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Economically Disadvantaged Children's Transitions Into Elementary School: Linking Family Processes, School Contexts, and Educational Policy

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Abstract

Working from a core perspective on the developmental implications of economic disadvantage, this study attempted to identify *family-based* mechanisms of economic effects on early learning and their potential *school-based* remedies. Multilevel analysis of the Early Childhood Longitudinal Study–Kindergarten Cohort revealed that the accumulation of markers of economic disadvantage reduced math and reading testing gains across the primary grades. Such disparities were partially mediated by corresponding differences in children's socioemotional problems, parenting stress, and parents' human capital investments. These patterns appeared to be robust to observed and unobserved confounds. Various teacher qualifications and classroom practices were assessed as moderators of these family mediators, revealing teacher experience in grade level as a fairly consistent buffer against family-based risks for reading.

Keywords

economic disadvantage; transition to school; family processes; teacher effects

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As a striking example of the reproduction of economic stratification across generations, the children of economically disadvantaged parents lack access to resources and opportunities in ways that undermine their long-term social mobility (Fischer & Hout, 2006). Consequently, efforts to eradicate economic stratification, which typically target the *current* circumstances of disadvantaged adults, will benefit if they also raise the *future* prospects of their children. In other words, long-term, child-centered approaches are necessary because short-term, adult-centered approaches (e.g., public assistance, tax relief) can only go so far (Heckman, 2006; Smith, 1995).

Such child-centered approaches have been greatly informed by research elucidating the structural barriers to economically disadvantaged children's well-being that can be targeted by policy intervention (Waldfogel, 2006). The equally widespread attention to interpersonal

mechanisms of disadvantage has not filtered into policy to the same degree. As an example, psychologists have identified how the developmental significance of economic disadvantage is rooted in family dynamics (McLoyd, 1998). Yet, such insights have not been well integrated into policy action, primarily because of perceptions that family dynamics are not amenable to outside intervention and concerns that selection processes underlying family effects have not been adequately addressed (Duncan, Magnuson, & Ludwig, 2004; Mayer, 1997). Education research, however, offers insights into how the role of family dynamics in the intergenerational transmission of inequality can be better leveraged in efforts to break this transmission.

The purpose of this study is to apply a core theoretical framework from developmental research (the family socialization model) to child learning during a critical period while expanding this framework to incorporate forces selecting children into different kinds of families and schools as well as policy-relevant organizational characteristics that might buffer against family risks. Specifically, this study draws on the Early Childhood Longitudinal Study–Kindergarten Cohort (ECLS-K) to identify family factors that mediate the link between economic disadvantage and child learning at the beginning of school and the teacher characteristics that condition these factors. In doing so, multiple techniques are employed to gauge the robustness of hypothesized patterns in relation to important selection processes.

Economic Disadvantage, Children, and Family Life

Economically disadvantaged children enter school with less developed cognitive skills than their peers and then make lower grades and test scores, take lower level course work, and ultimately obtain fewer degrees (Barker & Coley, 2007; Duncan, Brooks-Gunn, Yeung, & Smith, 1998; Peters & Mullis, 1997; Raver, Gershoff, & Aber, 2007). Thus, economic disadvantage can derail the trajectories of educational attainment on which long-term socioeconomic attainment is predicated. Many *structural* mechanisms for these patterns have been identified (Arum, 2000; Bernhardt, Morris, Handcock, & Scott, 2001; Leventhal & Brooks-Gunn, 2000). Developmentalists have elucidated how the risks of economic disadvantage are also rooted in *interpersonal* contexts (McLoyd, 1998). Such research is exemplified by the family socialization (or process) model, which theorizes that the effects of economic stratification are filtered through family dynamics. In short, the stresses of economic hardship disrupt parents' lives in ways that alter the organization of the home, family relations, and the psychological well-being of family members. Such changes are then manifested in child maladjustment (Elder, 1974; McLoyd, 1998). Although occasionally criticized as blaming poor parents for children's troubles, proponents of the family socialization model have argued that it captures how parents and children are *both* victims of economic stratification (Huston, 1991).

Traditionally, the family socialization model has focused on *interpersonal processes*. For example, research on a variety of data sources has indicated that maternal sensitivity and parental discipline are powerful mediators of income effects on early childhood outcomes (Conger, Ge, Elder, Lorenz, & Simons, 1994; Mistry, Vandewater, Huston, & McLoyd, 2002). Moreover, parental management of education and marital/partner interactions (e.g., conflict) also appear to be mediators for academic outcomes (Brody, Stoneman, & Flor, 1995; Conger et al., 2002; Raver et al., 2007). Over time, *family member adjustment* has become central to the model. For example, a constellation of psychological responses to economic hardship, such as depression and stress, alters parents' organization of their own and their children's lives (Elder, Eccles, Ardelt, & Lord, 1995; Mistry et al., 2002). The corresponding psychological conditions of economically disadvantaged children have not been consistently incorporated into the family socialization model as mediators because they typically serve as outcomes. Yet, because of research documenting that psychosocial

problems can disrupt learning (Crosnoe, 2006; Miles & Stipek, 2006), the social and emotional adjustment of children might be considered a mediator of economic effects on academic outcomes just as their parents' adjustment is.

According to recent research, this family socialization model is especially relevant to the transition into elementary school (Gershoff, Aber, Raver, & Lennon, 2007; Raver et al., 2007). Family dynamics are most implicated in academic *disparities* during this period because, as children move through school, the formal (e.g., curriculum) and informal (e.g., peer influences) processes of education account for increasingly larger shares of such disparities. Moreover, because the educational system is cumulative, small group differences tend to widen as initial advantages select children into better opportunities to learn over time (Alexander, Entwisle, & Olson, 2007; Farkas, 1996; Pianta & Walsh, 1996). Thus, the transition into school is when family dynamics related to economic disadvantage likely have a pronounced impact on learning in ways that forecast long-term disparities. As such, it may be a critical intervention point.

A Family Socialization Model of Early Education

Building on past research, this study reconfigures and expands the family socialization model as it is applied to early education. The first expansion, alluded to above, involves the consideration of child adjustment as part of the set of potential mediators linking economic disadvantage and learning in elementary school.[1] A second change concerns the conceptualization of economic disadvantage. Typically, it is captured by income, with other social and economic statuses (e.g., parent education, family structure) controlled to isolate income effects (Duncan et al., 1998). Yet, isolating income may be counterproductive if what is really disadvantaging children is the accumulation of risks, not any one risk (McLanahan, 2004). In this spirit, we replicate research (Crosnoe, Mistry, & Elder, 2002) based on the theoretical work of Elder by viewing disadvantage as the clustering of social and economic risks, including income poverty, single-parent structure, teen fertility, low parent education, and welfare receipt.

Yet another expansion of the family socialization model in this study is the treatment of selection as a conceptual issue, not just a methodological problem. Specifically, the positions of parents in larger structures and institutions of society tend to shape their parenting behavior while also organizing their children's opportunities to learn (Duncan et al., 2004). Theoretically grounded, empirically supported examples include race/ethnicity, neighborhood settings, migration and employment histories, and job characteristics, as well as the more immediately felt consequences of global socioeconomic statuses, such as food insecurity (Crosnoe, 2006; Gershoff et al., 2007; Mayer, 1997). At the same time, children's traits and early experiences that support or disrupt learning over time may also elicit different kinds of parenting. Children's experiences in early child care and their cognitive and personality characteristics (many of which are genetically inherited) likely play such roles (Pianta & Walsh, 1996). Thus, we build on the family socialization model by contextualizing its paths within the transactions among structural, institutional, interpersonal, and intraindividual systems in the developmental ecology of early childhood. By allowing for better understanding of what the "effects" in the family socialization model may be, this expansion improves the potential of this conceptual model to inform policy.

A final expansion of the family socialization model concerns what, from an educational standpoint, is one of its biggest weaknesses: the absence of schools. The school is the

[1]Attempts to tease out the ordering of the three main mediators (e.g., parent adjustment linking income to parenting behavior; see Conger et al., 2002; Mistry, Biesanz, Taylor, Burchinal, & Cox, 2004) have yielded inconsistent, causally indeterminate evidence.

primary extrafamilial context of childhood, and economically disadvantaged and advantaged youth differ in the quality of their schools and in the benefits they derive from school quality (Miller & Chait, 2008; Yan & Lin, 2005). Furthermore, compared to families, schools are less difficult to change on the large scale and efforts to do so are less controversial (Coleman, 1990; Huston, 1991). From a policy perspective, then, incorporating schools into the family socialization model adds value. Consequently, we connect this model to education research and increase its policy relevance by considering whether school resources can buffer against the learning risks associated with the family disruptions of economic disadvantage.

Of course, a multitude of school and classroom factors could be conceptualized as buffers in this expanded family socialization model. We focus on teachers' qualifications (e.g., training, credentials) and classroom practices (e.g., instructional foci) in part because they have been empirically related to achievement disparities and are frequent targets of educational policy (Darling-Hammond, 2006). Theoretically, such teacher characteristics also align with the family socialization model's emphasis on parents because they tap resources (and risks) children can accrue through their connections to adult figures at school. Specifically, following the functional substitution idea that resources in one context will make more of a difference to individuals who lack similar resources in other contexts (Mirowsky & Ross, 2003), economically disadvantaged children who have less social capital, cognitive stimulation, and stability at home (relative to peers) may benefit more when they can tap such resources at school.

Evidence from national and localized investigations documents that teacher experience, advanced credentials, and education factor into student learning (Ferguson & Ladd, 1996; E. Fuller, 1998; Goldhaber & Anthony, 2007; Goldhaber & Brewer, 2002; Wenglinsky, 2000). Other studies report more limited effects of teacher qualifications relative to teacher attitudes and teaching styles (Hanushek, 1997; Palardy & Rumberger, 2008). On the whole, a better trained, more experienced teaching staff focusing on academic skills seems to be part of building a school context with a storehouse of information and knowledge, a consistent curriculum, and a positive environment (Clotfelter, Ladd, & Vigdor, 2007; Darling-Hammond & Youngs, 2002; Xue & Meisels, 2004). Unfortunately, schools serving economically disadvantaged youth tend to have teaching staffs with fewer credentials, fewer in-subject degrees, and shorter tenures than do other schools, and teachers in these schools tend to spend less time on academic instruction (Clotfelter et al., 2007; Lankford, Loeb, & Wyckoff, 2002; Peske & Haycock, 2006). Indeed, these very disparities motivated the highly-qualified-teacher provision of No Child Left Behind.

