Father Involvement and Socioeconomic Disparities in Child Academic Outcomes

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INTRODUCTION

Decades of research has demonstrated that children in low-SES families have substantially worse academic outcomes on average than children in high-SES families (Engel, Claessens, Watts, & Stone, 2016; National Center for Education Statistics, 2015; Reardon, 2011). Children from low-SES families have significantly 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 (Reardon, 2011), such that the achievement gap in test scores between rich and poor children is now about twice as large as the gap between black and white children (Reardon, 2011).

SES-based disparities remain even when accounting for a wide range of other factors, including the behaviors and characteristics of mothers (Dotterer, Iruka, & Pungello, 2012; Paschall, Gershoff, & Kuhfeld, 2018; Reardon & Portilla, 2016). Fewer studies have focused on fathers' parenting, however, and no US study has investigated whether differences in father involvement account for SES-based disparities in academic outcomes. Paralleling disparities in academic indicators, father involvement is significantly lower for children in low-SES families (Carlson & Magnuson, 2011). This is important, as previous theory and research identify father involvement as an integral contributor to child well-being (Cabrera, Fitzgerald, Bradley, & Roggman, 2007, 2014; Lamb, 2010). Indeed, a growing 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 pronounced and lasting impacts on children. This study investigates the relationship between father involvement and SES-based gaps in child academics using nationally representative data from a panel study of US children. First, we assess whether biological father involvement is associated with child reading scores, math scores, and rates of grade retention. We then conduct a series of novel simulation analyses that estimate the degree to which the level of father involvement contributes to reductions in SES-based inequality in these outcomes. Because they are a central developmental influence on children, fathers may be an essential but overlooked agent in reducing socioeconomic inequality in child outcomes that has been 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 and physical involvement with children (Carlson & Magnuson, 2011; Lamb, 2010). Fathers' material contributions can be used to directly support children or the upkeep and functioning of the 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 are closely tied to father residence, which constrains or facilitates different types of involvement (Carlson & Magnuson, 2011; McLanahan, Tach, & Schneider, 2013). Nonresident fathers may be involved in the formal child support system, which stipulates the amount of support they must pay through a child support order. Outside of this formal system, many nonresident fathers provide informal cash or non-cash support by paying for things like food, diapers, or doctor's visits. These in-kind contributions are particularly important, as they help to cultivate stronger

bonds between fathers and children and may be preferred by low-income parents (Kane, Nelson, & Edin, 2015; Roy, 1999; Waller, 2002), because the government passes through only a nominal amount of child support for families on public assistance in most states. Though nonresident fathers' patterns of involvement are diverse (Cheadle, Amato, & King, 2010), on average, children of nonresident fathers have access to fewer resources (Carlson & Berger, 2013; Carlson & Magnuson, 2011; Kennedy & Bumpass, 2008; McLanahan & Sandefur, 1994). Like nonresident fathers, resident fathers can contribute cash and in-kind support, but the nature and extent of their material support is difficult to disentangle from other adults' financial contributions to the household.

Fathers' social and physical involvement includes the quantity and quality of time spent together. The quantity of time spent together has been often been operationalized as the number of days of contact in recent weeks, time engaged in developmentally appropriate activities, and time spent in activities outside of the home. Additionally, research points to the importance of considering how fathers and children spend time together (i.e., the quality of involvement), which may be a better predictor of child outcomes than frequency of contact (Amato & Gilbreth, 1999). As with material contributions, different measures of time are relevant for resident and nonresident fathers. Notably, nonresident fathers are less likely to see their children or to be involved in their rearing and they have weaker ties to their children (Carlson & Berger, 2013; Carlson & Magnuson, 2011; Kennedy & Bumpass, 2008; McLanahan & Sandefur, 1994). Thus, nonresident fathers' access to and opportunities for engagement with children may be different than for resident fathers, as time with children is often dictated by formal and informal arrangements with mothers, which are in turn associated with the quality of fathers' relationships with mothers and fathers' characteristics (McHale, 1995; Sobolewski & King, 2005).

Fathers' school involvement is an important type of social and physical involvement with particular salience for academic outcomes. Researchers have constructed various typologies of parental school involvement and detailed the ways it might translate into better outcomes for children. 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 PTO meetings or parent-teacher conference, volunteering), and academic socialization (e.g., parental communications about educational expectations).

