Neighborhood Characteristics, Parental Practices and Children's Math Achievement in Elementary School

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Abstract

This paper investigates the relationships among neighborhood characteristics, education-related parental practices, and children's academic achievement during a critical but under-studied stage of children's educational trajectories – the elementary school years. Using a large, nationally representative database of American elementary school students – the Early Childhood Longitudinal Study – Kindergarten Cohort (ECLS–K) – and contextual data from the 2000 U.S. Census, we examine parental practices and neighborhood characteristics at the beginning of children's school careers (grades K-1) and their associations with math achievement through the end of the 5th grade.

Findings—Net of family-level characteristics, higher levels of early education- oriented parental practices were associated with higher mathematics achievement at the end of 5th grade, while neighborhood disadvantage was associated with lower 5th grade math achievement. Families residing in high poverty, high unemployment, low-education neighborhoods employed fewer education- oriented practices with their kindergarten- first grade children, but the positive effect of such parental practices on children's mathematics achievement was stronger for children who live in disadvantaged neighborhoods.

Parental practices and parental involvement in children's educational careers have been found to positively affect educational achievement (Hanson, McLanahan and Thompson, 1997; Lareau, 2000, 2003; Muller, 1995; Portes, 1995; Ream and Palardy, 2008; Rumbaut, 1994; Stevenson and Baker, 1987). While previous studies have investigated sources of variation in parental practices, most have focused on only parental demographic characteristics, such as race, socioeconomic status, and family structure as predictors of parental practices. Because of a growing interest in neighborhood-based interventions and programs, examining how neighborhood characteristics affect parenting and how the effects of parental practices on children's school outcomes differ by neighborhood is crucial.

This paper examines the relationships among neighborhood characteristics, education-related parental practices, and children's educational achievement. By education-related parental practices, we refer specifically to parenting practices designed to enhance children's

educational experiences both in and out of school. Such practices include organization of children's non school time, participation in school activities, educational trips and extra-curricular activities, and provision of learning materials in the home (Bodovski and Farkas, 2008; Dumais, 2006; Lareau, 2003). This study overcomes several limitations of previous research. First, previous research on neighborhood influences has tended to overlook parenting practices and child outcomes that are specifically related to education, focusing instead on topics such as rates of child maltreatment, risk behavior, delinquency, and the psycho-social development of children and youth (Brodsky, 1996; Brody et al., 2001; Coulton, Korbin, Su, and Chow, 1995; Hill and Herman-Stahl, 2002; Molnar et al., 2003). Our study focuses on elementary school children's educational achievement and its link to education-related parental practices.

Second, previous studies of neighborhood influences on parental practices have been limited in their generalizability by their focus on high poverty, high minority areas, often located particular geographic areas (Ceballo and McLoyd, 2002; Elder et al., 1995; Furstenberg et al., 1999; Jarrett, 1997; Molnar et al., 2003; Puntenney, 1997; Roche, Ensminger, and Cherlin, 2007; Sampson, 1997; Samson et al., 1997). The relatively small, non-representative samples used by these studies yield results that may not be generalizable to other geographic locations or populations. Our use of a large nationally representative sample of elementary school students, the Early Childhood Longitudinal Study – Kindergarten Cohort (ECLS-K), will address this limitation.

Lastly, studies linking parental practices to neighborhood characteristics have focused almost exclusively on either preschool-age children or adolescents (Sastry and Pebley, 2010). As such, these studies have examined emotional adjustment and behavior problems among younger children, or adolescents' depression, social and emotional adjustment and delinquent behavior. A smaller group of studies have considered neighborhood influences on educational attainment and achievement among adolescents, but very few have focused on the academic achievement of elementary school students. It is important to consider neighborhood influences on elementary school students' academic achievement because the literature has demonstrated that the seeds of secondary and even postsecondary schooling outcomes have already been planted in elementary school (Entwisle, Alexander and Olson, 2005). Thus, studies of neighborhood effects on academic achievement that focus on the adolescent years overlook a potentially critical period of educational development. From a policy perspective, it is crucial to know whether the educational outcomes of elementary school students, as well as adolescents, are affected by neighborhood conditions so that interventions can be targeted appropriately. Programs that start in adolescence may be too late.

In her 2007 Population Association of America Presidential address, Barbara Entwisle called on the scholarly community to think about better measures and diverse methods to capture contexts that will allow "putting people into place" (Entwisle, 2007). Although, as Entwisle (2007, p. 687) stated, "there has been an explosion of empirical research on neighborhoods and health," there has been little research on neighborhoods, parental practices and children's educational experiences. In fact, Entwisle found that only 3% of studies that have taken into account local contexts (such as neighborhoods, communities,

and areas), were focused on child development and parenting (p.691). Our study attempts to respond to Entwisle's call by contextualizing parental practices and their effects on children's achievement in the neighborhood setting.

