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School and Behavioral Outcomes Among Inner City Children: Five-Year Follow-Up

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Abstract

Educational achievement is a key determinant of future life chances, but children growing up in poverty tend to do worse by many academic measures. Family, school, and neighborhood contextual characteristics may affect academic outcomes. In an attempt to explore neighborhood and individual level factors, we performed multilevel analyses to explain child's behavioral problems, repeat grade, average math and reading scores. Outcome measures were associated with specific neighborhood characteristics, above and beyond the effect of student/family level factors. The findings warrant further consideration of ecological interventions aiming to improve academic and behavioral outcomes of children living in poverty.

Keywords

Race; Identity; Elementary school; Programs; Achievement Gap; Social; Urban; Social; Academic Achievement; Urban Education

1. Introduction

Growing up in a disadvantaged household affects a child's academic achievement and behaviors (Goebert et al., 2004; Gorman-Smith, Tolan, & Henry, 2000; Jaynes, 2005, 2007; Markham et al., 2003; Murray & Farrington, 2005; O'Conner, Dunn, Jenkins, Pickering, & Rasbash, 2001; Patall, Cooper, & Robinson, 2008; Stanton-Chapman, Chapman, Kaiser, & Hancock, 2004; Woolley & Grogan-Kaylor, 2006). In a recent article published in *Boston Review*, Heckman describes that "the accident of birth is a principal source of inequality in America today." (Heckman, 2012). Researchers have argued that children living in poor economic conditions are disadvantaged from the beginning of their schooling and this gap continues into their adulthood (Duncan, Morris, & Rodrigues, 2011; Duncan, Ziol-Guest, & Kalil, 2010; Lee & Burkam, 2002). For example, poor children are more likely to have lower math and reading skills and to have behavioral problems, compared with children from wealthier families (Chambers, Abrami, Massue, & Morrison, 1998; College Board, 2011; Duncan & Seymour, 2000; Isaacs & Magnuson, 2011; Offord, Boyle, & Jones, 1987; Smith, Brooks-Gunn, & Klebanov, 1997). One potential way in which the effect of living in poor households influences children's academic achievement and behavior may be that parents who experience economic challenges may have difficulty getting involved in the child's school activities and fail to provide adequate adult supervision (Gonzales, Cauce,

Freedman, & Mason, 1996; Laniel, 2003; Roosa, Jones, Tein, & Cree, 2003; Jaynes, 2007; Sampson & Laub, 2008).

In addition, children living in poverty may be disproportionately affected by socially disorganized neighborhood conditions such as crime, lack of access to resources, and other environmental risks (Evans, 2004). While racial/ethnic differences in test scores have been well documented, household and neighborhood disadvantage among racial and ethnic minority students may explain in part the difference in academic and behavioral outcomes (Andreias et al., 2010; Bradley & Corwyn, 2002; Brooks-Gunn, Duncan, Klebanov, & Sealander, 1993; Card & Rothstein, 2007; Cheng & Starks, 2002; Jencks & Phillips, 1998; Orr, 2003; Sampson & Morenoff, 2002).

However, race/ethnicity and socioeconomic status are highly correlated, and the racial differences between white children and minority children could be attributed to differential socioeconomic conditions. In addition, the difference in behavioral and academic outcomes between minority groups needs further evaluation. To do so, we compared the effects of household and neighborhood level factors between African American and Hispanic children who were living in racially segregated poor neighborhoods in Chicago.

Children living in impoverished neighborhoods are more likely to have a lower level of school performance and experience more academic and behavioral problems than their counterparts in neighborhoods with higher average incomes and higher social stability (Andreias, et al., 2010; Ginther, Haveman, & Wolfe, 2000; Gorman-Smith, et al., 2000; Leventhal & Brooks-Gunn, 2000; Sampson, 2003; Sampson & Laub, 2008; Tolan, Guerra, & Kendall, 1995). For example, Crane reported that the higher the proportion of residents with professional, white-collar occupations, the lower the rate of school dropout in the neighborhood (Crane, 1991). Garner and Raudenbush also documented a negative association between neighborhood deprivation and educational attainment (Garner & Raudenbush, 1991). Findings from the Moving to Opportunity (MTO) for Fair Housing demonstration program by the federal Housing and Urban Development confirmed that children's school and behavioral outcomes were associated with neighborhood poverty. When children moved to more affluent neighborhoods, they demonstrated significant improvement in school achievement, physical and mental health outcomes (Goering & Feins, 2003; Leventhal & Brooks-Gunn, 2002; Liebman, Katz, & Kling, 2004; Rubinowitz & Rosenbaum, 2000; Sanbonmatsu, Kling, Duncan, & Brooks-Gunn, 2006). Brooks-Gunn and colleagues also found that children growing up in more affluent neighborhoods performed better on multiple outcomes than children in low-income neighborhoods, even after controlling for family level differences (Brooks-Gunn, et al., 1993).