These types of school involvement can be considered forms of social or physical involvement, either because they are purported to affect child outcomes during direct contact between fathers and children or because they serve as precursors to potentially impactful social interactions between the father and child. For example, with regards to academic socialization, expectations around schooling are communicated during social encounters, and other forms of socialization (e.g. attending museums or going on college tours) involve shared parent-child activities. Likewise, school-based involvement fosters proximity to the school, teacher, and classroom and thus improves parents' knowledge of the curriculum and relationships with school staff (Hill & Tyson, 2009). Fathers who are more familiar with school expectations will likely be better equipped to support their children's academic work. As with social and physical involvement more broadly, nonresident fathers' opportunities for school involvement are apt to be heavily affected by fathers' relationships with children and their mothers, and with the circumstances in children's households.

Father Involvement and Child Outcomes

Pleck's (2007; 2010) conceptual model of father involvement proposes that the various domains of involvement organize the transmission of social and material capital from the father to the 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.

Indeed, 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). Much of this literature is rooted in the study of father absence, and explores the involvement of nonresident fathers or examines differences in resident and non-resident involvement. Nonresident fathers are likely different from resident fathers in unobservable and observable ways. Still, the balance of evidence from research that has best controlled for selection factors suggests that fathers residence in the household offers some additional benefits to children (Carlson & Magnuson, 2011; McLanahan et al., 2013).

Beyond residence, other types of involvement by both resident and non-resident fathers has also been found to benefit children (Adamsons & Johnson, 2013; Amato & Gilbreth, 1999; Carlson & Magnuson, 2011; Kim & Hill, 2015), with studies reporting statistically significant but small predicted increases in children's academic, socio-emotional, and behavioral outcomes. An early meta-analysis (Amato & Gilbreth, 1999) found that child support payment, contact, closeness, and authoritative parenting improved children's academic achievement. However,

effect sizes were quite small for most types of involvement except authoritative parenting (Amato & Gilbreth, 1999).

A more recent meta-analysis of non-resident father involvement found a significant but small or moderate positive association between fathers' involvement in activities, engagement in multiple kinds of involvement, and relationship with the child on academic attainment, child behaviors (e.g. delinquency, aggression), psychological wellbeing (e.g. anxiety, depression;), and social outcomes (e.g. peer relationships) (Adamsons & Johnson, 2013). Contact and financial support were not associated with child outcomes. Kim and Hill's (2015) meta-analysis of school involvement found father 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, have focused on the involvement of low-income or low-SES fathers specifically. These find small but 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 series of studies using samples of low-income single mothers from the Fragile Families and Child Wellbeing Study (FFCWS) found that father involvement was 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). 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 math and reading scores in 5th grade (Cook, Roggman, & Boyce, 2011). Another study of the FFCWS found that nonresident fathers' provision of high levels of informal cash support (but not formal support) was associated

with better cognitive outcomes for children, even after controlling for outcome variables at an earlier wave (Nepomnyascy, Magnuson, & Berger, 2012).

Father Involvement and SES-based Disparities in Child Academic Outcomes

In summarizing the quality of 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 in which low-income father involvement is beneficial to children. Indeed, in spite of a growing body of theoretical and empirical work linking low-income (and other low-SES) father involvement to child outcomes, previous studies have not yet articulated how or explored whether father involvement can reduced SES-based disparities.

To inform our understanding of the potential link between father involvement and disparities in child outcomes, we again turn to Peck's (2007; 2010) conceptual model. For one, the model suggests the importance of the level (or amount) of father involvement. To the extent that low-SES fathers are less involved than their more affluent counterparts, this model predicts they will pass along social and economic capital at a lower rate with potential implications for differences in child outcomes by family SES. Thus, all else equal, increasing the involvement of low-SES fathers should help to reduce such disparities.

However, in addition to considering the level of father involvement, Pleck's work also suggests that the effects of involvement may vary by SES. To the extent that low-SES fathers have less human, social, and economic capital to pass along (Carlson & Magnuson, 2011), the effect of their involvement on child outcomes may be smaller than the effect of involvement by higher-SES fathers. Similarly, Pleck (2010) is clear that involvement with children is beneficial if it is characterized as warm, responsive, and developmentally appropriate. If the conditions

under which low-SES fathers are involved inhibit such optimal interactions with children, then even with similar levels of capital to pass along, the effects of father involvement by low-SES fathers may be less consequential.