The contribution of this study lies in disentangling the intertwined relationships among neighborhood characteristics, parental practices and children's achievement. We employ the recently available waves of the ECLS–K and merged its restricted data with Census 2000 to investigate the following research questions: 1) Do neighborhood characteristics influence parental educational practices? 2) How do neighborhood characteristics and parental practices affect student achievement, net of family-level characteristics such as education, family structure, race, and income? 3) Does the effect of education-related parenting practices on children's outcomes differ by the level of neighborhood disadvantage?

Background

Neighborhoods characteristics and parental practices

Neighborhood characteristics have been linked to parenting factors as diverse as parental role commitment, parenting styles, resource-seeking behaviors, advocacy efforts, child-monitoring strategies, and in-home learning strategies (Burton and Jarrett, 2000). Neighborhoods influence parenting through at least two mechanisms. First, neighborhood characteristics affect parenting behavior partly through affecting parental psychological well-being and family relationship dynamics. Specifically, Klebanov et al. (1994) found that neighborhood poverty was associated with less maternal warmth and a poorer home physical environment, controlling for individual family conditions. Shumow and Lomax (2002) found that neighborhood quality predicted parental involvement and monitoring, both of which predicted academic and social-emotional adjustment of adolescents. Other studies have found that neighborhood conditions are related to nurturing parenting and parental use of punishment (Ceballo and McLoyd, 2002).

Second, neighborhoods may serve as a venue in which parents meet, interact, and thus influence and reinforce each others' parenting practices. Ideas regarding "right" parenting behaviors are deeply embedded in the cultural discourse within a given social and spatial location that, in the case of the U.S., is defined by class and race. Parents from the same neighborhood often share and reinforce each others' notions as to what is to be done to raise a child properly. Neighborhood segregation by race and class may serve to strengthen the association between social class and parental practices, further disadvantaging poor and working-class children.

Thus, there are both theoretical and empirical reasons to suspect that neighborhood characteristics will be associated with education-related parenting practices. However, it has also been shown that parents' education- related practices are heavily influenced by family socioeconomic characteristics (particularly education) (Bowles and Gintis, 1976, 2000, 2002; Lareau, 2000, 2003; Lareau and Weininger, 2003; Stevenson and Baker, 1987). This association is due in part to the negative effect of poverty and economic stress on individual well-being and family relationships (Conger et al., 1993; Elder et al., 1995; Menaghan et al., 1997; McLeod and Shanahan 1996). Poverty and economic hardship are in turn associated

with neighborhood characteristics, as economically disadvantaged families are more likely to live in disadvantaged neighborhoods. Research that focuses solely on families who are both economically disadvantaged and living in disadvantaged neighborhoods is thus incapable of separating the influences of family characteristics from those of neighborhood characteristics. A nationally representative data source such as ECLS-K, which contains children living across the full spectrum of neighborhood characteristics and has a large enough sample to contain less common family-neighborhood combinations (e.g., poor children living in middle-class neighborhoods and vice versa), is necessary to tease out the unique effects of neighborhood characteristics. We therefore employ ECLS-K data to test the following hypothesis:

> **H1:** Net of family-level characteristics such as education, family structure, race, and income, families residing in structurally disadvantaged neighborhoods employ fewer education- oriented practices with their kindergarten- first grade children.

Neighborhoods characteristics and student achievement

Previous studies examining the link between neighborhood characteristics and educational outcomes have focused primarily on either young children's school readiness or adolescents' schooling outcomes. Several studies have examined the effects of neighborhood affluence on young children's cognitive functioning. Such studies have generally found a positive relationship between neighborhood affluence and preschool-age children's IQ (Brooks-Gunn et al., 1993) and five and six-year-old children's IQ, verbal ability, and/or reading achievement scores (Benson and Borman, 2010; Chase-Lansdale and Gordon, 1996; Chase-Lansdale et al., 1997; Duncan, Brooks-Gunn, and Klebanov, 1994).

Further, using The Los Angeles Family and Neighborhood Survey (L.A. FANS), Lara-Cinisomo et al. (2004) concluded that mothers' educational attainment and neighborhood poverty are the two social characteristics most strongly associated with school readiness. Using the same data (L.A. FANS), Jackson and Mare (2007) found a statistically significant association between neighborhood poverty and children's frequency of internalizing behavior problems. No such association was found with math achievement. However, when the authors replicated the analysis with PSID- CDS data they found the reverse situation: in the national sample neighborhood poverty was negatively and significantly associated with math achievement, but not with behavior problems. This discrepancy highlights the importance of investigating the relationship between neighborhood characteristics and children's educational outcomes using a nationally representative data source, as we do in this study.

Other research has examined achievement of older students. Most studies find that higher neighborhood SES has a positive effect on student achievement. Several studies based on a nationally representative longitudinal data source, the Panel Study of Income Dynamics, support this positive effect. These studies show that with the exception of African American males, neighborhood affluence is positively associated with high school graduation (Brooks-Gunn et al., 1993; Duncan, 1994; Halpern-Felsher et al., 1997), that neighborhood female family headship rates are negatively associated with years of completed schooling and high school graduation (Brooks-Gunn et al., 1993; Duncan, 1994), and that there is a negative

association between neighborhood dropout rates and individual chances of high school graduation (Aaronson, 1997; Foster and McLanahan, 1996).

