

# Number of Siblings and Social Skills Revisited Among American Fifth Graders

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## Abstract

Most research on the consequences of the number of siblings highlights their downside—the negative association between sibship size and educational outcomes. But recently scholars have begun to understand the potential benefits of siblings, with some research indicating that kindergartners are more socially adept when they have at least one brother or sister. We expand this line of inquiry by studying fifth graders, a point where sufficient school-based peer interactions have occurred to potentially eliminate the social skills deficit observed among only children beginning kindergarten. Analyzing 11,820 children from the *Early Childhood Longitudinal Study—Kindergarten Cohort of 1998-99*, we find that, contrary to our expectations, only children failed to gain more social skills between kindergarten and fifth grade than their counterparts with siblings. This pattern has important implications for the one in five children now raised without siblings.

## Keywords

children, siblings, social skills

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American children are growing up with fewer siblings today than at any time during the past century. In addition to declining fertility rates, delayed first births and less stable family structures have resulted in an increasing number of children raised with few or no siblings. Accordingly, the percentage of women with just one child ever born increased from 9.6% in 1980 to about 17% in the 1990s and 19% in 2010 (U.S. Census Bureau, 2010). This significant family change prompts the question: What are the consequences of growing up without siblings?

Only 4% of Americans believe that a family with one child is ideal (Saad, 2011)—they worry that lacking siblings is problematic for children's social development (Blake, 1981b). Skills learned via sibling interactions are thought to be useful outside the home for developing relationships with peers (Mancillas, 2011; Whiteman, McHale, & Soli, 2011). But is this belief about social development and siblings accurate? There is not yet consensus among social scientists for two reasons: (a) measuring social skills in a way that garners agreement among scholars is a significant challenge and (b) most studies of siblings lack the generalizability necessary for making broad claims.

Our study extends recent work and addresses these most critical limitations. Specifically, scholars are beginning to employ nationally representative data that rely on teachers' evaluations of students' interpersonal skills. And while much of the literature on siblings suggests little reason to doubt whether only children are socially adept, more recent scholarship using stronger methods finds that, at the beginning of kindergarten, teachers rate only children as exhibiting fewer interpersonal skills, less self-control, and greater externalizing problem behaviors than children with at least one sibling (Downey & Condrón, 2004), a pattern that challenges the old view and raises new questions. Downey and Condrón (2004) analyzed *the Early Childhood Longitudinal Study—Kindergarten Cohort of 1998-99* (ECLS-K), a nationally representative sample of children beginning kindergarten. We follow these same children 5 years later, when they are fifth graders, to see if, after the children have had considerable school-based peer interactions, only children exhibited greater gains in social skills than children with siblings.

## Number of Siblings and Social Skills: Competing Views

### *Resource Dilution*

Simply put, the dilution model contends that the quality of children declines as the quantity increases because parents' resources (e.g., time, energy, money) are finite (Blake, 1981a, 1989). Conceptualizing parental resources as like a

pie, the dilution model posits that children receive increasingly smaller pieces of the pie as sibship size increases. This view is bolstered by one of the most consistently observed patterns in the social sciences: the inverse association between sibship size and educational outcomes, net of socioeconomic status (Blake, 1981a, 1989; Downey, 1995, 2001; Steelman, Powell, Werum, & Carter, 2002).

Whether predicting years of education attained, grade point average, or cognitive skills, the patterns across samples, subgroups, and time periods generally demonstrate that children with few siblings perform better academically than those with many. For example, in Blake's widely cited 1989 book, *Family Size and Achievement*, she analyzed several of the best survey data sets available: *Occupational Changes in a Generation* (1962 and 1973), *General Social Surveys* (1972-1986), *Health Examination Surveys* (Cycles II and III), *Youth in Transition*, and *High School and Beyond*. She found that sibship size was a consistent negative predictor of years of education attained. Indeed, in multivariate models, the magnitude of the negative effect of sibship size was comparable to the leading predictor in the model (father's education)<sup>1</sup>. The extent to which these correlations represent a causal relationship has been debated in more recent scholarship (Guo & VanWey, 1999), but the dilution ideas, especially when applied to dependent variables like the amount of money parents save for college (Steelman & Powell, 1989), remain intuitive and continue to provide the point of departure for discussions about how sibship size matters.

Although the resource dilution model has been employed primarily as a way of understanding the relationship between sibship size and educational outcomes, its claim that parental resources are what matters is readily extended to understanding how siblings might affect social skills. In the 1981 article, "Only Children in America: Prejudice versus Performance," Blake maintained that there is little evidence that siblings promote social skills and posited that only children have been unfairly criticized. Blake reported evidence from the *General Social Surveys, 1972-1978*, that singletons are not different in important ways from others in terms of their participation in non-church organizations and the frequency that they spend an evening with friends or relatives.