Lest this argument be misinterpreted, we do not believe that lower levels of capital or suboptimal interactions imply any sort of inherent deficiency among low-SES fathers. Rather, we adopt a structural orientation by acknowledging the large-scale and powerful factors like mass incarceration and decline in wages that have conspired in recent decades to erode the standing of low-SES men in this country (Bianchi & Milkie, 2010; Cherlin, 2014; Edin & Nelson, 2013; Mincy, Jethwani, & Klempin, 2014). Likewise, we make note of the variety of factors that conspire to make parenting a stressful endeavor for low-income families (Duncan, Magnuson, & Votruba-Drzal, 2014), and which might affect the quality of father-child interactions. Further, it is important to emphasize that the effects of father involvement may in fact be more beneficial for children of low-SES men if such involvement is not commonplace or can otherwise act as a compensatory resource for children.

We are aware of only one study – which used data from the UK – that has investigated whether father involvement can reduce disparities. Basing their study on the hypothesis that father involvement can compensate for a lack of resources in the household, Tanskanen and Erola (2017) assessed whether nonresident father financial and social involvement was more strongly associated with child academic and cognitive outcomes for children in low-SES homes than in high-SES homes. Although they found that father involvement was associated with better outcomes overall, and for chidlren of low-SES fathers in particular, they did not find any significant interactions between various measures of SES and father involvement. To our knowledge, no previous study has examined father involvement and disparities in child outcomes

using US data, nor has previous work systematically assessed the degree to which the level and/or effect of involvement affects such disparities.

Current Study

In this study, we undertake the first analysis of 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 adopt a number of novel analyses. First, in examining associations between father involvement and child outcomes, we consider multiple measures of father involvement including father residence, father school involvement, and multiple measures of social and financial involvement. In addition, given the likely differences between resident and nonresident fathers, we separately analyze involvement by fathers' 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 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 the separate consideration of the ways that resident and nonresident fathers might affect children. Last, building on conceptual evidence regarding the ways in which involvement could reduce disparities, we conduct a series of regression and simulation analyses that test whether both the level and effect of father involvement affect SES-based disparities in child academic outcomes.

Methods

Data

This paper uses data from the nationally representative 1998 Early Childhood Longitudinal Study – Kindergarten Cohort (ECLS-K). A more recent version of the ECLS was

begun in 2010, but this dataset lacks the comprehensive information on father involvement available in the 1998 study. Approximately 21,400 kindergarteners began the survey in the 1998-99 school year, after which they were followed when most were in 1st, 3rd, 5th, and 8th grade. 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, & Najari-an, 2009). Though we also drew on data from earlier waves for indicators of 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.

After eliminating cases missing data on any variable, we pooled observations across these three waves, ending with an analytic sample of 24,260 child-year observations. Much of the 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). We used this full 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 17,950 observations recorded when biological fathers were resident in the focal child's home, and nonresident father involvement using the 6,320 observations when biological fathers were not resident. Data license restrictions require that we round all sample sizes to the nearest 10.

Measures

Child academic outcomes. The ECLS-K is also noteworthy for its direct assessments of children, which included measures of their academic performance. Of these, we used children's standardized t scores (M = 50, SD = 10) for both reading and mathematics, which were designed

to assess children's performance relative to their peers. Reliability for these measures was high; for instance, in the eighth grade data wave, the theta reliability score was 0.87 for reading and 0.92 for mathematics (Najarian, Pollack, & Sorongon, 2009).

In addition to these standardized scores, we measured grade retention (repeating a grade), which while rare, may be an indicator of serious problems. At every wave, teachers reported the grade level of each child. 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 appropriate (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.

Table 1. ***Sample Descriptives (n=24,260)***

Variable	Mean	SD	Min	Max
Reading T Score	52.59	9.27	12.99	83.59
Math T Score	52.47	9.32	14.98	83.72
Grade Retention	.03		0	1
Biological Father Resident	.74		0	1
Resident Biological Father School Involvement (n=17,950)	1.68	1.29	0	4
Nonresident Biological Father Involvement Index (n=6,320)	0.14	0.72	-1.28	1.71
Other Resident Parent(s) School Involvement	2.63	1.24	0	4
Types of Parents in Household				
Bio Mother and Bio Father	.73		0	1
Bio Mother and Other Father	.09		0	1
Bio Father and Other Mother	.01		0	1
Bio Mother Only	.17		0	1
Child Age in Months	134.03	24.27	87	193
Child is Female	.50		0	1
Child Race/Ethnicity				
White, not Hispanic	.67		0	1

