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Abstract

Objective. This paper explores whether father involvement can reduce socioeconomic (SES) disparities in child academic outcomes.

Background. An emerging body of literature points to the benefits to children of involvement by low-SES fathers. Research has not systematically investigated whether differences in father involvement can account for SES-based disparities in child outcomes.

Method. This study used data from 12,030 unique children from the 1998 Early Childhood Longitudinal Study. Using multiple regression models and novel simulation analyses, it investigated whether accounting for SES-based differences in either the amount or effect of involvement by biological fathers explains gaps in reading scores, math scores, and rates of grade retention between low-SES and high-SES children.

Results. Father residence, resident father school involvement, and a comprehensive index of nonresident father involvement were associated with better child academic outcomes. Associations between residence and nonresident father involvement and child outcomes were consistent for fathers in all SES quintiles. School involvement by low-SES resident fathers was more beneficial than involvement by the highest-SES fathers. Simulation analyses indicated that increasing the amount of involvement by low-SES fathers to that of high-SES fathers would result in minimal decreases in SES disparities in reading and math scores, but more sizeable decreases in rates of grade retention.

Conclusion. Increasing some types of father involvement may help to narrow academic gaps between low- and high-SES children.

Keywords. child well-being; disparities; fathers; inequalities; parent involvement; social class

INTRODUCTION

Decades of research has demonstrated that children in low-socioeconomic status (SES) families have substantially worse academic outcomes than children in high-SES families (Engel, Claessens, Watts, & Stone, 2016; National Center for Education Statistics, 2015). Children from low-SES families have lower test scores and academic skills in kindergarten (Duncan & Murnane, 2011; Reardon & Portilla, 2016), and these disparities tend to remain stable or grow as children age (Duncan & Magnuson, 2011; Duncan, Magnuson, Kalil, & Ziol-Guest, 2012). Over the last 50 years, the magnitude of these disparities has increased (Duncan, Magnuson, Murnane, & Votruba-Drzal, 2019; Reardon, 2011).

SES-based disparities in academic outcomes remain even when accounting for a wide range of other factors, including the parenting behaviors of mothers (Dotterer, Iruka, & Pungello, 2012; Reardon & Portilla, 2016). Few studies, and none in the US context, have investigated whether differences in father involvement account for SES-based disparities in academic outcomes. Children in low-SES families have significantly less involved fathers, reflecting major social and economic changes that have disproportionately affected low-SES men (Carlson & Magnuson, 2011; Cherlin, 2014; Mincy, Jethwani, & Klempin, 2014). This is important, as previous theory and research identify father involvement as an integral contributor to child well-being (Cabrera, Fitzgerald, Bradley, & Roggman, 2014; Lamb, 2010). Indeed, an emerging body of research has linked low-income and nonresident father involvement with better child outcomes (e.g. Carlson & Magnuson, 2011), implying that engaged fathers could help to reduce disparities in academic outcomes between higher- and lower-SES children.

Given the likely link between father involvement and child academic outcomes, lower levels of involvement by low-SES fathers may have serious and lasting impacts on children.

Using data from a national panel of US children, this study is the first to explore the relationship between father involvement and SES-based gaps in child academic outcomes. To do so, we first assessed whether biological father involvement was associated with child reading scores, math scores, and grade retention and estimated whether these associations varied by SES. Based on the results of these analyses, we then conducted a series of novel simulation analyses that estimated whether increasing involvement by fathers of low-SES children could reduce SES-based inequality in these outcomes. Father involvement is a key developmental influence, but this is among the first papers to examine how fathers could help narrow academic disparities driven by the growing gaps in resources available to high- and low-SES children (McLanahan, 2004).

BACKGROUND

Conceptualizing Father Involvement

Father involvement is a broad construct including fathers' material contributions and their social involvement with children (Carlson & Magnuson, 2011; Lamb, 2010). Though we discuss distinct types of father involvement for conceptual clarity, fathers involved in one domain are frequently involved in others (Garasky, Stewart, Gundersen, & Lohman, 2010; Nepomnyaschy, 2007; Waller, Emory, & Paul, 2018). Fathers' material contributions can be used to directly support children or for the upkeep and functioning of the child's household. For example, fathers can buy food, contribute to rent or mortgage payments, or purchase important goods and services. The nature of these material contributions is closely tied to father residence, which constrains or facilitates different types of involvement (Carlson & Magnuson, 2011; McLanahan, Tach, & Schneider, 2013). When fathers live apart from their children, they may have a child support order requiring the provision of a certain amount of monetary support through the formal child support system. Many nonresident fathers provide informal cash or non-

cash support by paying for things like food, diapers, or doctor's visits either instead of or in addition to formal child support. These in-kind contributions are particularly important, as they help to cultivate stronger emotional bonds between fathers and children (Kane, Nelson, & Edin, 2015; Waller, Emory, & Paul., 2018). In-kind support may also be preferred by low-income parents because in most states the formal child support system only provides families receiving public assistance with a nominal amount of the child support paid by fathers (Sorensen & Hill, 2004; Waller & Plotnick, 2001). While resident fathers can also contribute cash and in-kind support, the nature and extent of their material support is difficult to disentangle from other adults' financial contributions to the household.

Fathers' social involvement includes both the quantity and quality of time spent with children. The quantity of time spent together has often been operationalized as the number of days of contact in recent weeks, time engaged in developmentally appropriate activities, and time spent involved in activities outside of the home (Argys et al., 2007).The quality of fathers' involvement is instead operationalized as the nature of the engagement between fathers and children in time spent together (Amato & Gilbreth, 1999; Marsiglio & Roy, 2012). As with material contributions, relevant measures of the quantity of involvement differ for resident and nonresident fathers. Nonresident fathers' access to and opportunities for engagement with children are more constrained, as time with children is often dictated by either formal or informal arrangements with mothers, which are in turn associated with fathers' characteristics and the quality of their relationships with mothers (Sobolewski & King, 2005).

Fathers' school involvement is an important type of social involvement with particular salience for academic outcomes. Researchers have constructed various typologies of parental school involvement and detailed the ways in which such involvement translates into child

outcomes. Though they differ in some regards, these typologies share a number of similarities and tend to distinguish between home- and school-based activities (Hill & Tyson, 2009; Kim & Hill, 2015). For example, a recent meta-analysis of parental involvement in middle school (Hill & Tyson, 2009) identified three types of school involvement: home-based involvement (e.g., communication between parents and children about school or homework), school-based involvement (e.g. attendance at parent-teacher organization (PTO) meetings or volunteering), and academic socialization (e.g., parental communications about educational expectations).