These teacher-related dimensions of school context, therefore, are hypothesized to buffer against some academic risks related to family life that young economically disadvantaged children face. Teachers cannot change how families are hurt by economic disadvantage, but they may protect child learning from associated risks during a critical window. Yet, just as family mediation should be conceptualized as part of a system of selection processes, school moderation must be embedded in an array of institutional, social, and individual forces that help to match children to teachers. In addition to the selection factors described above for the family piece of the conceptual model, the location, structure, and composition of economically disadvantaged children's schools affect the kinds of teachers they have as well as their general opportunities to learn (Darling-Hammond, 2006; Palardy & Rumberger, 2008; Pianta, Belsky, Houts, Morrison, & The NICHD Early Child Care Research Network, 2007).

The Present Study

The basic structure of the family socialization model, therefore, can be enriched by expanding the conceptualization of economic disadvantage and family mediation and then incorporating selection processes and school context more fully into this conceptualization. Following this argument, the three research questions of this study are:

- Do parenting behaviors, family relations, parent adjustment, and child adjustment mediate the link between parents' general level of economic disadvantage and children's learning early in elementary school?
- To what extent is this family-based mediation a proxy for the impact of related parental statuses, family circumstances, and children's traits and experiences on the early learning of economically disadvantaged children?
- Can the qualifications and classroom practices of elementary school teachers condition family-based mediation of economic disadvantage above and beyond the forces selecting disadvantaged children into different kinds of classrooms in schools?

Method

Data and Sample

Run by the National Center for Education Statistics (NCES), the ECLS-K is a study of a nationally representative sample of American kindergartners, created through a multistage sampling frame—the selection of 100 primary sampling units (typically counties), then 1,000 schools, and then 22,782 students. All students were in kindergarten at the first wave (fall 1998), with subsequent waves in the spring of 1999, fall of 1999, and the spring of 2000, 2002, and 2004. Data collection consisted of interviews with parents and school personnel and diagnostic tests for children (http://nces.ed.gov/ecls). We retained the full 2002 data release (N = 17,401) in order to compare the focal kindergarten/ first-grade period to the end of primary grades. Such a comparison allowed us to assess the potential relative fade, noted earlier, of family dynamics in economic disparities as children move through the educational system (Alexander et al., 2007) as well as the potential decay of teacher effects after children leave a classroom (Rothstein, 2008). Longitudinal sample weights were employed to account for differential attrition across waves.

Measures

Academic achievement—At each wave, children completed standardized assessments in math (e.g., numbers, arithmetic) and reading (e.g., letter recognition, literal inference) in two stages. Their performance on the uniform first stage determined whether they took the low-, medium-, or high-difficulty second stage. With item response theory, proficiency scores were developed across stages that represent specific points along the same ability continuum and, as such, are directly comparable across years. As expected, scores increased between kindergarten and first-grade spring (see Table 1 for descriptive statistics for main study variables).[2] We took the difference between these two scores to create a kindergarten/first-grade change score in each subject, which was statistically sound given that the ECLS-K tests were designed with adaptive procedures that eliminated the potential for floor and ceiling effects (Rock, 2007).

[2]Children who scored below a set threshold on an oral language test were screened out of reading tests. Math tests were given in Spanish when appropriate. These numbers decreased substantially from year to year. A binary marker for test language status was added as a control.

Family economic disadvantage—In line with our reconceptualization of economic disadvantage in the family socialization model, we replicated a multidimensional scale created for a community sample (Crosnoe et al., 2002). This scale tapped social and economic risks to identify families in *persistently* dire straits in the larger system of socioeconomic stratification. A family received 1 point on the scale for each of the following statuses: (a) annual income fell below the federal poverty threshold for household size (21%), (b) there was a single-parent family structure (21%), (c) custodial parent did not graduate from high school (14%), (d) custodial parent had first child as a teen (27%), and (e) there was a history of welfare receipt (7%). Correlations among these statuses ranged from . 10 (low parent education, single-parent family structure) to .34 (low income, welfare receipt). The sum of these five parent-reported items served as the final scale.

Family socialization factors—For the first research question of this study, we needed to identify measures in the ECLS-K tapping the main mediators in the family socialization model. Fortunately, past cross-sectional studies of the family socialization model in the ECLS-K provided a template for doing so (Gershoff et al., 2007; Raver et al., 2007). We should note that some summed scales had low alphas but were retained to be consistent with this past research. Unless otherwise noted, all measures were based on parent reports in the spring of kindergarten.

Beginning with family relationships, 20 parent-reported items were averaged to measure *marital conflict* (α = .79). Examples include frequency of positive behaviors (reversed), use of conflict tactics, and frequency of arguments (1 = *less than once a month* to 4 = *almost every day*). Also, parents rated five statements (1 = *completely true* to 4 = *not at all true*) from the HOME Scale (Caldwell & Bradley, 1984), such as “Even when I’m in a bad mood, I show [child] a lot of love” and “I express affection by hugging, kissing, and holding [child].” Scores were averaged to measure *parental warmth* (α = .54).

Turning to family members’ adjustment, the ECLS-K included a subset of the Center for Epidemiologic Studies–Depression Scale (Radloff & Locke, 1986) in which parents reported how often (1 = *never* to 4 = *most of the time*) during the past week they experienced 11 depressive symptoms, such as loss of appetite and sadness. The mean measured *parent depression* (α = .86). Parents also completed the Parenting Stress Index (Abidin, 1983), a set of items measuring how true (1 = *completely true* to 4 = *not at all true*) various statements were, including “being a parent harder than expected” and “feeling trapped as a parent” (α = .67). Although also tapping family relationships, we categorized this *parenting stress* measure as adjustment because of its strong emphasis on parents’ psychological well-being. Finally, the ECLS-K measured *children’s externalizing and internalizing problems* with the Social Rating Scale, in which teachers reported how often (1 to 4) they had witnessed symptoms of externalized (e.g., fighting) and internalized (e.g., anxiety) distress. Although teachers can be biased in their assessments of children and typically lack clinical training, teacher reports are widely used in national research when “neutral” assessments are not feasible. Moreover, given our focus on schools, consideration of how child adjustment is manifested in school settings—and, therefore, might directly disrupt instruction and learning —is theoretically appropriate.

Finally, all parenting behaviors were measured with items from the HOME Scale (Caldwell & Bradley, 1984). *Cultural activities* was the sum of whether (1 = *yes*) parents, in the past month, took children to a library, show, or four similar activities. *Provision of cognitively stimulating materials in the home* was the mean of three items about the presence of children’s books, CDs, and computers in the home (α = .64). Parents reported whether they involved their children (1 = *yes*) in eight formal activities outside of school, including clubs and music lessons. The sum measured *enrollment in organized activities*. They also reported

how often (1 = *not at all* to 4 = *everyday*) they engaged their children in nine *home learning activities* (e.g., puzzles, reading), which were averaged (α = .72). *School-based parental involvement* was the sum of seven yes-or-no items, including volunteering at school, attending open house, and meeting with teachers (α = .72). Parents responded to a vignette about potential discipline techniques if their children hit them. Responses were quartered—0 (e.g., give warning), 1 (e.g., take a time out), 2 (e.g., yell/threaten, make fun), and 3 (e.g., spank, hit back)—and then averaged with their frequency of spanking (0 to 31 times) to measure *physical discipline*. Finally, eight binary items were summed to measure *rules and routines* in the home, including three on the use of television rules and four on patterns of meals and bedtimes (α = .54).

Because of concerns about multicollinearity, we examined correlations among all focal family measures. Only four exceeded .25: school-based parental involvement and cognitively stimulating materials (.44), school-based parental involvement and organized activities (.39), child internalizing problems and child externalizing problems (.30), and parental depression and parenting stress (.38). Most correlations were between .10 and .20.

Other child/family factors—Central to the second research question were selection processes simultaneously influencing family dynamics and child learning. The first set included parents' demographic and employment statuses. We measured race/ethnicity (African American, Asian American, White, Latino/a, other), immigration status (1 = *at least one parent foreign-born*, 0 = *both parents U.S.-born*), and maternal employment (dummy variables for full-time, part-time, not working, and no mom in household). The second set tapped family circumstances. Of those hypothesized to be important, only one (material hardship) could be directly measured in the ECLS-K. Following theory and replicating past research (Gershoff et al., 2007), we measured four dimensions of immediate material hardships related to economic disadvantage, all based on parent reports in kindergarten: residential instability (number of places child had lived for 4 months or more), inadequacy of medical care (sum of whether child was not covered by insurance, had not seen primary care physician in last year, and had not seen dentist in last year), food insecurity (1 = *secure*, 2 = *insecure without hunger*, 3 = *insecure with moderate hunger*, 4 = *insecure with severe hunger*), and months of financial problems. The third set of selection factors included child traits and experiences. We were able to measure child age, gender, and pre-K child care (parental, relative, nonrelative, preschool, child care center, Head Start, other).

Several kinds of selection processes, such as those related to neighborhood conditions, state policies, and genetic heritability, could not be measured in the ECLS-K. They were *unobserved*. As described below, we took steps to account for the potential impact of such factors if they could have been observed. Finally, two other factors had to be measured as controls to gauge students' exposure to instruction before testing: a binary marker of whether students were first-time kindergarteners and a continuous measure of the timing of assessment (days between the first assessment given in the study and the child's actual assessment).

Teacher characteristics—For the third research question of this study, we followed past ECLS-K conventions for measuring teachers' qualifications and classroom practices (Palardy & Rumberger, 2008; Xue & Meisels, 2004). All measures came from the fall or spring of kindergarten, and the correlations among them never exceeded .22.[3] Beginning with qualifications, teachers reported their highest degree, general certification (0 = *none*, 1

[3]If a child had more than one teacher, the National Center for Education Statistics selected a "primary" teacher according to who had primary academic responsibility for the child and could best report the needed information.