Similarly, in a review of 141 studies of family configuration and personality development, Polit and Falbo (1987) concluded that "only children scored significantly better than other groups in achievement motivation and personal adjustment" (p. 309). For example, their meta-analysis included 21 studies of the relationship between sibship size and peer popularity and 19 assessing the relationship with parents. While peer popularity measures for only children were comparable to those of children with siblings, indicators of relations

with parents were significantly better for only children. While both Blake's study and Polit and Falbo's meta-analysis suggest that singletons possess social skills comparable to other children, the studies' significant limitations leave the issue unresolved. For example, critics have questioned whether Blake's measures of sociability—spending an evening with friends or relatives—reflect social skills (Downey & Condron, 2004). And the average methodological quality of the studies in Polit and Falbo's (1987) meta-analysis was just 2.0 (on a scale of 0-5) for the peer popularity studies and 2.1 for studies of relations with parents.<sup>2</sup>

### *Siblings as Resources*

Alternatively, there are compelling reasons for challenging the dilution view that siblings primarily reduce the quality of life. Debate continues over whether the negative correlation between sibship size and educational outcomes is causal. The kinds of parents who have many children are typically different than the kinds of parents who have few, and the differences nearly always favor families with few children (Downey, 2001; Steelman et al., 2002). As a result, scholars have relied on a variety of instrumental variable approaches to gain greater leverage on the question (Åslund & Grönqvist, 2010; Black, Devereux, & Salvanes, 2005, 2010; Conley & Glauber, 2006; Lee, 2008). For example, some researchers have taken advantage of the randomness of twin births, which often results in larger-than-expected family size. If siblings have a deleterious causal effect, children who receive the birth of younger twins should perform more poorly on educational outcomes than children with a singleton younger sibling (Black et al., 2005, 2010)<sup>3</sup>. Another random event that shapes sibship size is the sex composition of the sibship—American parents are more likely to have a third child, for example, if their first two children are of the same sex. Because the sex composition of the first two children is typically a random event, this exogenous source of variation provides leverage for assessing sibship's causal effect (Conley & Glauber, 2006). Overall, this methodologically rigorous research produces mixed results—some of it suggests a causal relationship, and some of it does not<sup>4</sup>.

While issues of causality remain unsettled, perhaps the most compelling reason for questioning the resource dilution perspective is that proponents have not actively considered the broader ways in which siblings might matter, beyond their influence on cognitive skills. The emphasis on education has diverted attention away from outcomes where siblings' positive influence may be revealed. For example, the possibility that siblings promote social skills is largely dismissed from the dilution perspective. Instead, siblings are viewed as mere competitors for parental resources, incapable of contributing

meaningfully to childhood development. As Blake (1989) put it, “The notion that older siblings typically, and on average, function in loco parentis assumes too much about sibling goodwill and maturity” (p. 12).

But that view may underestimate the value of siblings. Social skill development is an obvious arena where children may benefit from the presence of brothers and sisters. Children may profit socially from having a practice partner at home, a sibling with whom they can engage in a wide range of interactions (both positive and negative), and thereby gain skills for interactions with peers. Brody (1998) articulates how sibling interactions at home can be useful in other contexts:

In learning and practicing a role, a child learns not only his or her own role, but also the complimentary ones. Naturalistic observations of sibling interactions indicate that siblings enact asymmetrical, complimentary roles with one another. Older siblings act as teachers, managers, and helpers when playing with their younger brothers and sisters, and the younger siblings assume the corresponding learner, managee, and helpee roles. (p. 16)

One way of assessing whether siblings promote social skills is to consider whether the quality of sibling relationships is correlated with the quality of peer relationships. For example, Stormshak, Bellanti, and Bierman (1996) found that, among first- and second-grade children, those who had difficult sibling relationships were likely to be the same children teachers rated as having poor emotional control and social competence and peers rated poorly on sociometric measures. Similarly, Dunn, Brown, and Maguire (1995) noted that children’s moral maturity at age 3 to 4 was predicted by siblings’ friendliness 2 years prior. And children who are nurtured by older siblings exhibit greater sensitivity toward other people’s feelings and beliefs than children who have a more antagonistic relationship with their sibling(s) (Dunn, 1988). The older sibling can benefit from this relationship too—teaching and caregiving can promote the ability to balance self-concerns with those of others (Zukow-Goldring, 1995). As the authors of these studies note, however, it is unclear whether these correlations represent causal relationships (see Jenkins & Dunn, 2009). Children with better social skills in general may enjoy both positive sibling and peer relationships. And because all children in these studies have at least one sibling, this research does not directly test whether children with siblings are more socially skilled than only children. Nevertheless, these patterns are consistent with the hypothesis that sibling interactions shape social skills.

