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NEIGHBORHOOD CONTEXT AND THE DEVELOPMENT OF AGGRESSION IN BOYS AND GIRLS

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Abstract

We examine the roles of neighborhood characteristics in the development of the aggressive behavior of 1,409 urban boys and girls between the first and seventh grades. The multilevel, longitudinal growth analyses find strong neighborhood effects in all models, while controlling for individual-level variables. Results indicated that the effects of neighborhood violence, employment, income, and percentages of single males and female-headed households do not manifest in first grade, but affect the trajectory of child aggression between first and seventh grades. The influence of family income and frequent physical discipline on boys' and girls' aggression occurs at first grade, and family income has a modest effect on the trajectory. The findings strongly suggest that the neighborhood sources of the development of child aggression are independent and different from early childhood experiences.

INTRODUCTION

Aggressive children who bully peers and make trouble for teachers and neighbors are more likely than other children are to have difficulties both as a child and as an adult. They are more likely to have problems with academic work and peer relationships and display antisocial behavior, juvenile delinquency, conduct disorders, and drug abuse during adolescence (Coie & Dodge, 1998; Ensminger, Kellam, & Rubin, 1983; Kellam, Brown, Rubin, & Ensminger, 1983; Petras et al., 2008; Poduska et al., 2008). As adults, aggressive children are more likely to suffer substance abuse, alcoholism, accidents, unemployment, divorce, and physical and psychiatric illness, commit delinquent and violent behavior, and require more social and remedial services (Caspi, Elder, & Bem, 1987; Ensminger, Juon, & Fothergill, 2002; Farrington, 1998; Kellam et al., 2008; Petras et al., 2008). Concern about these far-reaching consequences has made identification of contributing factors to the development of aggressive behavior a high research priority for testing etiological theory and effective prevention programs. This study considers two basic questions: Do neighborhood characteristics influence the development of early child aggression? If so,

what is the nature of the influence? It uses a multilevel, longitudinal design to examine how neighborhood context may affect the development of child aggression over time.

Many studies of the origins of child aggression have focused on the family, school, or peer group (see review by Bradley & Corwyn, 2002). But because children live not only in these smaller social fields but also in communities, we need to understand the potential nature of neighborhood influences as well. Prior studies of whether and how early child aggression may be related to neighborhood characteristics are limited (Ingoldsby et al., 2006). Recent studies of the nexus of neighborhood and child have differed regarding the size of neighborhood effects, and how neighborhood characteristics and processes may impact on child development. Comprehensive reviews assessing the quality and quantity of the work on neighborhood effects conclude that the empirical results regarding their strength and nature are mixed (Aber, Gephart, Brooks-Gunn, Connell, & Spencer, 1997; Furstenberg & Hughes, 1997; Sampson, Morenoff, & Gannon-Rowley, 2002). Although some analyses show moderate correlations between neighborhood characteristics and child outcomes, others find weak or nonexistent relationships.

Neighborhood Effects on Child Aggression

Several perspectives on how neighborhood context might affect child development have been proposed. These suggest that neighborhoods affect both neighborhood social organization and cultural processes, contain a local opportunity structure that channels and constrains child behaviors, engender a prevailing normative climate delimiting the boundaries of acceptable and desirable conduct, and may predispose individuals to respond differently to social institutions (Aber et al., 1997; Brewster, Billy, & Grady, 1993; Garner & Raudenbush, 1991). Common to these conceptualizations is the idea that institutions and social and economic patterns inherent in neighborhood life influence male and female child outcomes by creating opportunities, providing resources, setting limits, and encouraging behavior through example. Relevant neighborhood institutions include the neighborhood's employment patterns, economic vitality, educational and religious organizations, and structures designed for maintenance of safety and order.

Addressing the importance of employment opportunities, Wilson (1987) outlined the connections between structural changes in the economy of the city and the behavior of residents of inner-city, poor neighborhoods. Research has shown that the greater the level of income in the neighborhood, the more likely is it to have other enhanced institutions in the areas of education, health care, and government, and to provide positive role models showing the importance of career preparation (Brooks-Gunn, Guo, & Furstenberg, 1993). In their review of the research, Leventhal and Brooks-Gunn (2000) concluded that across all outcomes, neighborhood economic status appears to matter more than other dimensions of neighborhood context, including racial/ethnic heterogeneity or residential stability.

Prior research using cross-sectional and single-level analyses have suggested that the effects on children of neighborhood economic status generally are small to modest, accounting for 5–10% of the variance in child and adolescent outcomes. However, because family income and neighborhood median income may be confounded in single-level models, recent multilevel studies have sought to measure the independent effects of neighborhood income. Multilevel modeling efforts include Kalff et al.'s 2001 research on second grade students, which found that neighborhood deprivation affected aggression net of family income, and Mrug and Windle's cross-sectional study (2009), which found that neighborhood poverty accounted for 33% of the variance in the externalizing behavior of 11-year-olds.

Another important neighborhood institution is the political institution, which includes the degree to which neighborhoods can maintain law and order, and are safe from violence. In

particular, neighborhood affluence fosters the presence of police protection. Highly violent neighborhoods represent the emergence of illegal forms of making a living, particularly when legal means are less available. But does the presence of violence in the neighborhood filter down to affect children in any major way? Substantial prior research suggests that this is the case (Guerra, Huesmann, & Spindler, 2003; Lorion & Saltzman, 1993). Research on the issue has not been systematic, and further empirical investigation is needed.

A related question is whether the presence of large numbers of single men and mothers living alone in the community might dilute the quality of community networks, or might pose a separate influence from that of each individual child's family structure. Schwartz (2008) concluded that higher rates of single men were correlated with higher levels of both female and male violence. It may be that large numbers of single men in a neighborhood might constitute a demographic that in itself creates the neighborhood conditions that ultimately lead to neighborhood violence, thus serving as an independent influence. It was Wilson's thesis (1996) that male unemployment leads to a lower marriage rate, which increases the crime rate. Sampson (1987) found that the effect of Black adult male joblessness on Black crime was mediated largely through its effects on family disruption, even after controlling for income, region, race and age composition, density, city size, and welfare benefits. He also found similar effects of White family disruption on White violence.