While not included in earlier conceptualizations of father social involvement, the effects of school involvement for children are based on direct contact and academic-focused interactions between fathers and children. For example, expectations around schooling are likely communicated during social encounters or through shared parent-child activities directly related to academic socialization (e.g. attending museums or touring colleges). Likewise, school-based involvement is apt to facilitate greater knowledge of the curriculum and relationships with school staff (Hill & Tyson, 2009), and thus improve fathers' ability to support their children's academic work. As with social involvement more broadly, however, nonresident fathers' opportunities for school involvement are likely to be strongly shaped by their relationship with their child's mother, their relationship with their child, and the socioeconomic context of the family.

The impact on children of fathers' material, social, and school involvement can be understood through Pleck's (2007; 2010) conceptual model of father involvement. This model, which draws both on Bronfenbrenner's (1979, 1986) earlier work on Ecological Systems Theory and on theories of social capital, proposes that the various domains of involvement organize the transmission of social and material capital from father to child. For instance, fathers can take money from income or other sources (material capital) and use it for "purchasing and arranging

goods and services" for the child, what Pleck terms "material indirect care" (Pleck, 2010, p.85). Likewise, when social interactions with children are warm, responsive, and developmentally appropriate, they can create opportunities for the exchange of social capital and knowledge that promote positive development (Pleck, 2010).

We further draw on Pleck's (2007; 2010) conceptual model to inform our understanding of the potential link between father involvement and disparities in child outcomes. For one, the model suggests the importance of the amount of involvement. Large-scale and powerful factors like mass incarceration and declines in wages have converged in recent decades to erode the economic and social well-being of low-SES men (Bianchi & Milkie, 2010; Cherlin, 2014; Edin & Nelson, 2013; Mincy et al., 2014), which in turn has limited their ability to be involved with their children. If low-SES fathers are less involved than their more affluent counterparts, this model predicts that they will have fewer opportunities to pass along social and economic capital, potentially exacerbating SES-based disparities in child outcomes. Thus, all else equal, increasing the amount of involvement by low-SES fathers should reduce such disparities.

In addition to considering the amount of father involvement, Pleck's work also suggests that the effects (or strength of impact on children) of involvement may vary by SES if fathers themselves have different levels of relevant capital. Even if they are involved to the same degree, if low-SES fathers have less human, social, and economic capital to pass along than their high-SES counterparts (Carlson & Magnuson, 2011), their involvement may not have the same implications for children For example, a low-SES father may help his child with homework for the same amount of time as a higher-SES father, but have fewer tutoring skills or subject-specific knowledge to draw upon and thus make less progress during that time. Further, involvement with children is beneficial if it is characterized as warm, responsive, and developmentally appropriate

(Pleck, 2010), but research points to a variety of factors that converge to make parenting a stressful endeavor for low-income families (Duncan, Magnuson, & Votruba-Drzal, 2014), which might affect the quality of father-child interactions. Thus, if the conditions under which low-SES fathers are involved inhibit optimal interactions with children, the effect of low-SES fathers' involvement may also be weaker (less beneficial). Conversely, the effects of father involvement for children could instead be stronger (more beneficial) in low-SES families if involvement uniquely compensates for other areas of hardship. That is, in the face of limited resources, the presence of a meaningfully involved father may represent a relatively greater influx of resources to children than in circumstances where children have access to a range of positive supports. This idea is supported by a wealth of research in developmental psychology, where scholars have long acknowledged the potential for interactions between developmental processes (like father involvement) and environmental contexts (e.g., Bronfenbrenner & Morris, 2006).

Father Involvement and Child Outcomes

A substantial body of literature finds that father involvement is associated with a range of child outcomes, including academic attainment, socio-emotional wellbeing, and behavior (Adamsons & Johnson, 2013; Amato & Gilbreth, 1999; Carlson & Magnuson, 2011; McLanahan et al., 2013). For instance, though nonresident fathers' patterns of involvement are diverse (Cheadle, Amato, & King, 2010), on average, children of nonresident fathers have access to fewer material and parental resources than children of resident fathers. Nonresident fathers are also less likely to see and be involved in the rearing of their children and typically have weaker relationships with their children, which may be a better predictor of child outcomes than frequency of contact (Amato & Gilbreth, 1999; Carlson & Berger, 2013; Carlson & Magnuson, 2011; McLanahan & Sandefur, 1994). While nonresident fathers differ from resident fathers in

both unobservable and observable ways, the balance of evidence from research that has best controlled for selection factors suggests that fathers' residence in the household offers some benefits to children (Carlson & Magnuson, 2011; McLanahan et al., 2013).

Other types of involvement by both resident and nonresident fathers have also been found to have small but statistically significant benefits for children (Adamsons & Johnson, 2013; Amato & Gilbreth, 1999; Carlson & Magnuson, 2011; Kim & Hill, 2015). An early meta-analysis (Amato & Gilbreth, 1999) found that child support payments, contact, closeness, and authoritative parenting improved children's academic achievement. An updated meta-analysis of nonresident father involvement found significant but small or moderate positive associations between fathers' involvement in activities and relationship with the child and academic attainment, child behaviors (e.g. delinquency, aggression), psychological wellbeing (e.g. anxiety, depression), and social outcomes (e.g. peer relationships) (Adamsons & Johnson, 2013). Frequency of contact and financial support were not associated with child outcomes. Another meta-analysis focusing specifically on fathers' school involvement (Kim & Hill, 2015) found such involvement by resident and nonresident fathers to be associated with academic achievement at a level comparable to that of mother involvement.