However, household characteristics often interact with neighborhood contexts (Brooks-Gunn, et al., 1993; Gorman-Smith, et al., 2000; Sampson, Raudenbush, & Earls, 1997; Sheidow, Gorman-Smith, Tolan, & Henry, 2001). Not only do poor families tend to live in disadvantaged neighborhoods, thus are more likely to experience socioeconomic difficulties and/or household adversities such as substance use, incarceration, and violence (Patterson, DeBaryshe, & Ramsey, 1989; Tolan, et al., 1995). Studies have shown that the negative effects of family poverty and other adverse events are even more prominent in poorer

neighborhoods (Jencks & Mayer, 1990; Lippman, Burns, & McArthur, 2004; Sampson, et al., 1997; Wilson, 1987). It may be because neighborhood level stress and constraints contribute to family adverse events, and consequently, families in disadvantaged neighborhoods are more likely to experience a greater level of challenges in raising children (Conduct Problems Prevention Research Group, 1999; Elliott & Tolan, 1998; Elliott et al., 1996; Gonzales, et al., 1996; Spoth, Lopez-Reyes, Redmond, & Shin, 1999; Tolan, Gorman-Smith, & Henry, 2004).

To further examine behavioral and school achievements between African American and Hispanic children who are living in highly disadvantaged urban neighborhoods, we used an ecological approach to describe multilevel contextual factors affecting children's school achievement (Tolan, et al., 1995; Warnecke et al., 2008; Williams, Davis, Saunders & Williams, 2002). The ecological perspective proposes that children's behavioral and social development and school performance are shaped by broader household, school, and neighborhood contexts (Bronfenbrenner, 1986; Jencks & Mayer, 1990; Leventhal & Brooks-Gunn, 2000). The various ecological models address the effects of neighborhood social and economic resources, social capital, social networks, and collective efficacy that define life chances, quality of environment, access to resources, exposure to risks, types of skills, and the various other norms of residents (Berkman, Glass, Brissette, & Seeman, 2000; Gee & Payne-Sturges, 2004; Leventhal & Brooks-Gunn, 2004; Payne-Sturges & Gee, 2006; Sampson, Morenoff, & Gannon-Rowley, 2002; R. Sampson, et al., 1997).

To reflect such multi-level influence on children's behavioral and school outcomes, we created a two-level model including children/household factors nested within neighborhoods. The multi-level model accounts for clustering of individual outcome measures within communities which, in turn, allows for the correlation of error terms within each community (Goldstein, 1995). Figure 1 depicts the conceptual model, which pays attention to the effects of multilevel factors on children's school achievement and behavioral problems and examines the interactions between contextual and individual characteristics.

For this study, we specifically focused on the part indicated with a dashed box in the figure. The study sample included African American and Hispanic children living in poor neighborhoods in Chicago. We explored the effects of household and neighborhood characteristics on children's school achievements and behavioral problems.

2. Methods

2.1. Sample

For the purpose of the study, we utilized data on 424 children which were originally collected for an ongoing longitudinal study (SAFEChildren) of the long-term school, behavioral, and social outcomes of children living in Chicago's poor neighborhoods (Gorman-Smith, et al., 2000; Tolan, et al., 2004; Tolan, et al., 1995). The original study was conducted between 1997 and 2002. Seven Chicago public schools were selected, and children were randomly selected from within the schools. Children were enrolled in the study at the beginning of first grade and followed up with over a five-year study period. Children and their parents who consented to participate in the study were interviewed. The

survey interviews took place approximately every 6 months for a total of seven time points. Parents were asked questions regarding their child's behavior. Teachers were also interviewed regarding their students' school achievement and behavior. Information on students' math and reading scores, as well as whether students had to repeat any grades, were also collected from the school records.