Black, not Hispanic	.09		0	1
Hispanic any Race	.14		0	1
Asian Pacific Islander	.06		0	1
Other Race/Ethnicity	.04		0	1
Child Attends Public School	.79		0	1
Size of Child's School				
0 to 149	.04		0	1
150-299	.17		0	1
300-499	.31		0	1
500-749	.28		0	1
750+	.20		0	1
% non-White in Child's School				
<10%	.36		0	1
10-24%	.20		0	1
25-49%	.18		0	1
50-74%	.10		0	1
75%+	.17		0	1
Child is in Special Education	.07		0	1
Parental Weekly Hours of Work	32.16	13.32	0	80
English Spoken at Home	.90		0	1
Parent Age in Years	39.53	6.00	21	66
Wave				
3rd Grade	.40		0	1
5th Grade	.34		0	1
8th Grade	.26		0	1

Socioeconomic status. The ECLS included a constructed 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 continuous measure of SES, 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. Of note, we do not directly observe the SES of nonresident fathers and thus use the SES of mothers and children to classify these men.

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 one described above for resident fathers. In addition, a more extensive set of involvement measures was available for nonresident fathers in the ECLS based on parental respondent reports of nonresident fathers' social involvement. First was an overall measure of any recent contact, coded ordinally from 0 (*no contact since birth*) to 3 (*contact in the past month*). Because this measure of overall contact 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 that ranged from 0 (*no contact since birth*) to 4 (*15-28 days in the past four weeks*). Last, we included a measure of how many minutes 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 of whether they had established a child support order, were supposed to receive child support, and the regularity with which they received it, we created a measure of child support receipt (0 "not supposed to receive support", 1 "supposed to but did not receive regular support", 2 "received regular support").

These measures of father involvement are highly correlated, which would create multicollinearity if used in a single regression. Moreover, our interest is whether global father involvement (rather than specific types) can reduce socioeconomic disparities in child outcomes. Therefore, and based on previous 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 0.88 and 0.90.

Control variables. In all analyses described below, we controlled for a number of additional variables. These were: survey wave, child age (in months), child race/ethnicity (white, not Hispanic; black, not Hispanic; Hispanic, any race; Asian or Pacific Islander, not Hispanic; or other, not Hispanic), an indicator for whether the child attended public school, size of the child's school ("1-149 students"; "150-299 students"; "300-299 students"; "500-749 students"; "750+ students"), the percent of the child's school that was non-Hispanic white, ("<10%"; "10-24%"; "25-49%" "50-74%"; "75%+") 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 generated an index of school involvement for other parents in the home (identical to that described above), equal to 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.

Analyses

In our multivariate analyses, we specified a series of models to analyze the ways that father involvement might operate to reduce inequality in academic outcomes. In particular, and based on our review of pertinent literature, we specified our models in such a way as to allow us to assess the degree to which differences in academic outcomes between low- and high-SES children were attributable to differences in the level or the effect of father involvement.

We began by examining father residence, our broadest indicator of involvement. In analyses of the full pooled sample of children from 3rd to 8th grade (n=24,260), we first estimated the associations between SES quintile and academic outcomes (reading and mathematics score and grade retention). The results of this model allowed us to establish the predicted difference in outcomes between children in the lowest SES quintile and those in the highest. Next, we re-estimated this model after including our indicator for father residence. Conceptually, this model treats father residence as a control, and by comparing the coefficient for the highest SES quintile to that of the previous model, we can measure the degree to which the level of father involvement (residence) accounts for SES-based differences in child academic outcomes.

To assess the importance of the effects of father involvement, we extended the above model in two ways. First, we included interactions between father residence and SES quintile.

