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Nonmarital Fertility, Family Structure, and the Early School Achievement of Young Children from Different Race/Ethnic and Immigration Groups

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Abstract

Working from a life course perspective, this study examined the links between mothers' fertility and relationship statuses and children's early school achievement and how these links varied by race/ethnicity and immigration status. Analyses of nationally representative data from the Early Childhood Longitudinal Study—Kindergarten Cohort revealed that children born to unmarried women scored lower than children of married women on math tests in kindergarten and first grade. This pattern was most attributable to associated differences in family income and parent education, and it was moderated by women's marital and relationship statuses after having their children. Evidence also suggested that the academic risks of some family structure pattern relative to continuously married parents might have been more pronounced for White children.

Rising rates of nonmarital fertility are intricately linked to socioeconomic stratification. On one hand, women of lower socioeconomic status (SES) are more likely to have children outside marriage. On the other, children born outside of marriage fare worse on numerous developmental indicators than their peers, disrupting their own eventual socioeconomic attainment (Driscoll, Hearn, Evans, Moore, Sugland, & Call 1999; Gibson-Davis, Edin, & McLanahan, 2005; Wu & Wolfe, 2001). In this way, nonmarital fertility is a channel for the intergenerational transmission of socioeconomic inequality. Unpacking this transmission is important to current policy initiatives targeting nonmarital fertility and its relation to family poverty and child well-being (Furstenberg, 2007; Gray, Stockard, & Allan, 2006).

This study takes a theoretically grounded child-centered approach to this timely issue. Drawing on the life course perspective on human development (Elder, Johnson, & Crosnoe, 2003), it views nonmarital fertility through the prism of the linked lives of mothers and children within larger social structures. This framework considers a nonmarital birth to be one point on women's fertility/relationship trajectories, children's transitions into formal schooling to be one point on their educational trajectories, and race/ethnicity and immigration status to be cultural meaning systems and opportunity structures in which maternal and child trajectories connect. Specifically, we use nationally representative data on children—the Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K)—to estimate associations of children's early school achievement with their family arrangements at that point and at birth. Further, we examine how these associations vary across four race/ethnic populations (Whites, African Americans, native-born Latino/as, and Mexican

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immigrants) with well-documented differences in the prevalence and meaning of nonmarital fertility (Wildsmith & Raley, 2006; Wu, 2008).

Nonmarital Fertility in Life Course Terms

Today, upwards of 40% of all births in the U.S. are to unmarried women, representing a steady increase across the last century (Ventura, 2010). This trend has caused a great deal of concern because children born to unmarried women are more likely to be raised in poverty and, partly but not completely as a function of these circumstances, tend to fare worse than other children in terms of schooling, health, and other developmental markers (Amato, 2005; Moore, 1995; Wu & Wolfe, 2001). This phenomenon, and its relation to family structure more generally, was a major motivation behind welfare reform in the 1990s and the federal healthy marriage initiative in the 2000s (Foster & Kalil, 2007; Furstenberg, 2007; Wertheimer & Papillo, 2004).

The life course perspective provides insights into this issue (Aquilino, 1996). Specifically, it suggests that social patterns are rooted in contextualized linked lives. The linked lives concept means that the actions and experiences of individuals have an impact on those with whom they share close ties. A dynamic concept, it stresses the inter-locking nature of life pathways. On a more micro level, parents' trajectories are linked to their children's trajectories within the social contexts of everyday life (e.g., neighborhoods). On a more macro level, the give and take between current and future prospects of two generations plays out within the larger structures of society, such as stratification systems (Elder et al., 2003).

Following this framework, having a child outside of marriage is a point on a maternal trajectory of fertility, sexual experiences, and union formation (Edin & Kefalas, 2005; Gibson-Davis, 2009; Musick, 2007). Likewise, child achievement is part of a trajectory of learning, skill development, and accumulation of academic credentials (Alexander, Entwisle, & Olson, 2007). The transition into school is a key point on this trajectory. Historically, this transition has provided leverage in efforts to see how parents' histories set the stage for and shape children's own pathways to adulthood, with parents' social, economic, and psychological experiences affecting how children make this transition in ways that create accumulating advantages and disadvantages over the long term (Entwisle & Alexander, 1993; Pianta, Cox, & Snow, 2007).

This study, therefore, investigates how the children of women with different fertility and relationship statuses transition into elementary school. The "success" of this transition is gauged by standardized tests of basic skills in the first two years of school. The purpose is to determine who has a competitive advantage—and how big—at the starting gate.

Connecting Nonmarital Fertility to Early Achievement

On average, children born outside of marriage are at greater risk for poor outcomes than other children. This risk partly reflects the biological, psychological, social, and economic factors that increase the likelihood of women having a nonmarital birth, and it partly reflects the experiences mothers have after such births, including their spells of marriage, cohabitation, and singlehood (Gibson-Davis, 2009; Heilan & Liu, 2006; McLanahan, 2004, 1995).

Consider that, compared to children born to married biological parents, children born to unmarried mothers spend more time in single parent, stepparent, and cohabiting households and experience more family structure change. In part, this link between children's birth statuses and subsequent family structures reflects that women who have children outside of marriage may differ from other women in ways that also lead them into more unstable relationship patterns, not the causal effects of nonmarital fertility itself. Yet, nonmarital

fertility can have its own effects, introducing socioeconomic hardships into women's lives that then become disadvantages on the relationship market. Beyond socioeconomic considerations, having a child can also be a disadvantage on the market and then a stressor on any relationships that they do form (Bumpass & Lu, 2000; Edin & Kefalas, 2005; McLanahan, 2004; Raley & Wildsmith, 2004).