If siblings influence children’s social skills (positively or negatively), how do children without any siblings fare? A recent study of Chinese adults took

advantage of the exogeneity of the one-child policy, using it as an instrument for the endogenous only-child variable—an approach that likely reduces omitted-variable bias suspected among more typical models. The authors found that only children were less trusting, less trustworthy, more risk-averse, less competitive, more pessimistic, and less conscientious than their counterparts with siblings (Cameron, Erkal, Gangadharan, & Meng, 2013). They discussed the possibility of “sibling deprivation” resulting in fewer skills for peer-based interactions.

The most compelling empirical evidence addressing this question with data in the United States comes from Downey and Condrón’s (2004) study of kindergartners in the ECLS-K. They found that only children were rated by teachers as exhibiting poorer interpersonal skills, less self-control, and more externalizing problem behaviors than their counterparts with one or more siblings. Their study represents a significant advancement over previous work—it would have received a perfect score on Polit and Falbo’s (1987) methodological quality scale (sample size over 500; use of probability sampling; controls for extraneous variables; multivariate methods; reliable measurement).

An important follow-up question to their study is: If only children arrive at kindergarten with social skills deficits, what happens as they progress through school? Downey and Condrón (2004) worried that “the patterns we observe here could cumulate over time so that the gap in social skills between only children and children with siblings would grow” (p. 347). But by fifth grade children have been exposed to several years of school-based interactions with peers and teachers. Given that they lack sibling interactions at home, we anticipate that singletons will be especially likely to improve their social skills as a result of years of school-based peer interactions. Children with siblings at home likely mature and increase social skills between kindergarten and fifth grade too, but only children are especially likely to gain from school-based interactions, because they started kindergarten with a deficit. We hypothesize that only children will gain more social skills than children with siblings between kindergarten and fifth grade.

### *Extending Past Research*

Our study is well positioned to assess whether the social skills deficit among only children at kindergarten entry narrows or increases over time. First, we follow the same ELCS-K children that Downey and Condrón (2004) studied. Similar to the kindergarten data, the fifth-grade ECLS-K children were rated by teachers in terms of interpersonal skills, self-control, and externalizing problem behaviors. These dimensions of social skills gauge children’s social

skills across several dimensions: the ability to form and maintain friendships and show sensitivity to the feelings of others (interpersonal skills), the ability to control their temper and respond appropriately in group activities (self-control), and the extent to which the child argues, fights, and disturbs ongoing activities (externalizing problem behaviors).

Of course, associations between sibship size and our social skills measures may not represent causal relationships but rather preexisting differences in the kinds of families that have many versus few children. Definitively resolving this causality issue remains a challenge for sibship size studies, but we attempt to reduce the problem by statistically controlling for several family and child characteristics potentially related to both sibship size and interpersonal skills. We control for the family's socioeconomic status (derived from information on parents' education level, occupational prestige, and income), the child's gender, the child's race (White, Black, Hispanic, Asian, or other), whether the child is raised by both biological parents, parents' age, and parents' marital status—all family characteristics that can be related to both sibship size and children's social skills. In addition, parents may discontinue having children if the first child exhibits particular problems, so we include statistical controls for: whether the child has a disability, the child's health, and the child's birth weight. We also include indicators of the child's age and whether he or she receives nonparental care outside their homes in our models because these factors may influence social skills. Finally, we include two variables that measure the change in sibship size and change in child's family structure, respectively, between kindergarten and fifth grade, respectively.

## Method

### Sample

Our data come from the kindergarten and fifth-grade waves of the ECLS-K. The U.S. Department of Education's National Center for Education Statistics collected data on this cohort of 21,260 children beginning in kindergarten, with follow-ups in first, third, fifth, and eighth grades. The eighth-grade wave lacked the social skills measures employed in the kindergarten through fifth-grade waves, making the fifth-grade wave the most recent one we could analyze for our purposes. The fifth-grade wave (collected during the 2003-2004 school year) contained data on 11,820 children, about 56% of the original sample of 21,260. As expected, our fifth-grade sample is slightly more advantaged (higher socioeconomic status, lower percentage minority) than the kindergarten sample that Downey and Condrón (2004) analyzed, and sibling

size increases slightly. The differences in children who persisted until the fifth grade versus those who did not appear modest, and there are no strong reasons for believing that the sibship size patterns should vary in important ways by factors related to attrition (e.g., socioeconomic status). Nevertheless, we keep these modest differences in mind when comparing results across the two samples.