Individual-Level Controls

Substantial research has already established the importance of family characteristics to the development of child aggression. Particularly salient factors are family socioeconomic status, how conflict between child and parent is managed, the presence of severe discipline, and family structure (Gershoff, 2002; Vaden-Kiernan, Ialongo, Pearson, & Kellam, 1995). Because these variables may covary with neighborhood variables, it is prudent to include them in the models as controls so that neighborhood effects are not exaggerated. Considerable prior research has identified that family income is a strong, inversely related predictor of aggressive behavior. Poverty in particular is detrimental to the development of socially adaptive behavior. Affluence allows a family to invest in stimulating environments, influence whether the child attends quality schools, and establish residence in safe neighborhoods. Prior research also has focused on the effects of living in a family with only a mother as the adult, with some studies finding that child aggression is related to living in a mother-alone family. This suggests that families with two or more adults are more able than are single adults living alone to monitor the child's actions and behaviors and thus reduce maladaptive behavior.

Gender Differences in Neighborhood Effects

The question of whether neighborhood characteristics have differential effects on the development of aggression among boys and girls has not received extensive study by the research community, possibly because boys have higher rates of aggressive behavior than girls and thus are more likely to be the subjects included in the research. Ideas sometimes advanced to argue for differential effects include the notion that different cultural expectations for boys and girls lead to gender differences, and that these expectations may themselves differ by neighborhood ethos. It also has been suggested that competent, assertive, and initiating behaviors may be more expected of males, and nurturing and cooperative behaviors expected of girls, consistent with traditional gender role norms.

Boys may be influenced by peer groups or gangs that reflect the economic patterns of the neighborhood (Beyers et al., 2003). Girls' experiences in gangs appear to be similar to those of boys, although girls may have lower rates of illegal actions (Carlson & Grant, 2008;

Deschenes & Esbensen, 1999). However, these studies have found that boys in disadvantaged neighborhoods are more likely to be exposed to violence and to be victims of violence, which might contribute to higher rates of male aggression. It also has been argued that family treatments of boys and girls such as restrictions on mobility outside may differ according to the conditions in the neighborhood.

Research Aims

This study examined the effects of neighborhood characteristics on the development of aggressive behavior of 1409 Baltimore boys and girls from the Baltimore Prevention and Education Program Study during the course of their early and middle school years. We used multilevel analyses to model the impact of neighborhood context on the child aggression trajectories while controlling for the impacts of family-level factors. Three research questions guided the empirical analysis of the relationships among resources and the development of child aggression. (a) Do neighborhood institutional resources affect the presence of aggression in the first grade, and continue to have influence as the child grows older? We expected to find that the higher the level of neighborhood employment and income, and the lower the level of neighborhood violence and unmarried adults, the less aggressive behavior there will be in first grade and the less it will increase over time. (b) Do the neighborhood institutional resources vary in the strength of their possible influences on child aggression? We expected to find that the economic dimensions of the neighborhood are more influential than the family structure variables. (c) Do neighborhood effects on child aggression differ depending on the gender of the child? We expected to find that the aggression of boys living in the more violent and poorer neighborhoods would increase over time more than the aggression of girls, and that neighborhood effects would be greater for boys than for girls.

METHOD

Analytic Strategy

We used multilevel analyses to model the impact of neighborhood context on the child aggression trajectories of the 1,409 Baltimore boys and girls, while controlling for the impacts of family-level factors. First grade boys and girls were selected from those in a large urban community, and measured annually through their seventh grade school year through surveys of the children themselves at each time point, school records, and interviews with teachers and parents. The neighborhood data came from census tract data. The multilevel, longitudinal analyses were approached first through an investigation of the effects of each neighborhood variable on child aggression, controlling on three family-level variables. Separate analyses were conducted for boys and girls to investigate similarities and differences in the neighborhood effects by gender.

The dependent variables were the intercept and trajectory of child aggression over time. The analyses modeled the level of child aggression at first grade (the intercept) as well as the change in level of aggression between the first and seventh grade (the slope). Independent variables were included at both levels. At the family level, the control variables were the child's family income, the severity of parental discipline the child experienced, and the family structure in which the child lived, all of which have previously been shown to be related to the development of child aggression. At the neighborhood level, five neighborhood independent variables were examined: neighborhood income, male employment, violence rate, percentage of single males, and percentage of female-headed households, all picked because of their salience according to prior research, and because of their value as proxies for the economic, political, and family social institutions.

Because all of the neighborhood variables are highly intercorrelated and thus prone to computational difficulties due to multicollinearity, each neighborhood variable was analyzed in a separate equation. This represents a departure from the dominant practice in prior investigations, which usually have formed indices such as neighborhood disadvantage as their measures of neighborhood characteristics. Such clustering of variables into indices has been justified by the suggestion that it reduces error and facilitates computation. But on the other hand, it may also conceal possible separate and differential effects of the indexed items. For example, is neighborhood poverty a more powerful influence than neighborhood violence? Although the two are correlated, it would be instructive to see if the strength of their effects differ. Such a question cannot be answered if the two items are merged into a single index. The first set of analyses presented in Tables 1 and 2 examine what is the relationship of each one of these neighborhood factors to the initial level and course of aggression, adjusting only for the family-level factors.

Following these analyses, the results were used to design a path model of the direct and indirect relationships among the neighborhood variables leading up to their impacts on child aggression. The path analysis explored how neighborhood institutions may relate and reinforce each other. It models direct effects of neighborhood employment on neighborhood violence, and indirect effects through its relationships to neighborhood income and neighborhood family structure distribution. Neighborhood violence is then hypothesized to directly affect the growth of child aggressive behavior over time. To construct the desired paths, we assumed that employment affects income, and that income negatively affects neighborhood violence. Part of the justification for these assumptions rests on prior research indicating that when there is little available income in a neighborhood, the likelihood is higher that residents may turn to illegal activities involving force. We also assumed that employment is negatively related to family structure because unemployment reduces marriage incentives.