The family situations linked back to nonmarital fertility, in turn, are associated with lower academic progress among children (Crosnoe & Cavanagh, 2010). Again, SES is important. The children of single parents are typically more socioeconomically disadvantaged than those with two parents. Moreover, because of differences in communal sharing and parental (especially paternal) investment, having a second parent who is not married to the first and/or is not biologically related to the child may provide less of a socioeconomic boost than living with two married biological parents. Yet, these disparities go beyond SES, tapping into differences in the ways that biological and non-biological parents (especially those not married to biological parents) participate in childrearing and attach to and invest in children (Amato, 2001; Aughinbaugh, Pierret, & Rothstein, 2005; Carlson & Corcoran, 2001; Cavanagh, Riegle-Crumb, & Schiller, 2006; Cooksey, 1997; Dunifon & Kowaleski-Jones, 2002). Thus, although children benefit somewhat when their parents cohabit or their custodial parent repartners, compared to their parents being completely separated or remaining single, these benefits are neither large nor consistent (Astone & McLanahan, 1991; Manning & Lamb, 2003; Raley, Frisco, & Wildsmith, 2004). Moreover, each relationship transition that a mother experiences (e.g., divorcing, remarrying, entering/exiting cohabitation) seems to have an additive impact on her children. Frequent changes in household composition and parental figures can create instability in children's lives that is stressful in and of itself and creates discontinuities in care and parenting, not to mention socioeconomic resources (Cavanagh & Huston, 2006; Wu, 1996).

What seems to matter across the board is the interplay of the socioeconomic circumstances of mothers and their psychosocial and behavioral experiences of parenting. These experiences include the stress of raising children and the emotional and practical constraints on their ability to actively manage their children's development and learning (Amato 2000; Carlson & Corcoran, 2001; Gibson-Davis & Gassman-Pines, 2010).

This link between women's nonmarital fertility and union formation/dissolution suggests the value of viewing both as characterizing the family setting of child development (Aquilino, 1996). For children, being born outside of marriage is a marker of family instability and its underlying causes and co-occurring circumstances, and it signifies the added stressors that they will experience over time relative to other children (Sigle-Rushton & McLanahan, 2002). In turn, instability and stress likely shape the degree to which parents can provide opportunities for learning inside and outside the home before and after children transition into school. According to developmentally-oriented models of this school transition and the educational policies they inform, children who start out school with more skills tend to learn more than peers as they move from grade to grade because of the cumulative nature of learning, curricular exposure, teacher/parent expectations, and class placements (Entwisle & Alexander, 1993; Pianta et al., 2007). In this way, achievement at the beginning of school sets the stage for the educational career, which has an impact on socioeconomic attainment and family formation in the long run, thereby reinforcing initial differences between children related to birth status and family history.

When exploring the link between birth status and the early achievement of children, therefore, this study examines two hypotheses concerning the degree to which family structure concurrent with the school transition factors into this link. First, concurrent family structures will *attenuate* any observed association between birth status and school

achievement. This attenuation is likely to be strongest for family structures not involving biological fathers, in that such structures are more likely to follow nonmarital fertility than other structures and seem to be more associated with later child outcomes. Second, concurrent family structures will *condition* any observed association between birth status and school achievement; specifically, early achievement disparities related to birth status will be less pronounced when children born outside of marriage later live in family structures characterized by the presence of their fathers and/or their mothers being married. In examining these hypotheses, we pay careful attention to key markers of SES (income, parent education) and to parenting experiences and behaviors, all of which may be related to observed effects of birth status and later family structure on children (Gibson-Davis & Gassman-Pines, 2010; McLanahan, 2004).

Race/Ethnic Variation in the Implications of Nonmarital Fertility

Race/ethnicity is an element of the larger social structure shaping the worldviews that individuals develop, the opportunities afforded them, and constraints placed on them. Immigration status can then qualify structural positions related to race/ethnicity (Kao & Thompson, 2003). Going back to the life course perspective, race/ethnicity is a backdrop that helps determine how maternal and child experiences come together. Methodologically, therefore, race/ethnicity should be viewed as a moderator of links between mother and child factors rather than simply a predictor of both (Garcia-Coll et al., 1996; McLoyd, 1990). To demonstrate the value of this approach, we focus on four race/ethnic groups that offer the greatest potential contrast in the link between nonmarital birth status and early achievement: White and African-American children and the children of native Latino/as and of Mexican immigrants.

A starting point is the substantial variation among these groups in the proportion of children born outside of marriage as well as in the various family trajectories followed after a child's birth. For example, over two-thirds of births to African-American women are nonmarital, compared to just under half of births to U.S.-born Latinas and only a quarter of births to White women. The numbers for Mexican immigrants are harder to determine, but they appear to fall between Whites and native Latinas (Child Trends, 2007; Solomon-Fears, 2008).

The prevalence of an event in a population, in turn, is important. First, it signifies the stigma that might be attached to it. In general, the stigma of nonmarital fertility has declined in recent decades, but it has remained stronger among Whites than in many other race/ethnic groups (Kendall & Temura, 2010; Roempke Graefe & Lichter, 2002). Of course, such stigma can affect the likelihood of children being born outside of marriage, but, more generally, a stigma can also create psychological stress and lead to lost opportunities and discrimination (Link & Phelan, 2003). Second, the prevalence of nonmarital fertility in a population likely captures the degree to which community resources have been marshaled over time to support unmarried parents and their children. Indeed, groups in which nonmarital fertility has been more common often have stronger kin systems and social networks for supporting families, implying that nonmarital fertility may be more challenging to manage in groups in which it has historically been rarer (Hatchett & Jackson, 1999). Nonmarital births, therefore, might pose more academic risks to White children once race/ethnic differences in markers of SES are held constant.

Another important consideration is that similar family arrangements may mean different things across race/ethnic groups for a variety of cultural and structural reasons (Garcia-Coll et al., 1996; Gibson-Davis & Gassman-Pines, 2010; Heard, 2007; Moore, 2003). Specifically, the degree to which cohabitation is viewed as s substitute for or stepping stone to marriage among parents varies by race/ethnicity (Smock, 2000). Here is where using

Mexican immigrants as a comparison is useful. Informal/consensual unions have a long history in Mexico and have traditionally been considered an analog to formal marriage (Castro Martin, 2002; Phillips & Sweeney, 2005). Thus, a nonmarital birth likely signifies a very different maternal trajectory for the children of Mexican immigrants than it will for children in any of the other race/ethnic groups, including children of more assimilated parents with Latin American roots. To the extent that births to unmarried Mexican immigrant women are more likely to occur in long-term stable relationships, their children should fare better academically (on average) relative to groups of children with the same birth status and SES (Frank & Heuveline, 2005).