Studies based on smaller and more localized samples have also tended to find a positive relationship between neighborhood SES and adolescent educational outcomes, at least for some groups. Some of the strongest evidence comes from the Gautreaux study (a quasi-experimental design in Chicago), which shows that youth who used the program to move to more affluent neighborhoods were more likely to graduate from high school and go to college than those who remained in the city (Rosenbaum, Kulieke, and Rubinowitz, 1988). However, this finding was not replicated by the larger Moving to Opportunity experiment (Sanbonmatsu et al., 2006). In addition, observational studies based on localized samples have found positive associations between neighborhood SES and math and/or reading test scores among girls from low-income urban schools (Halpern-Felsher et al., 1997), boys from Baltimore schools (Entwisle, Alexander, and Olson, 1994), and Latino adolescents (Eamon, 2005).

The relationship between neighborhood SES and educational outcomes is not trivial for adolescents: some studies indicate that the effect of neighborhood characteristics on educational outcomes is equal to or even stronger than that of family SES. Bowen, Bowen, and Ware (2002) found that among middle and high school students, the perceived level of social disorganization in their neighborhood exerted more influence on their educational behavior than family processes did. Dornbusch, Ritter, and Steinberg (1991) found that while parental education was not a strong predictor of high school grades for African American students, community SES predicted grades for both African American and whites. While the findings of previous studies thus strongly suggest a link between neighborhood characteristics and educational outcomes for very young children and adolescents, much less is known about how neighborhoods affect the educational achievement of elementary school-age children. In this study, we test the following hypothesis:

H2: Neighborhood disadvantage is associated with lower mathematics achievement at the end of 5th grade.

Parental practices and student achievement

Parental practices play a significant role in shaping children's educational experiences. Prior research finds that parental practices mediate the effects of family socioeconomic status and race/ethnicity/immigrant status on children's educational achievement and attainment (Bowles and Gintis, 1976; Farkas et al., 1990; Farkas and Beron, 2004; Farkas, 1996, 2003; Lareau, 2000, 2003; Pong, Hao, and Gardner, 2005). Parental practices and parental involvement in children's educational careers have been found to positively affect various dimensions of school success, such as improved homework and study habits, better attitudes toward school, and lower absenteeism and dropping out (Hanson, McLanahan and Thompson, 1997; Lareau 2000, 2003; Muller, 1995; Portes, 1995; Ream and Palardy, 2008; Stevenson and Baker, 1987).

Specifically, Lareau (2003) argued that the highly organized activities that middle- and upper-class parents engage in with their children, summarized as "concerted cultivation,"

foster skills, behaviors, and attitudes that lead to greater school success than among working-class and poor children. Children in middle- and upper-middle-class families frequently participate in structured activities administered by adults (such as art and music classes, sports, drama, clubs, or educational trips with family members). Further, middle-class parents possess greater knowledge about the structure and content of the educational system and greater confidence in approaching teachers than working-class parents, giving their children an advantage in school. Differences in parental practices related to education are thus an important way in which social class is transmitted between generations. We expect to find, in agreement with past literature, that children's elementary school achievement will be enhanced by education-related parenting practices. The hypothesis we test is thus:

> **H3:** Higher levels of early education- oriented parental practices (measured when the children attended kindergarten and first grade) are associated with higher mathematics achievement at the end of 5th grade.

Interactions between neighborhood characteristics and parental practices

Finally, several studies attempt to parse out the complex, interactive nature of family and neighborhood influences on academic achievement. Gonzales, Cauce, Friedman, and Mason (1996) show that for the 120 African American junior high school students in their study, neighborhood risk was not only related to lower grades but also moderated the effects of maternal restrictive control. Dearing (2004) shows similar results concerning the differential effects of parenting strategies. While on average restrictive parenting was negatively associated with academic achievement, this effect was intensified for European American students in risky neighborhoods, while for African American children in risky neighborhoods, restrictive parenting was a protective factor in terms of academic achievement.

Much of the research on the relationship between neighborhood characteristics and parenting, while not explicitly focused on neighborhood-parenting interactions, investigates parental strategies to improve child outcomes in poor, urban and/or minority communities. Such strategies include close parental monitoring, distrust of neighbors and other potential caregivers, and facilitating opportunities for growth (Ceballo and McLoyd, 2002; Kling, Liebman, and Katz, 2001; Letiecq and Koblinsky, 2004; Puntenney, 1997). Previous studies have found that parents take active steps to shield children from adverse neighborhood conditions. For example, studies have described how some mothers made elaborate schedules to ensure that children did not walk to school alone and did not come home to an empty house (Kling, Liebman, and Katz, 2001; Puntenney, 1997).