A more recent group of studies, mostly not included in earlier meta-analyses, has focused specifically on the involvement of low-income or low-SES fathers. These find small beneficial effects of involvement on children's academic achievement, behaviors, and socio-emotional well-being, and more consistent benefits for resident than nonresident father involvement (Carlson & Magnuson, 2011). For example, a study of low-income children and parents who were enrolled in Early Head Start found that engagement by resident (but not nonresident) fathers in cognitively stimulating activities was associated with higher math and reading scores

in 5th grade (Cook, Roggman, & Boyce, 2011). A series of studies using samples of low-income single mothers from the Fragile Families and Child Wellbeing Study (FFCWS) found that father involvement was both directly and indirectly associated (often via mothers' parenting behaviors) with better cognitive and behavioral outcomes for children (Choi, 2010; Choi & Jackson, 2011; Choi & Pyun, 2014). Another study of the FFCWS found that nonresident fathers' provision of high amounts of informal cash support (but not formal child support) was associated with better cognitive outcomes for children, even after controlling for outcome variables at an earlier wave (Nepomnyaschy, Magnuson, & Berger, 2012).

Father Involvement and SES-based Disparities in Child Academic Outcomes

In summarizing the available evidence, Carlson and Magnuson (2011) emphasize the likely importance of high quality interactions between low-income fathers and their children. However, they acknowledge the still-limited body of research examining the circumstances or contexts in which low-income father involvement is most beneficial to children. Indeed, despite an emerging body of theoretical and empirical work linking involvement of low-income (and other low-SES) fathers to child outcomes, very little prior research has investigated if and how father involvement can reduce SES-based disparities. Indeed, we are aware of only one study – which used data from the UK – that has examined whether father involvement can reduce disparities in child outcomes. Testing the hypothesis that father involvement can compensate for a lack of resources in the household, Tanskanen and Erola (2017) assessed whether the effects of nonresident fathers' financial and social involvement were stronger for children in low-SES homes than in high-SES homes. They found that father involvement was associated with better academic and cognitive outcomes, and most importantly, they found no significant interactions between SES and father involvement, indicating that involvement was similarly beneficial for

children regardless of family SES. To our knowledge, no previous study has examined whether differences in either the amount or effects of involvement by fathers can account for SES-based disparities in child outcomes using US data.

Current Study

Extensive prior research has established that SES predicts children's academic outcomes, and further empirical evidence demonstrates that father involvement is associated with children's outcomes. This is the first study to analyze both the relationship between father involvement and SES-based disparities in child academic outcomes using US data. Building on our review of relevant theory and research, we designed a series of novel analyses to investigate this relationship. First, in examining associations between father involvement and child outcomes, we considered multiple measures of father involvement including father residence, father school involvement, and multiple measures of social and financial involvement. We also controlled for a number of child, family, and school factors that may be associated with both father involvement and children's academic outcomes (e.g. child age and race/ethnicity, parental age, child's use of special education services, etc.). In addition, given the well-documented differences between resident and nonresident fathers in access to and opportunities to be involved with children (Carlson & Berger, 2013), we analyzed involvement separately by residence status. While there are a variety of statistical methods that attempt to account for social selection into nonresidence, the well-recognized and observable differences between these two groups of men (McLanahan, 2004; McLanahan and Jacobsen, 2015) also strongly suggest the potential for unobserved differences that are difficult to account for. That such differences might result in heterogeneous associations between involvement and child outcomes argues for separate consideration of the ways that resident and nonresident fathers affect children. Last,

building on conceptual evidence regarding the plausible ways in which involvement could reduce disparities, we conducted a series of analyses that tested whether – after accounting for possible differences in the amount or effects of father involvement – increasing the amount of involvement by low-SES fathers can reduce SES-based disparities in child academic outcomes.

METHODS

Data

This paper uses data from the 1998 Early Childhood Longitudinal Study – Kindergarten Cohort (ECLS-K), which followed a panel of children from 1998 until 2007. The ECLS is the best available dataset for our study for a number of reasons. For one, it started with a nationally representative sample of kindergarten students, and thus contains a large number of children from a diverse range of family structures. In addition, it contains information on involvement by both resident and nonresident fathers, comprehensive detail on family SES, and reliable and valid information on child academic outcomes. We are not aware of any other dataset that is similarly well-suite to our current analysis. Though data collected from recent Healthy Marriage programs like the Building Strong Families Project (Lee, Pace, Lee, & Knauer, 2018; Wood, Moore, Clarkwest, & Killewald, 2014) contain excellent measures of father involvement, they are limited in important ways that affect their suitability for this study. For instance, the Healthy Marriage initiatives required parents to volunteer and screened out ineligible participants, creating a select group of participants in sites where these initiatives took place (Amato, 2014). In addition, to our knowledge, none contains a national sample along with the high-quality child assessment available in the ECLS. A more recent version of the ECLS was begun in 2010, but it lacks the comprehensive information on father involvement available in the 1998 study.

Approximately 21,400 kindergarteners began the ECLS survey in the 1998-99 school

year, after which they were followed when most were in 1st, 3rd, 5th, and 8th grade, (in 2000, 2002, 2004, and 2007, respectively). Among other national datasets, the ECLS is distinguished by its comprehensive data collection strategy: at every wave, parents, teachers, and school administrators filled out surveys, and children completed direct assessments (Tourangeau, Nord, Le, Sorongon, & Najarian, 2009). Though we also drew on data from earlier waves to measure family SES and other covariates, we measured child outcomes and father involvement (both described in detail below) in the 3rd, 5th, and 8th grade survey waves, when data on all key variables were available.

We pooled observations across these three waves, resulting in an initial sample of 64,230 child-year observations. We omitted child-year observations when children were not living with either a biological mother or biological father (n=2,070), when they did not have a living biological father (n=420), and when data were missing on SES (n=3,680), outcomes of interest (n=26,870), and predictors (n=5,020), ending with an analytic sample of 26,180 child-year observations, contributed by 12,030 unique children. The majority of missing data is attributable to anticipated sample attrition, as the ECLS-K intentionally did not follow about 8,500 children who changed schools between the Kindergarten and 5th grade waves (Tourangeau et al., 2009). To test whether our results were affected by missing data, we conducted supplemental analyses (available upon request) using multiple imputation with chained equations. We created 10 imputed datasets and, because of our interest in whether associations between father involvement and child outcomes vary by SES (see below), we imputed separately by SES quintile at baseline. We then replicated our main analyses both with the full imputed sample and again after dropping observations where dependent variables had been imputed (von Hippel, 2007). Both sets of analyses produced results that were highly similar to our main findings, lessening concern about

bias from missing data. We thus report the findings from our complete case sample below.