The results from these models allowed us to assess whether the predicted associations between residence and child academic outcomes varied by family SES and also to conduct simulations using the *margins* command in Stata. Specifically, we calculated the mean predicted value of each outcome for children in the lowest and highest SES quintiles and the predicted gap between these two groups. We then re-calculated these predicted values after setting the rate (level) of father residence for children in the lowest SES quintile to that of children in the highest. Because this simulation was based on the interacted model, it allowed us to account for both the level and effect of father residence, generating 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 were resident at the same rate and whose residence affected their academic outcomes in the way typical of those in high-SES families? By comparing the newly simulated gap between low- and high-SES children to that from the previous model, we can calculate the degree to which disparities in child outcomes are attributable to the level and effect of residence. We used this same approach to analyze the other types of involvement among the pooled subsamples of children with resident (17,950) and non-resident (6,320) fathers. Because we pool observations across survey waves, we pool standard errors 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 lowest SES quintile and all others, we ran an uncontrolled regression for each measure to predict involvement as a function of SES quintile. As expected, involvement was lowest for the lowest

quintile for each variable, with monotonic increases with higher SES. For example, roughly 55% of children in the lowest SES quintile lived with their biological fathers compared to nearly 90% in the highest quintile. Likewise, resident biological fathers in the highest SES quintile were engaged in nearly one more school activity than fathers in the lowest (2.02 vs. 1.12), and the average level of involvement by nonresident fathers in the highest quintile was about 0.50 SD higher than for those in the lowest (0.412 vs -0.113). In all but one case, the differences in involvement between the lowest SES fathers and all others were statistically significant.

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

		SES Quintile				
	Range	1	2	3	4	5
Full Sample (n=24,260)						
Father Residence	0-1	.55	.68	.75	.82	.90
Resident Biological Fathers (n=17,950)						
School Involvement	0-4	1.12	1.55	1.77	1.93	2.02
Nonresident Biological Fathers (n=6,320)						
Standardized Index of Involvement	-1.03-2.25	-0.11	.04	.13	.19	.41
School Involvement	0-4	.29	.44	.53	0.63	.96
Contact Last Month	0-3	2.06	2.24	2.29	2.37	2.59
Days Seen Last Month	0-4	2.09	2.25(a)	2.32	2.38	2.66
Days Slept at Father's House Last Month	0-4	1.82	2.03	2.12	2.16	2.42
Days Spoke to Father by Phone Last Month	0-4	2.09	2.28	2.37	2.47	2.73
How Far Away Does Father Live?	1-6	3.29	3.05(a)	2.98	2.93	2.71
Helped Pay Medical Bills	0-3	.48	.73	.88	1.00	1.37
Helped Pay Other Bills	0-3	.60	.68(b)	.81	.87	1.13
Provision of Cash Child Support	0-2	.74	.93	1.04	1.10	1.22

Table Notes: SES quintiles established separately for the full sample, the resident father sample, and the non-resident father sample. Unless otherwise noted, all comparisons between the first quintile and all other quintiles are significant at $p<.01$.
(a) significant at $p<.05$; (b) not significant.

The results for our first series of multivariate analyses are shown in Table 3. The top panel presents results from analyses examining whether the level of father residence is associated with reductions in SES-based disparities in reading, mathematics and grade retention. The bottom panel shows results from interacted models and accompanying simulations, which demonstrate whether the level and effect of residence collectively explain disparities. For parsimony, the Table includes only key variables and only shows results comparing fathers in the

highest (5th) SES quintile to those in the lowest. Full results are available from the authors.

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

Level Model	Reading		Mathematics		Grade Retention	
	Coefficients		Coefficients		Coefficients	
SES Quintile	before control	after control	before control	after control	before control	after control
1 (omitted)						
5	8.16***	8.05***	8.06***	7.94***	-0.034***	0.034***
Residence		0.86***		0.93***		-0.01
% Reduction in Q5-Q1 diff. after control		1.35%		1.47%		n/a
Interacted Model						
SES Quintile	main	interaction	main	interaction	main	interaction
1 (omitted)						
5	7.35***	0.71	7.43***	0.55	-0.048***	0.023*
Residence	1.02**		0.97**		-0.022**	
	Simulation: Predicted Margins					
	At Sample Means	At Quintile 5 Means	At Sample Means	At Quintile 5 Means	At Sample Means	At Quintile 5 Means
Quintile 1	48.42	48.78	48.39	48.73	0.054	0.046
Quintile 5	56.77	56.77	56.65	56.65	0.019	0.019
Q5-Q1	8.34	7.99	8.26	7.92	-0.035	-0.028
% Reduction in Q5-Q1 diff. after simulation		4.26%		4.12%		21.46%

Note: models include all controls identified above.
* p<.05; ** p<.01; ***p<.001

Results from the top panel indicate that controlling for residence has little impact on disparities, though residence is associated with significantly higher math and reading scores. Before controlling for father residence, children in the highest SES quintile have reading scores that are 8.16 points (~82% of a standard deviation) higher, mathematics scores that are 8.06 points higher, and rates of grade retention that are 3.4 percentage points lower than those in the lowest SES quintile. Controlling for father residence closed the gap between children in the lowest and highest quintile by only 1.35% and 1.47% for reading and math. Residence was not

significantly associated with grade retention, and so did not reduce SES-based disparities.