Sample

The participants included 701 boys and 708 girls from 62 census tracts in Baltimore who entered the study in first grade. The child and family data were drawn from the first Baltimore Prevention and Education Program's ongoing randomized field trial and longitudinal follow-up of two classroom-based, universal preventive intervention trials (Kellam et al., 2008; Petras et al., 2008). The trials were fielded in 19 Baltimore City Public Schools with two consecutive cohorts of first graders in 1985–1986 ($N_I = 1196$) and 1986–1987 ($N_{II} = 1115$), with yearly follow-ups through 2000. The five geographic areas in which the participating schools were located were deliberately chosen to vary by ethnicity, type of housing, family structure, income, unemployment, violent crime, suicide, and school dropout rates. Within each area, three schools were matched and then randomly chosen to receive one of two interventions or to be a control school without an intervention. Because our study focuses on the role of neighborhood without classroom intervention, we used data only from those classrooms wherein children were not assigned to the intervention.

Measures

All measures of neighborhood characteristics came from the 1990 U.S. Census STF3A data files, except for neighborhood violence, which came from police records. The 1990 census data were collected midway through this study period and were never more than 4 years distant from the time these children's aggression scores were recorded. Each child was linked to a census tract using the child's address in each grade.

The dependent variable: Teacher-rated aggression—The interview used the authority acceptance scale of the teacher observation of classroom adaptation–revised

(TOCA-R; Werthamer-Larsson, Kellam, & Wheeler, 1991), which is a summary measure of each child's adequacy of performance on the core tasks in the classroom as defined by the teacher. Teacher reports of aggressive behavior have been found to correlate highly with students' self-reports, and to be equal or better at predicting delinquency than are parent and student self-reports of aggressive behavior (Lochman, 1995).

The aggression scale includes 10 items reflecting aggressive behavior and disobedience (starts fights, harms others, yells at others, lies, teases classmates, is stubborn, breaks rules, breaks things, harms property, and takes others' property.) Initial measure development on 200 first-grade children revealed internal consistency of the aggression subscale to be $\alpha = .92$. The TOCA-R aggression scores correlated .41 with disciplinary removals and suspensions in sixth grade. Additional factor analysis of the items in the TOCA-R aggression scale revealed two factors: TOCA-A, interpersonal aggression that basically measured how children interact with each other; and TOCA-B, property aggression, basically measuring property violations. We selected TOCA-A as our measure of aggression, using the first seven scale items (starts fights, harms others, yells at others, lies, teases classmates, is stubborn, breaks rules). All aggression scores were log transformed (with base 10) to reduce skewness and nonnormality.

Neighborhood context variables—The measures of neighborhood characteristics came from 1990 U.S. Census tract data. The variables were obtained for the child's first grade tract and then were attached to the child records as the measures of neighborhood characteristics. Neighborhood employment is acquired from the 1990 census tract variable "male civilian employment rate," neighborhood economic health from the "median household income," neighborhood family structure from "percent of single males," and "percent female-headed households." Neighborhood violence is based on data collected by the Baltimore City Police Department. It is the rate of aggravated assault crimes committed between 1989 and 1992 known to the police in each census tract per 1000 residents.

Family and individual-level variables—These variables came from school data and interviews with parents. Lunch status has been found to have a strong relationship to other measures of child socioeconomic status and to have low rates of missing data. Thus, it is one of the best measures of family income for low-income child populations (Ensminger et al., 2000). The family income latent variable was formed by modeling input from all of the seven indicators of the child's school lunch status, taken when the children were in each grade. Each year the Baltimore City Public School System provided data on whether children qualified for free or reduced-fee lunch programs at school. Children from families with incomes at or below 130% of the poverty level were eligible for free meals. Those with incomes between 130% and 185% of the poverty level were eligible for reduced-price meals. Children qualifying for the free lunch program were coded as 1, those qualifying for the reduced lunch program were coded as 2, and those who did not qualify for either free or reduced lunch were coded as 3.

The individual-level measure of family structure coded children as 1 if in the fourth and sixth grades they lived in a family with only a mother present, and as a 0 if they lived in any other form of family structure (e.g., with a father or another adult present in addition to the mother). The measure of family physical discipline was based on questions asked in the Grade 6 parental interview about management and discipline skills and practices. Four open-ended questions asked how the parent responds in a situation where a child lies, sasses, fights siblings or peers, or violates curfew. The responses to these open-ended situational questions were coded into 80 different wordings used for punishment, which then were recoded into the following five common categories identified by factor analysis: the parent discusses the issue with the child; the parent uses physical violence of some kind; the parent

has a verbal outburst of yelling or scolding; the parent withdraws privileges for a specified time, and the parent ignores or gives in. Each category of punishment was coded as 1 if the parental response was mentioned in the situation and 0 if the parental response was not mentioned. The physical discipline variable was created by totaling the situational scores indicating physical punishment, with a score of 0 indicating that physical discipline was never mentioned for any of the four situations, and a score of 4 indicating that the parent mentioned physical discipline as a punishment given in all four situations.

In earlier models, the child's race was included as a predictor variable at the individual level. The zero-order correlations of race with the seven aggression measures were low (between .08 and .13), but statistically significant. However, in all the full models race was not related to child aggression at first grade nor was it related to changes in levels of child aggression over time. We also did not find any significant interactions involving race. Subsequently, it was dropped from all analyses because it did not add predictive value to the model.

Neighborhood measures and child residential mobility—To assess the degree of residential mobility of the children in our data set and the likely impact that mobility might have on the study results, we examined the degree and type of mobility experienced. We found that 51% of the children lived in the same neighborhood in the seventh grade as in first grade. For the others, to estimate the similarity of neighborhoods when a move occurred, we first ranked the neighborhoods based on the sizes of their median income. The ranking then was divided into quartiles. A new variable was created that measured the difference between the neighborhood income quartile where each child lived while in the first grade and the neighborhood income quartile of where he or she lived during the seventh grade. The results indicated that in the seventh grade, 63% of the children lived in neighborhoods within the same quartile as they did in the first grade. Thirty percent moved to a neighborhood within the next lower or higher quartile. Seven percent moved to a neighborhood two or three quartiles greater or smaller in median income than their first grade neighborhood. To assess whether such movement might affect the trajectory of aggression after the first grade, we inserted the mobility change variable into the Mplus models. The results indicated that the mere fact of residential mobility between first and seventh grade was not related to the trajectory of child aggression. Additionally, movement to a seventh grade neighborhood with a median income one or more quartiles different from the first grade neighborhood also was not related to any change in aggression. These analyses suggest that measuring the child's neighborhood on the basis of the characteristics of the neighborhood when the child was in first grade does not introduce significant error due to mobility effects.