Together, these trends suggest a general set of hypotheses. Nnonmarital fertility and related union formation/dissolution patterns will pose less risk to the early achievement of children in the Mexican immigrant population and the greatest risk for White children, net of systematic differences in SES. For the former, marital status matters less than union status. For the latter, marital and union statuses matter. African-American and other Latino/a children will likely fall in the middle, as their lesser experience of stigma and stronger community supports are countered by their greater experience of subsequent family instability. Another way of looking at this pattern is that the benefits of marriage at birth and then later on will be greatest for White children. Testing this set of hypotheses is the final objective of this study.

Method

Data Set

Collected by the National Center for Education Statistics (NCES), ECLS-K began with interviews of 22,782 American children in about 1,000 schools within 100 primary sampling units (most often counties). The first wave consisted of diagnostic testing of children and interviews with parents, teachers, and school administrators during the fall of kindergarten in 1998. Subsequent waves occurred in the spring of kindergarten (1999), the fall of first grade (1999), and the spring of first (2000), third (2002), fifth (2004), and eighth grade (2007). Our analytical sample consists of all White, African-American, third-plus generation Latino/a, and Mexican immigrant children (see below for the race/ethnicity coding scheme) who participated in data collection in kindergarten and the spring of first grade, completed achievement tests, and had birth status data. These restrictions resulted in a sample of 12,076 children.

Measures

Race/ethnicity and immigration status—For theoretical reasons, we focused on four race/ethnic groups that had potential for the greatest contrast. They were White (n = 8,152), African-American (n = 1,899), third-plus generation Latino/a (n = 1,286), and Mexican immigrant (n = 739) children. The third-plus Latino/a group included children of all Latino/a ethnicities, including Mexican, who were born in the U.S. to U.S.-born parents. The Mexican immigrant group consisted of children born in the U.S. or Mexico to Mexican-born parents. The comparison of these two groups is important for three reasons. First, among Latino/a immigrants, family formation patterns vary substantially by ethnicity (Oropesa & Landale, 2004; Tienda, 2009). Second, Latino/as differ by nativity, with later generation groups farther removed from the influence of the homeland (Bean, Swicegood, & Berg, 2000; Oropesa & Landale, 2004). Third, Mexicans were the only national origin group with sufficient cases for separate analysis.

Birth status and family structure—ECLS-K is a child-centered study. As a result, we used measures of children's circumstances (e.g., birth status, family structure) to tap their

mothers' fertility/relationship experiences at specific times. Doing so was possible because the overwhelming majority of children lived with their mothers throughout the study.

Two binary measures of child birth status were based on parent reports of whether the biological parents were ever married and, if so, when. Children whose biological parents were never married as well as those whose parents married after their births were classified as nonmarital births. Children missing on these measures were classified as having unknown birth status (2.1%). As seen in Table 1, approximately 30% of the children in the sample were born to unmarried parents. This rate was higher among African-American (70%) and third-plus Latino/a children (41%) than among White (18%) and Mexican immigrant (28%) children. All of these differences were statistically significant. Table 1 also contains descriptive statistics (with significant race/ethnic differences noted) for all variables described after this point.

To truly capture mothers' relationship trajectories, we would need their relationship statuses at regular intervals before/after their children's births. Unfortunately, ECLS-K only contains such data at birth and when children start elementary school. Thus, we developed an alternate strategy. Based on parent-reported information on the living arrangements and marital statuses of the resident parent(s), dummy variables identified whether children lived with married biological parents, cohabiting biological parents, married step parents, cohabiting step parents, a single parent, or in other family types (adopted/guardian) during kindergarten, and a binary marker identified whether the child experienced a change in family structure between kindergarten and first grade. Cross-classifying birth status with family structure in kindergarten allowed some approximation of family change in early childhood. For example, this classification distinguished children living with a single parent in kindergarten who may have experienced a divorce of biological parents (married birth) from those who did not (unmarried birth). This measure identified 10 possible birth status/family structure combinations. Due to small cell sizes, we did not distinguish children in "other" family types by birth status. Children missing information on birth status were kept separate. In all multivariate analyses, children born to married parents who were still married when they reached kindergarten were the reference. Of note is that the results were similar when birth status x family structure interactions were used, which was not surprising given the binary nature of all of the main effect variables.

Early achievement—In the fall of kindergarten and spring of first grade, children took math skill tests that contained items on number sense, problem-solving, number properties, and measurement. To account for the fact that the difficulty level of exam questions depended on how well a student answered earlier questions on the test (see Baker 2001), a single proficiency score was created by NCES for each student with Item Response Theory (IRT). Kindergarten scores were low (M = 20.03; SD = 7.40 on a scale from 8 to 61), reflecting the low level of formal math training that had occurred at this point. White children scored, on average, 6 points higher than the children of Mexican immigrants, with African-American and third-plus Latino/a children scoring almost exactly in the middle of these two extremes. First grade scores were higher (M = 43.70; SD = 9.03), reflecting the early learning that occurred during formal schooling. Ideally, we would have used math *and* reading skills to tap early achievement, but this was not possible with ECLS-K. NCES screened for English language proficiency. Spanish speakers who fell below a certain threshold were tested for math in Spanish and were excluded from non-math tests. Given the prominence of Mexican immigrants in our conceptual model, we could not use the reading tests from which they were differentially excluded. In models examining math test scores, we did control for the language status of the test.

Family characteristics—SES can lead to nonmarital fertility but also be affected by nonmarital fertility and subsequent family arrangements (Gibson-Davis, 2009; McLanahan, 2004). Thus, it could be confounded with or explain observed birth status and family structure effects on children and, therefore, needed to be accounted for in analyses. Parent education signified the highest level of education attained by a child's parents based on a 5-point scale from *less than high school graduate* to *graduate degree-masters or higher*. A continuous parent report of annual household income, divided by household size, was the indicator of per capita income in the family. Other family characteristics that were examined include language use and maternal age. Home language use is related to immigration status, SES, and children's school achievement, and so we created a binary variable differentiating mothers who reported that a non-English language was predominant in their homes from mothers reporting that English was predominant. A control for mother's age at first birth (mean centered in years) was intended to account for at least some of the maturity and experience with which a mother could parent and also to tap the greater likelihood of nonmarital fertility among young women).

Parent adjustment and parenting behavior—Theoretical discussions and empirical analyses emphasize the role of parent/parenting factors as links of birth status and family structure to child outcomes (Cavanagh & Huston, 2006). Following past work with ECLS-K (Crosnoe & Cooper, 2010; Gibson-Davis & Gassman-Pines, 2010; Magnuson, Meyers, Ruhm, & Waldfogel, 2004; Raver, Gershoff, & Aber, 2007), therefore, we used several measures gauging such factors. Unfortunately, only first grade measures could be used, as the relevant kindergarten measurement occurred in the spring, after the fall achievement tests.