The results from our interacted models indicate that biological father residence is associated with better academic outcomes for low-SES children, and is more strongly associated with reductions in rates of grade retention than for higher SES children. Results from these analyses, which consider both the level and effect of father involvement (measured here as residence), are shown in the bottom panel of the Table. Because these models contain a full set of interactions between the indicator for father residence and SES quintile, the coefficients for the various SES quintiles now refer to the predicted change in academic outcomes for children without resident fathers while the coefficient for residence refers to predicted changes in outcomes for children in the lowest SES quintile. The coefficient for residence is significant for all outcomes, signifying that the presence of a biological father in the households is significantly associated with academic well-being for low-SES children. While interactions between SES and residence are not significant for reading and math, they are significant and positive for grade retention implying that residence is more beneficial for low-SES than high-SES children.

Consistent with the lack of significant interactions between SES and residence for either reading or math, the results of our simulations (shown at the very bottom of the Table) indicate that also accounting for the effect of residence does little to shrink disparities between low- and high-SES youth above and beyond controlling for level. In these simulations, we used our interaction models to predict differences in academic outcomes for children in the lowest- and highest-SES quintile and then re-estimated these differences after increasing the level of involvement (in this Table, the rate of residence) for the lowest SES group to be equal to that of the highest. For reading scores for example, the observed gap between low- and high-SES children is 8.34 points based on the model results. Increasing residence to a rate (level) typical of

fathers in the highest quintile only shrinks this difference by 0.35 points, a 4.26% reduction. The comparable reduction for mathematics is 4.12%. For grade retention, however, accounting for both the level and effect of residence has noticeable impacts on disparities. Increasing low-SES fathers' residence to a level typical of that of fathers in the highest quintile (90% based on results shown in Table 2), is associated with a reduction in the gap in the rate of grade retention from -0.035 to -0.028, a nearly 21.5% decrease.

Table 4 presents results for models examining the importance of resident biological father school involvement; it is organized similarly to Table 3. As with father residence, controlling for father school involvement has only minor impacts on the SES-based disparities in reading (1.37% decrease) and mathematics (0.90% decrease) scores. However, in these models, school involvement is associated with significant but small (-0.002) decreases in the probability of grade retention, and controlling for school involvement eliminated roughly 5% of the gap between low- and high-SES children. The results of the interacted models show that as with father residence, school involvement by low-SES fathers is associated with significant increases in reading and math scores (0.595 and 0.431, respectively) and with significant reductions in the probability of grade retention (-0.009). Also noteworthy are the coefficients attached to the interaction terms, which indicate that – compared to fathers in the lowest SES quintile - the associations between involvement and reading, mathematics, and grade retention are less pronounced for fathers in the highest SES quintile. The results of the simulations suggest that taking into account level and effect of father involvement in school reduces disparities in reading scores by 6.84%, mathematics scores by 4.95%, and grade retention by a third (33.02%).

Table 4. ***Resident Biological Father School Involvement and Socioeconomic Disparities in Child Academics (n=17,950)***

Level Model	Reading	Mathematics	Grade Retention
	Coefficients	Coefficients	Coefficients

SES Quintile	before control	after control	before control	after control	before control	after control
1 (omitted)						
5	7.72***	7.62***	7.76***	7.69***	0.024***	0.023***
School Inv.		0.19**		0.13*		-0.002*
% Reduction in Q5-Q1 diff after control		1.37%		0.90%		5.10%
Interacted Model						
SES Quintile	main	interaction	main	interaction	main	interaction
1 (omitted)						
5	8.66***	-0.69***	8.58***	-0.57**	-0.034***	0.008**
School Inv.	0.60***		0.43**		-0.009**	
	Simulation: Predicted Margins					
	At Sample Means	At Quintile 5 Means	At Sample Means	At Quintile 5 Means	At Sample Means	At Quintile 5 Means
Quintile 1	49.74	50.28	49.60	49.98	0.040	0.032
Quintile 5	57.55	57.55	57.41	57.41	0.015	0.015
Q5-Q1	7.80	7.27	7.82	7.43	-0.025	-0.017
% Reduction in Q5-Q1 diff. after simulation		6.84%		4.95%		33.02%