Overall, 95% of the sample families (N=401) completed all five assessments (Tolan, et al., 2004). The original study found that there was no significant difference in attrition based on ethnicity, gender, or other related demographic variables, such as parental education level, occupation, receipt of public aid, and family-relationship characteristics.

2.2 Measures

Dependent variables—We examined four school performance outcomes including: child's math and reading level, grades repeated, and behavioral problems. Math and reading scores were measured in percentile ranks where the higher the percentile, the higher score of the child relative to the students in the group. Percentile ranks range from 1 to 99. Math and reading percentile ranks were measured five times; approximately every year over the study period. The average scores of math and reading percentiles were calculated. Having repeated one or more grades was a cumulative, dichotomous variable which indicated whether the child had ever repeated one or more grades since beginning elementary school. The behavioral problems variable was a cumulative variable. This variable indicates whether a child ever had behavioral problems, received special counseling for behavioral problems, or had taken medications for their behavioral problems.

Independent variables—The demographic characteristics of the families of the children sampled, as well as of the census tracts in which the families resided were included in the study. The children's demographic characteristics were race/ethnicity (African American or Hispanic), gender (male or female), and age at the time of school enrollment. Household characteristics were income, size, adversities, and the presence of a father in the household.

The original household income information was measured as an ordinal variable (<\$10,000; \$10,000–\$20,000; \$20,000–\$30,000; and >\$30,000). We then created three dummy variables for the four categories of household income at intake. The less than \$10,000 category was used as the reference group. The total number of adults and children living in the household was used along with household income to indicate the poverty level. The household adversity variable, which captures factors such as parental use of drugs or alcohol and criminal activities and/or arrests (ever or never), was a dichotomous variable which indicates whether the participant had any adverse household events over the study period. The father living in the household variable was a dichotomous variable indicating study participants who answered that father was present in the same household where the child resided, more than five out of seven surveys (more than 75% over the course of the five-year study period).

In addition, school performance level was included. In our analysis, we compared high performing schools with low and medium level schools (reference category). The variable was created by using the overall performance ratings found on the Chicago Public Schools

(CPS) website (CPS, 2011). The variable for school achievement is determined by the CPS policy manual (Manual, 2010). Chicago elementary schools are ranked into three levels: Excellent Standing (Level 1), Good Standing (Level 2), and Low Standing (Level 3). Schools were ranked based on an average composite score that includes the percentage of students who meet or surpass standards on reading, mathematics, science, and rate of attendance, where each indicator is scored from 0–3 points. If an elementary school gets a score of 30 or above, or achieve at least 71% of the possible performance points, they achieve a Level 1 categorization. For Level 2, they must earn 21–29 points, with at least 50–70.9% of possible points. Any school that achieves less than 20 points or 50% of the possible points receives a Level 3 standing.

Children’s home addresses were geocoded to their census tract, and the tract level census data were included in the analysis. Census tract level community characteristics were the percent of residents with less than a high school education, the percent of people living below poverty level, and the crime rate per 1,000 residents.

We acknowledged that the census tract level variables could be highly correlated; therefore, we conducted a factor analysis on the tract level variables and found that education level exhibited a distinct component while poverty was a separate domain. We consequently chose to use separate variables for the analysis.

The independent variables used in the analyses were tested for potential multicollinearity issues. The variance inflation factor score among independent variables ranged from 5.0 (race/ethnicity of children) to 1.2 (household adverse events), which indicated that multicollinearity issues would not be a significant concern in our analysis.

2.3 Analysis

Descriptive statistics were used to summarize sample characteristics (Tables 1 and 2). We then analyzed a two level hierarchical linear model (HLM): outcome measures of children nested within census tract (Table 3). The multilevel model accounts for clustering of individual outcome measures within communities; this allows for the correlation of error terms within each community (Goldstein, 1995). For the dichotomous outcome variables (repeat grade and behavioral problems), logistic regressions utilizing nonlinear Bernoulli models were specified, accounting for census tract level clustering and controlling for individual-level characteristics. For the continuous outcome variables (math and reading scores), two level linear regressions were modeled (Bryk & Raudenbush, 1992). In all models, only the intercept was treated as random (random intercept model) to explore differences in average measures between communities along with individual variance. To examine the effect of race/ethnicity, we first included race/ethnicity only with the second level intercept (Model I), and we introduced all other independent variables in Model II.