Statistical Methods

Multilevel modeling using longitudinal data relies on latent growth models that examine the development of individuals on one or more outcome variables over time. Latent growth modeling can be used to investigate change in the dependent variable over time, as well as the interindividual variability in this change. It also allows investigation of the relation of covariates to the patterns of growth. A latent growth model treats repeated measures of a dependent variable as a function of time and other measures. The relative standing of an individual at a specific time point is seen as a part of an underlying process, the parameter values of which vary randomly across individuals.

All multilevel and latent growth analyses were run using Mplus 5.2 (Muthén and Muthén, 2007). Model fit was evaluated using overall fit indices including the Tucker-Lewis Index (TLI), the comparative fit index (CFI), and the root mean squared error of approximation (RMSEA). The following fit index cutoff values indicate good-fitting models with

continuous outcomes: RMSEA < .06, TLI > .95, and CFI > .95. Individual coefficients were tested using sandwich-type robust standard errors (Muthén & Muthén, 2007).

For a baseline measurement, we fitted linear growth models of the trajectory of child aggressive behavior during the first through seventh grades, without the control and neighborhood variables present. The seven repeated measures of aggressive behavior were modeled using two latent growth factors: the intercept (initial value), and the linear slope (trajectory) of aggression over time. Then, to determine whether there was any effect ensuing from neighborhood characteristics, a preliminary null multilevel model of the child aggression trajectories was fit. It modeled the aggression intercepts and slopes for both the individual and neighborhood levels, without covariates.

The next step was to examine how the trajectories were affected by family and neighborhood characteristics. The latent intercepts and slopes were predicted at the individual (within) level and also at the neighborhood (between) level. We fixed the variances of the neighborhood-level intercepts (which were small and nonsignificant) to zero, a modification that allowed identification and computation of the models.

Intraclass correlations (ICCs) were produced that gave the proportion of the total variance in aggression that occurs between neighborhoods. The seven aggression measures taken in each year between first grade and seventh grade produced ICCs ranging from .042 to .110 (average = .08), indicating that between 4 and 11% of the variance in child aggression scores occurs at the neighborhood level. The design effect for an ICC of .11 is 2.19, indicating that an analysis that does not take neighborhood characteristics into account would be misspecified. Both of these results identify sufficient heterogeneity among the neighborhoods to require a multilevel model.

Missing Data

There are no missing data at the neighborhood level among the 79 census tracts in Baltimore City. Missing data do exist for the child measures. By seventh grade, 70.1% of the children who were enrolled in first grade at the time of the first teacher ratings were still in the study. Ialongo, Edelson, and Kellam (2001) compared the characteristics of children with complete data at fourth, sixth, and eighth grades and found that there were few differences in the characteristics of the children with complete data across those years. However, children with complete data were more likely to be African American and to have received free lunch in the first grade. The Mplus software program uses full maximum likelihood methods that treat the longitudinal data as missing at random (MAR), meaning that missingness does not depend on the value of the dependent variable after controlling for another variable (Muthén & Muthén, 2007), and it has become widely accepted as an appropriate way of handling missing data.

Descriptive Statistics

As expected, boys exhibited higher average aggressive behavior than did girls at all time points, and the standard deviations are modestly higher for boys than for girls. About 73% of the children were African American; nearly all the remainder were Caucasian. About 30% of the children lived in mother-alone households in Grades 4 and 6. The mean for physical discipline was about .18 on a 5-point scale, indicating relatively low frequencies of the use of physical discipline overall. The average neighborhood income was lower-middle in size (based on a 1990 average of \$24,000). Two thirds of the children were from neighborhoods with median incomes from \$16,000 to \$32,000, and one quarter of the children lived in communities with median income similar to that of the United States. The total range of

median income was from \$4,950 to \$39,480, indicating that some of the neighborhoods were predominantly middle-class, while some others were extremely poor.

The distribution of children across the neighborhoods is close to ideal for multilevel modeling, with ample neighborhoods to model their characteristics, and enough children in most of the neighborhoods to provide adequate sample sizes. Twenty boys and 19 girls who were the only children in the original sample to live in their neighborhood were eliminated from the analysis. At first grade, the remaining 1409 girls and boys lived in 59 and 62 Baltimore census tracts, respectively. The average cluster size was 11.

RESULTS

The Multilevel Growth Modeling Results

The relationships between the growth trajectories of child aggression over the course of early education (Grades 1 to 7) and the individual- and neighborhood-level predictors were calculated in multilevel structural equation and growth modeling. The main analyses for boys and girls are presented in Tables 1 and 2. Column 1 contains the results of a baseline within-level model showing the effects of the child and family covariates on the intercept and slope of the development of child aggression between Grades 1 and 7. Columns 2–6 give the results when the between-level neighborhood variables are individually modeled while controlling for the within-level measures.

All models fit the data very well, with CFIs and TLIs above .95 and RMSEAs below .05. The R-squares for the gender-specific models indicate that in general, the individual-level variables account for about 7–8% of the variation in the first-grade aggression scores (the intercept) and 13 to 23% of the variation in the growth in aggression scores between Grades 1 and 2. For the neighborhood-level aggression slopes, the R-squares indicate that around 48–99% of the variation in neighborhood levels of change in child aggression between Grades 1 and 7 are accounted for by the modeled neighborhood characteristics.

Neighborhood Effects

Effects at first grade—For boys, none of the neighborhood characteristics are related to child aggression levels at first grade. For girls, there are mild positive effects of neighborhood male employment and neighborhood median income, indicating that first grade girls in the more advantaged neighborhoods are a little more likely to show aggressive behavior than those in the less advantaged neighborhoods. By second grade, the difference in girls' aggression by neighborhood income disappears.

