171–185. <http://dx.doi.org/10.1002/mpr.47>.
- Kohen, D. E., Leventhal, T., Dahinten, V. S., & McIntosh, C. N. (2008). Neighborhood disadvantage: Pathways of effects for young children. *Child Development*, 79(1), 156–169.
- Krishnakumar, A., Narine, L., Roopnarine, J. L., & Logie, C. (2014). Multilevel and cross-level effects of neighborhood and family influences on children's behavioral outcomes in Trinidad and Tobago: The intervening role of parental control. *Journal of Abnormal Child Psychology*, 42(6), 1057–1068. <http://dx.doi.org/10.1007/s10802-014-9852-2>.
- Lansford, J. E., Chang, L., Dodge, K. A., Malone, P. S., Oburu, P., Palmérus, K., et al. (2005). Physical discipline and children's adjustment: Cultural normativeness as a moderator. *Child Development*, 76(6), 1234–1246.
- Larzelere, R. E., Gunnoe, M. L., Roberts, M. W., & Ferguson, C. J. (2017). Children and parents deserve better parental discipline research: Critiquing the evidence for exclusively positive parenting. *Marriage & Family Review*, 53(1), 24–35. <http://dx.doi.org/10.1080/01494929.2016.1145613>.
- Lee, D., Brooks-Gunn, J., McLanahan, S. S., Notterman, D., & Garfinkel, I. (2013). The Great Recession, genetic sensitivity, and maternal harsh parenting. *Proceedings of the National Academy of Sciences*, 110(34), 13780–13784. <http://dx.doi.org/10.1073/pnas.1312398110>.
- Lee, S. J., Altschul, I., & Gershoff, E. T. (2013). Does warmth moderate longitudinal associations between maternal spanking and child aggression in early childhood? *Developmental Psychology*, 49(11), 2017–2028.
- Lee, S. J., Altschul, I., & Gershoff, E. T. (2015). Wait until your father gets home? Mother's and fathers' spanking and development of child aggression. *Children and Youth Services Review*, 52, 158–166.
- Lee, S. J., Taylor, C. A., Altschul, I., & Rice, J. C. (2013). Parental spanking and subsequent risk for child aggression in father-involved families of young children. *Children and Youth Services Review*, 35(9), 1476–1485. <http://dx.doi.org/10.1016/j.chidyouth.2013.05.016>.
- Leung, S.-O. (2011). A comparison of psychometric properties and normality in 4-, 5-, 6-, and 11-Point Likert scales. *Journal of Social Service Research*, 37(4), 412–421. <http://dx.doi.org/10.1080/01488376.2011.580697>.
- Leventhal, T., & Brooks-Gunn, J. (2000). The neighborhoods they live in: the effects of neighborhood residence on child and adolescent outcomes. *Psychological Bulletin*, 126(2), 309–337.
- Ma, J. (2016). Neighborhood and parenting both matter: The role of neighborhood collective efficacy and maternal spanking in early behavior problems. *Children and Youth Services Review*, 70, 250–260.
- Ma, J., & Grogan-Kaylor, A. (2017). Longitudinal associations of neighborhood collective efficacy and maternal corporal punishment with behavior problems in early childhood. *Developmental Psychology*, 53(6), 1027–1041. <http://dx.doi.org/10.1037/dev0000308>.
- Ma, J., Grogan-Kaylor, A., & Delva, J. (2016). Behavior problems among adolescents exposed to family and community violence in Chile. *Family Relations*, 65(3), 502–516. <http://dx.doi.org/10.1111/fare.12199>.
- MacMillan, H. L., & Mikton, C. R. (2017). Moving research beyond the spanking debate. *Child Abuse & Neglect*, 5–8. <http://dx.doi.org/10.1016/j.chiabu.2017.02.012>.
- McDonnell, J. R., Ben-Arieh, A., & Melton, G. B. (2015). Strong Communities for Children: Results of a multi-year community-based initiative to protect children from harm. *Child Abuse & Neglect*, 41, 79–96. <http://dx.doi.org/10.1016/j.chiabu.2014.11.016>.
- Patterson, M. W., Cheung, A. K., Mann, F. D., Tucker-Drob, E. M., & Harden, K. P. (2017). Multivariate analysis of genetic and environmental influences on parenting in adolescence. *Journal of Family Psychology*. <http://dx.doi.org/10.1037/fam0000298>.