3. Results

3.1. Descriptive Sample Characteristics

Overall, many household and neighborhood characteristics were significantly different by race/ethnicity in bivariate associations (Tables 1 & 2). Outcome measures were also associated with individual student, family, and neighborhood characteristics.

Of the 424 children in the study, 42.5% were African American and 57.5% were Hispanic. Males made up of 48.8% of the sample. The average age of the students was six years old at the time of enrollment (beginning of the first grade). Over 63% of the families reported an annual income of less than \$20,000 at intake. Nearly 31% of families had one or more parental adversities during the study period. Less than 42% of children were consistently living with their father in the same household.

Demographic characteristics were statistically different between African American and Hispanic children. More than 67% of the Hispanic children lived with their father in the same household, compared to less than 14% of the African American children. The average number of individuals in households was 4.6 for African American families compared with 5.3 for Hispanic families. More than 50% of the households of African American children experienced one or more parental adverse events, such as arrest, drug or alcohol use, or other criminal activities while only 15.7% of households among Hispanic children reported one or more parental adverse events. Household income level also differed by race/ethnicity. African American children were more likely to live in households with annual incomes of less than \$10,000 when compared with Hispanic children. Less than 14% of children attended high performing schools, and the majority of these were Hispanic students. Less than 2% of African American children in the study went to high performing schools compared with 23% of Hispanic children.

The participating families resided in 96 census tracts in Chicago. The average census tract characteristics are shown in Table 1. Census tracts in which children in our analysis resided were predominantly disadvantaged areas where the average percentage of residents lived below the poverty line was much higher than the Chicago average, with less than a high school education, in an area with a high crime rate. Children in the sample were living in neighborhoods with high rates of racial homogeneity. The average proportion of Hispanics in neighborhoods among Hispanic children was 76.5% and the average proportion of African American residents among African American children in the sample was 85.4%. The average tract level unemployment was 19% for African American children and 11% for Hispanic children. Conversely, the proportion of residents with less than a high school education was 34% for African American children and 54% for Hispanic children. Crime rate was also significantly different by race/ethnicity. The average crime rate was 196.7 per 1,000 residents for African American students, compared with 113.4 per 1,000 residents for Hispanic students. The average census tract level percent of residents living below the poverty line was 31% for African American children, compared to 22% for Hispanic children.

Table 2 describes the bivariate relationships between the outcome measures by explanatory variables. Overall, the average math score percentile was 40.6 (sd=24.0) and the mean reading score percentile was 38.5 (sd=20.8). Over the five year period, 21.3% of children repeated one or more grades, and 29% of children reported behavioral problems. The average math score percentile was higher for Hispanic children than for African American children (46 and 35 percentile, respectively). The average reading score percentile did not differ by race/ethnicity. The percent of cumulative grades repeated did not differ by race/ethnicity, and overall about 21% of children repeated one or more grades over the study period. Similarly, the proportion of cumulative behavioral problems did not differ by race/ethnicity.

3.2. Hierarchical linear regression model

Table 3 summarizes the hierarchical regression models predicting four outcome variables. The models were estimated as random intercept models, where only the mean (intercept) for each census tract was allowed to differ but a common linear effect (slope) of child level variables for all census tracts were equal. Overall, varying combinations of community and individual level variables were associated with a child's school achievement outcomes.

We performed linear regressions with the normal distribution for average math and reading scores, and logistic regressions allowing the Bernoulli distribution for repeat grade and behavioral problems. First, we included the race/ethnicity variable in the model to see bivariate associations with the outcome variables. We then introduced all other child level and census tract level variables (Model II).

Child level variables included gender, race/ethnicity, age, household size, household income, household adversity, and father in the household. Census tract level variables were the percentage of residents living below poverty level, the percentage of residents with less than a high school education, and the crime rate per 1,000 residents. School performance level was included as a child level variable. Although crime rate was considered to affect children's behavioral problems and school achievements, the crime rate was not associated with any of the four outcome measures in our analysis.