Effects on the trajectory of aggression between first and seventh grades by gender—For boys, all neighborhood characteristics are significantly related to the trajectory of aggression over time. Regarding the direction of the relationships, high levels of male employment and median income are related to lower levels of aggressive behavior over time, while high levels of neighborhood violence and percentages of single males and female-headed households are related to an increase in aggressive behavior. The strongest of the neighborhood characteristics is neighborhood violence, closely followed by neighborhood income.

For girls, all neighborhood characteristics are related to the trajectory of aggression. The relationships are similar in their direction to those of the boys. However, the standardized coefficients are higher and more robust than those for the boys, and the percentage of single men and mother-alone families rival neighborhood violence as providing the most explanatory power, as shown by sizes of their standardized coefficients and significance

levels. With regard to the third research question regarding differential neighborhood effects, these results suggest that the neighborhood influences on the development of aggression may be slightly different for boys and girls, with neighborhood violence showing a stronger effect on the boys. These results also address the second research question regarding how neighborhood institutional resources may vary in their impacts, indicating that for boys violence has the greater direct effects, while neighborhood family structures have the greater impacts on girls. For both, male employment has the least direct effect.

A graphic portrayal of the level of child aggression in neighborhoods differentiated by different levels of neighborhood violence is portrayed in Figure 1. This figure shows both gender differences and trajectory differences by violence of neighborhoods. (High violence neighborhoods were defined as the one third of the neighborhoods with the highest rates of violence, and low violence neighborhoods comprised the remaining two thirds of the neighborhoods.) Although the levels of aggression at first grade by neighborhood type are fairly close together, they spread out over time. More aggressive boys increase in aggression if they live in violent neighborhoods, whereas lower aggressive boys remain about the same if they live in lower-violence neighborhoods. The slightly more aggressive girls at first grade who live in lower violence neighborhoods become less aggressive by second grade. The slightly less aggressive girls at first grade who live in high violence neighborhoods tend to increase in aggression over time. For both boys and girls who increase in aggression over time, much of the change occurs after the second grade and reaches a peak in fifth grade.

Control Variable Effects

Child's family income—At first grade, all the models for boys and girls indicate that family income measured at the individual level has a negative relationship to first grade child aggression. This relationship is stronger for boys than for girls. Individual family income continues to have a modest impact on the growth of aggression after the first grade, as indicated by the coefficients for the within-level slopes. For both boys and girls, family income at the within-level is less predictive of the aggression slope when the neighborhood variables are included in the models.

Child's experience of physical discipline—For boys, higher frequencies of physical discipline are strongly related to higher levels of aggressive behavior at first grade. For girls, the relationship exists as well, but the sizes of the coefficients are lower than for boys. However, family physical discipline does not explain the increases in the slope of aggressive behavior for either boys or girls.

Child's family structure—Contrary to our expectations, the results do not indicate that children in mother-alone families are more likely than children in the comparison families to have higher aggression scores at first grade. Likewise, the child's family structure shows no relationship to the change in aggression scores over time for either boys or girls. Perhaps this nonfinding is due to the way we constructed the family structure variable (mother-alone scored as one and all others scored as zero). Prior research using a similar sample found that mother-alone families had fewer adaptive first grade children than any other family type, whereas families with two or more stable adults (but not a stepfather) had adaptive first grade children (Kellam, Enslinger, & Turner, 1977). Comparing mother-alone with other types that include both adaptive and nonadaptive family structures might conceal how being in a positive stable two-adult family versus a negative mother-alone family or a stepfather and mother family could influence child development.

Gender Differences

A comparison of the aggression intercepts and slopes by gender indicated that boys as compared to girls had higher levels of aggressive behavior at first grade and increased more in their aggressive behavior over time. The mean difference in the intercept for girls compared to boys was $-.204$ ($SE = .023$; $p < .001$). The mean difference in slopes for girls compared to boys was $-.013$ ($SE = .005$; $p < .01$). Nevertheless, increasingly aggressive behavior over time is a characteristic of those girls who live in high-violence neighborhoods.

With reference to which neighborhood characteristics affect boys versus girls, there are remarkable similarities. For the most part for both girls and boys, (a) neighborhood characteristics do not have noticeable effects on the level of aggression at the first grade (the intercept), but (b) almost all neighborhood characteristics are related to the development of aggression over time (the slope); and (c) the strongest neighborhood effects are neighborhood levels of violence, median income, and employment, in that order. There are several exceptions to these generalizations that should be noted. There is a small effect of neighborhood employment and income on first-grade girls' aggression, and the effects of the neighborhood family structure variables on the girls' aggression slope are stronger than the effects on boys.

The Path Analysis Results

Figure 2 presents the results of the path model. In the upper portion of the figure, neighborhood violence is the only path to the dependent variable, child aggression at the neighborhood level. This is because neighborhood violence was found in the earlier multilevel modeling to have the strongest effect of all the neighborhood variables on the increase in aggressive behavior over time (and especially for boys). The neighborhood level of employment is modeled as affecting neighborhood violence both directly and also indirectly through its effect on neighborhood median income and the percentage of single men or percentage of mothers living alone, which are modeled as having their own effects on neighborhood violence. The fit statistics indicate that these models fit the data well.

In Figure 2, the standardized coefficients are indicated along the path lines (top figures are for boys, bottom figures are for girls). Both direct and indirect paths are presented. Two path analyses were calculated for each gender, with one using the percentage of single men in the neighborhood as a measure of neighborhood family structure, and the other using the percentage of female-headed households. The figure portrays only the model that includes the percentage of single men because the results for these path models are very similar. As expected, the results indicate that the path from neighborhood violence to the increase in the neighborhood's level of child aggressive behavior is very high and statistically significant (the standardized coefficient for this path is $.940$ for boys and $.983$ for girls).