Such research indicates that parental practices may mitigate the detrimental effects of living in disadvantaged neighborhoods. Several studies have described how parents in poor neighborhoods compensate for the deficiencies of their children's school and neighborhood environments by incorporating learning activities into their daily routines and participating in educational trips or programs (Gándara, 1995; Jarrett, 1997; Soto, 1990). Jarrett (1997) argues that such activities are "an important strategy for mediating the limitations of impoverished inner-city schools" (p. 283). This literature suggests an interactive effect

between social context and parental practices, such that parental practices take on increased importance for children's outcomes in disadvantaged neighborhood or school environments. Our study tests how the effect of parental practices on children's educational achievement varies by neighborhood conditions, leading us to our final hypothesis:

> **H4:** The effect of education-related parenting practices on children's mathematics achievement is stronger for children who live in disadvantaged neighborhoods.

Why math in fifth grade?

It has been found that elementary school performance is a good predictor of both high school grades and ultimate educational attainment (Alexander et al., 1997; Duran and Weffer, 1992; Entwisle, Alexander, and Olson, 2005). In this paper we focus on math achievement because it isone of the core curricula in elementary school and remains so in high school and beyond (Crosnoe, 2005, 2006). Math skills are crucial for opportunities for advanced course-taking in high school that open doors for post-secondary education. Specifically, achievement at the end of the 5th grade serves as a key to placement of students in courses in middle school, which in turn set students on track for certain course sequences in high school, particularly for math and science. Elementary school math achievement can thus have far-reaching impacts on students' school careers.

In sum, the existing literature strongly suggests that interrelationships exist between neighborhood characteristics, parental practices, and children's educational outcomes, but no study has focused specifically on education-related parental practices in families of elementary school students, which is the goal of the present study.

Data and Methods

The ECLS-K, sponsored by the U.S. Department of Education, National Center for Education Statistics, selected a nationally representative sample of kindergartners in fall 1998, and has followed these children through eighth grade. The ECLS-K sample is a stratified, multistage probability sample, which contains longitudinal assessments of student performance as well as measures of family context and socioeconomic background collected during parent interviews (NCES, 2002). The longitudinal nature of the data allows us to examine the parental practices and strategies at the beginning of children's school career and their effects on achievement through the end of the 5th grade. Census 2000 corresponds with the ECLS-K data wave of Spring 2000 (when most of children attended 1st grade), thus making it an ideal match to examine the characteristics of the neighborhood where children live. For this reason, and also because ECLS-K refreshed the sample in the first grade, thus adding children who are missing the Kindergarten measurements, we take our independent variables from the first grade survey unless otherwise noted. Multiple imputation was used to handle cases with missing values on any of the independent variables used in the analysis. Following the recommendation of von Hippel (2007), we deleted cases with missing values on the dependent variable (fifth grade math scores) prior to running the analyses (these cases were included, however, in the multiple imputation model). The results are nearly identical regardless of whether these cases are included in the analytical models. In order to estimate multilevel models of children clustered within neighborhoods, it was also necessary to delete

1,046 cases with missing neighborhood identifiers. After these deletions, the resulting sample size is 10,049. A comparison of the results using list wise deletion and multiple imputation to handle missing values revealed no substantive differences.

Variables

Neighborhood Disadvantage

We measured neighborhood disadvantage using methodology similar to that employed by Harding (2007). In order to obtain measures of neighborhood characteristics, we merged ECLS-K data with data from the 2000 Census. Using census tracts to define neighborhood boundaries, we created a scale from several interrelated demographic and economic characteristics of the neighborhood. Each item was z-scored, and the scale was created by summing the z-scored items. These items include: the percent of residents living in poverty, the percent unemployed, the percent of families headed by single parents, the percent of residents with a college degree (reverse coded), the percent with less than a high school diploma, median household income (reverse coded), the percentage of housing units that are owner occupied (reverse coded), and the percent of males age 16+ not in the labor force. A Cronbach's alpha of .916 confirms that combining these items into a single scale is appropriate. For purposes of providing descriptive differences by levels of neighborhood disadvantage in Table 2, this variable was divided into three categories based on the percentile of the continuous scale. "Low" neighborhood disadvantage is defined as less than the 25th percentile, "moderate" disadvantage is defined as between the 25th and 75th percentile, and "high" disadvantage is above the 75th percentile. In the regression models in Tables 3 and 4, the neighborhood disadvantage scale is used as a continuous variable.

Education-related Parental Practices

ECLS-K contains a wealth of items that can be used to measure education-related parental practices. These items are taken from the spring of first grade interview unless otherwise noted. Roughly, these items fall into three domains. The first domain measures how parents organize children's non-school time. ECLS-K asks whether or not a child participates in the following activities outside of school: Dance lessons, athletics, clubs, music, arts and crafts, and organized performing arts. It also contains questions about educational outings, including trips to the library, zoo, museum, and attending concerts. The latter three variables were measured at the Kindergarten interview but not during first grade. They are imputed for those respondents who were not sampled prior to first grade. These items are made into a scale by summing the individual items and taking the z-score of the sum. The second domain measures parents' involvement in their children's school. Relevant items include whether or not the parent has participated in parent- teacher conferences, attended an open house or back to school night, participated in PTA, attended school events, volunteered at school, or participated in fundraising since the beginning of the current school year. These items are made into a scale by summing the individual items and taking the z-score of the sum. The final domain, parents' provision of home learning environment, is measured with the number of children's books in the household. This variable was also z-scored.