= *temporary*, 2 = *alternative*, 3 = *regular*, 4 = *highest available*), and elementary certification. Responses were dichotomized (1 = *master's degree or higher*; 1 = *regular certification or higher*; 1 = *elementary certified*). Two tenure measures gauged the years teachers had taught in the child's grade and at the child's school. Finally, teachers reported how many hours per week they had designated for paid preparation (1 = *0–2*, 2 = *2–5*, 3 = *5–9*, 4 = *10–14*, 5 = *15+*).

Turning to reading instructional practices, the frequency with which teachers used phonics instruction was measured by the mean of their reports of how often (0 = *never*, 1 = *once or month or less*, 2 = *2–3 times a month*, 3 = *1–2 times a week*, 4 = *3–4 times a week*, 5 = *daily*) they engaged in 9 basic reading activities, including alphabetizing, rhyming words, and matching letters to sounds ($\alpha = .72$). A second measure tapped frequency of whole-language activities by averaging reports of 17 activities, including retelling stories, making predictions from text, and using context cues for comprehension (same response categories; $\alpha = .82$). Teacher-reported minutes per day children spent on reading and language arts in their classrooms (1 = *1–30*, 2 = *31–60*, 3 = *61–90*, 4 = *more than 90*) measured reading instruction time. As for math instruction, teachers reported how often (same response categories) they used 5 activities related to number operations (e.g., counting by 2s, 5s, and 10s; reading two- and three-digit numbers) and 3 related to mechanics (e.g., subtract two-digit numbers without regrouping, carry numbers in addition). Averaging the respective items resulted in two scales ($\alpha = .74$ for operations, .79 for mechanics).

Other school factors—A key component of the conceptualization of the third research question was the embeddedness of teachers in various types of schools (and classrooms within schools) that might attract different kinds of teachers, promote different levels of teacher investments, and elicit different teaching strategies while also affecting children's learning. Attempting to account for the spuriousness that might result from this interplay between teachers and schools, we measured factors tapping school location, school services, and classroom environment (see the appendix). Correlations among these variables were weak to moderate.

Plan of Analyses

The analytical plan included a series of models with the kindergarten/ first-grade math/ reading change scores as outcomes. The use of change scores was motivated by two factors. First, children's academic skills and behaviors can elicit parenting (Duncan et al., 2004). As a result, we needed to measure child factors before (or at the same time as) family factors. Unfortunately, ECLS-K child assessments began in kindergarten. Thus, the best alternative to studying the transition into school was to examine what happened to children in the first 2 years of school, while holding constant their starting level. In other words, did family or school processes exacerbate extant economic disparities in child learning *after* elementary school had begun? Second, results were identical for change score models and lagged models (predicting the first-grade test scores controlling for the kindergarten scores). We chose the former because the interpretation of the outcome— point increases on the tests from year to year—is more straightforward for readers of diverse methodological backgrounds.

For the first research question, the math/reading change scores were regressed on economic disadvantage and, to calibrate from what starting level over-time change occurred, the corresponding kindergarten test scores. Next, the three sets of family socialization factors were added to the model. Following Baron and Kenny (1986), we assessed mediation by determining whether the family factors were predicted by economic disadvantage, whether they predicted the outcomes, and whether their inclusion attenuated the economic

disadvantage coefficient, with the significance of this attenuation gauged by a test of indirect effects (Sobel, 1982).

These models were estimated with the mixed procedure, the SAS version of multilevel modeling (Singer, 1998). Because all predictor variables at this point were individual level, they were entered on Level 1. Still, multilevel modeling was useful because it corrected the school-based clustering of the ECLS-K to produce robust standard errors. In these models, weights were employed to account for the bias of differential attrition and planned oversamples. To reduce additivity violations (e.g., when alternate samples are underrepresented) that undermine causal inference, we employed the multiple imputation procedure in SAS to estimate all item-level missing data, thereby maintaining the large, heterogeneous longitudinal sample and avoiding the statistical bias of listwise deletion (Allison, 2001). This procedure used full information from available data to create multiple data sets in which missing values were replaced with different equally plausible values.[4] Results from the mixed models were generated from each data set and then combined across data sets to produce valid statistical inferences for parameters of interest.

For the second research question, the child and family controls were added to the models as predictors of the math/reading change scores in an attempt to account for observable selection processes. Of course, some hypothesized selection processes (e.g., neighborhood conditions, genetic effects) could not be studied in the ECLS-K, and we acknowledge that other selection processes may have been omitted from our conceptual model. These unobserved confounds posed clear threats to tests of the conceptual model. To explore these threats, we drew on robustness indices. Rather than controlling for the impact of unobserved confounds on a focal association, the impact threshold for confounding variables (ITCV) index quantifies just how powerfully an unknown confound would have to be correlated with both variables in that association for its control to wash out the association. The ITCV equation is $r_{xy} - r^{\#}_{xy} / 1 - r^{\#}_{xy}$, where $r^{\#}_{xy} = t / \mathrm{SQRT}[(n - q - 1) + t^2]$, t is the critical t value, n is the sample size, and q refers to the number of model parameters (excluding the intercept). This equation can be extended to models with multiple covariates by $\mathrm{ITCV}_{\text{with covariates}} = \mathrm{ITCV}_{\text{no covariates}} \times [\mathrm{SQRT}\ (1 - R^2_{xg})(1 - R^2_{yg})]$, where g is the set of covariates, R^2_{xg} is the R^2 value from a regression predicting the focal independent variable by the covariates, and R^2_{yg} is the R^2 value from a regression predicting the outcome by the covariates (Frank, 2000). The ITCV represents the minimum product of the correlation between the predictor and confound and the correlation between the outcome and the confound ($r_{xc} \times r_{yc}$) needed to make the focal association from the regression (e.g., family factor → math change score) nonsignificant. Thus, higher ITCV values indicate more confidence that a coefficient in a multivariate model would remain statistically significant even if all unobserved confounds could be observed and entered as controls.

For the third research question, all teacher qualification and classroom practice variables were entered into the models as predictors of the math/reading change scores, with and without the full set of school and classroom controls. Technically, school variables and teacher/classroom variables were on different levels. Yet, results did not differ when two- and three-level models were estimated, and so we entered all school and teacher/classroom variables on Level 2. Next, cross-level interactions were estimated between all significant family mediators of economic disadvantage effects and all of the focal teacher variables.

[4]On average, 5% to 10% of the sample had missing data on the child, family, or school variables, and 15% to 22% had missing data on teacher variables.

Results

As a starting point, the top section of Table 2 provides the percentage of families at each point of the family economic disadvantage scale who had each marker of economic disadvantage. For example, of the families with a 1 on the scale, 32% were headed by a single parent. The percentages in Category 1 summed to 100% because, by definition, each family could have only one marker of disadvantage. In general, the percentage of families with a history of welfare receipt increased across points on the scale, but this percentage was smaller than the percentage of families with other markers (at least until 5 on the disadvantage scale). The small percentage of families with incomes below the poverty line increased across each point of the scale so that, among families with four markers of disadvantage, almost all were poor by the federal standard.

For more information, the remaining rows in Table 2 present unweighted statistics for key variables by the number of markers of economic disadvantage. Reflecting the overlay of race/ethnic and economic stratification in the United States, children from families with no markers of disadvantage tended to be White, and majorities of children from families with four or five markers were African American or Latino/a (race/ethnicity statistics not shown). Generally, child profiles became more problematic with each additional marker of disadvantage. Children with no markers scored higher on kindergarten tests than did children with one marker, who scored higher than children with two, and so forth. In near lockstep were increases in parents' relationship problems as well as parent/child socioemotional problems. At the same time, the prevalence of positive family dynamics and parenting behaviors supporting learning declined as economic disadvantage increased. Teacher qualifications, however, did not demonstrate a consistent linear pattern across the economic disadvantage categories. The same was true for teacher classroom practices (not presented in the table for space reasons but available upon request).

Thus, as economic disadvantages accumulated, parents had more difficulty constructing household environments supportive of children's learning, and these children lagged behind academically from the start of their school careers. These patterns provide *preliminary* support for our specification of a family socialization model for the transition into elementary school.

Economic Disadvantage, Family Disruption, and Math

All three research questions of this study center on the link between economic disadvantage and children's learning. Thus, we first regressed the kindergarten/first-grade math change score on economic disadvantage and the kindergarten math score. Model 1 in Table 3 presents the results of this weighted multilevel model. For an assessment of effect sizes, we have included standardized β coefficients in the parentheses below the unstandardized *b* coefficients.

With each marker of disadvantage, children lost just under 1 point of increase on the test between periods ($b = -0.81$, $p < 001$). In terms of effect size, every standard deviation increase in disadvantage was associated with just under one tenth of a point difference in test score change ($\beta = -.09$). Extrapolating from the *b* coefficient, the average child with no marker of disadvantage would gain an extra 4 points on the test (about 40% of a standard deviation in the outcome) than the average child with all 5. As a side analysis, we gauged the degree to which these economic disadvantage effects were accounted for by factors besides our family socialization mediators by adding the full set of child and family controls to Model 2. The economic disadvantage coefficient was reduced by about 20%, especially by the control for race/ethnicity. The new coefficient ($b = -0.64$, $\beta = -.07$, $p < .001$) was smaller but significant.[5]

Of course, the economic disadvantage scale encompasses several family circumstances. To unpack its effect, we broke down the scale into its constituent markers (results not shown). All five were inversely associated with math change scores, especially low parent education. Its standardized coefficient doubled the magnitude of all other disadvantage markers. Different *combinations* of markers were also assessed to determine which configuration best captured the effect size for the full economic disadvantage scale in Model 2. These ancillary analyses revealed that summing scores for poverty status, low maternal education, and teen parenthood effectively created the general economic disadvantage coefficient.