For boys, the direct path from male employment to neighborhood violence is small ($.101$ for boys, and $.172$ for girls). However, the coefficients for the indirect effects of employment to neighborhood violence are highly significant (the standardized coefficient is $-.829$ for boys and $-.911$ for girls). These results suggest that the neighborhood level of employment does have a powerful effect on neighborhood violence, but mainly as it operates through its impact on other characteristics of neighborhoods. For example, as shown in the diagram, the indirect effects in the boys' models occur through the paths to household income (standardized coefficient = $-.394$) and percentage of single men in the neighborhood (standardized coefficient = $-.435$) or percentage of female-headed households (standardized coefficient = $-.582$).

DISCUSSION

We now have good evidence that there are two important and parallel sources of aggression. First are those conditions such as family discipline and family economic wellbeing that exist in early family and preschool environments, thus affecting early child behavior. These have been the object of study of much prior research on antisocial behavior among children. Second are the conditions in the neighborhood that affect the child as he or she proceeds through elementary and middle school education. Those neighborhood conditions that are especially encouraging to the growth of the aggression of both girls and boys over time include neighborhood levels of neighborhood violence, economic stress, and unstable and insufficient family structures in the neighborhood. These do not manifest in first grade, but grow over time, particularly during the transition into middle schools. No interactions were discovered between these two sources of influence on the child's developing aggressive behavior. Such findings strongly suggest that early childhood experiences are independent and different from the neighborhood sources of aggression that we have identified.

The Importance of Employment Opportunities to Income and Family Structure

A surprising finding of the study was that family structure appeared as an influence on the aggression trajectories at the neighborhood level rather than the individual level. In turn, the path analyses suggest that the fracturing of family structure is highly influenced by the degree of employment opportunities available to neighborhood residents. A shortage of jobs for men and the accompanying loss of income may make it more difficult for them to support a family, and render marriage to them less attractive or essential to women (Sampson, Morenoff, & Raudenbush, 2005; Tucker & Mitchell-Kernan, 1998). In this interpretation, the presence of many single men and mothers living alone is symptomatic of a neighborhood that is economically unhealthy. The lack of employment opportunities thus elevates the numbers of single men and female-headed households, which then may, in turn, contribute to a maladaptive contextual social climate in the neighborhood.

At the same time, the shortage of legal jobs may lead to the growth of illegal ways of making a living, which then may elevate the rates of violence in the neighborhood. It has previously been found that employment scarcity and declining wages in the legitimate sector often lead to the growth of an underground economy such as drug trafficking, and that often promotes violence (Huizinga, Loeber, & Thornberry, 1995; Shihadeh & Steffensmeier, 1994; Strom & MacDonald, 2007). Hamid (1990) emphasizes that income generation is vital for the functioning of a neighborhood, and poverty-stricken communities may become dependent on a drug economy. For example, when drug trafficking is well developed in a neighborhood, everyone—drug users as well as drug sellers—becomes viewed as a worker whose income enables him or her to perform vital functions for the overall neighborhood.

Illegal activities often promote violent acts. The lack of access to job opportunities and to the sustaining income it provides thus is an important risk factor for the emergence of violent behavior among youth (Huizinga et al., 1995). In this way, conditions exist that socialize and induct some neighborhood children into the illegal labor market where they learn and participate in its accompanying violence. As children and adolescents become oriented toward peers, they may come to desire the status, prestige, and security that accompany a successful career in the illegal economy (Bourgois, 1995). Communities thus set examples for children to follow, serving powerful socialization functions and impacting the child's orientation toward school.

This interpretation implies that a neighborhood that has a serious deficit of economic resources takes on new characteristics based upon survival techniques. Our findings suggest that the economic underpinnings of neighborhoods matter deeply because the demise of a

viable economic structure in a neighborhood contributes to the neighborhood poverty and violence that ultimately involve the children, and accelerates the adoption of aggressive behavior.

Strengths and Limitations of the Study

Strengths of the study include the use of multilevel modeling and longitudinal data, both contributing to the study of aggression trajectories over time. The analysis of longitudinal data using structural equation modeling, latent growth modeling, and multilevel modeling techniques produce more reliable estimates of complex contextual effects than other methods that are unable to deal with correlated errors, multiple measures of a concept, path analyses, or change over time. Our findings also suggest the importance of using statistical methods that can separate the effects of nested domains such as families residing within neighborhoods. Other strengths include the availability of 62 neighborhoods for the neighborhood clustering; the use of multiple sources of data (children, teachers, parents, census, and police); and the use of data on both boys and girls. Models with these multiple features are very limited in the current literature.

One limitation is that several variables were not measured for each year of the study. The neighborhood measures are based on 1990 data and were used as proxies for neighborhood characteristics between 1985 and 1993. Although neighborhoods tend to have considerable stability over time, some changes may have taken place between 1985 and 1992. In addition, for the family structure and physical discipline variables, the data were collected on families only for the fourth and sixth grade surveys. (However, the family income data were collected every year.) A second limitation is that we were not able to include multiple neighborhood variables simultaneously, due to the multicollinearity of the neighborhood data. We substituted a path analysis that was able to present multiple measures of neighborhood characteristics, but only in an assumed sequence of paths. Finally, a third issue concerns the generalizability of the findings. Because the data are drawn from a well-specified population of all first graders from specific urban neighborhoods followed over time, the findings may not be applicable to all other populations. Future research would be useful for comparison.

Implications for Future Research

These findings highlight the importance of the neighborhood context in the shaping of child personality and mental health. Poor, violent neighborhoods are not simply containers for poor, violent people, but have their own structures and organization that encourage an increase in children's aggressive behavior. Research that can elucidate how structural features such as employment, poverty, or neighborhood violence may impact on children will make a valuable contribution to our understanding of child development. Additional neighborhood measures of institutional supports that might be useful to study include educational and schooling patterns, religious organizational strength, availability of community gathering places and shops, loan opportunities, after-school programs, welfare practices, and transportation to employment sites.