Note: models include all controls identified above.
* p<.05; ** p<.01; ***p<.001

The final set of models, which examined associations between nonresident father involvement and child academic outcomes, are shown in Table 5. On average, a one standard deviation increase in nonresident father involvement was associated with significantly higher (0.59) reading and (0.794) mathematics scores, but controlling for involvement had only minimal impact on disparities between children in the lowest- and highest-SES quintiles. Nonresident involvement was not associated with grade retention, and so we omit reference to a reduction in disparities associated with controlling for involvement. Results presented in the bottom panel of the Table indicate that unlike for residence in the full sample or for resident father involvement in school, involvement by the lowest-SES fathers was not associated with any outcome in the

interacted models nor were any interaction terms significant. Thus, we conclude that accounting for the effect of nonresident involvement had little bearing on SES-based disparities, and we omit calculations regarding the percent reduction in inequality from the Table.

Table 5. ***Nonresident Biological Father Involvement and Socioeconomic Disparities in Child Academics (n=6,320)***

	Reading		Mathematics		Grade Retention	
Level Model						
	Coefficients		Coefficients		Coefficients	
SES Quintile	before control	after control	before control	after control	before control	after control
1 (omitted)						
5	7.56***	7.39***	6.79***	6.57***	-0.052***	-0.050***
Involvement Index		0.59**		0.79***		-0.007
% Reduction in Q5-Q1 diff after control		2.19%		3.27%		n/a
Interacted Model						
SES Quintile	main	interaction	main	interaction	main	interaction
1 (omitted)						
5	7.08***	0.65	6.33***	1.07	-0.052***	0.015
Involvement Index	0.69		0.43		-0.016	
	Predicted Margins					
	At Sample Means	At Quintile 5 Means	At Sample Means	At Quintile 5 Means	At Sample Means	At Quintile 5 Means
Quintile 1	45.65	46.01	45.90	46.13	0.089	0.080
Quintile 5	53.36	53.36	52.90	52.90	0.035	0.035
Q5-Q1	7.71	7.35	7.00	6.77	-0.054	-0.045
% Reduction in Q5-Q1 diff. after simulation		n/a		n/a		n/a

Note: models include all controls identified above. * p<.05; ** p<.01; ***p<.001

DISCUSSION

The relationship between father involvement and child outcomes has long been a topic of interest for scholars and policymakers, but to date, there has been almost no research on whether fathers can help to reduce SES-based disparities in child outcomes. Children from low-SES

homes fare significantly and substantially worse on nearly every measure of academic achievement (Brooks-Gunn & Duncan, 1997; Reardon, 2011) and are less likely to live with their fathers or to have them be involved in their lives (Carlson & Magnuson, 2011; U.S. Census Bureau, 2016). In this paper, we used data from a nationally representative 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, we tested both whether the level or effect of involvement by low-SES fathers could reduce disparities. Building on evidence regarding important differences between the two groups, we conducted separate analyses for resident and nonresident fathers.

A few important findings emerge from our results. Consistent with previous research, fathers of children in the lowest SES quintile had levels of involvement that were significantly lower than every other quintile for nearly every measure. Fifty-five percent of fathers in the lowest quintile lived with their children compared to 90% of fathers of children in the highest; on a measure of involvement at school, lowest SES resident fathers were involved in approximately one fewer activity than highest SES fathers, and lowest SES nonresident fathers had levels of involvement that were about 0.50 SD lower on a standardized scale of multiple types of involvement. Though these findings are not novel, they are noteworthy nonetheless; given a growing body of research on its benefits, the markedly lower levels of involvement by low-SES fathers in this nationally representative sample of school-age children suggest the potential for detriments to the well-being of their children.