With the magnitude of this association between economic disadvantage and child learning established, we turned to the first research question of this study, which concerned the potential for family socialization factors to mediate this association (Model 3 in Table 3). For the sake of parsimony, only the six *significant* predictors of the math change score were retained in the final model. Three (parenting stress, child externalizing problems, and child internalizing problems) tapped family members' adjustment. They were inversely associated with the outcome. The remaining three (organized activities, parental involvement, cognitively stimulating materials) were parenting factors positively associated with the outcome. Of these, internalizing problems ($b = -1.48$, $\beta = -.07$, $p < .001$) and cognitively stimulating materials ($b = 0.78$, $\beta = .07$, $p < .001$) had the biggest effect sizes. A 1 standard deviation change in each (0.51 for internalizing, 0.96 for stimulation materials) was associated with a 0.07 change on the math test over time. Child externalizing problems had the next largest effect size, followed by the other three factors.

Although effect sizes gauge the statistical magnitude of the observed impact of some factor, we recognize that they do not necessarily gauge the meaningfulness of this impact. To that end, we can compare the effect sizes of the family socialization main effects to the various items in the economic disadvantage scale, given that the importance of these specific items for children have long been viewed as real public concerns worthy of millions, even billions, of dollars of federal and state investment (Duncan, Huston, & Weisner, 2007). The effect sizes for child internalizing problems, child externalizing problems, and cognitively stimulating materials exceeded the effect sizes for all markers of economic disadvantage except for low parent education. In other words, these family socialization effect sizes—which controlled for economic disadvantage—exceeded those for low-income status (one of the major disparities targeted by No Child Left Behind) and single-parent family structure (the focus of the federal government's Healthy Marriage Initiative). The other family socialization factors had smaller effect sizes than teen parenthood but essentially the same effect size as low-income status and single-parent family structure. Thus, to the extent that something like income is accepted as having a meaningfully large association with child learning, then the corresponding associations for the family socialization factors should be viewed as meaningful too.

As for mediation, the six significant family factors attenuated the association between economic disadvantage and the math change score by 42% relative to Model 2 and 54% relative to Model 1. Moreover, ancillary analyses revealed that *each* accounted for some attenuation in the association between economic disadvantage and the math change score, when entered separately, and was itself significantly predicted by economic disadvantage and passed the Sobel test. Thus, the six family socialization factors all met the basic criteria for mediation.[6]

[5]Results for other child and family factors are available from the authors. Predictors of math change scores with significant positive coefficients included being White, having immigrant parents, later timing of assessment, and Southern region. Predictors with significant negative coefficients included female gender, food insecurity, inadequate medical care, and residential instability.

[6]Group-specific side analyses revealed a slight tendency for family mediation to be stronger among White children than among children from other race/ethnic groups.

Turning to the second research question of this study, which concerned the robustness of these family socialization patterns in the face of selection processes, we estimated the family mediation model just described with (Model 3) and without (not shown) the full set of child and family controls. Comparing the results indicated that these child and family factors accounted for about 2% of the observed associations with the outcome for child internalizing problems and school-based parental involvement and 9% of the association for cognitively stimulating materials. The other family socialization factors remained stable or slightly increased when the additional child and family factors were controlled.

To explore the selection processes that could not be measured in the ECLS-K, we calculated the ITCV for all significant family mediators in Model 3. The highest ITCV (.10) was for cognitively stimulating materials. Assuming that the two focal correlations (Materials × Unknown Confound, Math Change Score × Unknown Confound) were equivalent, each correlation would have to exceed .32 (absolute value) to produce a confounding effect big enough to reduce the association between cognitively stimulating materials and the math change score in Table 3 to nonsignificance. For comparison's sake, only a few demographic factors even approached this level of correlation with the math change score, and none of them were correlated with the family factor at the same level. This ITCV boosts confidence that the coefficient for this family factor would be robust if other unobserved confounds could be measured and controlled.

The ITCV was .09 (.30 × .30) for child internalizing problems and school-based parental involvement, .08 (.28 × .28) for organized activities, and .06 (.24 × .24) for child externalizing problems. The lowest ITCV (.04 = .20 × .20) was for parenting stress, indicating that it was the most vulnerable to some unobservable confound. Still, given that *no* variable examined in the ECLS-K was correlated with *both* parenting stress and the math change score at this magnitude, the level of robustness for even this family factor appeared to be acceptable.

Economic Disadvantage, Family Disruption, and Reading

The steps taken to answer the first and second research questions were repeated for reading. The initial association between family economic disadvantage and the reading change score ($b = -1.44$, $p < .001$, in Model 1 in Table 3) indicated that a child with no markers of economic disadvantage would gain, on average, 7-plus more points on the reading test over time than a child with all five markers. This difference equaled two thirds of a standard deviation in the outcome. The effect size ($\beta = -.13$) was slightly larger than what was seen in the math model. This association was attenuated (by about 15%)by the control of observed child and family confounds in Model 2, but it persisted and remained highly significant.[7] Again, when the disadvantage scale was decomposed into its constituent items, all five were significantly and inversely associated with the reading change scores. The associations for poverty status, receipt of public assistance, and low parent education (the marker with the biggest effect size) were at least two times the magnitude of those for teen parenthood and single parenthood. Indeed, the combination of the first three markers accounted for the coefficient for the full scale in Model 2.

For the first research question, Model 3 included six family socialization factors that significantly predicted the reading change score when examined independently and together (as well as the child and family controls). Three tapped family adjustment (parent depression, child externalizing problems, and child internalizing problems) and were

[7]Few controls predicted the reading change score beyond economic disadvantage. Exceptions included significant positive coefficients for female gender, age, and timing of assessment and significant negative coefficients for food insecurity and inadequate medical care.

inversely associated with the reading change score. Three tapped parenting factors (organized activities, cognitively stimulating materials, rules/routines) and were positively associated with the reading change score. Child externalizing behaviors ($b = -1.48$, $\beta = -.07$, $p < .001$) and cognitively stimulating materials ($b = 0.95$, $\beta = .07$, $p < .001$) had the largest effect sizes. A 1 standard deviation change in each (0.64 for externalizing, 0.96 for stimulating materials) was associated with a 0.07 change in reading test scores between kindergarten and first grade. The remaining effect sizes were, in order, internalizing problems, rules and routines, parent depression, and organized activities. The effect sizes for child externalizing problems and cognitively stimulating materials exceeded the effect sizes for all of the constituent items in the economic disadvantage scale, and the effect sizes for the remaining family socialization factors met or exceeded the effect sizes for all of the disadvantage items besides low-income status and low parent education. The inclusion of these six factors attenuated the economic disadvantage coefficient by 28% relative to Model 2 and 39% relative to Model 1. All six factors met the criteria (including the Sobel test) for mediation.

The second research question, comparing the reading results from Model 3 with and without the child and family controls, indicated that the child and family controls accounted for about 10% of the association of parent depression with child learning (3% for child internalizing problems and 12% for child externalizing problems and organized activities). The remaining family socialization factors remained the same or increased slightly when the child and family controls were added to the model. The ITCV was also calculated for the six family socialization mediators. Child externalizing problems and cognitively stimulating materials had the highest values (.12), meaning that an unobserved confound would have to be correlated with *both* the family predictor and the outcome at absolute values of .35 or higher for its inclusion in Model 3 to reduce the association between predictor and outcome to non-significance. The other family factors had ITCV values between .07 (.26 × .26) and .10 (.32 × .32). These values help to boost confidence, at least somewhat, that the results in Model 3 were robust to threats to causal inference from confounds that could not be or were not measured.

Bringing in the School

Our third research question concerned the potential for teacher qualifications and practices to condition the link between child learning and the family socialization factors that mediated economic disadvantage effects, above and beyond the school and classroom settings of different kinds of teacher recruitment, investment, and practice. In an attempt to answer this question, we added measures tapping various dimensions of teacher qualifications and practices to our comprehensive family socialization model of kindergarten/first-grade math/reading change scores (Table 4) as well as their interactions with the focal family socialization factors.

Net of the child and family controls, as well as the kindergarten test score, economic disadvantage, and the significant family socialization mediators, teacher qualifications and practices did little to predict math/reading change scores (Model 1). Indeed, only mechanics instruction was significantly associated with the math outcome. Four (elementary certification, tenure in grade, tenure in school, whole-language instruction) were associated with the reading outcome.[8] These patterns did not change when the full set of school and classroom controls were included as covariates (Model 2). With a few exceptions, most school and classroom variables did not predict the outcomes in the full model. Moreover,

[8]See the 2007 report by Barker and Coley for a similar pattern of how family factors trump school and classroom factors in predicting achievement outcomes. See the article by Palardy and Rumberger (2008) for similar weak findings on certain teacher qualifications in ECLS-K.

their inclusion did not affect the pattern of results for the focal family variables. Lastly, calculating the ITCV for the significant teacher factors in these models revealed sufficiently high values (greater than .04) for elementary certification and teacher grade tenure but low values for all other factors (< .01). Thus, the school-based selection processes in our conceptual model did not appear to be all that important.

Testing for interactions between each teacher factor and each significant family socialization factor revealed that the only significant interactions concerned teacher tenure. For math, the only such interaction was between parenting stress and teacher tenure in grade ($b = -0.70$, *ns*, for parenting stress; −0.04, *ns*, for grade tenure; 0.04, $p < .05$ for Stress × Tenure). For reading, these interactions were

- Parenting Stress × Teacher Grade Tenure ($b = -0.96$, *ns*, for parenting stress; −0.003, *ns*, for grade tenure; 0.04, $p < .05$, for interaction)
- Child Internalizing Problems × Teacher Grade Tenure ($b = -2.13$, $p < 05$, for internalizing; −0.01, *ns*, for grade tenure; 0.05, $p < .05$, for interaction)
- Child Externalizing Problems × Teacher Grade Tenure ($b = -1.96$, $p < .001$, for externalizing; −0.01, *ns*, for grade tenure; 0.05, $p < .05$, for interaction)
- Cognitively Stimulating Materials at Home × Teacher Grade Tenure ($b = 0.68$, *ns*, for materials; −0.03, *ns*, for grade tenure; 0.04, $p < .01$, for interaction)
- Cognitively Stimulating Materials at Home × Teacher School Tenure ($b = 0.68$, *ns*, for materials; 0.03, *ns*, for grade tenure; −0.04, $p < .05$, for interaction)

These interactions were interpreted by calculating predicted math and reading change scores for children in the sample varying on the focal family and teacher factors (1 standard deviation below and above the mean for both), with all other variables in the model held to their sample means. For all teacher grade tenure interactions, doing so revealed evidence of buffering, or protection—the negative association between the family factor and the achievement change scores appeared to decrease in magnitude in the presence of the teacher factor.