Results for the three scales were quite similar, so we decided for the sake of parsimony to combine all three domains into a single scale of education-related parental practices. The Cronbach's alpha for the individual items included in this scale is .66. After summing the three subscales, we took the z-score of the combined scale (a similar technique was used in Bodovski and Farkas (2008)).

Mathematics Achievement

Mathematics achievement is measured using the ECLS-K's standardized math test score from the end of fifth grade (c6r3mscl).

Control variables

We control for a variety of child and family characteristics in the multivariate models. *Race/ethnicity* is included as a series of dummy variables measuring whether the child is black, Hispanic, Asian, other race, or white (omitted). *Gender* is coded 1 for female, 0 for male. *Family structure* is classified as 2-biological-parent family (omitted), single-parent family, or other family structure. *Family socioeconomic status* is a scale, constructed by ECLS-K, combining information on parental education, income, and occupational status. The child's *number of siblings* is measured as a continuous variable. *Mother's nativity* is measured with a dummy variable coded 1 if the mother is foreign-born, 0 otherwise. Age measures the child's age in months in the spring of first grade. *Parental educational expectations* is an ordinal scale ranging from 1 (parent expects the child to complete less than high school) to 6 (parent expects child to earn a PhD or medical degree). Various binary specifications of parental expectations produced similar results as the ordinal scale. *Attending a private or parochial school* is measured with a dummy variable (1 = private/parochial, 0 = public). *First grade math* score measures the child's math achievement in the spring of first grade.

Finally, two control variables deserve special mention due to their theoretical role as potential mediators between neighborhood characteristics and parental practices. *Parental depression* is measured with a scale summing 11 ordinal items gauging various aspects of psychological distress (alpha = .85). The depression scale ranges from 12 to 44. Because these questions were asked in the Kindergarten year survey while neighborhood characteristics are only available for the first grade year, this variable cannot technically serve as a mediator between neighborhood characteristics and parental practices. However, we include it as both a proxy for parental depression levels in first grade among families that do not move and as a control variable to account for the possibility that parental depression is one of the disadvantageous characteristics that may predispose families to live in poorer neighborhoods. *Communication with other parents* is a potential means through which neighborhoods may influence parenting practices, as ideas regarding appropriate parenting are shared between and reinforced by neighboring parents. Unfortunately, ECLS-K contains no measure of communication with other parents in the neighborhood. It does, however, have a measure of communication with the child's school classmates in the form of a question asking parents "how many of your child's classmates' parents do you speak with regularly?" We include this in our multivariate models as a continuous variable.

Analytical procedure

Because the sample is made up of children clustered within neighborhoods, we use multilevel models to analyze the data. All variables are measured at the individual level (Level 1) with the exception of the neighborhood disadvantage scale, which is measured at the neighborhood level (Level 2). Models are estimated using the xtmixed command in Stata 11, combined with Stata's commands for handling multiply imputed data.

Like other studies of neighborhood influences based on observational data, this study must contend with the potential for biased results due to endogeneity. Individuals are not randomly distributed across neighborhoods, and it is possible that apparent "neighborhood effects" instead reflect the effects of unmeasured individual or family characteristics that influence both the choice of neighborhood and the outcome being studied. In addition to family socioeconomic characteristics, which clearly affect both neighborhood residence and children's school outcomes, it is possible that parents' commitment to their children's well-being may influence neighborhood choice as well as educational outcomes. Fortunately, the ECLS-K contains information on a wide array of parent and family characteristics, and including these in our models should minimize the potential for endogeneity. In addition to controlling for family socioeconomic characteristics, we include two other variables that are likely to be correlated with any unmeasured characteristics affecting both neighborhood choice and children's educational outcomes. The first is parental expectations for children's educational attainment. This measure taps into parental commitment to children's educational success. Second, we include a control for children's first grade test scores in all models of fifth grade test scores. The first grade scores should reflect the effects of time-invariant unmeasured family and parent attributes, such as genetic endowments. While such controls cannot completely eliminate the possibility of endogeneity, they do allow us to have greater confidence in our results.

Results

Means of the variables are shown in Table 1. Half of the sample was female, 11% of the sample was Black, 19% Hispanic, 7% Asian and 4% other race (American Indians and Pacific Islanders). 17% of children were living in single- parent homes, additional 11% had families with other family structures (remarried parents, adoptive parents, extended family). The average parental educational expectation was for children to complete four years of college. The mean first-grade test score was 59, the mean 5th grade score was 115.

Table 2 presents means of the education- related parental practices and test scores by neighborhood disadvantage. As neighborhood disadvantage becomes more severe, the number of education- related parental practices decreases and so do math test scores. These bivariate relationships indicate that neighborhood characteristics are related to parental practices and children's outcomes. As previous studies have suggested, it is important to examine whether these relationships are indeed neighborhood effects or whether they are fully explained by family demographic characteristics that are correlated with neighborhood disadvantage. We test these questions in the next two tables.