The first parent variable, home learning activities, averaged parent reports of the frequency (1 = never – 4 = everyday) of building things, doing nature lessons, playing sports, doing art, singing songs, playing games, telling stories, and reading books with their children (α = .73). The second was based on reports of the frequency (1 = never – 4 = everyday) with which children looked at and read books at home (α = .62). The third, parent-child warmth, averaged reports of the extent to which parents (1 = not true at all – 4 = completely true) felt that their children liked them, expressed affection to their children, showed their children love, and spent close time with their children (α = .69). The fourth, parent stress, summed reports on the extent to which parents (1 = not true at all – 4 = completely true) felt that they were trapped as parents, parenting was more work than pleasure, children were hard to care for, children did bothersome things, they had to sacrifice for their children, they were often angry with their children, and parenting was harder than expected (α = .70).

Preschool experience—Parents can manage their children's opportunities for learning by enrolling them in education-focused child care, a process related to race/ethnicity and family status (Brandon, 2004; Magnuson et al., 2004). Dummy variables, therefore, indicated whether prior to kindergarten children attended center-based care and Head Start as well as other forms of child care (parental, relative, non-relative, other). Of course, the arrangement of care for children, especially preschool enrollment, can also be viewed as a form of parenting.

Other controls—Analyses also controlled for gender (1 = female) and age of child (in months and mean centered). Because region was part of the sampling frame of ECLS-K, we included the ECLS-K dummy markers of region.

Analytical Plan

A series of nested regression models established associations between birth status and test scores. First, the kindergarten test scores were regressed on birth status as well as controls for race/ethnicity, child gender, child age, and region. Second, the markers of current family structure were added to examine the extent to which any observed effects of birth status were channeled through subsequent family change. Third, the per capita income and parent education were added. Fourth, the family characteristics and preschool experience dummy variables were added. Fifth, additional models included the dummy variables combining birth status and family structure in kindergarten, both before and after including the potential family, parent, and preschool factors. Sixth, in order to determine whether the association between family situations and the math outcomes varied across the four focal race/ethnic groups, we included interactions between race/ethnicity dummy variables and the birth status/current family structure dummy variables. The entire modeling plan was repeated for the first grade test scores. The only differences were that these models also controlled for the kindergarten test score, thereby capturing change over the first two years of school, and that the full set of parent adjustment and parenting factors were included as covariates.

Because the ECLS-K sampling frame created significant variation in test scores at the school level, students within a school were more similar to one another than to students in other schools. Consequently, OLS regression would underestimate standard errors and overstate the significance of parameter estimates. Multilevel models deal with the non-independence of error terms across levels to produce more accurate estimates of model error and statistical significance. All multivariate analyses in this study, therefore, were estimated in the SAS mixed procedure, which allowed a random intercept for school location (Singer 1998). The prevalence of missing data in the sample was below 5% for all variables. Nonetheless, we used multiple imputation (PROC MI) to deal with missing data on all continuous measures. Due to the difficulty of estimating these models for categorical data, we used dummy indicators of missing data for the two categorical measures missing any information: birth status and preschool childcare.

Results

Kindergarten Achievement

Estimates from multilevel models of math test scores at the start of kindergarten are presented in Table 2. Children born to unmarried parents scored about two points lower on the first math test in school than children born to married parents, controlling for race/ethnicity, region, and child age and gender (Model 1). Children with unknown birth status—many of whom were likely nonmarital births—scored roughly 2.7 points lower. Race/ethnic gaps in kindergarten scores were large, with Mexican immigrant children scoring the lowest. We should note that comparison of models with and without the birth status variables (not shown) revealed that birth status substantially reduced the initial race/ethnic differences in kindergarten test scores. Thus, race/ethnic differences in children's math test scores reflected, in part, corresponding differences in their birth statuses.

The first set of hypotheses concerned the role of family structure proximate to the start of school in these observed disparities in early achievement by birth status. Model 2 added the full set of dummy variables for kindergarten family structure. Collectively, these dummy variables partially attenuated the previously observed birth status effect (although not the race/ethnic effect) by roughly 30%. Thus, the greater prevalence of kindergarten family structures without married biological parents among children born to unmarried parents explained some of the inverse association between birth status and kindergarten test scores. Of these family structures, those involving the presence of the biological father and, to a

lesser extent, mothers' marriages to others, appeared to pose less risk to children's early achievement relative to children living with two married biological parents. Children who lived with a single mother or who lived with a mother who was partnered with, but not married to, their children's father had the lowest test scores in kindergarten, net of birth status. Moreover, these family structures did the most to attenuate the initial birth status association with kindergarten test scores.

Model 3 added to Model 2 parent education and per capita family income. The addition of these two factors, both of which significantly predicted the outcome, substantially reduced, but did not eliminate, the coefficients for birth status and current family structure. In terms of effect size and the attenuation of birth status and family structure coefficients, parent education was the most important. Not surprisingly, children with lower-income and/or less educated mothers had lower test scores. Children with younger mothers had lower test scores. Non-English language use at home was significantly associated with math scores and explained much of the Mexican immigrant disadvantage in math scores, as would be expected given that this was the only group with a significant foreign-born subset. Lastly, pre-K center care (but not Head Start) enrollment was associated with higher scores in kindergarten.

To test the potential moderating role of family structure, dummy variables capturing various birth status/current family structure combinations—essentially, interactions between the two sets of dummy variables—were added next, replacing the separate sets of birth status and family structure variables (Model 5). This replacement significantly improved model fit over the prior model (Model 4), as indicated by changes in the -2 Res LL. Multiple versions of these models were estimated with rotating reference categories (not shown) to make all pairwise comparisons among birth status/current family structure combinations.