The findings have implications for prevention-oriented research projects. Sources of aggression manifested by children in first grade have been shown to be malleable through preventive interventions carried out in classrooms and in families, as we have cited earlier in this article. If prevention research investigates the effects of neighborhood economic and political institutions and other community characteristics on child aggression, potential targets for prevention policies are doubled. Together, these two sources of aggression have great importance to later problem behaviors, and thus inform the nature of comprehensive programs preventing drug abuse, violence, and other major problems facing our society

(Kellam et al., 2008; Petras et al., 2008). The findings also make a case for increased study of the specific mechanisms whereby neighborhood characteristics influence child development. Research that could further elucidate how structural features of our society such as employment, poverty, or neighborhood violence may impact on the development of children would make valuable contributions to our understanding of the processes of child development.

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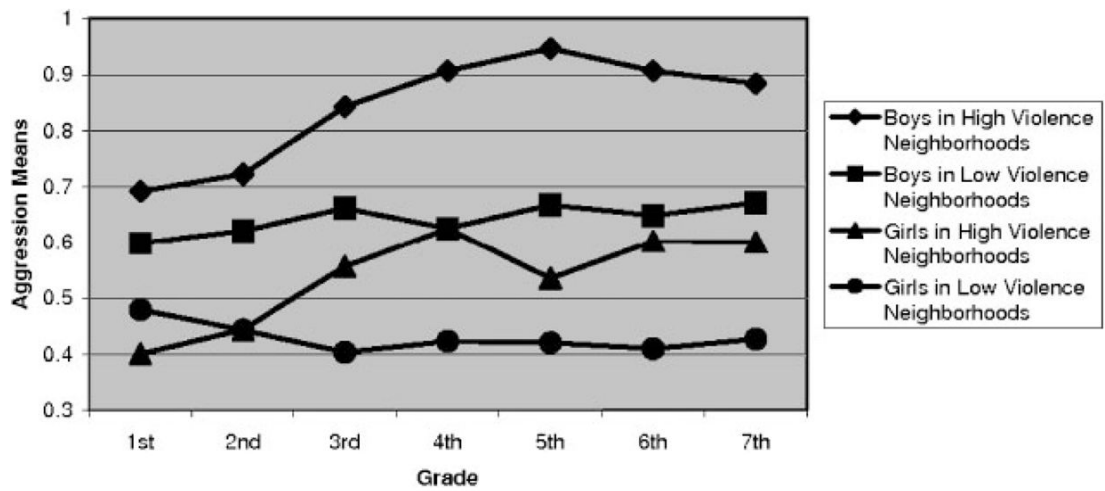


Figure 1. Aggression Trajectories of Boys and Girls in High and Low Violence Neighborhoods, Grades 1–7.

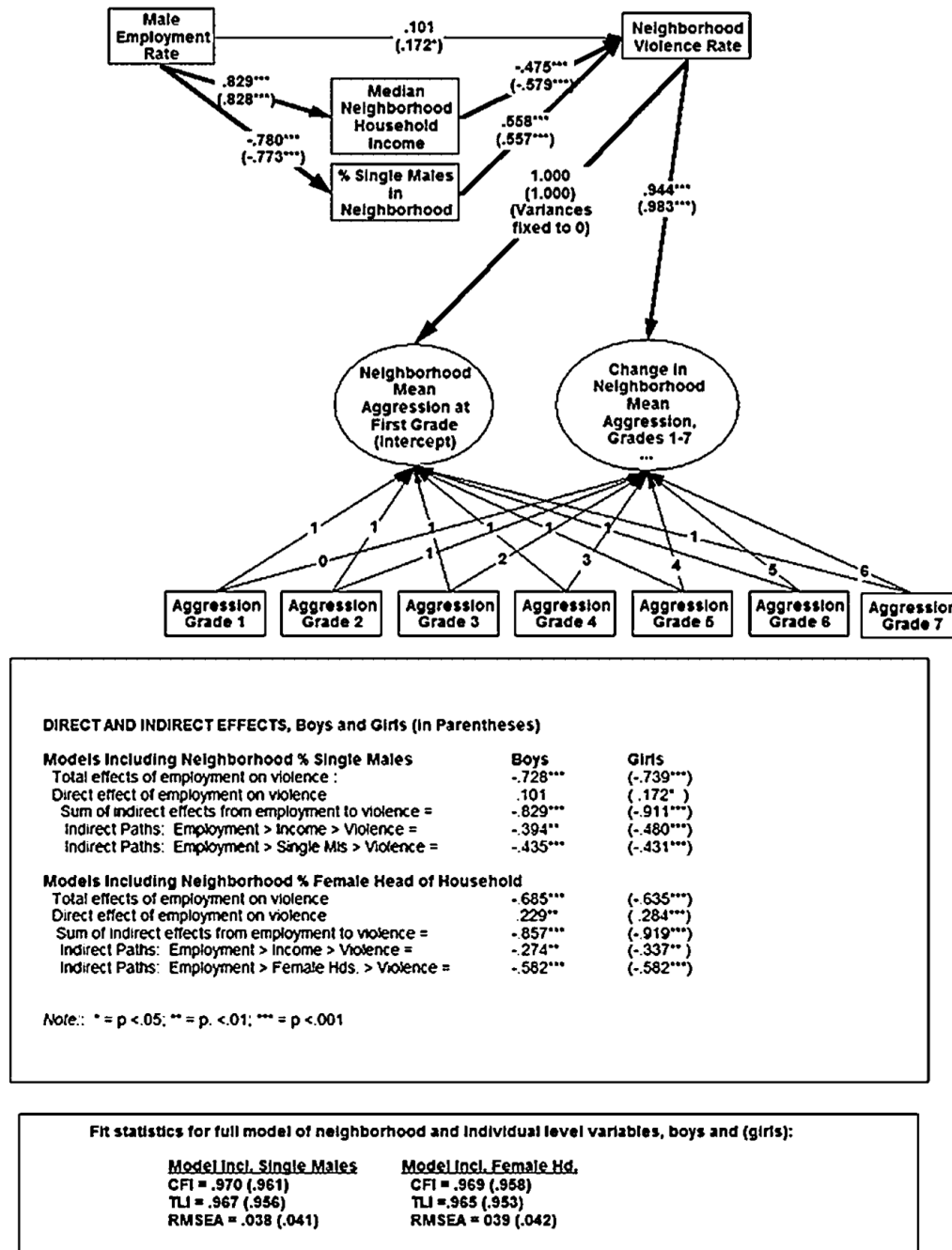


Figure 2. Path Model of Neighborhood Effects on the Origin and Development of Interpersonal Aggression, Standardized Coefficients, Boys and Girls (in Parentheses) (Individual-level Effects were Modeled but are not Displayed).