Table 3 presents findings from models testing Hypothesis 1, which states that neighborhood disadvantage is associated with fewer education-related parental practices. Model 1 includes only our Level 2 predictor, the neighborhood disadvantage scale. Consistent with the results in Table 2, it has a negative statistically significant association with parental practices – that is, neighborhood disadvantage is inversely associated with education- related practices employed by parents. In model 2 we added family and child demographic characteristics. Family SES was positively and significantly associated with a number of parental practices. Hispanic and Asian parents, but not African American parents, engaged in fewer education-related parental practices than did white parents. Having a foreign born mother further reduced the number of these practices. These findings reinforce the notion that the education- related practices we examine are particularly prevalent among white middle class families.

A larger number of siblings, single parent families and other non- traditional family structure were associated with a lower number of education- related parental practices. Girls, private school students, children whose parents expect higher educational attainment, and children whose parents were more familiar with their classmates' parents were exposed to a larger number of education- related parental practices. Levels of parental depression, on the other hand, appear to make little difference in the presence of other control variables. Including family and child characteristics in the model substantially reduced the coefficient for the neighborhood disadvantage scale (from −.06 to −.01), but it retained its statistical significance. This suggests that although family demographic characteristics and parental educational expectations play a major role in determining parental practices, residing in high disadvantage neighborhood has an additional negative association with parental practices. Thus, our findings support Hypothesis 1.

The prediction of fifth-grade math scores is shown in Table 4. Model 1, which includes the neighborhood disadvantage scale along with all the Level 1 control variables, tests Hypothesis 2, which states that neighborhood disadvantage will be associated with lower math scores. As is typical in models of test scores that control for scores at an earlier point in time, the coefficients in these models are relatively small because many of the independent variables' effects are captured in the first grade score. Thus, these results indicate the effect of other covariates on *change* in math score between first and fifth grades. The results show that even controlling for family and child characteristics, including previous math score in the 1st grade, residing in a more disadvantaged neighborhood was associated with lower math scores at the end of 5th grade. This supports Hypothesis 2. We also found that Black and Hispanic children had lower 5th grade scores than white children, whereas Asian children outperformed white children. Having a foreign- born mother was associated with an increase in math scores. Girls had lower scores than boys, and children with more siblings had lower math scores. Family SES and parental educational expectations were positively and significantly associated with math scores. Attending a private or parochial school was associated with lower scores. Finally, children with higher math achievement in first grade continued to do better in 5th grade.

Table 4, model 2 tests Hypothesis 3, which states that a higher level of education-related parental practices in grades K-1 will be associated with higher math scores in fifth grade.

The results show that parental educational practices are positively and significantly associated with math achievement, supporting Hypothesis 3. Adding parental practices into the model did not change significantly the negative effect of neighborhood disadvantage, suggesting that the effect of neighborhood poverty on children's math achievement is not mediated through parental practices. Lastly, Table 4, model 3 tests Hypothesis 4, which states that the effect of education-related parental practices will be stronger in more disadvantaged neighborhoods. To test H4, we added an interaction term between neighborhood disadvantage and parental practices. The interaction term was positive and significant, suggesting the increased importance of education-related parental practices in highly disadvantaged neighborhoods. Generating predicted test scores from model 3 allows a more concrete comparison of the effects of parental practices in more and less disadvantaged neighborhoods. Holding other covariates at their sample means, there is almost no difference between the predicted scores of children in the 90th percentile of parental practices and those in the 10th percentile of parental practices in low-disadvantage neighborhoods (defined as neighborhoods at the 10th percentile of the disadvantage scale), with both groups having predicted test scores of about 115. In highly disadvantaged neighborhoods (those at the 90th percentile of the neighborhood disadvantage scale), the predicted test score of children exposed to high levels of parental practices is 113.3, while that of children exposed to low levels of parental practices is 109.7. Thus, children in the most disadvantaged neighborhoods have test scores that are fairly close to those of their (otherwise similar) peers in less disadvantaged neighborhoods *if* their parents employ high levels of education-promoting parenting practices. This result supports our fourth hypothesis.

Discussion

This study capitalized on the availability of a recent, nationally representative dataset (the ECLS-K) to assess the relationship between neighborhood characteristics, parental practices and math achievement at a critical but under-studied stage of children's educational trajectories – the elementary school years. The longitudinal nature of the data allowed us to examine parental practices at the beginning of children's school career (grades K-1) and their effects on achievement through the end of the 5th grade. We focused on a specific set of parental practices that have not previously been studied in relation to neighborhoods – practices pertaining to education. Merging the restricted data from ECLS-K with Census 2000 provided a unique opportunity to simultaneously assess the effects of parental demographic characteristics and neighborhood characteristics on parental practices, and the differential effects of the latter on students' achievement. No prior, comparable-sized, nationally representative database, including extensive information on parental practices and student achievement, has been analyzed in conjunction with geographic information.