Of note is that, for the sake of comparison, we also estimated a version of Model 5 without per capita family income, parent education, or any other family or preschool factors, revealing that children in all other birth status/current family structure combinations fared worse than children born to continuously married parents. These disparities were generally reduced by the inclusion of these other covariates, especially parent education and per capita family income, and the coefficients for married stepparent family after a marital birth and cohabiting biological parents after a nonmarital birth were reduced to non-significance. Several patterns related to the presence of fathers and the role of post-birth marriage/remarriage are worth highlighting. First, among children born to married *and* unmarried parents, those in cohabiting stepfamilies had the lowest test scores. Second, among children born to unmarried parents, even those whose biological parents married scored significantly lower than the reference group (children with continuously married biological parents). Third, the association between current family structure and math scores varied by birth status. Children born to unmarried parents who lived in married and cohabiting stepparent households in kindergarten scored significantly worse on math tests than their peers in the same family structures born to married parents.

Achievement Gains by First Grade

Table 3 contains the results of models of first grade math test scores, net of kindergarten test scores. Model 1 reveals that children born to unmarried parents scored slightly less than one point lower than children born to married parents on the first grade math test, even after taking into account their lower scores on the kindergarten test. Thus, children born outside of marriage have lower absolute test scores and then lower rates of growth in these scores over time. Independent of birth status, African-American and third-plus Latino/a children demonstrated the same pattern, although children from Mexican immigrant families did not. They had lower absolute scores than children from all other groups but roughly the same

level of growth in scores between kindergarten and first grade as White and third-plus Latino/a children and a higher level of growth than African-American children. As seen in Model 2, roughly 40% of the coefficient for nonmarital birth status was accounted for by differences in kindergarten family structure. These observed family structure effects were, in turn, largely accounted for by parent education (Model 3). Adding the other covariates (Model 4) further affected the birth status and family structure coefficients, particularly reading activities and parenting stress.

After accounting for the covariates, nonmarital birth status no longer predicted first grade test scores, net of kindergarten scores, and the only current family structure related (inversely) to change in test scores over time was living with cohabiting biological parents. This finding was in line with our expectation that mothers' post-birth marriage would be important but not with our expectation that the presence of fathers would benefit children's test scores.

Again Model 5 replaced the birth status and family structure variables with a set of dummy variables for birth status/current family structure combinations. Doing so did not provide better fit. The main differences were the lower test score gains of children living with cohabiting biological parents after a nonmarital birth or living in a single parent home after a marital birth (implying a parental divorce).

Variations by Race/Ethnicity

Building on Model 5 from Table 2, the model in Table 4 presents results from analyses of kindergarten math scores that included interactions between birth status/current family structure combinations and race/ethnicity (effectively, three way interactions), with all covariates taken into account.. Worth noting up front is that most of these interactions were not statistically significant. Still, the models provided significant improvement in fit over the corresponding Table 2 model (as evidenced by changes in the -2 Res LL, not shown), suggesting that, jointly, the race/ethnic variation in the associations between birth status/current family structure combinations with kindergarten math scores was significant. Also of note is the sparse cell coverage in the relatively small Mexican immigrant subsample. Some cells for the interactions with the rarer birth status/current family structure categories contained few observations in this subsample (e.g., less than 15 for the two stepparent family after marital birth categories and the guardian/adopted categories). Results appeared robust to different modeling iterations, but coefficients for race/ethnicity x family categories with the smallest cell sizes should be interpreted with some caution. Again, we also rotated reference categories to catalog all possible pairwise differences within the set of dummy variables.

Basically, two differences emerged. First, living in a cohabiting stepfamily after a nonmarital birth (relative to living with continuously married parents) conferred less disadvantage to African-American children, net of all controls. Children of Mexican immigrants and third-plus generation Latino/a children fell in between the African-American and White children in this regard. Second, living with cohabiting biological parents after a nonmarital birth posed less academic disadvantage for third-plus generation Latino/as than it did for White children. The same initially appeared to true of children of Mexican immigrants, although this difference was a function of parent education and other sociodemographic factors. The advantage conferred on those third-plus generation Latino/a children born to biological parents who remained cohabiting may reflect a cultural tradition in which long-term cohabiting relationships are viewed as analogous to marriage. Yet, this association did not exist for Mexican immigrant children, for whom we might expect this to be even more the case.

Similar analyses modeled gains in math scores between kindergarten and first grade. Although these models did improve fit, few coefficients indicated significant differences across race/ethnic groups—likely reflecting that we measured gains in scores over a small window and that the main effects of birth status/current family structure combinations on gains were more modest than for absolute scores. In the interest of space, we have not presented these results.

Discussion

In recent years, research linking family demographic trends (e.g., marriage, divorce) to children's school achievement has done a great deal to elucidate how family disparities can create educational inequalities that then forecast widening family disparities in the future. This process is a major component of the intergenerational transmission of disadvantage as well as a focal point of social policy (Crosnoe & Cavanagh, 2010). Drawing on the life course perspective, this study attempted to contribute to this cross-pollination of major policy-oriented fields of developmental science by combining information on women's fertility and relationships (including cohabitation), focusing on a key transition point in children's educational careers, and exploring race/ethnic variation in the connections between mothers' and children's experiences.

As a starting point, our analyses demonstrated that children born to unmarried parents entered elementary school with less developed skills in a core subject and then learned less about this subject in the subsequent year. Our first set of hypotheses concerned the power of current family structure to attenuate or condition these disparities. The second set concerned potential race/ethnic and immigration-related variation in the associations among birth status, later family structure, and early achievement among children.

First, concerning attenuation, some of these birth status-related disparities were attributable to differences in mothers' and children's living arrangements in kindergarten that were related to birth status on one hand and child achievement on the other. One reason that children born to unmarried parents looked less favorable on the academic outcomes early in school was that they were less likely to be in a household with their parents when they started school than children born into marriage. Part of this disadvantage was also that they were more likely to live in arrangements without their fathers and/or without their mothers being married. Much, but not all, of these disparities was rooted in the better socioeconomic circumstances of families headed by stably married parents. Given the degree to which children's early achievement predicts their long-term educational attainment (Entwisle, Alexander, & Olson, 2005) and the extent to which educational attainment predicts the likelihood of having a nonmarital birth or an unstable relationship history in adulthood (Driscoll et al., 1999), these patterns indicate one vehicle—through early educational disadvantages—for the intergenerational transmission of family status and circumstances. Overall, therefore, evidence suggested that current family structure explained some of the observed birth status effects on early school achievement, but this explanatory power paled in comparison to socioeconomic circumstances like income and parent education.