Boys: Neighborhood Effects on Interpersonal Aggression Coefficients and Standardized Coefficients (in Parentheses), 701 Boys and 62 Neighborhoods

Predictors of Aggression	Single-level model (1)	Nei. % Single Male (2)	Nei. % Female Head (3)	Nei. Male Employment (4)	Nei. Median Income (5)	Nei. Violence (6)
<i>Individual-Level Predictors</i>						
<i>Child Aggression at First Grade (Intercept)</i>						
Family Income	-.122 (-.211)**	-.114 (-.200)*	-.117 (-.205)*	-.139 (-.241)**	-.132 (-.229)**	-.116 (-.202)*
Family Structure ¹	.009 (.010)	.008 (.009)	.006 (.007)	.009 (.010)	.010 (.011)	.003 (.003)
Physical Discipline ²	.206 (.148)**	.212 (.154)**	.215 (-.156)**	.216 (-.156)**	.216 (.156)**	.214 (.156)***
<i>Change in Aggression of Children Between 1st 7th Grade (Slope)</i>						
Family Income	-.033 (-.379)***	-.019 (-.336)*	-.020 (-.243)*	-.019 (-.247)*	-.018 (-.230)~	-.018 (-.228)*
Family Structure ¹	.013 (.101)	.010 (.068)	.009 (.082)	.009 (.079)	.008 (.069)	.009 (.072)
Physical Discipline ²	.001 (.003)	.001 (.001)	-.000 (-.008)	.000 (.002)	-.001 (-.004)	.000 (-.002)
<i>Neighborhood-Level Predictors</i>						
<i>Aggression of Neighborhood Children at Grade One (Intercept)</i>						
		.056(1.00)	.017(1.00)	.009(1.00)	.006(1.00)	.120(1.00)
<i>Change in Aggression of Neighborhood Children Between 1st and 7th Grade (Slope)</i>						
		.043(739)***	.014(760)**	.011 (-702)***	-.033 (-.824)***	.102 (.944)***
Chi-Square/df	168.7/109	286.83/148	285.18/148	281.47/148	280.87/148	289.51/148
CFI	.987	.975	.975	.976	.976	.975
TLI	.984	.972	.972	.973	.973	.972
RMSEA	.028	.037	.036	.036	.036	.037
<i>% of Variance Explained (R2)</i>						
Within-Level Intercept	.084**	.066*	.068*	.085*	.080*	.066*
Within-Level Slope	.279***	.224**	.231**	.218*	.214*	.224**
Between-Level Intercept (set to 0)		1.000	1.000	1.000	1.000	1.000
Between-Level Slope		.546	.577	.493*	.680**	.892*

NOTE:

~ $p < .06$;

* $p < .05$;

¹ $p < .01$;

² $p < .001$.

¹Mother alone = 1; all other combinations = 0.

²High = frequent.

Girls: Neighborhood Effects on Interpersonal Aggression Coefficients and Standardized Coefficients (in Parentheses), 708 Girls and 59 Neighborhoods

Table 2

Predictors of Aggression	Single-level model (1)	Nei. % Single Male (2)	Nei. % Female Head (3)	Nei. Male Employment (4)	Nei. Median Income (5)	Nei. Violence (6)
<i>Individual-Level Parameters</i>						
<i>Child Aggression at First Grade (Intercept)</i>						
Family Income	-.061 (-.122) ~	-.073 (-.146) *	-.075 (-.150) ~	-.104 (-.207) **	-.110 (-.219) **	-.078 (-.156) *
Family Structure ¹	-.011 (-.012)	-.008 (-.009)	-.005 (-.005)	-.007 (-.003)	.004 (.005)	-.004 (-.055)
Physical Discipline ²	.128 (.107) ~	.140 (.116) *	.171 (.142) *	.184 (.152) **	.180 (.149) *	.169 (.139) *
<i>Change in Aggression for Children Between 1st-7th Grade (Slope)</i>						
Family Income	-.029 (-.413) ***	-.014 (-.232) **	-.015 (-.245) **	-.014 (-.235) **	-.011 (-.190) *	-.015 (-.248) **
Family Structure ¹	.000 (-.002)	-.006 (-.052)	-.008 (-.070)	-.007 (-.065)	-.008 (-.075)	-.007 (-.065)
Physical Discipline ²	.003 (.107)	-.003 (-.018)	-.002 (-.013)	-.006 (-.045)	-.006 (-.044)	-.003 (-.018)
<i>Neighborhood-Level Parameters</i>						
<i>Aggression of Neighborhood Children at Grade One (Intercept)</i>						
		-.049 (-1.00)	-.020 (-1.00)	.040 (1.000) *	.124 (1.000) *	-.139 (-1.000)
<i>Change in Aggression of Neighborhood Children Between 1st and 7th Grade (Slope)</i>						
		.069 (.994) ***	.022 (.998) ***	-.015 (-.879) ***	-.051 (-.978) ***	.126 (.978) ***
Chi-Square/df	210.37/109	304.45/148	308.90/148	307.22/148	307.01/148	307.81/148
CFI	.977	.967	.967	.967	.967	.967
TLI	.972	.964	.963	.963	.963	.963
RMSEA	.036	.039	.039	.039	.039	.039
% of Variance Explained (R2)						
Within-Level						
I (intercept)	.029	.034	.042	.065 *	.071 *	.043
S (slope)	.251 ***	.161 *	.162 *	.146 *	.131 *	.167 **
Between-Level						
IB (intercept — fixed to 0 in model)		1.000	1.000	1.000	1.000	1.000
SB (slope)		.987 ***	.997 ***	.773 ***	.957 ***	.956 ***

NOTE:

\sim $p < .06$;

* $p < .05$;

** $p < .01$;

*** $p < .001$.

¹ Mother alone = 1; all other combinations = 0.

² High = frequent.