To illustrate, Figure 1 graphs the interactions between the child adjustment factors and teacher tenure in grade for reading. Children with externalizing problems had smaller gains in reading across the 2-year span than their peers did, regardless of whether their teachers had experience in their grade level or not, but this gap between high- and low-externalizing children was smaller when their teachers had such experience (a 1.7 point difference in test score gains equaling 13% of a standard deviation in the test change score) than when their teachers had less grade-level experience (a 2.75 point difference equaling 21% of a standard deviation). The same pattern held, with slightly smaller effect sizes, for internalizing problems. The other family risks associated with economic disadvantage—parenting stress (both subjects) and a lack of cognitively stimulating materials at home (reading only)—demonstrated the same buffering pattern of interaction with teacher tenure in grade.

Interestingly, the only other significant Family × Teacher interaction that emerged (Teacher Tenure in School × Cognitively Stimulating Materials for the reading change score) did not fit the buffering pattern. Controlling for teacher tenure in grade, the learning gap between children from families with few cognitively stimulating materials at home (who tended to be economically disadvantaged) and children from families with more cognitively stimulating materials at home was more pronounced when teachers had more experience at a school. This learning gap was less pronounced when teachers had less experience at a school.

Shifting the Time Frame

To examine the degree to which our model was subject to the expected fade in family effects (relative to school) as children progress through the system and the decay in benefits of having a certain teacher after that school year has ended, we reestimated our models for math/reading change scores between first and third grade, measuring the family and school factors in the spring of first grade. Six of the 13 family socialization factors (marital conflict, parental warmth, parent depression, parenting stress, cultural activities, physical discipline) were not considered, as they were not measured after kindergarten. Fortunately, only two had been significant mediators of economic disadvantage effects on kindergarten/first-grade change scores (parenting stress for math, parent depression for reading). All teacher measures were repeated in first grade, as were all of the school controls. We summarize the results of these models here.

Overall, economic disadvantage had stronger effects on first-grade to third-grade change scores than it had on the corresponding kindergarten/first-grade change scores. Yet, the extent to which family socialization factors mediated these effects was diminished in the later time frame. Three factors (cognitive stimulating materials at home, child internalizing problems, and child externalizing problems) mediated the association between economic disadvantage and the math change score, and five (cognitive stimulating materials at home, organized activities, parental involvement at school, child internalizing problems, and child externalizing problems) mediated the association between economic disadvantage and the reading change score. ITCV values for the child adjustment factors, however, revealed scant evidence of robustness. Moreover, the degree of attenuation of the economic disadvantage coefficient by the significant family mediators was low relative to the kindergarten/first-grade period. Lastly, none of the teacher factors interacted with any family mediators to predict the change score in math or reading between first and third grade.

Discussion and Conclusion

Over the years, a good deal of research has explored the effects of economic disadvantage on children’s learning as a window into the intergeneration transmission of inequality (Duncan et al., 1998). Much of this research has drawn on the ECLS-K (Lee & Burkham, 2002), and some (including a few studies using the ECLS-K) has been organized by the family socialization model or related perspectives (Raver et al., 2007). This study has contributed to this general literature in three ways. Conceptually, it has directly connected the developmental focus of the family socialization model to the realm of education by considering how various elements of school context condition the significance of family processes that have traditionally been the focus of developmental researchers interested in education. It has also incorporated selection processes into the very conceptualization of the model. Methodologically, our more aggressive attempts to deal with the endogeneity problems inherent to educational and developmental questions, including the more demanding challenges of confounds that are unknown or difficult to observe, has built on the insights emerging from past family socialization model research in general and family- and teacher-focused research in the ECLS-K in particular (Palardy & Rumberger, 2008; Raver et al., 2007). In terms of policy, our conceptual extension of the family socialization model to include contextual factors (e.g., teacher characteristics) that are viewed as more policy amenable than family processes and our methodological improvements on causal inference address some of the past criticisms that family-focused research on economic disadvantage is not useful for informing social policy (Mayer, 1997).

To summarize, children had smaller gains on the math and reading tests between their kindergarten and first-grade years with each additional marker of family economic disadvantage (especially the combination of low parent education, family poverty, and some

third dimension of disadvantage). This economic gap was bigger for reading but more related to family socialization factors in math. Of the family socialization factors, two sets were the most consistent mediators: family adjustment (especially for children) and parenting (especially practices related to education and enrichment). These family socialization factors appeared fairly robust in terms of selection processes, and their effect sizes were in line with the effects of many social and economic factors already targeted by large-scale policy investments. For the most part, the risks to math and reading test scores posed by certain family socialization factors common in disadvantaged families were stable across educational contexts (at least as defined here). The one consistent exception was that children with such family risk factors tended to do better than expected when they had teachers with experience teaching within their grade level, especially for reading. This observed buffering by kindergarten teachers, however, did not persist after the children had left first grade and cycled through multiple teachers.

Overall, the difference in test score gains between the most and least disadvantaged children was 4 to 7 points, which translated into moderate effect sizes. The family socialization factors did more to explain these differences than a set of conventionally examined correlates of economic disparities in education, such as race/ethnicity, immigration status, preschool experience, and school sector/composition. Still, around half of the effect of economic disadvantage went unexplained. Moreover, incorporating the school/ classroom context did not improve the explanatory power of the model as much as we had expected. The only teacher qualification related to the family socialization mediation of economic disparities—teacher tenure in grade—appeared to subtract a point from the overall main effect differences in test score gains over time. Thus, attention to family socialization could not capture all risks of economic disadvantage, and attention to teacher characteristics could not capture all of the portion of those risks associated with family socialization. This end result is not surprising, given that economic disparities are multidetermined. What we have done here is identify one piece of the puzzle that might lend itself to intervention and, in turn, provide traction for efforts to address such disparities.

One finding of this study—that income poverty played a greater role in early learning when it clustered with other elements of social and economic stratification—is itself relevant to large-scale policy. Many major educational policies rely solely on income information to designate children as at risk, such as No Child Left Behind and school socioeconomic integration (Darling-Hammond, 2006; Kahlenberg, 2001). At the same time, welfare reform has cut the number of hours in educational activities that states can count toward work-for-welfare clients (Goldrick-Rab & Shaw, 2005). Our results indicate that policy designations of economic risk should include parent education information, at a minimum, and that cutting educational funding may block low-income mothers with the most at-risk children from a pathway of action that likely has the most payoff.

Similarly, we also took a broad view of family socialization to include patterns of interpersonal interaction and individual well-being *within a single family*. How parents invested in and managed their children's education appeared more important than other parenting practices as a link between economic disadvantage and early education, a pattern that lends support to policy initiatives to increase funding for structured activities outside school, build family-school relations, and help economically disadvantaged parents identify methods for rearing their children in ways that promote school success (Duncan et al., 2007; Vandell et al., 2006). Furthermore, how children were doing socially and emotionally also appeared to have more mediational power than how parents were doing, a pattern that supports the underlying argument about the need to increase mental health services for children and parents in school, perhaps as a part of a comprehensive school-based program

to integrate the educational and health care systems (Kirst, 1994). In both cases, acting early seems important.

The extension of the family socialization model into the educational realm is, we argue, an important aim. We did so by conceptualizing schools as potential buffers against the family-based risks of economic disadvantage. Teacher qualifications and practices seemed like a good place to start given their conceptual symmetry with parenting statuses and behaviors and their centrality to major educational policy. The one teacher characteristic that worked in the expected way was teacher tenure within grade level. This pattern, which was limited to early reading, offers some evidence that teachers who accumulate experience in a certain grade level may be more likely to recognize and respond to the special needs of at-risk children in developmentally appropriate ways. If true, then one specification of the highly-qualified-teacher provision of No Child Left Behind (Darling-Hammond, 2006) worth exploring would be retaining teachers within grade levels to address the related No Child Left Behind mandate to close economic achievement gaps. Although programs to reduce teacher attrition are common across states, they usually target keeping teachers on the job or in the same school. Such programs provide incentives, including monetary rewards, loan repayment, and accelerated tenure, for keeping teachers on staff and/or for earning advanced degrees (Miller & Chait, 2008; National Council on Teacher Quality, 2008). The logic of these programs applies to promoting teacher stability within grades, which may be more important for economic disparities than the teacher qualifications (e.g., years in grade, advanced degrees) targeted by these programs.

Of course, the conclusions and recommendations just discussed will only be valid if the findings of this study prove consistent after future research corrects the limitations of what we have done and makes the necessary extensions. As one example, the family socialization mediators are theoretically ordered (e.g., parent adjustment → parenting → child adjustment), but, because we could not establish the proper time ordering, we treated all mediators as parallel. As another example, we measured many aspects of school context but focused explicitly on teacher characteristics. We argue that the potential value of injecting school context into the family socialization model warrants a broader look. Moreover, given our focus on the transition into school, the preschool and child care contexts need to be considered more fully. This need is especially great given the increasing policy interest in pre-K educational investment (B. Fuller, 2007). Worth noting is that we did perform a race/ethnic-specific analysis (see Notes) that revealed some interesting patterns of variation in family mediation of economic disadvantage effects that need to be explored in their own right. Finally, although we took steps to promote causal inference, more can be done. Employing instrumental variable analysis (Gennetian, Magnuson, & Morris, 2008) is probably the best strategy, short of experimental designs, and so efforts must be taken to identify appropriate instruments for these kinds of research questions. Mining census business data and national school databases (e.g., Common Core) for measures of local school and preschool market conditions would provide a pool of potential instruments to be tested in conjunction with the ECLS-K or other child-focused data sets.

Many of the limitations of this study reflected some common drawbacks of working with nationally representative public use data sets. The depth of measurement in the ECLS-K, for example, is weak. Family processes were based on parent reports, and only teacher reports were used for child adjustment. School measures were quite general, and the classroom data (especially on classroom processes) lacked detail. For family, school, and classroom contexts, observational techniques would be optimal, such as those employed in the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (Pianta et al., 2007) or in localized data collections or qualitative studies (Lareau, 2004). Yet, compared to other data sources, the ECLS-K allows more coverage of

schools, promotes generalizability to the national context, and provides more internal heterogeneity (e.g., by race/ethnicity, immigration status) within the focal sample of economically disadvantaged families. These trade-offs between different kinds of data suggest that the practical option in this line of research, for now, is to triangulate studies employing different methods and data.