Second, turning to conditional effects, this study demonstrated that well-documented patterns of family structure differences in children's academic outcomes (see Foster & Kalil, 2007; Heard, 2007; Cooksey 1997) varied according to birth status; specifically, whether mothers had children outside of marriage or not. For example, the observed advantage of living with two married biological parents was larger for children whose parents were married at their birth than it was for those whose parents married after their birth, even when controlling for other family factors (e.g., parent education). Similar differences by birth status were seen for being in a married stepparent, cohabiting stepparent, and single parent

household. In these analyses, we were able to identify children living in cohabiting households, either with biological or stepparents. Among children born to married *or* unmarried parents, those living with cohabiting stepparents had the lowest kindergarten math scores net of other factors. This group also fared significantly worse than children living in single parent households at kindergarten, at least those born to unmarried mothers. Among children born to married mothers, being in a cohabiting stepfamily did not confer the same academic benefits as being in a married stepfamily. These findings further highlight the importance of extending our measurement of children's family experiences to capture formal and informal marital relationships over time and suggest that the targeted risk groups of No Child Left Behind (e.g., low-income youth, English language learners; see U.S. Department of Education, 2001) could be expanded to include categories defined by current and past family structure. In sum, evidence suggested that the interplay of birth status and later family structures was important, especially singling out cohabiting families as risky.

Third, concerning race/ethnic differences, the focal associations were similar across the population subgroups studied. Still, he few differences that did emerge were telling and call for closer inspection. When differences in the links among birth status, current family structure, and children's early achievement did emerge, they fit the pattern of White children experiencing more academic disadvantage from following family patterns other than being born to married parents who remained married, especially cohabiting families after both marital and nonmarital births. These differences persisted despite controls for family status and environment, allowing for the possibility of cultural differences in the role that cohabitation plays in the lives of families and their children. The bottom line is that the interplay of birth status and later family structure was mostly similar across groups but appeared to differ by race/ethnicity in terms of the academic risks posed by family structures characterized by cohabitation, including cohabitation between biological parents of children.

Such findings indicate that the risks of nonmarital fertility, family instability, and "alternative" family structures for children's education—and, conversely, the benefits of stable marriage—may be somewhat more pronounced in populations with a higher average SES, lower prevalence of nonmarital fertility, and a weaker tradition of viewing cohabitation as a substitute for marriage (e.g., Whites). This information suggests that the current marriage promotion efforts—which are, in part, designed to reduce the intergenerational transmission of inequality by providing the kind of stability in living arrangements and resources that can foster cognitive development and school performance (Furstenberg, 2007)—might only make a difference in specific subsets of the population. To complicate matters more, the stigma of nonmarital fertility could have offsetting effects on the developmental significance of nonmarital fertility—with weak stigma allowing some couples who probably should marry to avoid marriage, and strong stigma forcing some couples of who probably should not marry to marry (Kendall & Tamura, 2010). These kinds of nuances need to be studied more closely.

Of course, this study has several limitations. The measurement of family structure was spotty, the time ordering of parenting variables and test scores was problematic, and only rudimentary steps to address threats to causal inference were taken. Moreover, the effect sizes for birth status and family structure reported here were fairly modest relative to the standard deviations of math scores in kindergarten and first grade. For example, in the baseline models, being born to unmarried mothers was equivalent to a test score difference of less than one third of a standard deviation. The observed academic significance of birth status and related family structures also paled in comparison to the more critical academic importance of the larger socioeconomic forces underlying these family circumstances, especially parent education.

We argue, however, that these family-related patterns warrant further discussion and examination. They mattered above and beyond socioeconomic differences and might have accounted for some of the larger socioeconomic differences in academic outcomes. Moreover, many observed effects of birth status and family structure on academic outcomes were comparable to those for race/ethnicity, which receive a great deal of attention from educational researchers and policy-makers. Thus, attempts to counter the potential risks of being born to an unmarried mother or of living in certain family structures may have merit in general, but they would likely have greater impact if they also addressed socioeconomic circumstances that contribute to and are shaped by diversity in family formation and stability.

If future research can address the limitations of this study and replicate these findings, then two general conclusions may be drawn. The first is that connecting measures of women's fertility and relationship statuses and taking into account cohabitation as well as the connection between children's birth status and later living arrangements provides a more complete understanding of how the family context is implicated in a children's educational experiences early in life. The second is that group variation in the role that the family plays in children's educational experiences is still likely to be an important consideration. The differential distribution of socioeconomic resources by birth status/current family structure combinations across race/ethnic groups certainly explained some of the race/ethnic-specific effects of these combinations on children's test scores. Some of this variation, however, was also likely due to different normative values and supports available across groups, although we were not able to explore these possibilities here. The apparent importance of family processes (e.g., home activities, child/parent relationships) for understanding test score gains calls for a closer inspection of the differential role of parenting across populations. Although our focus was on a few large race/ethnic groups in the U.S. chosen to contrast each other, similar group variations might be found when comparing segments of the population with unique norms about and patterns of fertility and marriage. Together, these two conclusions suggest the importance of expanding the "inequality starts early" argument about education (Entwisle et al., 2005) to better account for the dynamic nature of family composition.