We used this complete case sample to assess associations between father residence and SES-based disparities in child academic outcomes. In addition, we examined involvement by resident fathers, using the subsample of 19,370 observations recorded when biological fathers were resident in the focal child's home, and nonresident father involvement using the 6,810 observations when biological fathers were not resident. Because our unit of analysis was a child-year observation, observations from a small minority of individual children (3.7% of the sample) show up in both the resident and nonresident samples at different years because father residence changed. Data license restrictions require that we round all sample sizes to the nearest 10.

Measures

Child academic outcomes. The ECLS-K is particularly noteworthy for its direct assessments of children, which included measures of their academic performance. Of these, we used children's standardized scores (M = 50, SD = 10) for both reading and mathematics, which were designed to assess children's performance relative to their peers. Theta reliability scores for these measures were high at all waves, greater than .90 in every case except for the eighth grade data wave where the reliability of theta for the reading assessment was 0.87 (Najarian, Pollack, & Sorongon, 2009; Pollack, Atkins-Burnett, Najarian, & Rock, 2005).

In addition to these standardized scores, we measured grade retention (repeating a grade), which while rare, may be an indicator of serious academic problems. Teachers reported the grade level of each child at every wave. Based on this information, students were coded as having repeated a grade if they had not progressed a number of grades equal to the time between survey waves. For instance, a child who was in 3rd grade in the 2001-02 school year but 4th grade in 2003-04 (two years later) would be coded as having been retained. Importantly, with this coding

strategy, children were not penalized for being off typical grade level in multiple survey waves. That is, the hypothetical child described above would not have been coded as having been retained were they in 7th grade in the 2006-07 school year, as this is an expected (3-grade) progression from the previous survey wave. Table 1 provides descriptive information on the academic outcome measures and all other study variables for the pooled sample of children.

Socioeconomic status. The ECLS included a continuous measure of SES, created as a composite of father's and mother's education, father's and mother's occupational prestige, and household income in the kindergarten wave (Tourangeau et al., 2009). Using this measure, we created three sets of SES quintiles: one for the entire sample, one for the sample of children living with biological fathers, and one for the sample of children with nonresident fathers.

Father residence. As noted above, we consider fathers' residence to be a primary indicator of their involvement with their children. Thus, we created a 0-1 indicator of residence, equal to 1 in the waves that biological fathers lived with the focal child and 0 otherwise.

Resident father involvement. At each wave, respondents to the ECLS parental survey were asked, "Since the beginning of this school year, have you or the other adults in your household: attended an open house or back-to-school night? Gone to a regularly scheduled parent-teacher conference…or meeting with [the child's] teacher? Attended a school or class event, such as a play, sports event, or science fair? Volunteered at the school or served on a committee?" For each option, the respondent was also asked "Who did this? Was it the child's mother, father, both of them, or neither of them?" Using these questions, we created four separate 0-1 indicators of resident father involvement at school, and summed these into an overall (0-4) school involvement index.

Nonresident father involvement. We created a measure of school involvement among

nonresident fathers identical to the measure described above for resident fathers. In addition, a more extensive set of involvement measures was available for nonresident fathers in the ECLS based on reports by the parental respondent (who was typically the resident mother). We used these measures, described in detail below, to create a comprehensive index capturing aspects of fathers' social and material involvement, as these indicators are highly interrelated (Garasky et al., 2010; Nepomnyaschy, 2007; Waller, Emory, & Paul, 2018). To do so, we first created an overall measure of any recent contact, coded ordinally from 0 (*no contact since birth*) to 3 (*contact in the past month*). Because this overall measure established the skip pattern for all subsequent social involvement questions, we explicitly embedded responses for no contact into all additional measures. These included how often in the four weeks before the survey a nonresident father: saw the child, slept in the same house, and spoke to the child by phone. Each of these variables was ordinal, with a scale coded 0 "no contact since birth," 1 "prior contact, not this year," 2 "0 days in the past four weeks," 3 "1-14 days in the past four weeks," 4 "15-28 days in the past four weeks." Last, we included a measure of how far away the nonresident father lived, coded 1 "10 minutes", 2 "11-30 minutes", 3 "31-59 minutes", 4 "1-2 hours", 5 "greater than 2 hours", or 6 "the father had never seen the child."

Finally, in addition to measures of school and social involvement, the ECLS asked parent respondents to report on nonresident fathers' contributions of in-kind and financial support. Thus, we coded measures identifying how often nonresident fathers paid medical bills or other bills in the past year (0 "never", 1 "hardly ever", 2 "sometimes", 3 "often"). In addition, based on mothers' reports, we created an (0-1) indicator measure of regular child support receipt (coded 1 for those due and regularly receiving support and 0 otherwise). Results reported below were robust to different specifications of the child support measure.

As we note, these measures of father involvement are highly correlated, which would lead to biased and less precise estimates if they were all used in a single regression. Moreover, our interest is whether father involvement globally (rather than by individual indicators) can reduce socioeconomic disparities in child outcomes. Therefore, and following other research (Nepomnyaschy, Miller, Garasky, & Nanda, 2014), at the 3rd, 5th, and 8th grade waves, we standardized each of these items (mean=0, SD=1) before averaging them to create a standardized index of nonresident father involvement. The alpha reliability of this index at each wave was high, between 0.90 and 0.91.

Control variables. In all analyses, we controlled for important characteristics of the child, parents, household, and school that may be associated with both father involvement and children's academic outcomes. These were: survey wave, child age (in months), child race/ethnicity, child gender, an indicator for whether the child attended public school, size of the child's school, the percent of the child's school that was not non-Hispanic White, whether the child received special education services, parents' typical hours of work, whether English was the primary language in the home, and parental age in years (set equal to the resident biological mother's age in most cases, but equal to the biological father's age when the mother's information was missing or when the biological mother was nonresident). Last, we controlled for school involvement for parents other than the biological father in the home (measured identically to the variable described above), based on: the biological mother's involvement in single mother families and families with two biological parents; an average of the biological mother's and social father's involvement in families where the mother had repartnered; and the social mother's involvement when resident biological fathers had repartnered.