- Prinz, R. J., Sanders, M. R., Shapiro, C. J., Whitaker, D. J., & Lutzker, J. R. (2009). Population-Based prevention of child maltreatment: The U.S. triple P system population trial. *Prevention Science*, 10(1), 1–12. <http://dx.doi.org/10.1007/s11121-009-0123-3>.
- Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage.
- Reichman, N. E., Teitler, J. O., Garfinkel, I., & McLanahan, S. S. (2001). Fragile Families: Sample and design. *Children and Youth Services Review*, 23(4-5), 303–326. [http://dx.doi.org/10.1016/S0190-7409\(01\)00141-4](http://dx.doi.org/10.1016/S0190-7409(01)00141-4).
- Royston, P. (2004). Multiple imputation of missing values. *Stata Journal*, 4(3), 227–241.
- Sampson, R. J., Morenoff, J. D., & Gannon-Rowley, T. (2002). Assessing neighborhood effects: Social processes and new directions in research. *Annual Review of*

- Sociology*, 28, 443–478.
- Sampson, R. J., Raudenbush, S. W., & Earls, F. (1997). Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science*, 277(5328), 918–924.
- Sanders, M. R., Montgomery, D. T., & Brechman-Toussaint, M. L. (2000). The mass media and the prevention of child behavior problems: The evaluation of a television series to promote positive outcomes for parents and their children. *Journal of Child Psychology and Psychiatry*, 41(7), 939–948. <http://dx.doi.org/10.1111/1469-7610.00681>.
- Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, 7(2), 147–177.
- StataCorp (2015). *Stata statistical software: Release 14*. College Station, TX: StataCorp LP.
- Stock, J. H., & Watson, M. W. (2003). *Introduction to econometrics, Vol. 04* Boston: Addison Wesley [Retrieved from <http://www.ssc.wisc.edu/~munia/475/InstVaReg.pdf>].
- Straus, M. A., Hamby, S. L., Boney-McCoy, S., & Sugarman, D. B. (1996). The revised Conflict Tactics Scales (CTS2) development and preliminary psychometric data. *Journal of Family Issues*, 17(3), 283–316. <http://dx.doi.org/10.1177/019251396017003001>.
- Trickett, E. J., & Beehler, S. (2013). The ecology of multilevel interventions to reduce social inequalities in health. *American Behavioral Scientist*, 5, 1227–1246.
- United Nations Committee on the Rights of the Child (2006). *Convention on the Rights of the Child: General comment No. 8 (2006)*. [Retrieved June 6, 2015, from [http://www.unhcr.ch/tbs/doc.nsf/898586b1dc7b4043c1256a450044f331/6545c032cb57bfff5c12571fc002e834d/\\$FILE/G0740771.pdf](http://www.unhcr.ch/tbs/doc.nsf/898586b1dc7b4043c1256a450044f331/6545c032cb57bfff5c12571fc002e834d/$FILE/G0740771.pdf)].
- Vaden-Kiernan, M., D'Elia, M. A., O'Brien, R. W., Tarullo, L. B., Zill, N., & Hubbell-McKey, R. (2010). Neighborhoods as a developmental context: A multilevel analysis of neighborhood effects on head start families and children. *American Journal of Community Psychology*, 45(1-2), 49–67. <http://dx.doi.org/10.1007/s10464-009-9279-z>.
- Wilson, W. J. (1987). *The truly disadvantaged: The inner city, the underclass, and public policy*. Chicago: Chicago University Press.
- Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT press.
- Zolotor, A. J., Theodore, A. D., Chang, J. J., Berkoff, M. C., & Runyan, D. K. (2008). Speak softly—and forget the stick: Corporal punishment and child physical abuse. *American Journal of Preventive Medicine*, 35(4), 364–369. <http://dx.doi.org/10.1016/j.amepre.2008.06.031>.
- Zolotor, A. J., Theodore, A. D., Runyan, D. K., Chang, J. J., & Laskey, A. L. (2011). Corporal punishment and physical abuse: Population-based trends for three-to-11-year-old children in the United States. *Child Abuse Review*, 20(1), 57–66.