We found that children who were younger at the time of their enrollment and children with larger numbers of people living in their household were more likely to have a higher math score. In addition, children enrolled in a high performing school were more likely to have a higher math score compared with children from mid/low performing schools. Children living in neighborhoods with a higher percentage of residents with less than a high school education were more likely to have a lower math score.

Reading scores were negatively associated with the size of the household and census tract level percentage of residents with less than a high school education. Children from families in the second quartile of household income (\$10,000–\$20,000) compared with the first quartile (less than \$10,000) had higher average reading scores. Additionally, children enrolled in high performing schools had higher reading scores.

We found that the younger the children at the time of enrollment, the less likely they were to have repeated a grade. Children living with their father were also less likely to repeat a grade. Additionally, both household size and household adversity were significantly associated with the increased probability of repeating a grade. Children living with their fathers were also less likely to report behavioral problems. The school performance level was not associated with either repeat grade or behavioral problems.

4. Discussion

This study examined the effects of multi-level family, school, and neighborhood characteristics on student's school achievement (Figure 1) among African American and Hispanic students, both of which were predominantly living in poor neighborhoods in Chicago. While previous studies have reported differences in school achievement between white and African American students, factors affecting differential school outcomes among minority students (in our study, African Americans and Hispanics) have been less explored.

Although both African American and Hispanic children were randomly selected from eight schools located in impoverished neighborhoods, all demographic characteristics explored were significantly different between the two groups. African American children were more likely to be living in households with lower annual incomes, more household adversities, and less likely to have a father in the household. Furthermore, neighborhoods in which African American students resided had higher crime and poverty rates compared with neighborhoods in which predominantly Hispanic students resided. Additionally, while school performance level was a significant explanatory variable for math and reading scores, a significantly higher proportion of Hispanic students were enrolled in high performing schools compared with African American students. These descriptive findings suggest that African American students tend to be disadvantaged by both family and neighborhood level factors when compared to Hispanic students, even among students living in poor neighborhoods.

Having a father in the household significantly reduced the risk of having behavioral problems as well as repeating one or more grades. Studies have documented that the absence of a father has negative effects on child development and school achievement (Blankenhorn, 1995; Single-Rushton & McLanahan, 2004; Popenoe, 1988, 1996; Sarkadi, Kristiansson, Oberklaid, & Bremberg, 2008; Whitehead, 1993). These studies suggest that having a father in the household may affect economic stability. A father's involvement and supervision in child development (Stacy, 1993; Single-Rushton & McLanahan, 2004) may have protective effects on behavioral problems. Our findings showed that children living consistently with a father in the same household were less likely to report behavioral problems. This finding is significant, particularly considering the fact that having behavioral problems may influence the potential for repeating grades and consequently effect school achievement. While not presented in this paper, a father living in the household was associated with other individual socioeconomic characteristics. Hispanic children, children from households with incomes more than \$20,000 and those without household adverse events were all more likely to have a father living at home.

As we proposed in Figure 1, our analysis suggests that more fundamental social factors determine a child's family structure and neighborhood environment and, consequently, a child's school achievement and development (Berkman, Glass, Brissette, & Seeman, 2000; Gee & Payne-Sturges, 2004; Leventhal & Brooks-Gunn, 2004; Payne-Sturges & Gee, 2006; Sampson, Morenoff, & Gannon-Rowley, 2002; Milner, 2013). Designing interventions to improve school achievement requires taking into account such fundamental causes of disparities.

Any household adverse events, such as parental substance use, incarceration, and mental health problems, were associated with the increased chance of repeating a grade. The bivariate association between household adverse events and behavioral problems was shown to be significant. However, controlling for all other variables, this relationship was no longer significant. It is plausible that the effects of household adverse events on children's behavior might have been mediated by other factors, such as whether a father lived in the household. Although important research questions to explore further, our findings could not identify a relationship between repeating a grade and behavioral problems.

Children living in households with parental substance use or negative involvement with law enforcement may exhibit more behavioral problems. Studies have shown that children living in impoverished areas are more likely to be exposed to violence and crime, both of which affect development (Kowaleski-Jones & Dunifon, 2006). Sampson and others have argued that high crime areas may suffer from a lack of social control, where children are often influenced by surrounding crime and delinquent behaviors while lacking community and family level informal control (Elliott et al., 1996; Sampson, Raudenbush, & Earls, 1997). The social environment in such areas may increase the risk of behavioral problems, including poor attendance which may lead to poor school performance, and can further result in repeating a grade.