Table 1. ***Sample Descriptives (n=26,180)***

Variable	Mean	SD	Min	Max

Reading T Score	51.983	9.548	12.828	83.59
Math T Score	52.008	9.485	14.977	83.716
Grade Retention	0.030		0	1
Biological Father Resident	0.740		0	1
Resident Biological Father School Involvement (n=19,370)	1.635		0	4
Nonresident Biological Father Involvement Index (n=6,810)	0.105		-1.301	1.732
Other Resident Parent(s) School Involvement	2.585	1.248	0	4
Types of Parents in Household				
Bio Mother and Bio Father	0.728		0	1
Bio Mother and Other Father	0.090		0	1
Bio Father and Other Mother	0.012		0	1
Bio Mother Only	0.170		0	1
Child Age in Months	133.950	24.254	87	193
Child is Female	0.496		0	1
Child Race/Ethnicity				
White, not Hispanic	0.634		0	1
Black, not Hispanic	0.091		0	1
Hispanic any Race	0.173		0	1
Asian Pacific Islander	0.065		0	1
Other Race/Ethnicity	0.036		0	1
Child Attends Public School	0.803		0	1
Size of Child's School				
0 to 149	0.042		0	1
150-299	0.166		0	1
300-499	0.300		0	1
500-749	0.279		0	1
750+	0.213		0	1
% Hispanic and/or non-White in Child's School				
<10%	0.337		0	1
10-24%	0.190		0	1
25-49%	0.176		0	1
50-74%	0.103		0	1
75%+	0.194		0	1
Child is in Special Education	0.071		0	1
Parental Weekly Hours of Work	31.829	13.479	0	80
English Spoken at Home	0.862		0	1
Parent Age in Years	39.374	6.037	21	66
Wave				
3rd Grade	0.403		0	1
5th Grade	0.341		0	1
8th Grade	0.256		0	1

SOURCE: Early Childhood Longitudinal Study – Kindergarten Class of 1998-99 (ECLS-K), 1998-2007. U.S. Department of Education, National Center for Education Statistics

Analyses

In our multivariate analyses, we specified a series of ordinary least squares (OLS) regression models to analyze the ways in which father involvement might impact inequality in academic outcomes. Using our pooled sample, we first estimated associations between SES quintile and academic outcomes (reading score, mathematics score, grade retention). These models allowed us to then calculate the predicted difference in outcomes between children in the first (lowest) and fifth (highest) SES quintile. Next, we re-estimated these models after including our indicator for father involvement (residence, resident father school involvement, or a global index of nonresident father involvement). Conceptually, these models treat father involvement as an omitted variable that might explain some of the observable disparity in child academic outcomes. By comparing the coefficient for the first SES quintile to that in the model without father involvement, we can measure the degree to which the amount of father involvement accounts for SES-based disparities in child academic outcomes. As our conceptual review suggests, however, the strength (benefits) of the effects of father involvement on child outcomes also may differ by SES quintile. To account for this possibility, we ran a third model that included interactions between father involvement and SES quintile.

The aim of these initial models was to generate three key inferences: 1) whether father involvement is associated with child academic outcomes; 2) if controlling for father involvement helps to explain any of the SES-based disparities in these outcomes; and 3) whether associations between involvement and child outcomes vary by SES. Based on these inferences, we were able to explore our central question: whether changing the amount of father involvement of low-SES fathers could shrink the size of SES-based disparities in child outcomes. To do so, we conducted simulations, using the *margins* command in Stata. We calculated the mean predicted value of

each outcome for children in the first and fifth SES quintiles and the predicted gap between these two groups after assigning them the average amount of involvement typical of fathers in their quintile (see Table 2, below). We then re-calculated these predicted values after setting the amount of father involvement for children in the first SES quintile to that of children in the fifth. The structure of the simulation was based on the results of our initial models. If father involvement was significantly associated with a specific academic outcome but our interaction models showed that these associations did not vary by SES, we concluded that the effect of father involvement was consistent across fathers of different SES levels and generated our predictions based on the non-interacted model. If, on the other hand, the interaction between father involvement and SES was significant, we conducted our simulation based on the interacted model to capture this variation in the effect of father involvement by SES. If father involvement was not significantly associated with child outcomes, we concluded that increasing father involvement could not reduce disparities and conducted no simulation.

To summarize, our simulations allow us to engage in the following thought experiment: what would the gaps in child academic outcomes between low- and high-SES children look like if children in low-SES families had fathers who provided the same amount of involvement as those of children in high-SES families? By basing our simulation analysis on either main effects or interacted models, we can answer this question after accounting for possible SES-based differences in both the amount and effect of father involvement. For analyses of father residence, we used our pooled sample of child-year observations, which were contributed when children were in 3rd, 5th, and 8th grades (n=26,180). Appendix Table 1 reports sample sizes by SES quintile and father residence for this sample. For analyses of resident father school involvement and global nonresident father involvement, we relied on subsamples of 19,370 and 6,810 child-

year observations, respectively, and Appendix Tables 2 and 3 show sample sizes by SES quintile for these subsamples. Information in the Appendix Tables indicates that our analyses are adequately powered. For all analyses, standard errors were clustered at the child level.

Results

Table 2 presents average levels of father involvement by SES quintile. Results are presented separately for father residence in the full sample, school involvement alone for the sample of resident biological fathers, and the composite index of involvement along with its constituent parts for nonresident biological fathers. To test for differences between the first SES quintile and all others, we ran a bivariate regression for each measure to predict involvement as a function of SES quintile. As expected, involvement was lowest for the first SES quintile for each variable, with monotonic increases at each higher quintile. For example, 58% of children in the first SES quintile lived with their biological fathers compared to 89% in the fifth quintile. Also, resident biological fathers of children in the fifth quintile were engaged in one more school activity than fathers in the first (2.01 vs. 1.01), and the average amount of involvement by nonresident fathers of children in the fifth quintile was more than 0.50 SD higher than for those in the first (0.39 vs. -0.17). In all cases, the differences in involvement between fathers of the lowest-SES children and all others were statistically significant.