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Table 1

Means and Frequencies for Key Study Variables, by Race/Ethnicity

	Full Sample (*n* = 12,076)	White (*n* = 8,152)	African-American (*n* = 1,899)	Mexican Immigrant (*n* = 739)	3rd-Plus Latino/a (*n* = 1,286)
Birth Status					
Parents married at birth	68.3	81.1_{a}	26.8_{d}	67.3_{b}	55.3_{c}
Parents unmarried at birth	29.6	17.8_{d}	69.5_{a}	28.2_{c}	41.0_{b}
Missing birth status	2.1	1.1_{b}	3.7_{a}	4.5_{a}	3.7_{a}
Current Family Structure (by Birth Status)					
After a marital births					
Married biological	56.8	68.5_{a}	18.2_{d}	59.8_{b}	43.5_{c}
Married stepparent	2.6	3.4_{a}	0.5_{c}	1.1_{b}	1.8_{b}
Cohabiting stepparent	1.4	1.6_{a}	0.3_{b}	1.6_{a}	1.4_{a}
Single parent	7.5	7.5_{a}	7.6_{a}	4.8_{b}	8.6_{a}
After a nonmarital births					
Married biological	5.6	4.6_{c}	6.6_{b}	6.6_{b}	8.9_{a}
Cohabiting biological	3.5	1.9_{c}	5.3_{b}	9.8_{a}	6.2_{b}
Married stepparent	3.3	2.7_{b}	5.5_{a}	2.2_{b}	4.7_{a}
Cohabiting stepparent	2.2	1.7_{b}	3.7_{a}	2.0_{b}	2.5_{b}
Single parent	12.4	5.4_{d}	39.6_{a}	7.5_{c}	16.4_{b}
Guradian/Adopted/Other	2.8	$1.5b_{c}$	8.9_{a}	0.2_{c}	2.5_{b}
Family/Parent Characteristics					
Parent education (*M/SD*)	2.9 (1.2)	$3.2\ (1.1)_{a}$	$2.5\ (1.0)_{b}$	$1.8\ (1.0)_{c}$	$2.5\ (1.0)_{b}$
Per capita income/1000 (*M/SD*)	12.4 (13.3)	$15.0\ (13.1)_{a}$	$7.0\ (8.3)_{c}$	$4.8\ (4.5)_{d}$	$9.9\ (12.9)_{b}$
Home language use (non-English)	8.0	0.3_{c}	0.2_{c}	85.6_{a}	18.8_{b}
Maternal age at first birth (*M/SD*)	23.5 (5.6)	$24.7\ (5.4)_{a}$	$20.5\ (4.9)_{c}$	$21.6\ (4.6)_{b}$	$21.7\ (5.1)_{b}$
In-home activities (*M/SD*)	2.78 (.49)	$2.82\ (.45)_{a}$	$2.76\ (.53)_{b}$	$2.47\ (.62)_{c}$	$2.77\ (.47)_{b}$
Reading activities (*M/SD*)	3.21 (.74)	$3.23\ (.71)_{a}$	$3.24\ (.80)_{a}$	$2.94\ (.91)_{b}$	$3.23\ (.69)_{a}$
Parent/child warmth (*M/SD*)	1.30 (.36)	$1.31\ (.35)_{a}$	$1.25\ (.39)_{b}$	$1.31\ (.49)_{a}$	$1.29\ (.35)_{ab}$
Parenting stress (*M/SD*)	3.40 (.46)	$3.42\ (.41)_{a}$	$3.33\ (.56)_{b}$	$3.29\ (.61)_{c}$	$3.42\ (.46)_{a}$
Preschool Experience					

	Full Sample (*n* = 12,076)	White (*n* = 8,152)	African-American (*n* = 1,899)	Mexican Immigrant (*n* = 739)	3rd-Plus Latino/a (*n* = 1,286)
Parental care	17.3	16.3_{d}	12.0_{c}	38.1_{a}	21.6_{b}
Relative care	13.3	11.2_{b}	17.7_{a}	13.5_{b}	19.1_{a}
Non-relative care	11.0	13.6_{a}	4.1_{c}	7.2_{b}	7.7_{b}
Center care	42.3	48.5_{a}	33.1_{b}	20.0_{c}	33.2_{b}
Head start	9.6	5.3_{d}	22.0_{a}	16.1_{b}	12.6_{c}
Other care	4.9	4.4_{b}	8.0_{a}	3.4_{b}	4.6_{b}
Other Controls					
Child gender (female)	48.7	48.6_{a}	49.6_{a}	46.8_{a}	49.0_{a}
Child age in months (*M/SD*)	68.6 (4.5)	$68.9\ (4.4)_{a}$	$68.34\ (4.6)_{b}$	$67.3\ (4.7)_{c}$	$68.1\ (4.4)_{b}$

Note: Results were weighted. Statistics with different subscripts differed significantly ($p < .05$) between groups in question. Means with the same subscript did not differ significantly.

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Table 2

Regression Results for Kindergarten Math Scores

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Estimate	***p***	**Estimate**	***p***	**Estimate**	***p***	**Estimate**	***p***	**Estimate**	***p***
Race/Ethnicity and Immigration										
African-American	−2.88	***	−2.70	***	−1.96	***	−1.81	***	−1.97	***
3rd-plus Latino/a	−2.82	***	−2.77	***	−1.73	***	−1.39	***	−1.33	***
Mexican immigrant	−5.43	***	−5.52	***	−3.28	***	−1.77	***	−1.59	***
Birth Status										
Nonmarital	−1.95	***	−1.36	***	−0.40	*	−0.35	*		
Unknown	−2.66	***	−2.23	***	−1.51	***	−1.40	**		
Current Family Structure										
Cohabiting biological parent			−0.54		−0.05		−0.05			
Married stepparent			−0.88	**	−0.23		−0.26			
Cohabiting stepparent			−2.03	***	−1.17	***	−1.23	***		
Single parent			−1.24	***	−0.31	*	−0.30	*		
Other			−0.95	**	−0.46		−0.55			
Family Characteristics										
Parent education					1.46	***	1.35	***	1.35	***
Per capita income/1000					0.05	***	0.04	***	0.04	***
Maternal age at first birth							0.13	***	0.14	***
Home language (non-English)							−1.91	***	−1.89	***
Preschool Experience										
Relative care							0.14		0.19	
Non-relative care							0.52	*	0.54	*
Center care							1.46	***	1.42	***
Head start							0.04		0.04	
Other care							0.98	***	0.99	***
Birth Status by Current Structure										
After marital birth										
Married stepparent									0.05	

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Estimate	***p***	**Estimate**	***p***	**Estimate**	***p***	**Estimate**	***p***	**Estimate**	***p***
Cohabiting stepparent									−1.21	*
Single parent									−0.79	***
After nonmarital birth										
Married biological									−0.68	**
Cohabiting biological									−0.43	
Married stepparent									−0.91	**
Cohabiting stepparent									−1.64	***
Single parent									−0.57	**
Guardian/adopted									−0.68	*
Unknown birth status									−1.75	***
Δ-2 Res LL/df (vs. prior model)			−70/5	***	−1062/2	***	−117/7	***	−24/3	***

*** p<.001

** p<.01

* p<.05.

Note: All models controlled for region and child age/gender, were weighted, included a random intercept for school, and employed MI to deal with missing data on continuous measures. For sets of dummy variables, reference categories were married (birth status), married biological (current family structure; birth status by current structure), parental care (preschool), and White (race/ethnicity).