Biographies

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References

Abidin, RR. Parenting Stress Index—Manual. Charlottesville, VA: Pediatric Psychology Press; 1983.

Alexander KL, Entwisle DR, Olson LS. Lasting consequences of the summer learning gap. American Sociological Review 2007;72:167–180.

Allison, P. Missing data. Thousand Oaks, CA: Sage; 2001.

Arum R. Schools and communities: Ecological and institutional dimensions. Annual Review of Sociology 2000;26:395–418.

Barker, PE.; Coley, RT. The family: America's smallest school. Princeton, NJ: Educational Testing Service; 2007.

Baron R, Kenny D. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology 1986;51:1173–1182. [PubMed: 3806354]

Bernhardt, A.; Morris, M.; Handcock, MS.; Scott, MA. Divergent paths: Economic mobility in the new American labor market. New York: Russell Sage; 2001.

Brody GH, Stoneman Z, Flor D. Linking family processes and academic competence among rural African-American youths. Journal of Marriage and Family 1995;57:567–579.

Caldwell, BM.; Bradley, RH. Home observation for measurement of the environment. Little Rock: University of Arkansas; 1984.

Clotfelter CT, Ladd HF, Vigdor J. Teacher credentials and student achievement: Longitudinal analysis with student fixed effects. Economics of Education Review 2007;26:673–682.

Coleman, J. Foundations of social theory. Cambridge, MA: Harvard; 1990.

Conger R, Ge X, Elder GH Jr, Lorenz F, Simons RL. Economic stress, coercive family process, and developmental problems of adolescents. Child Development 1994;65:541–561. [PubMed: 8013239]

Conger RD, Wallace LE, Sun Y, Simons RL, McLoyd V, Brody GH. Economic pressure in African American families: A replication and extension of the Family Stress Model. Developmental Psychology 2002;38:179–193. [PubMed: 11881755]

Crosnoe, R. Mexican roots, American schools: Helping Mexican immigrant children succeed. Stanford, CA: Stanford University Press; 2006.

Crosnoe R, Mistry R, Elder GH Jr. Economic disadvantage, family dynamics, and adolescent enrollment in higher education. Journal of Marriage and Family 2002;64:690–702.

Darling-Hammond L. No Child Left Behind and high school reform. Harvard Educational Review 2006;76:642–667.

Darling-Hammond L, Youngs P. Defining “highly qualified teachers”: What does “scientifically-based research” actually tell us? Educational Researcher 2002;31:13–25.

Duncan GJ, Brooks-Gunn J, Yeung W-J, Smith JR. How much does childhood poverty affect the life chances of children? American Sociological Review 1998;63:406–423.

Duncan, GJ.; Huston, AC.; Weisner, TS. Higher ground: New hope for the working poor and their children. New York: Russell Sage; 2007.

Duncan GJ, Magnuson K, Ludwig J. The endogeneity problem in developmental studies. Research in Human Development 2004;1(1/2):59–80.

Elder, GH, Jr. Children of the Great Depression: Social change and life experience. Boulder, CO: Westview; 1974.

Elder GH Jr, Eccles J, Ardelt M, Lord S. Inner-city parents under economic pressure: Perspectives on the strategies of parenting. Journal of Marriage and the Family 1995;57:771–784.

Farkas, G. Human capital or cultural capital? Ethnicity and poverty groups in an urban school district. New York: Aldine de Gruyter; 1996.

Ferguson, RF.; Ladd, HF. How and why money matters: Ananalys is of Alabama schools. In: Ladd, HF., editor. Holding schools accountable: Performance-based reform in education. Washington, DC: Brookings Institution; 1996. p. 265-298.

Fischer, CS.; Hout, M. Century of difference: How America changed in the last one hundred years. New York: Russell Sage; 2006.

Frank KA. Impact of a confounding variable on a regression equation. Sociological Methods and Research 2000;29:147–194.

Fuller, B. Standardized childhood: The political and cultural struggle over early education. Stanford, CA: Stanford University Press; 2007.

Fuller, E. Do properly certified teachers matter? A comparison of elementary school performance on the TAAS in 1997 between schools with high and low percentages of properly certified regular education teachers. Austin, TX: Charles A. Dana Center; 1998.

Gennetian LA, Magnuson K, Morris PA. From statistical associations to causation: What developmentalists can learn from instrumental variables techniques coupled with experimental data. Developmental Psychology 2008;44:381–394. [PubMed: 18331130]

Gershoff ET, Aber JL, Raver CC, Lennon MC. Income is not enough: Incorporating material hardship into models of income associations with parenting and child development. Child Development 2007;78:70–95. [PubMed: 17328694]

Goldhaber D, Anthony E. Can teacher quality be effectively assessed? National board certification as a signal of effective teaching. Review of Economics and Statistics 2007;89:134–150.

Goldhaber DD, Brewer DJ. Does teacher certification matter? High school teacher certification status and student achievement. Education Evaluation and Policy Analysis 2002;22:129–145.

Goldrick-Rab S, Shaw K. Racial and ethnic differences in the impact of work-first reforms on access to postsecondary education. Educational Evaluation and Policy Analysis 2005;27:291–307.

Hanushek E. Assessing the effects of school resources on student performance: An update. Educational Evaluation and Policy Analysis 1997;19:141–164.

Heckman J. Skill formation and the economics of investing in disadvantaged children. Science 2006;312(5782):1900–1902. [PubMed: 16809525]

Huston, AC. Children in poverty: Child development and public policy. New York: Cambridge University Press; 1991.

Kahlenberg, R. All together now: Creating middle class schools through public choice. Washington, DC: Brookings Institution; 2001.

Kirst M. Equity for children: Linking education and children's services. Educational Policy 1994;8:583–590.

Lankford H, Loeb S, Wyckoff J. Teacher sorting and the plight of urban schools: A descriptive analysis. Educational Evaluation and Policy Analysis 2002;24:37–62.

Lareau, A. Unequal childhoods: Class, race, and family life. Berkeley: University of California Press; 2004.

Lee, V.; Burkham, D. Inequality at the starting gate. Washington, DC: Economic Policy Institute; 2002.

Leventhal T, Brooks-Gunn J. The neighborhoods they live in: The effects of neighborhood residence on child and adolescent outcomes. Psychological Bulletin 2000;126:309–337. [PubMed: 10748645]

Mayer, SE. What money can't buy. Cambridge, MA: Harvard University Press; 1997.

McLanahan S. Diverging destinies: How children are faring under the second demographic transition. Demography 2004;41:607–627. [PubMed: 15622946]

McLoyd V. Socioeconomic disadvantage and child development. American Psychologist 1998;53:185–204. [PubMed: 9491747]

Miles SB, Stipek D. Contemporaneous and longitudinal associations between social behavior and literacy achievement in a sample of low-income elementary school children. Child Development 2006;77:103–117. [PubMed: 16460528]

Miller, R.; Chait, R. Teacher turnover, tenure policies, and the distribution of teacher quality: Can high-poverty schools catch a break?. Washington, DC: Center for American Progress; 2008.

Mirowsky, J.; Ross, CE. Education, social status, and health. New York: Aldine de Gruyter; 2003.

Mistry R, Biesanz J, Taylor L, Burchinal M, Cox MJ. Family income and its relation to pre-school children's adjustment for families in the NICHD Study of Early Child Care. Developmental Psychology 2004;40:727–745. [PubMed: 15355162]

Mistry R, Vandewater E, Huston AC, McLoyd V. Economic well-being and children's social adjustment: The role of family process in an ethnically diverse low-income sample. Child Development 2002;73:935–951. [PubMed: 12038561]

National Council on Teacher Quality. State teacher policy yearbook: What states can do to retain effective new teachers. Washington, DC: Author; 2008.

Palardy G, Rumberger RW. Teacher effectiveness in first grade: The importance of background qualifications, attitudes, and instructional practices for student learning. Educational Evaluation and Policy Analysis 2008;30:111–140.

Peske, HG.; Haycock, K. Teaching inequality: How poor and minority students are shortchanged on teacher quality. Washington, DC: Education Trust; 2006.

Peters, HE.; Mullis, NC. The role of family income and sources of income in adolescent achievement. In: Duncan, GJ.; Brooks-Gunn, J., editors. Consequences of growing up poor. New York: Russell Sage; 1997. p. 518-540.

Pianta RC, Belsky J, Houts R, Morrison F. The NICHD Early Child Care Research Network. Opportunities to learn in America's elementary classrooms. Science 2007;315(5820):1795–1796. [PubMed: 17395814]

Pianta, RC.; Walsh, DJ. High-risk children in schools: Constructing sustaining relationships. New York: Routledge; 1996.

Radloff, LS.; Locke, BZ. The Community Mental Health Assessment Survey and the CES-D Scale. In: Weissman, M.; Meyers, J.; Ross, C., editors. Community surveys of psychiatric disorders. New Brunswick, NJ: Rutgers University Press; 1986. p. 177-189.

Raver CC, Gershoff E, Aber JL. Testing equivalence of mediating models of income, parenting, and school readiness for White, Black, and Hispanic children in a national sample. Child Development 2007;78:96–115. [PubMed: 17328695]

Rock, D. A note on gain scores and their interpretation in developmental models designed to measure change in the early school years. Princeton, NJ: Educational Testing Service; 2007. Available from www.ets.org/Media/Research/pdf/RR-07-08.pdf

Rothstein, J. Teacher quality in educational production: Tracking, decay, and student achievement (NBER Working Paper No. 14442). Cambridge, MA: National Bureau of Economic Research; 2008.

Singer JD. Using SAS Proc Mixed to fit multilevel models, hierarchical models, and individual growth models. Journal of Educational and Behavioral Statistics 1998;24:323–355.

Smith, S. Two-generation programs for families in poverty: A new intervention strategy. Norwood, NJ: Ablex; 1995.