Table 2. ***Father Involvement by SES Quintile***

		SES Quintile				
	Range	1	2	3	4	5
Full Sample (n=26,180)						
Father Residence	0-1	.58	.67	.74	.82	.89
Resident Biological Fathers (n=19,370)						
School Involvement	0-4	1.01	1.48	1.74	1.92	2.01
Nonresident Biological Fathers (n=6,810)						
Standardized Index of Involvement	-1.3-1.7	-.17	.02	.10	.18	.39
School Involvement	0-4	.25	.44	.52	.61	.94
Contact Last Month	0-3	1.97	2.22	2.27	2.37	2.62
Days Seen Last Month	0-4	1.98	2,24	2.29	2.38	2.62

Days Slept at Father's House Last Month	0-4	1.74	2.00	2.08	2.16	2.39
Days Spoke to Father by Phone Last Month	0-4	2.00	2.25	2.34	2.46	2.70
How Far Away Does Father Live?	1-6	3.45	3.08	3.03	2.93	2.74
Helped Pay Medical Bills	0-3	.44	.72	.85	.98	1.35
Helped Pay Other Bills	0-3	.57	.68(a)	.79	.86	1.11
Regular Receipt of Cash Child Support	0-1	.22	.31	.37	.42	.51

Table Notes: SES quintiles established separately for the full sample, the resident father sample, and the nonresident father sample. Unless otherwise noted, all comparisons between the first quintile and all other quintiles are significant at $p<.01$. (a) difference significant at $p<.05$.
SOURCE: Early Childhood Longitudinal Study – Kindergarten Class of 1998-99 (ECLS-K), 1998-2007. U.S. Department of Education, National Center for Education Statistics

The results for our first series of multivariate analyses are shown in Table 3. For each outcome, the top panel presents results from analyses establishing the disparity between children in the first and fifth SES quintile (Column 1), the disparity after controlling for father residence (Column 2), and finally a model including a full set of interactions between father residence and the indicators for SES quintile (Column 3). The bottom panel shows the results of the simulation including whether it is based on the main or interaction model, the model-based predictions of SES-based disparities in child academic outcomes, the predicted disparity after setting father residence to the amount typical of fathers in the fifth SES quintile, and the percentage decrease in the gap between children from high- and low-SES homes accomplished by this simulated increase. For parsimony, Table 3 only shows key variables and comparisons between children in the first and fifth SES quintiles. Full results are available upon request.

Results from the top panel indicate sizeable disparities in child academic outcomes between children from families in the first and fifth SES quintiles (Column 1 for each outcome). As shown in Column 2, father residence was associated with higher reading and mathematics scores and lower rates of grade retention, though controlling for residence resulted in only minor reductions in the observed disparities. Reading disparities were 8.79 points compared to 8.71 points after controlling for father residence, math disparities shifted from 8.56 points to 8.47

points after control, and disparity in the rate of grade retention (-0.039) was identical.

The interaction term between SES and residence introduced in Column 3 was not significant at $p<.05$ for any of the outcomes, implying that the effect of father residence was similar across SES levels. Thus, our simulation analyses (shown in the bottom panel), were based on our main (un-interacted) regression models. As anticipated based on the results of adding a control for father residence to the un-interacted models, the results of our simulation indicate that increasing residence for the first SES quintile to that typical of fathers in the fifth quintile (from 58% to 89% as shown in Table 2) shrank disparities in reading by 2.33%, mathematics by 2.81% and grade retention by 5.62%. The simulated differences between low- and high-SES children were equal to the predicted differences from our main regression reported in Column 2 of the top panel. This is because when associations between residence and child outcomes do not differ by SES, the second step of the simulations generates results equivalent to a regression, holding residence constant at a fixed level typical of high-SES fathers. Thus, the important comparison in this simulation is between this predicted disparity in child outcomes (8.71 for reading) and the comparable disparity estimated when fathers are resident at the typical level for their SES quintile (8.92 for reading).

Table 4 presents results for models examining resident biological father school involvement; it is organized similarly to Table 3. Resident father school involvement was associated with significant increases in reading and math scores and reductions in grade retention (Column 2). As with residence, controlling for school involvement had only a minor impact on SES-based disparities for all outcomes, reducing gaps between children in the first and fifth SES quintiles from 8.32 to 8.21 for reading, for example. Unlike father residence models, however, the results of the interacted models (Column 3) showed significant interactions between school involvement

and SES ($p<.10$ for grade retention). Compared to children in the first quintile, associations between father school involvement and reading, mathematics, and grade retention were significantly weaker for children in the fifth quintile. As a result, the simulation analyses in the bottom panel of the Table are based on these interacted models. When fathers were assigned a level of school involvement typical of fathers in their SES quintile (1.01 activity for low-SES fathers and 2.01 activities for high-SES fathers), disparities in reading, mathematics, and grade retention were 8.43, 8.23, and 0.03, respectively. Increasing the amount of involvement for low-SES fathers to that of the mean high-SES father decreased reading disparities by 6.84%, mathematics disparities by 6.36%, and gaps in the rate of grade retention by 22.81%.

The final set of models, examining associations between nonresident father involvement and child academic outcomes, is shown in Table 5. On average, a one standard deviation increase in nonresident father involvement was associated with significantly higher reading (0.73) and mathematics (0.92) scores and significantly lower rates of grade retention (-0.008). As with the first models, however, controlling for involvement had little impact on disparities (Column 2), and interactions between nonresident father involvement and reading scores and grade retention (Column 3) were not significant. For mathematics scores, the interaction was marginally ($p<.10$) significant, but the main effect of involvement was not. Therefore, for each outcome we conclude that the effect of involvement was constant across SES quintile and base our simulations (bottom panel) on the un-interacted model. According to these simulations, increasing the amount of nonresident father involvement from the amount typical of low-SES fathers to the amount typical of high-SES fathers (from -0.17 to 0.39, a greater than 0.5 SD increase) reduced disparities in reading by 5.26%, mathematics by 7.22%, and grade retention by 8.14%.

Table 3. Father Residence and Socioeconomic Disparities in Child Academic Outcomes (n=24,260)

	Reading (OLS Coeff)			Mathematics (OLS Coeff)			Grade Retention (OLS Coeff)		
	1	2	3	1	2	3	1	2	3
SES Quintile:									
Q1 (reference)									
Q5	8.79***	8.71***	7.83***	8.56***	8.47***	7.70***	-.039***	-.039***	-0.046***
Father residence		0.67***	0.58+		0.78***	0.57+		-.007*	-0.020**
Q5*Father Residence			1.02+			0.95			0.013
Simulation									
Based on Main or Interaction Model?		Main			Main			Main	
SES Gaps (Q5-Q1)									
Model Gap at Residence = Sample Mean		8.92			8.71			0.041	
Simulated Gap at Residence = Q5 Mean		8.71			8.47			0.039	
% Q5-Q1 Gap Closed		2.33%			2.81%			5.62%	