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Table 3

Regression Results for First Grade Math Scores, Controlling for Kindergarten Scores

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Estimate	*p*	Estimate	*p*	Estimate	*p*	Estimate	*p*	Estimate	*p*
Race/Ethnicity and Immigration										
African-American	−2.04	***	−1.97	***	−1.88	***	−1.71	***	−1.75	***
3rd-plus Latino/a	−0.46	*	−0.44		−0.22		−0.23		−0.22	
Mexican immigrant	−0.46		−0.46		−0.19		−0.22		0.44	
Birth Status										
Nonmarital	−0.87	***	−0.51	**	−0.30		−0.22			
Unknown	−0.79		−0.54		−.36		0.03			
Current Family Structure										
Cohabiting biological parent			−1.10	**	−0.93	*	−0.80	*		
Married stepparent			−0.36		−0.25		−0.27			
Cohabiting stepparent			−0.41		−0.28		−0.22			
Single parent			−0.58	**	−0.34		−0.25			
Other			−0.66		−0.66		−0.44			
Change in Family Structure			0.24		0.32		0.31		0.33	
Family/Parent Characteristics										
Parent education					0.58	***	0.55	***	0.55	***
Per capita income/1000					0.01		0.00		0.00	
Maternal age at first birth							−0.01		−0.10	
Home language (non-Eng.)							−0.15		−0.14	
Reading activities							0.24	*	0.24	*
In-home activities							−0.16		−0.15	
Parent/child warmth							0.14		0.13	
Parenting stress							−0.68	***	−0.68	***
Preschool Experience										
Relative care							−0.26		−0.21	
Non-relative care							0.16		0.16	
Center care							−0.24		−0.24	

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Estimate	***p***	**Estimate**	***p***	**Estimate**	***p***	**Estimate**	***p***	**Estimate**	***p***
Head start							−1.47	***	−1.48	***
Other care							−0.81	*	−0.81	*
Birth Status by Current Structure										
After marital birth										
Married stepparent									−0.14	
Cohabiting stepparent									−0.02	
Single parent									−0.53	*
After nonmarital birth										
Married biological									−0.49	
Cohabiting biological									−1.03	**
Married stepparent									−0.65	
Cohabiting stepparent									−0.61	
Single parent									−0.27	
Guardian/adopted									−0.77	
Unknown birth status									−0.30	
Δ-2 Res LL/df (vs. prior model)			−20/6	**	−47/2	***	−73/10	***	−7/4	

*** p<.001

** p<.01

* p<.05.

Note: All models controlled for region, child age/gender, and kindergarten math score. They were also weighted, included a random intercept for school, and employed MI to deal with missing data on continuous measures. For sets of dummy variables, reference categories were married (birth status), married biological (current family structure; birth status by current structure), parental care (preschool), and White (race/ethnicity).

Table 4

Results for Kindergarten Math Scores, by Birth Status, Current Family Structure, and Race/Ethnicity

	Model 1		Model 2		Model 3	
	Estimate	***p***	**Estimate**	***p***	**Estimate**	***p***
Birth Status by Current Structure						
After marital birth						
Married stepparent	−1.06	**	0.05		0.03	
Cohabiting stepparent	−2.79	***	−1.53	***	−1.51	***
Single parent	−1.93	***	−0.88	***	−0.81	**
After nonmarital birth						
Married biological	−2.44	***	−0.81	**	−0.81	**
Cohabiting biological	−2.94	***	−1.06	*	−1.16	*
Married stepparent	−2.73	***	−1.05	*	−1.06	*
Cohabiting stepparent	−4.62	***	−2.57	***	−2.63	***
Single parent	−2.29	***	−0.40		−0.42	
Guardian/adopted	−1.28	*	0.04		0.15	
Unknown birth status	−3.67	***	−2.65	***	−2.71	***
Race/Ethnicity						
African-American	−3.12	***	−2.29	***	−2.33	***
After marital birth						
Married stepparent	0.46		0.20		0.23	
Cohabiting stepparent	0.89		0.38		0.43	
Single parent	0.72		0.64		0.68	
After nonmarital birth						
Married biological	1.32		0.44		0.46	
Cohabiting biological	1.35		0.86		0.93	
Married stepparent	1.43		1.45		1.47	
Cohabiting stepparent	2.81	**	2.74	**	2.67	**
Single parent	−0.07		−0.01		−0.02	
Guardian/adopted	−1.12		−0.97		−1.12	
Unknown birth status	1.08		1.52		0.67	

	Model 1		Model 2		Model 3	
	Estimate	***p***	**Estimate**	***p***	**Estimate**	***p***
Mexican Immigrant	−6.00	***	−2.58	***	−3.39	***
After marital birth						
Married step	1.41		0.55		0.29	
Cohabiting stepparent	3.54		1.39		1.80	
Single parent	1.15		0.47		0.76	
After nonmarital birth						
Married biological	1.06		−0.33		−0.17	
Cohabiting biological	1.78		0.40		0.65	
Married stepparent	−0.54		−2.13		−2.14	
Cohabiting stepparent	2.60		0.69		1.08	
Single parent	1.72		0.43		0.69	
Guardian/adopted	−0.43		0.67		0.46	
Unknown birth status	1.30		1.25		1.36	
3rd-Plus Latino/a	−3.18	***	−1.57	***	−1.97	***
After marital birth						
Married step	1.19		−0.12		0.03	
Cohabiting stepparent	3.49	*	1.92		2.32	
Single parent	0.26		0.02		0.08	
After nonmarital birth						
Married biological	1.13		0.84		.65	
Cohabiting biological	2.47	**	2.29	*	2.29	*
Married stepparent	0.24		−0.41		−0.43	
Cohabiting stepparent	2.54	*	1.50		1.76	
Single parent	0.04		−0.16		−0.15	
Guardian/adopted	0.05		−0.49		−0.42	
Unknown birth status	1.52		1.87		1.59	
Δ-*2 Res LL/df* (vs. prior model)			−1176/2	***	+116/7	***

*** p<.001,

** p<.01,

* p<.05.

Note: Model 1 controlled for region and child age and gender, was weighted, included a random intercept for school, and used MI to deal with missing data on continuous measures. Model 2 also controlled for parent education and per capita income. Model 3 also controlled for other family factors and preschool experiences. For sets of dummy variables, reference categories were married biological (current family structure; birth status by current structure) and White (race/ethnicity).