The findings of the study supported all four hypotheses. Indeed, net of family-level characteristics, families residing in structurally disadvantaged neighborhoods employed fewer education-oriented practices with their kindergarten-first grade children. This is consistent with the findings of other studies that have linked neighborhood characteristics to various parental behaviors, such as parental warmth, child monitoring, and parenting styles (Burton and Jarrett, 2000; Klebanov et al., 1994; Shumow and Lomax, 2002). Further,

neighborhood disadvantage was associated with lower mathematics achievement at the end of 5th grade. This finding is consistent with previous studies that looked at neighborhood effects on school readiness (Chase-Lansdale and Gordon, 1996; Chase-Lansdale et al., 1997; Duncan, Brooks-Gunn, and Klebanov, 1994; Lara-Cinisomo et al., 2004) and early reading achievement (Benson and Borman, 2010).

Higher levels of early education-oriented parental practices (measured when the children attended kindergarten and first grade) were associated with higher mathematics achievement at the end of 5th grade. Despite the fact that all non-white groups were less likely to employ the studied education-oriented practices, with foreign-born mothers employing even fewer, the positive effects of these practices on math achievement did not differ by race/ ethnicity (in calculations not shown we tested interaction effects between parental practices and race/ ethnicity). Finally, the positive effect of education-related parental practices on children's mathematics achievement was stronger for children who live in disadvantaged neighborhoods. Conversely, the effect of neighborhood disadvantage was weaker among children in families employing high levels of parental educational practices. This suggests that positive parental educational practices can serve as a buffer against neighborhood adversities.

These findings give reasons for both greater hope and greater concern about the educational prospects of children living in disadvantaged neighborhoods. On the negative side, we have shown that children who reside in such neighborhoods tend to be doubly disadvantaged by also having parents who engage in fewer education-enhancing parenting practices, even net of family characteristics. These findings indicate that parental practices form part of a constellation of factors that jeopardize the educational success of children living in disadvantaged neighborhoods. Future research should try to identify the specific mechanisms through which neighborhood disadvantage may influence parents' behavior. Previous research suggests that factors such as parental stress and mental health, which are negatively affected by adverse neighborhood conditions, may play a role (Burton and Jarrett, 2000; Ceballo and McLoyd, 2002; Conger et al., 1993; McLeod and Shanahan 1996; Klebanov et al., 1994; Shumow and Lomax, 2002).

On a more positive note, our findings show that if parents living in disadvantaged neighborhoods do manage to employ a greater number of education-enhancing parental practices, the association between neighborhood disadvantage and children's fifth grade math scores is substantially reduced. This shows that parents can take concrete steps to protect their children from the adverse influences of disadvantaged neighborhoods, at least during the elementary school years. From a policy perspective, it also suggests that interventions designed to increase parental educational practices should be targeted toward parents living in poor neighborhoods. Because the effect of parental practices on students' math achievement is strongest in such neighborhoods, targeting interventions to disadvantaged areas would not only reach an at-risk group of children, but would also yield more "bang for the buck" in terms of the potential benefits for children's educational achievement.

Our study has several limitations. First, we employed a rather crude definition of neighborhood, using census tracts as a proxy. In future research we plan to experiment with alternative definitions of neighborhood boundaries calculated using advanced GIS techniques based on child's residence. Second, although our measure of education-related parental practices is based on a large number of items, it does not include a measure of the complexity of language spoken at home between parents and children, which has been found to be an important factor in children's cognitive development (Hart and Risley, 1995; Lareau, 2003). Further, since we found that Asian children had higher math scores compared to white children despite the fact that Asian parents were significantly less likely to employ the parental practices captured in this research, it is possible that these parents employed strategies beyond the scope of our study.

Lastly, although we captured demographic characteristics of the neighborhood, it would also be useful to examine aspects of neighborhood social organization that contribute to both parental practices and children's educational outcomes. Bruch and Mare (2006) discussed and tested the "interdependent" assumption of human behavior that suggests that "on the one hand, people's actions may be influenced by the number (or proportion) of others who act in a given way or have a given characteristic. On the other, changes in individual behavior alter the makeup of the population. Thus, individuals' actions are both a response to some population statistic and contribute to that statistic" (Bruch and Mare, 2006, p. 668). Although that study was focused on residential segregation, the same logic can be applied on more "subtle" behavior such as parental practices. Parental choices are not only influenced by structural characteristics of the neighborhood, but also by the strategies and behavior of other parents in that neighborhood. One of the future directions of our inquiry is to capture and test the effects of prevalent parental practices in any given location on individual families' practices.

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- • We model relationships among neighborhoods, parenting and school achievement.

- • Positive parenting practices in 1st grade promote 5th grade math achievement.

- • Disadvantaged neighborhood contexts in 1st grade reduce 5th grade math achievement.

- • Positive parenting practices have a stronger effect in disadvantaged neighborhoods.