In addition, children attending high performing schools were more likely to have higher math and reading scores. In general, studies have shown that school performance levels are often affected by the level of local socioeconomic status, which often results in further disparities in the quality of school among children living in poor neighborhoods (Jargowsky & Komi, 2009; Manski, 1993; Wiggan, 2007; Milner, 2013).

The findings in our analysis suggest that interventions aiming to improve the quality of schools may mediate the negative effects of individual and neighborhood disadvantages on children's school performance. This finding may also imply that programs for improving school performance should address related contextual factors such as income or a father's presence, which are often shaped by broader social contexts; such interventions could improve school and behavioral outcomes, particularly, among children living in high risk environment.

Being in a supportive school environment could mitigate other risk exposures. In addition, future research examining the differential effects of school characteristics, along with individual and neighborhood factors, on predominantly African American and Hispanic

communities may help researchers to better understand different school elements influencing school performance and children's outcomes.

Concerned with a potential for multicollinearity between student math and reading scores and school performance levels, we examined correlations between the three variables, which showed no significant danger of multicollinearity. In any case, more often than not student level characteristics are associated with school level factors. Accounting for the fact that inequities in access to quality schools by individual SES exist, controlling for individual and neighborhood SES factors, the level of the quality of school may hold independent effects on students' academic achievement. However, there seems to be an overall difference in school performance between predominantly African American and Hispanic neighborhoods, where the overall poverty rate is higher and the education level lower in Hispanic communities, and yet the school performance level is better compared with African American communities.

Different neighborhood elements may affect different aspects of child outcomes. Wilson and others suggested that children in high poverty neighborhoods may be less motivated to achieve in school because they may not see education as a vehicle to landing jobs, or to social and economic success (Albee & Gullotta, 1997; Cook et al., 1996; Wilson, 1987; Wilson & Sampson, 1995). In our analysis, neighborhood education levels, but not the unemployment or the poverty levels, were associated with both math and reading scores. While neighborhood poverty and education levels are highly correlated, further research is warranted to identify the differential effects of these neighborhood socioeconomic characteristics on school performance.

The study presents several limitations which may pose threats to the reliability and validity of the findings. First, although the study deliberately sought to understand children living in high risk neighborhoods, the sample was recruited from seven elementary schools located in predominantly poor minority areas. These schools were all from high risk poverty areas but were not randomly sampled; thus, they may not reflect all schools in disadvantaged urban neighborhoods. In addition, because of the high correlation between school and individual race/ethnicity, only the individual race/ethnicity variable was included in the analysis. Schools were extremely racially segregated. In three schools, African American children made up over 97% of the student population, and in another three schools Hispanic children made up over 80% of the student population.

Second, there may have been bias in the parents' perception and/or reporting of their child's problems due to varying levels of parent participation in school activities. A more involved parent could potentially become more aware of their child's problems. However, it is difficult to predict whether this might lead to over or under reporting of children's problems. One speculation for this result is that family and neighborhood disadvantages may be stronger determinants for child outcomes. The study participants were recruited from predominantly racial/ethnic minority areas in Chicago. The children in this study were living in disenfranchised socioeconomic conditions; for example, only 14% of the families had an annual income of more than \$20,000, and more than 50% were on public aid. Also, just half of the children lived with their father in the same household. A quarter of children were

living in households with a parent facing behavioral problems such as substance use and incarceration.

Differential attrition could have been a source of potential bias. In the initial assessment, the authors found no significant difference in attrition based on race/ethnicity, gender, parental education and employment, receipt of public aid, and other family relationship related characteristics (Tolan, et al., 2004). However, the potential for selection bias may be minimal as 95% of participating families completed all follow-up surveys.

5. Conclusion

Our study validates the profound impact of poverty and other adversities on a child's school achievement and behaviors. We are able to make a strong case in this area because we are looking at cumulative outcome measures of inner city African American and Hispanic children.

These findings re-emphasize the importance of the ecological perspective on child development and outcomes. The ecological model (Figure 1) used in this study emphasizes the effects of a myriad of upstream social institutions including neighborhoods and schools on children and family risk factors and school and behavioral outcomes.