Note: models include all controls identified above. SES quintiles are abbreviated as quintile 1= Q1, etc. Coefficients are presented only for SES Q5, though models include all quintiles. * p<.05; ** p<.01; ***p<.001

SOURCE: Early Childhood Longitudinal Study – Kindergarten Class of 1998-99 (ECLS-K), 1998-2007. U.S. Department of Education, National Center for Education Statistics

Table 4. Resident Biological Father School Involvement and Socioeconomic Disparities in Child Academic Outcomes (n=19,370)

	Reading (OLS Coeff)			Mathematics (OLS Coeff)			Grade Retention (OLS Coeff)		
	1	2	3	1	2	3	1	2	3
SES Quintile:									
Q1 (reference)									
Q5	8.32***	8.21***	9.15***	8.14***	8.05***	9.05***	-0.027***	-0.026***	-0.033***
School Involvement		0.19***	0.58***		0.14*	0.52***		-0.002*	-0.007***
Q5*School Involvement			-0.64***			-0.67***			0.006+
Simulation									
Based on Main or Interaction Model?		Interaction			Interaction			Interaction	
SES Gaps (Q5-Q1)									

Model Gap at Involve. = Sample Mean	8.43	8.23	0.029
Simulated Gap at Involve. = Q5 Mean	7.85	7.70	0.022
% Q5-Q1 Gap Closed	6.84%	6.36%	22.81%

Note: models include all controls identified above. SES quintiles are abbreviated as quintile 1= Q1, etc. Coefficients are presented only for SES Q5, though models include all quintiles. * p<.05; ** p<.01; ***p<.001

SOURCE: Early Childhood Longitudinal Study – Kindergarten Class of 1998-99 (ECLS-K), 1998-2007. U.S. Department of Education, National Center for Education Statistics

Table 5. ***Nonresident Biological Father Involvement and Socioeconomic Disparities in Child Academic Outcomes (n=6,810)***

	Reading (OLS Coeff)			Mathematics (OLS Coeff)			Grade Retention (OLS Coeff)		
	1	2	3	1	2	3	1	2	3
SES Quintile:									
Q1 (reference)									
Q5	7.64***	7.43***	7.14***	7.00***	6.74***	6.51***	-0.056***	-0.054***	-0.055***
Nonresident Father Involvement		0.73***	0.86*		0.92***	0.60		-0.008*	-0.017
Q5*Nonresident Father Involvement			0.61			1.11+			0.016
Simulation									
Based on Main or Interaction Model?		Main			Main			Main	
SES Gaps (Q5-Q1)									
Model Gap at Nonres. Involvement = Sample Mean		7.84			7.26			0.059	
Simulated Gap at Nonres Involvement = Q5 Mean		7.43			6.74			0.054	
% Q5-Q1 Gap Closed		5.26%			7.22%			8.14%	

Note: models include all controls identified above. SES quintiles are abbreviated as quintile 1= Q1, etc. Coefficients are presented only for SES Q5, though models include all quintiles. * p<.05; ** p<.01; ***p<.001

SOURCE: Early Childhood Longitudinal Study – Kindergarten Class of 1998-99 (ECLS-K), 1998-2007. U.S. Department of Education, National Center for Education Statistics

DISCUSSION

The relationship between father involvement and child outcomes has long been a topic of interest for scholars and policymakers, but there has been almost no research on whether fathers can help to reduce SES-based disparities in child academic outcomes. Children from low-SES homes fare substantially worse on nearly every measure of academic achievement (Brooks-Gunn & Duncan, 1997; Reardon, 2011), and low-SES fathers face greater constraints to living with and being highly involved in the lives of their children (Carlson & Magnuson, 2011; U.S. Census Bureau, 2016). In this paper, we used data from a national panel of US children to investigate whether biological father involvement – measured as father residence, resident father involvement at school, and a comprehensive index of nonresident father involvement – was associated with reductions in SES-based disparities in child reading and mathematics scores and rates of grade retention. Using regression analyses coupled with simulations, and accounting for the possibility that both the amount and effect of father involvement vary by SES, we tested the degree to which increasing the involvement of low-SES fathers would reduce SES-based disparities in child academic outcomes. Building on evidence regarding important compositional differences between the two groups of fathers who do and do not live with their children, we conducted separate analyses for resident and nonresident fathers.

Consistent with previous work (Carlson, VanOrman, & Turner, 2017), our results demonstrate that the amount of involvement by fathers of children in the first SES quintile was lower than that for higher-SES fathers on every measure. Fifty-eight percent of fathers in the first quintile lived with their children compared to nearly 90% of fathers of children in the fifth; on a measure of involvement at school, resident fathers of the lowest-SES children were involved in one fewer activity (of 4 possible) than highest-SES fathers; and nonresident fathers of lowest-

SES children had levels of involvement that were more than 0.50 SD lower on a standardized scale of multiple types of involvement than fathers of highest-SES children.

Also consistent with the broader literature, we found that father involvement was associated with better child academic outcomes. For every outcome and for each type of involvement, we found that greater amounts of father involvement were associated with better academic outcomes for children: higher reading and mathematics scores, and lower rates of grade retention. For test scores, these associations were modest. When considered against the average outcome levels shown in Table 1, biological father residence was associated with a 1.3% increase in reading scores (0.67/51.98) and a 1.5% increase in mathematics scores. For grade retention, however, residence was associated with a 23% decrease (-0.007/0.030). Resident father school involvement and nonresident father involvement were also both associated with far larger relative decreases in grade retention than increases in test scores.

Previous work on parental involvement and social capital helps to interpret this pattern. MacNeal (1999) argues that, as forms of social capital, most types of parental involvement will be more meaningfully associated with behavioral outcomes than with cognitive ones. For example, parent-child communication about schooling would affect child behaviors by creating norms around schooling and academic performance and by increasing parental awareness of particularly problematic behaviors on the part of the child. Involvement at school (e.g. attending an open house or performance) would increase parents' social networks that could facilitate information sharing and social control and create a sense of collective responsibility among parents, all of which would likely affect behavior but not academic or cognitive outcomes. That is, the types of father involvement measured in this study all imply engagement with the child and/or school that could facilitate awareness of behaviors that could contribute to particularly

negative outcomes like repeating a grade, but which might not – on their own – make much of a difference to outcomes like child test scores.