Sobel, ME. Asymptotic confidence intervals for indirect effects in structural equation models. In: Leinhardt, S., editor. Sociological methodology. San Francisco: Jossey-Bass; 1982. p. 290-312.

Vandell, D.; Reisner, E.; Pierce, K.; Brown, BB.; Lee, D.; Bolt, D., et al. The study of promising after-school programs: Examination of longer term outcomes. Flint, MI: Mott Foundation; 2006.

Waldfogel, J. What children need. Cambridge, MA: Harvard University Press; 2006.

Wenglinsky, H. How teaching matters: Bringing the classroom back into discussions of teacher quality. Princeton, NJ: Educational Testing Service; 2000.

Xue Y, Meisels SJ. Early literacy instruction and learning in kindergarten: Evidence from the Early Childhood Longitudinal Study-Kindergarten class of 1998–1999. American Educational Research Journal 2004;41:191–229.

Yan W, Lin Q. Effects of class size and length of day on kindergartners' academic achievement: Findings from the Early Childhood Longitudinal Study. Early Education and Development 2005;16:49–68.

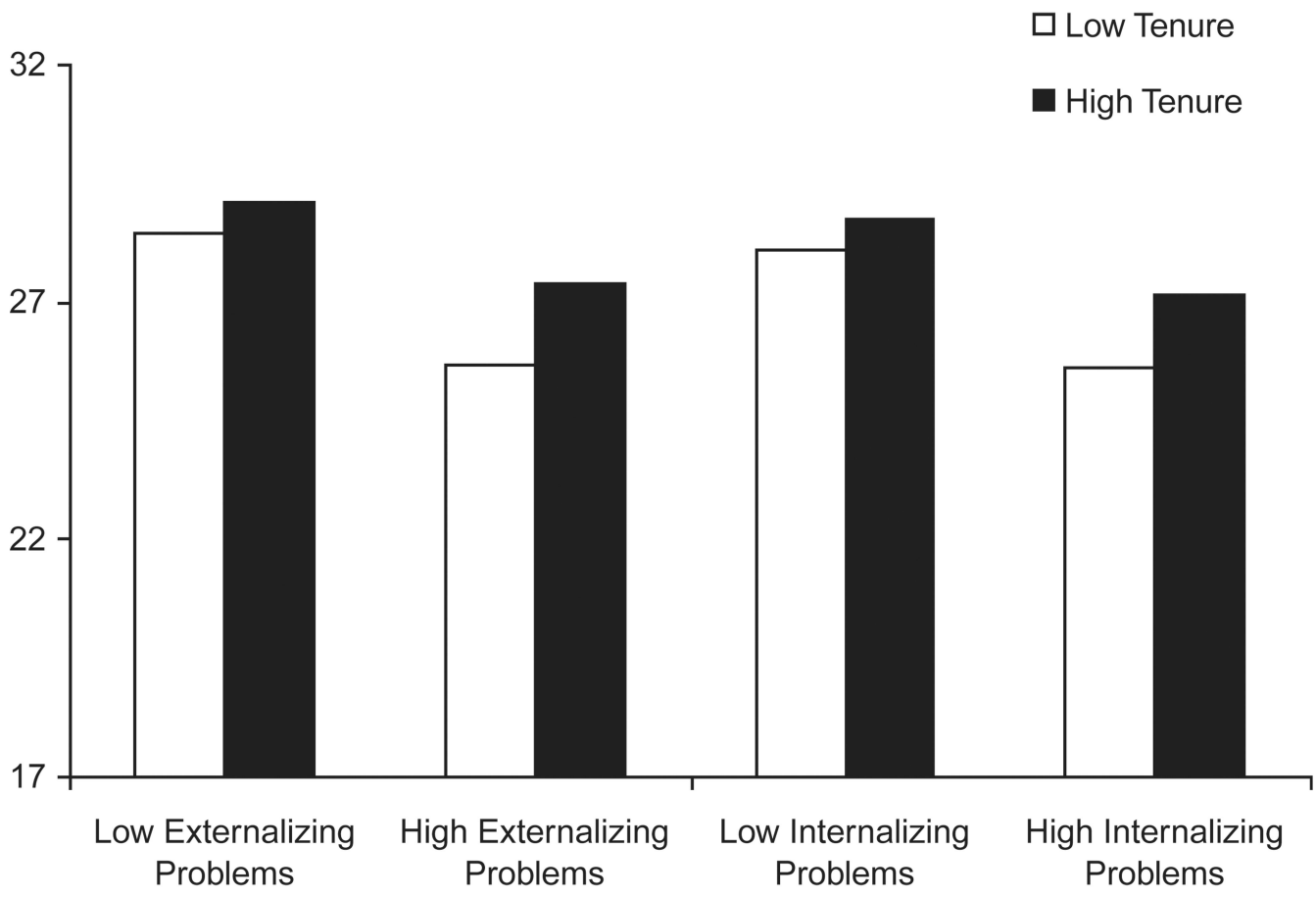

Figure 1.
Change in reading test scores between kindergarten and first grade by child adjustment and teacher grade tenure.

Table 1

Descriptive Statistics for Child, Family, and Teacher Variables

Variable	*M*	*SD*	%
Child academic achievement			
Kindergarten math test score	31.46	11.50	–
First-grade math test score	54.44	15.98	–
Change in math test score (K–1st)	22.99	10.06	–
Kindergarten reading test score	38.34	13.65	–
First-grade reading test score	67.93	20.72	–
Change in reading test score (K–1st)	29.59	13.35	–
Family economic disadvantage	0.89	1.17	–
Family socialization factors			
Family relationships			
Marital conflict	1.73	0.36	–
Parent warmth	3.69	0.36	–
Family adjustment			
Parent depression	1.46	0.45	–
Parenting stress	1.60	0.44	–
Child externalizing problems	1.66	0.64	–
Child internalizing problems	1.56	0.51	–
Parenting behavior			
Cultural activities	2.04	1.36	–
Cognitively stimulating materials	2.64	0.96	–
Organized activities	1.16	1.31	–
Home-learning activities	2.78	0.49	–
School-based parental involvement	4.32	1.79	–
Physical discipline	0.86	0.80	–
Rules and routines	6.30	1.47	–
Teacher qualifications			
Level of education (master's)	–	–	34.95
Type of certification (regular)	–	–	85.23
Elementary certification	–	–	83.89
Grade tenure	8.99	7.70	–
School tenure	9.28	7.93	–
Hours of paid preparation	1.99	0.82	–
Teacher classroom practices			
Phonics instruction	4.56	0.61	–
Whole-language instruction	4.23	0.78	–
Number operations instruction	3.43	1.34	–
Math mechanics instruction	1.21	0.68	–
Reading instruction time	2.57	0.93	–
Other child/family factors			

Variable	*M*	*SD*	%
Material hardship			
Residential instability	2.10	1.26	–
Inadequacy of medical care	0.30	0.57	–
Food insecurity	1.11	0.37	–
Months of financial problems	4.47	11.84	–
Age	5.70	0.36	–
Gender (female)	–	–	48.85
White	–	–	56.52
African American	–	–	14.26
Asian American	–	–	6.34
Latino/a	–	–	17.39
Other race/ethnicity	–	–	5.49
Immigration status (1st/2nd generation)	–	–	16.72
Mother employed full-time	–	–	43.08
Mother employed part-time	–	–	24.47
Mother not employed	–	–	30.40
No mother in home	–	–	2.06
Pre-K not in child care	–	–	17.45
Pre-K relative care	–	–	13.97
Pre-K nonrelative care	–	–	11.33
Pre-K day care	–	–	8.18
Pre-K preschool care	–	–	33.17
Pre-K Head Start	–	–	10.09
Pre-K other type of care	–	–	5.80
Year in grade (% in grade first time)	–	–	95.47
Timing of assessment (days from start)	65.57	17.31	
Assessment language status (Spanish)	–	–	3.76

Note. Descriptive statistics for school and classroom variables are in the appendix. N = 17,401.

Table 2

Descriptive Statistics for Selected Variables by Markers of Family Economic Disadvantage in Kindergarten

	Means for Accumulated Markers of Economic Disadvantage					
Variable	**0**	**1**	**2**	**3**	**4**	**5**
Social and economic risk						
Below the federal poverty line	.00[a]	.14[b]	.52[c]	.86[d]	.96[e]	1.00[f]
Single-parent family structure	.00[a]	.32[b]	.45[c]	.60[d]	.83[e]	1.00[f]
Low parent education	.00[a]	.12[b]	.34[c]	.50[d]	.72[e]	1.00[f]
First child when teen	.00[a]	.40[b]	.59[c]	.75[d]	.94[e]	1.00[f]
History of welfare receipt	.00[a]	.02[b]	.10[c]	.29[d]	.55[e]	1.00[f]
Child academic achievement						
Kindergarten math test score	34.94[a]	30.06[b]	26.33[c]	24.89[d]	23.89[e]	21.88[f]
Kindergarten reading test score	41.89[a]	36.82[b]	33.18[c]	31.62[d]	30.93[e]	29.04[f]
Family socialization factors						
Family relationships						
Marital conflict	1.75[a]	1.71[b]	1.71[b]	1.71[b]	1.68[c]	1.68[c]
Parent warmth	3.70[a]	3.70[a]	3.67[b]	3.64[c]	3.64[c]	3.62[d]
Family adjustment						
Parent depression	1.38[f]	1.48[e]	1.56[d]	1.63[c]	1.68[b]	1.80[a]
Parenting stress	1.57[d]	1.59[d]	1.66[c]	1.71[b]	1.73[ab]	1.75[a]
Externalizing problems	1.59[d]	1.70[c]	1.76[b]	1.79[ab]	1.82[a]	1.81[a]
Internalizing problems	1.50[e]	1.59[d]	1.64[cb]	1.66[b]	1.70[a]	1.63[c]
Parenting behavior						
Cultural activities	2.28[a]	1.99[b]	1.72[c]	1.53[d]	1.43[e]	1.42[e]
Cognitively stimulating materials	3.07[a]	2.50[b]	2.04[c]	1.77[d]	1.68[e]	1.57[f]
Organized activities	1.51[a]	0.98[b]	0.65[c]	0.51[d]	0.54[d]	0.43[e]
Home-learning activities	2.82[a]	2.76[b]	2.70[c]	2.68[c]	2.68[c]	2.59[d]
School-based parental involvement	4.91[a]	4.14[b]	3.46[c]	3.12[d]	2.80[e]	2.48[f]
Physical punishment	0.78[e]	0.86[d]	0.97[c]	1.04[b]	1.06[b]	1.24[a]
Rules and routines	6.53[a]	6.20[b]	5.93[c]	5.89[cd]	5.80[d]	5.71[e]