These findings warrant further consideration of ecological interventions. As previous studies have argued, children's behavior and school achievement levels are influenced by multiple layers of social context, including family, school, and neighborhood characteristics. Child development is a complex process which cannot be reduced solely to the individual or to the environmental determinants. Rather, development is an ongoing interaction between child, family, school, and the community: the interaction of multi-level factors through which cumulative effects of advantage and disadvantage ultimately shape one's life course.

While it has been well documented that children growing up in disadvantaged neighborhoods tend to do poorly in school and tend to exhibit more emotional and behavioral problems, how the effects of cumulative disadvantage may set forth a child's developmental trajectory needs further investigation. The effectiveness of ecological interventions which aim to improve individual as well as their contextual factors, on longer term social outcomes, such as school dropout, teenage pregnancy, and delinquency also need further research.

And yet, relatively little research has been done on effects of ecological interventions on children and families living in disadvantaged environments. Studies concerned with mechanisms through which these contextual factors influence child development may inform us on how to mitigate effects of social environmental exposures to promote more positive behavioral and health outcomes later in life. Interventions aiming to bring about changes in communities and families as a whole are far from perfect but should still be explored to identify more promising indicators of success.

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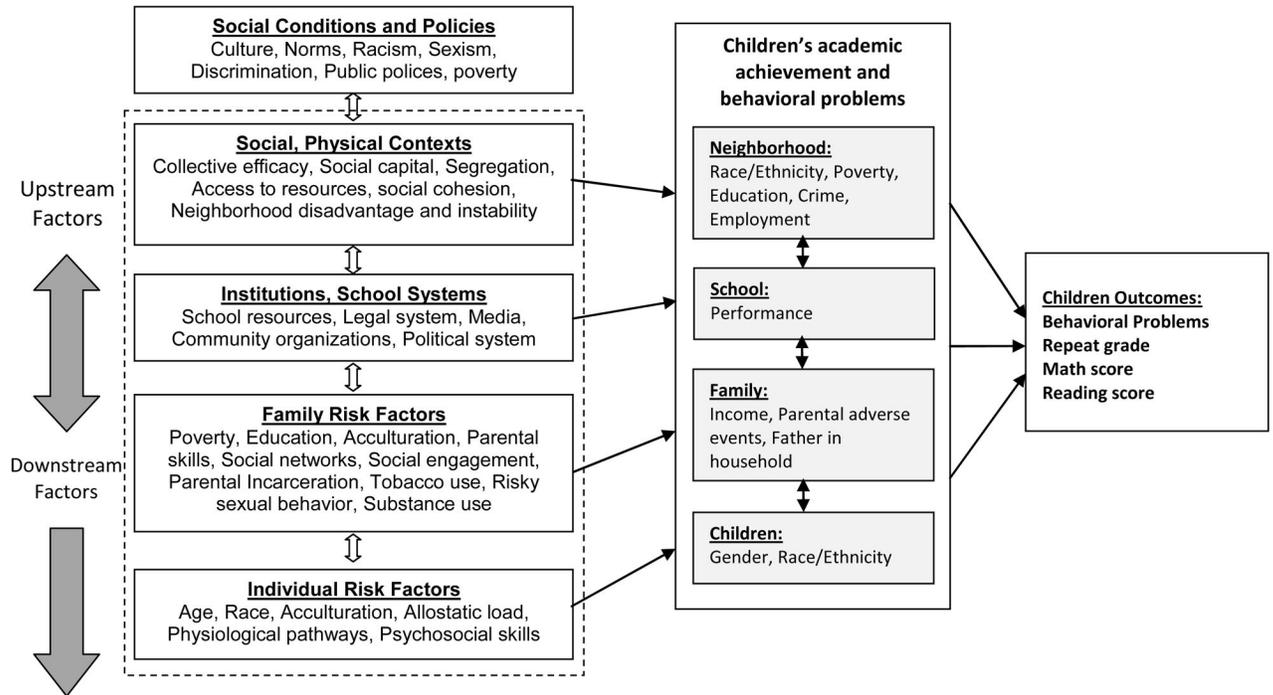


Figure 1. Ecological model explaining children’s academic achievement and behavioral problems