Relevant to this body of research, our study joins a growing number of others that have

found that involvement by low-SES and low-income fathers is associated with better outcomes for children. In models that interacted SES quintile with an indicator for residence we found that father residence (Table 3) and resident father involvement at school (Table 4) were both significantly associated with increases in mathematics and reading scores and decreases in the probability of grade retention. However, and underscoring the selective differences between resident and nonresident fathers, a comprehensive index of involvement by nonresident fathers in the lowest SES quintile was not associated with our outcome measures (Table 5). We can only speculate on the meaning of these findings, but Pleck's (2007; 2010) model offers some guidance. If children can benefit when fathers have capital to pass along and father-child interactions are warm, responsive, and developmentally appropriate, it may be the case that the lowest-SES nonresident fathers lack the requisite capital and/or are parenting under circumstances that are less than optimal. However, our non-interacted models show that among all nonresident fathers, involvement was still associated with significant increases in reading and math scores. Thus, our findings imply the importance of increased attention to the lowest-SES nonresident fathers, who are likely among the most disadvantaged men in our sample. Investments in these fathers could help to change the relationship between their involvement and their children's academic outcomes.

Regarding our key research aims, our analyses yielded an interesting series of findings. The differences between the results in the top and bottom panels of Tables 3 and 4 indicate that only investigating the level of involvement yields an incomplete story about the potential for father involvement to reduce disparities. Only after accounting for both the level and effect of father involvement (in interacted models) did we find any noticeable decrease in disparity. Our findings were most pronounced for grade retention, where results indicate that increasing the

lowest-SES fathers' residence and resident father involvement at school to the level typical of highest SES fathers would reduce disparities in rates of grade retention by 21.5% and 33%, respectively. The magnitude of these decreases owes to the fact that the predicted associations between involvement and grade retention were strongest for fathers in the lowest SES quintile. A similar set of findings emerged for resident father involvement at school, where associations with reading and mathematics scores for lowest-SES fathers were either equal to or greater than those for fathers in higher SES quintiles. This is an important result, as it suggests that residence and involvement in school by low-SES resident fathers may act in a compensatory way, fending off other sources of disadvantage for the lowest-SES 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 gap between high- and low-SES children. We are aware, however, that neither increasing father residence nor father involvement at school are straightforward undertakings. The decreases in biological father residence that have occurred in recent decades are the product of complex social forces (McLanahan & Jacobsen, 2015), and federal efforts over the last 20 years to promote father residence (via healthy marriage and other initiatives) have been fraught and of limited success (Manning, Brown, Payne, & Wu, 2014). 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. Further, our results suggest that simply improving the level of involvement of low-SES fathers does little to reduce disparities. Thus, any such efforts may have to be organized around long-term strategies that seek to improve the various types of capital

for low-SES men. The necessity of such efforts are underscored by our finding that involvement by low-SES nonresident fathers was not significantly associated with child academic outcomes. Though our analyses do not tell us what accounts for the differences between these fathers and others, broad-based strategies including changes to existing social and economic policies would likely be most effective at promoting human, economic, and social capital development for these most-disadvantaged fathers, with likely spillover benefits for their children. Such efforts might include policies to ease re-entry after criminal justice involvement (or indeed efforts to severely reduce police contact and incarceration for low-income men and men of color), income support policies like increases in the minimum wage, or broader campaigns to promote workers' unions.

This study is not without its limitations. Though there is a more recent ECLS survey, it lacks comprehensive information on father involvement and so was not useful for the current study. Updating this study using other, more recent datasets could be informative, though we have no particular reason to believe that findings would be systematically different. In addition, although the 1998 ECLS-K contained detailed information on child academic outcomes, family SES, and non-resident father involvement, only father involvement at school was consistently measured for resident fathers. This precluded a more systematic investigation of resident father involvement, and indeed it may be possible that (given the highly correlated nature of types of involvement) involvement at school is a proxy for fathers who are involved more broadly in their children's lives. 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 the case 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. Building on the initial evidence developed here, these are important next steps. Finally, while we use the term "effect" colloquially throughout this paper (largely as a conceptual shorthand to distinguish from the concept of "level" of involvement), we acknowledge that ours are not necessarily causal models. Particularly, we recognize both the likely endogeneity in the relationship between father involvement and children's outcomes and the possibility of bidirectional influences such that children's outcomes may influence father involvement. The consistency of our findings with a growing body of research on the effects of low-SES fathers' involvement lends some credence to our results, but we nonetheless acknowledge this limitation.

In all, we believe that the strengths of our study – nationally representative data, a theory-driven approach, separate analyses for resident and non-resident fathers, and high quality data on child outcomes – far outweigh these limitations. Our study makes an important contribution by moving past the question of whether father involvement is associated with child outcomes to considering the role of fathers in reducing inequality between low- and high-SES children.

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