Table 1

Variable means and definitions

	Mean	Std Dev	Minimum	Maximum
Neighborhood Disadvantage Scale	−0.40	6.29	−16.73	24.59
Parental Educational Practices	0.07	1.00	−2.35	16.29
5th Grade Math Score	115	21	47	151
Black	0.11	0.32	0	1
Hispanic	0.19	0.39	0	1
Asian	0.07	0.26	0	1
Other Race	0.04	0.20	0	1
Female	0.50	0.50	0	1
Single Parent Family	0.17	0.38	0	1
Other non-2-bio family structure	0.11	0.31	0	1
Family SES scale	0.04	0.82	−2.96	2.88
Number of siblings	1.53	1.15	0.0	11.0
Mother foreign-born	0.22	0.41	0	1
Age in months (April 1st grade)	85.0	4.2	76.0	99.0
Parental Educational Expectations	4.06	1.07	1.0	6.0
Parental Depression Scale	15.7	4.8	11	44
# other parents from class known	2.93	3.47	0	40
Private school	0.22	0.41	0	1
1st Grade Math Score	58.8	16.7	12	121

Omitted categories are: white, male, 2-biological-parent family structure, and mother U.S.-born.

N=10,089

Table 2

Means of education-related parental practices and test scores, by neighborhood disadvantage

	Neighborhood Disadvantage Scale		
	Low	**Moderate**	**High**
Parenting			
Parental Practices Scale	0.5851355	0.0568012 ***	−0.4349042 ***
Educational Achievement			
Math Score	124.41429	115.41585 ***	103.79701 ***

*
Different from low disadvantage at p<.05

**
Different from low disadvantage at p<.01

***
Different from low disadvantage at p<.001

N=10,089

Table 3

Multivariate models predicting parental practices

| | Parental Practices Scale | | | |
| | Model 1 | | Model 2 | |
	Coef	SE	Coef	SE
Neighborhood Disadvantage Scale	−0.06	0.00 ***	−0.01	0.00 ***
Black			0.01	0.03
Hispanic			−0.09	0.03 **
Asian			−0.16	0.04 ***
Other Race			−0.06	0.04
Female			0.19	0.02 ***
Single parent family			−0.09	0.02 ***
Other non-2-bio fam structure			−0.12	0.03 ***
Family SES scale			0.39	0.01 ***
# siblings			−0.05	0.01 ***
Mother foreign-born			−0.33	0.03 ***
Age in months			0.00	0.00
Parental Expectations			0.09	0.01 ***
Parental Depression Scale			0.00	0.00
# other parents from class known			0.06	0.00 ***
Private or parochial school			0.11	0.02 ***
Constant	0.07	0.01 ***	0.04	0.02 *

*
p<.05,

**
p<.01,

***
p<.001

N=10,089

Reported coefficients are from 2-level models of children clustered within neighborhoods

Omitted categories are: white, male, 2-biological-parent family structure, and mother U.S.-born.

Table 4

Multivariate models predicting fifth-grade math scores

	Model 1		Model 2		Model 3	
	Coef	**SE**	**Coef**	**SE**	**Coef**	**SE**
Neighborhood Disadvantage Scale	−0.23	0.03 ***	−0.22	0.03 ***	−0.22	0.03 ***
Parental Educational Practices			0.56	0.18 **	0.57	0.18 **
Neighborhood * Parental Practices					0.08	0.02 ***
Black	−5.01	0.53 ***	−5.03	0.53 ***	−5.02	0.53 ***
Hispanic	−1.56	0.46 **	−1.51	0.46 **	−1.46	0.46 **
Asian	1.87	0.63 **	1.96	0.63 **	1.89	0.63 **
Other Race	−1.05	0.70	−1.02	0.70	−1.10	0.70
Female	−2.61	0.27 ***	−2.73	0.27 ***	−2.68	0.27 ***
Single parent family	−0.84	0.44	−0.79	0.44	−0.76	0.44
Other non-2-bio fam structure	−1.12	0.47 *	−1.05	0.47 *	−1.08	0.47 *
Family SES scale	2.79	0.24 ***	2.58	0.24 ***	2.63	0.24 ***
# siblings	−0.64	0.12 ***	−0.61	0.12 ***	−0.60	0.12 ***
Mother foreign-born	2.22	0.46 ***	2.40	0.47 ***	2.51	0.47 ***
Age in months	−0.34	0.03 ***	−0.34	0.03 ***	−0.34	0.03 ***
Parental Expectations	0.68	0.15 ***	0.63	0.15 ***	0.62	0.15 ***
Parental Depression Scale	−0.05	0.03	−0.05	0.03	−0.05	0.03
# other parents from class known	−0.08	0.04	−0.11	0.04 *	−0.10	0.04 *
Private or parochial school	−0.79	0.38 *	−0.85	0.38 *	−0.93	0.38 *
First grade score	0.82	0.01 ***	0.82	0.01 ***	0.82	0.01 ***
Constant	68.45	0.64 ***	68.53	0.64 ***	68.66	0.64 ***
R^2						

*
p<.05,

**
p<.01,

***
p<.001

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Reported coefficients are from 2-level models of children clustered within neighborhoods

Omitted categories are: white, male, 2-biological-parent family structure, and mother U.S.-born.