	Means for Accumulated Markers of Economic Disadvantage					
Variable	**0**	**1**	**2**	**3**	**4**	**5**
Teacher qualifications						
Level of education (master's)	35.39[a]	34.76[a]	35.32[a]	32.89[a]	33.17[a]	32.99[b]
Type of certification (regular)	84.93[a]	85.31[a]	85.90[a]	86.29[a]	85.24[a]	80.48[b]
Elementary certification	83.34[c]	83.64[c]	84.48[bc]	86.49[ab]	85.04[bc]	87.19[a]
Grade tenure	9.30[a]	8.94[a]	8.41[bc]	8.52[b]	7.99[c]	8.12[bc]
School tenure	9.43[a]	9.26[ab]	8.92[bcd]	9.17[abc]	8.79[cd]	8.69[d]
Hours of paid preparation	1.98[ab]	2.01[a]	2.01[a]	1.98[ab]	1.95[b]	1.89[c]
n	9,089	3,996	2,228	1,371	587	130

Note. Means with different superscripts within each row differed significantly ($p < 05$), as determined by Duncan's Multiple Range Test.

Table 3

Partial Results of Multilevel Models Predicting Change in Test Scores Between Kindergarten and First Grade

	Math *b* (β)			Reading *b* (β)		
Variable	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Family economic disadvantage	−0.81***(−.09)	−0.64***(−.07)	−0.37***(−.04)	−1.44***(−.13)	−1.23***(−.11)	−0.88***(−.08)
Kindergarten math test score	0.06***(.07)	.05***(.06)	0.01(.01)	0.14***(.14)	0.13***(.13)	0.10***(.10)
Family socialization factors						
Parenting stress	–	–	−0.46*(−.02)	–	–	–
Parent depression	–	–	–	–	–	−0.81**(−.03)
Child externalizing problems	–	–	−0.75***(−.05)	–	–	−1.48***(−.07)
Child internalizing problems	–	–	−1.48***(−.07)	–	–	−1.39***(−.05)
Organized activities	–	–	0.22*(.03)	–	–	0.29*(.03)
School-based parental involvement	–	–	0.15**(.03)	–	–	–
Cognitively stimulating materials	–	–	0.78***(.07)	–	–	0.95***(.07)
Rules and routines	–	–	–	–	–	0.34***(.04)

Note. Models 2 and 3 controlled for family material hardship (food insecurity, residential instability, inadequacy of medical care, months of financial hardship), age, gender, race/ethnicity, immigration status, prekindergarten child care arrangement, maternal employment status, and assessment language.

N = 17,401.

* *p*< .05.

** *p*< .01.

*** *p*< .001.

Table 4

Partial Family and School Results From Multilevel Models Predicting Change in Test Scores Between Kindergarten and First Grade

	Math *b* (β)		Reading *b* (β)	
Variable	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Teacher qualifications				
Level of education (master's)	−0.26(−.01)	−0.29(−.01)	−0.21(−.01)	−0.28(−.01)
Type of certification (regular)	0.32(.01)	0.09(.003)	0.22(.01)	0.23(.01)
Elementary certification	−0.17(−.01)	−0.16(−.01)	0.81*(.02)	0.82*(.02)
Grade tenure	0.01(.01)	0.005(.004)	0.06*(−.03)	0.05*(03)
School tenure	−0.0003(−.0002)	0.005(.004)	−0.06*(−.03)	−0.06*(−.03)
Hours of paid preparation	0.06(.01)	0.01(.001)	−0.06(−.004)	−0.09(−.01)
Teacher classroom practices				
Mechanics instruction	−0.36*(−.02)	−0.34*(−.02)	–	–
Numbers instruction	0.19(.02)	0.14(.02)	–	–
Phonics instruction	–	–	0.49(.02)	0.45(.02)
Whole-language instruction	–	–	0.57**(.03)	0.62**(.04)
Reading instruction time	–	–	0.05(.004)	0.08(.01)
Family economic disadvantage	−0.37***(−.04)	−0.36***(−.04)	−0.89***(−.08)	−0.78***(−.07)
Kindergarten test score	0.01(.02)	0.01(.01)	0.10***(.10)	0.09***(−.10)
Family processes				
Parenting stress	−0.45*(−.02)	−0.45*(−.02)	–	–
Parent depression	–	–	−0.84**(−.03)	−0.84**(−.03)
Child externalizing problems	−0.75***(−.05)	−0.76***(−.05)	−1.47***(−.07)	−1.47***(−.07)
Child internalizing problems	−1.45***(−.07)	−1.50***(−.08)	−1.37***(−.05)	−1.39***(−.05)
Organized activities	0.23*(.03)	0.23*(−.03)	0.28*(.03)	0.27*(−.03)
School-based parental involvement	0.15**(.03)	0.15**(.03)	–	–
Cognitively stimulating materials	0.78***(.07)	0.79***(.08)	0.94***(.07)	0.83***(.06)
Rules and routine	–	–	0.34***(.04)	0.34***(.04)
School-level controls				
Northeast	–	−1.86***(−.07)	–	−0.52(−.02)
Midwest	–	−0.60(−.03)	–	−0.51(−.02)
West	–	−1.04**(−.04)	–	0.04(.001)
Central city	–	0.21(.01)	–	1.02(.04)
Fringe city	–	0.60(.03)	–	0.68(.03)
Size	–	0.26(.03)	–	0.21(.02)
Poverty rate	–	−0.47(−.01)	–	−4.64***(−.08)
Sector (private)	–	−0.27(−.01)		−0.19(−.01)
School services				

	Math *b* (β)		Reading *b* (β)	
Variable	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Parent outreach	–	−0.72*(−.03)	–	−0.58(−.02)
Transition program	–	0.16(.02)	–	0.05(.01)
Classroom environment				
Class size	–	0.03(.02)	–	0.06(.02)
Computer area in classroom	–	0.95*(−.04)	–	0.90(.03)
Adequacy of learning materials	–	−0.21(−.01)	–	0.55(.02)

Note. Both models controlled for family material hardship (food insecurity, residential instability, inadequacy of medical care, months of financial hardship), age, gender, race/ethnicity, immigration status, prekindergarten child care arrangement and hours in care, maternal employment status, and assessment language. N = 17,401.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Appendix

Descriptions of School and Classroom Factors

Variable	Description
School structure and composition	
Region[KF]	NCES-created dummy variables for Midwest (25.44%), Northeast (18.42%), South (33.61%), and West (22.54%).
Urbanicity[KF]	Following Lee and Burkham (2002), NCES-created dummy variables for urbanicity grouped into three categories: central city (39.81%), fringe city/large town (38.60%), and small town/rural (21.59%).
Sector (private)	Based on school administrator reports, collapsed into two categories (21.25% of children in private, 78.75% of children in public).
Size	Categorical measure based on school administrator reports (1 = *0–149*, 2 = *150–299*, 3 = *300–499* 4 = *500–749*, 5 = *750+*; *M* = 3.29, *SD* = 1.17, on individual level).
Poverty rate[KF]	Proportion of children in school with family incomes below poverty line for their household size, created by taking mean of individual-level poverty measure within school (*M* = 20.62, *SD* = 21.52, on individual level).
Receipt of Title I funding[a]	Based on school administrator reports (61.63% of children in school receiving funds).
School services	
Parent outreach	Based on Lee and Burkham (2002), the mean of nine administrator-reported items on the frequency (1 = *never*, 2 = *once a year*, 3 = 2 *or 3 times a year* 4 = *4–6 times a year 5 = 7+ times a year*) with which the school organized various parent outreach activities, including parent-teacher gatherings, family nights, and parent involvement workshops (α = .62; *M* = 3.40, *SD* = 0.46, on individual level). Note: This variable repeated in first-grade data collection, but only if the school was new to the sample.
Transition program[KF]	Based on Lee and Burkham (2002), sum of administrator reports of whether (1 = *yes*) school provided information about programs to parents of incoming students, allowed students to spend time in the new classroom, shortened school days at beginning of year, allowed parents/children to visit new classroom, visited children at home before start of school, and provided a parent orientation (*M* = 3.38, *SD* = 1.32, on individual level).
Various service provisions[a]	School administrator reports of whether (1 = *yes*) school offered adult literacy services, family literacy services, health services, and parenting education classes (s2adltlt, s2fmilit, s2scisrv, s2prntng). Each service constituted a separate binary variable. On individual level, the proportion of sample in a school with each service was 29.98%, 18.31%, 20.08%, and 64.21%, respectively. Note: These variables were not repeated in first-grade data collection.
Classroom environment	
Class size[KF]	Teacher-reported number of boys and girls in classroom (*M* = 20.65, *SD* = 5.24, on individual level).
Computer area in classroom	Teacher-reported presence of computer area in classroom (82.77% of children in such a classroom).
Adequacy of learning Materials	Teacher assessments of adequacy of textbooks, trade books, workbooks, manipulatives, and audiovisual equipment in the classroom. Responses were recoded (1 = *never adequate*, 2 = *often not adequate* 3 = *sometimes not adequate*, 4 = *always adequate*) and averaged to create the final scale (α = .73; *M* = 3.53, *SD* = 0.49 on individual level).
Other child-school factors	
School choice [KFa]	Parents reported whether they chose where to live based on the child's school (1 = *yes*) (p1choose) and whether the child enrolled in school by assignment (56%), parent choice (26%), or some combination (4%) (p1school).
School change[a]	A binary marker was created to identify children who changed schools after the first data point (12%) (fkchgsch).

Note. All variables were repeated at first-grade data collection unless otherwise noted. NCES = National Center for Education Statistics.

[a]Variables excluded from final models after preliminary tests revealed that they had no impact on focal results.

[KF]Variables measured in fall of kindergarten. All other variables measured in spring of kindergarten.