Table 1
Child level and census tract level characteristics and outcome measures, by race/ethnicity

	African American (42.5%)	Hispanic (57.5%)	Total (n=424)	Sig
Student level characteristics				
Male	45.0	51.6	48.8	n.s.
Age at intake*	6.4	6.5	6.4	<.05
Income at intake				
< \$10,000	52.5	23.1	35.6	
\$10,000–\$20,000	19.2	34.7	28.2	<.01
\$20,000–\$30,000	13.6	28.5	22.2	
>\$30,000	14.7	13.6	14.1	
Household adverse events	50.6	15.7	30.6	<.01
Father in household	13.9	67.5	44.9	<.01
Household size	4.6	5.3	5.0	<.01
High performing school	1.7	23.0	13.9	<.01
Outcome measures				
Math score percentile	34.7	46.2	40.6	<.01
Reading score percentile	37.2	39.8	38.5	n.s.
Repeat grade	20.0	20.7	20.4	n.s.
Behavioral problems	20.6	12.8	16.1	<.05
Census tract level characteristics				
% Less than HS education	34.5	54.4	45.9	<.01
Crime rate/1,000	196.7	113.4	148.8	<.01
% Poverty	43.7	33.8	38.0	<.01

* Mean age in years.

Table 2

Child level and census tract level characteristics and outcome measures

	Math score percentile	Reading score percentile	Behavioral problems	Repeat grade
Student level characteristics				
Male	40.6	37.9	18.4	22.0
Female (ref)	n.s.	n.s.	n.s.	n.s.
African American	40.6	39.1	13.9	19.0
Hispanic (ref)	34.7	37.2	20.6	20.0
	46.2	39.8	12.8	20.7
Income at intake				
<\$10,000	34.1	34.1	23.3	22.0
\$10,000–\$20,000	42.9	39.8	11.4	25.0
\$20,000–\$30,000	48.0	44.9	14.5	12.8
>\$30,000	43.1	39.4	9.6	20.8
Household adverse events				
No	41.6	38.7	21.1	27.6
	38.6	38.4	13.0	17.0
Father in household				
No	47.2	40.9	5.5	15.8
	35.6	36.7	22.3	24.5
Household size	-0.09	-0.20	1.08	1.33
	n.s.	<.01	n.s.	<.01
Census tract level characteristics				
% Less than HS education	0.25	0.05	0.98	1.00
	<.01	n.s.	<.01	n.s.
% Poverty	-0.17	-0.01	1.03	0.98
	n.s.	n.s.	n.s.	n.s.
Crime rate/1,000	-0.90	-0.01	1.00	1.00
	n.s.	n.s.	n.s.	n.s.

Table 3

Multilevel models predicting outcome measures

	Behavioral problems [§]		Repeat grade [§]		Average math ^{§§}		Average reading ^{§§}	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
LEVEL 1								
Male	-	0.95	-	1.05	-	0.11	-	-0.43
African American	1.62+	0.68	0.94	1.14	-13.01**	-12.92*	-2.66	-4.00
Age at intake	-	1.69	-	0.31*	-	2.17	-	-2.93
Household size	-	1.19+	-	1.46**	-	-1.90*	-	-2.42**
Income								
1 st quartile (ref)	-	-	-	-	-	-	-	-
2 nd quartile	-	0.94	-	1.93	-	3.27	-	4.42
3 rd quartile	-	1.08	-	0.71	-	5.48	-	7.37*
4 th quartile	-	0.73	-	1.38	-	2.99	-	3.23
Any HH adversity	-	1.61	-	2.07*	-	2.16	-	1.60
Father in HH	-	0.23**	-	0.36**	-	6.04	-	2.35
School performance								
Level I/II (ref)	-	-	-	-	-	-	-	-
Level III	-	0.54	-	2.18+	-	16.53**	-	13.78**
LEVEL 2								
Intercept	0.15**	0.002	-1.32**	130.23	47.73**	31.34	45.12**	68.82
% Below Poverty	-	1.02	-	0.97	-	0.42+	-	0.16
% Less than HS	-	1.00	-	1.00	-	-0.31**	-	-0.24*

* p < .05;

** p < .01

§ Odds ratios from logistic regressions

§§ Regression coefficients from linear regressions