Significantly, we also found that the effects of father residence and nonresident father involvement did not vary by SES and thus conclude that these types of involvement are consistently beneficial for children regardless of SES. However, our results indicate that school involvement by low-SES resident fathers was actually more beneficial than that of the highest-SES fathers. These results join an emerging body of work that finds that involvement by low-SES and low-income fathers is associated with better outcomes for children and that in some instances, involvement by low-SES fathers may act in a compensatory way, fending off other sources of disadvantage for the lowest-SES children.

Regarding our key research aims, because the effects of resident father school involvement varied by SES, examining only differences in amount of involvement would yield an incomplete story about the potential for father involvement to reduce disparities. In our simulations, we found that increasing the school involvement of low-SES resident fathers would reduce disparities in reading and mathematics scores by greater than 6%. Our findings were most pronounced for grade retention, where results indicate that increasing low-SES resident father involvement at school from roughly one activity to two since the start of the school year (the amount typical of high-SES fathers) would reduce disparities in rates of grade retention by 22.8%. Among nonresident fathers, where effects did not vary by SES, we found that increasing involvement by low-SES fathers by roughly half a standard deviation (the average gap in involvement between low- and high-SES fathers) would reduce reading disparities by 5.26%, mathematics disparities by 7.22%, and grade retention by 8.14%.

Finally, our simulation analyses suggest that simply increasing residence (where effects

did not differ by SES) would do little by itself to reduce disparities. That is, where the presence of a father in the home may benefit the child in other ways, residence alone has only minimal impacts on the outcomes considered here. Even the large increases in father involvement considered in our simulation (an increase from about 60% to nearly 90%) had little effect on the size of SES-based disparities in child academic outcomes. Because residence alone is not a guarantee of consistent or warm involvement, this makes sense and casts doubt on efforts to promote marriage or father residence without careful consideration of the ways that fathers are involved with their children.

Though subject to replication, these findings may have important implications for children's performance on key academic subjects and persistence in school. They suggest that – absent any other change – increasing some types of involvement could reduce the sizeable academic gap between high- and low-SES children, particularly for more behaviorally-focused outcomes like grade retention. We are aware, however, that increasing father involvement is not a straightforward undertaking. For instance, multiple social factors influence parents' engagement with their children's schooling, the type of involvement most strongly associated with decreases in disparities. Involvement at school requires flexible work schedules and sufficient energy on the part of low-SES fathers, whereas precarious work (Lambert, Fugiel, & Henly, 2014) and nonstandard schedules (Presser & Ward, 2011) are pervasive among low-SES workers. Recent research (Haskins & Jacobsen, 2017) finds that a collateral consequence of mass incarceration is the reduced school involvement of fathers with incarceration histories, explained in part by their avoidance of institutions like schools that are required to keep formal records. Further, low-SES parents may lack the cultural capital and thus comfort to effectively engage with schools and other institutions, preferring instead to defer to teachers and other school staff

in their prescriptions for children's academic success (Lareau, 2011).

Because disparate levels of involvement are likely the product of social and economic factors disproportionately impacting low-SES men that may create barriers to involvement with their children (Bianchi & Milkie, 2010; Cherlin, 2014; Edin & Nelson, 2013; Mincy et al., 2014), our findings highlight the potential importance to children's well-being of addressing such structural factors. Accordingly, efforts to increase fathers' meaningful involvement with their children will require multifaceted strategies including changes to existing social and economic policies, which would likely be most effective at promoting human, economic, and social capital development for these most-disadvantaged fathers, with spillover benefits for their children. Such efforts might include policies to ease re-entry after criminal justice involvement (or efforts to severely reduce police contact and incarceration for low-income men and men of color), interventions to support education and training, income support policies like increases in the minimum wage, or broader campaigns to promote scheduling stability and work-life balance.

This study is not without limitations. For one, although the 1998 ECLS-K contained detailed information on child academic outcomes, family SES, and nonresident father involvement, only involvement at school was consistently measured for resident fathers. This precluded a more systematic investigation of resident father involvement, and it may be possible (given the highly correlated nature of types of involvement) that school involvement is a proxy for broader involvement. Future research should attempt to tease out whether resident father school involvement has bearing on academic outcomes independent of other types of involvement. It may also be that a more nuanced approach to measuring father involvement could yield better insight into its relationship with disparities in outcomes. For instance, our approach (which involved pooling data across multiple waves and measuring involvement and

child outcomes contemporaneously), did not explore variation by child age or differences between long- or short-term involvement. In addition, we did not investigate whether associations between father involvement and child outcomes (and in turn the potential for father involvement to reduce disparities) varied by potentially important characteristics like the presence or involvement of a social father in the child's home. Future research building on our framework should explore these important nuances. As the first paper using US data to explore this question, we believe that our results make a meaningful contribution.

In addition, the 1998-99 ECLS is now somewhat dated. Our study used data collected in 2002, 2004, and 2007, when children were in 3rd, 5th, and 8th grades respectively. The Great Recession, which began after our last wave of data, arguably created even more difficulties for families at the bottom of the SES distribution, and evidence suggests that SES-based inequalities in child outcomes may have increased over this period (Duncan et al., 2019). As a result, replicating our results with more recent data would certainly be fertile ground for future research. While other datasets may be more current or have better measures of father involvement, no other dataset has all of the necessary elements for our study. Thus, a new large, national, and longitudinal sample with excellent measures of child outcomes and the type, quality, and amount of resident and nonresident father involvement would make it possible to assess the robustness of our results and would be a boon to other analyses whose conclusions are of import to decision makers.

Finally, while we use the term "effect" colloquially throughout this paper (largely as a conceptual shorthand to distinguish from the concept of "amount" of involvement), we do not intend or attempt to make causal inferences from our models. Particularly, we recognize both the likely endogeneity in the relationship between father involvement and children's outcomes and

the possibility of bidirectional influences through which children's outcomes influence later involvement. Our simulation analyses were not compatible with the typical approaches for casual inference in survey data, but the consistency of our findings with an emerging body of research on demonstrating the causal impact low-SES fathers' involvement lends credence to our results. We nonetheless acknowledge the importance of future research that relies on causal inference. Despite these limitations, our study makes an important contribution, moving past the findings of prior research demonstrating that father involvement improves child outcomes to show that such involvement among low-SES fathers may actually reduce SES-based inequalities.

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