ECLS-K consists of a multistage probability sample that originally represented the population of kindergartners in 1998-1999. The three sampling stages were primary sampling units (large geographic areas such as one or more counties), public and private schools within the sampled primary sampling units, and students within the sampled schools. To account for the clustering of students within schools, our analyses used SAS PROC SURVEYREG. This procedure used generalized least squares regression, which estimated robust standard errors given the clustering of students within schools. Once students were sampled, ECLS-K personnel obtained parents' contact information from the schools and used that information to obtain consent for both the child and parents to participate in the study. To collect the data, trained researchers used computer-assisted interviewing techniques on the children and their parents; teachers and school administrators completed questionnaires. For additional details on the ECLS-K, see U.S. Department of Education (2006).

To handle missing data, we used multiple imputation, then deletion (von Hippel, 2007). We included our dependent variables—along with all of our other variables—in the imputation process, which helped predict missing values on the independent variables. We then deleted cases that originally had missing values on the dependent variable. We did this because “random variation in the imputed  $Y$  values adds nothing but noise to the estimates” (von Hippel, 2007, p. 85). Therefore, our  $n$  of approximately 10,500 varied slightly from analysis to analysis depending on the number of valid cases on the dependent variable.

## **Measures**

Three teacher ratings of fifth-grade children's social skills constituted our primary dependent variables. We used measures derived from teachers' ratings given during the spring of the school year. This ensured that all of the teachers had adequate time to form their impressions of the students' social skills. For each of the three social skill measures, teachers answered a number of questions that ECLS-K combined into a scale ranging from 1 to 4. As is evident in Table 1, the social skill measures have high internal consistency reliability ( $\alpha = .88, .89, \text{ and } .79$ ).



**Table 1.** Descriptive Statistics for All Measures Used in Analyses ( $n = 11,820$ ).

Variables	<i>M</i>	<i>SD</i>	Range	$\alpha$
<b>Dependent variables</b>				
Interpersonal skills (fifth grade)	3.08	0.64	1.00 to 4.00	.88
Externalizing problem behaviors (fifth grade)	1.65	0.58	1.00 to 4.00	.89
Self-control (fifth grade)	3.23	0.60	1.00 to 4.00	.79
<b>Sibship measures</b>				
No siblings	0.14		0.00 to 1.00	
One sibling	0.41		0.00 to 1.00	
Two siblings	0.29		0.00 to 1.00	
Three siblings	0.11		0.00 to 1.00	
Four or more siblings	0.05		0.00 to 1.00	
Number of brothers	0.83	0.91	0.00 to 8.00	
Number of sisters	0.80	0.89	0.00 to 7.00	
Siblings $\geq 3$ years older	0.63	0.91	0.00 to 7.00	
Siblings 1-2 years older	0.22	0.44	0.00 to 3.00	
Siblings within 1 year	0.11	0.33	0.00 to 3.00	
Siblings 1-2 years younger	0.27	0.47	0.00 to 3.00	
Siblings $\geq 3$ years younger	0.41	0.69	0.00 to 7.00	
Full siblings	1.38	1.19	0.00 to 12.00	
Stepsiblings	0.03	0.21	0.00 to 5.00	
Half siblings	0.20	0.58	0.00 to 7.00	
Adopted and foster siblings	0.02	0.22	0.00 to 0.00	
<b>Controls</b>				
Interpersonal skills (kindergarten)	3.15	0.63	1.00 to 4.00	.89
Externalizing problem behaviors (kindergarten)	1.62	0.61	1.00 to 4.00	.90
Self-control (kindergarten)	3.21	0.61	1.00 to 4.00	.80
Change in number of siblings from K to 5	0.07	0.72	-6.00 to 5.00	
Socioeconomic status	-0.02	0.81	-2.48 to 2.54	
Parents' age	40.63	6.33	22.50 to 78.50	
Child has a disability	0.17		0.00 to 1.00	
Child's age (in months)	129.08	4.27	120.00 to 143.00	
Child receives nonparental care outside home	0.21		0.00 to 1.00	
Child's health	3.26	0.85	0.00 to 4.00	
Child's birth weight	7.39	1.32	1.00 to 13.38	
Child lives with both biological parents	0.65		0.00 to 1.00	
Child's family structure changed from K to 5	0.09		0.00 to 1.00	
White	0.57		0.00 to 1.00	
Black	0.11		0.00 to 1.00	
Hispanic	0.19		0.00 to 1.00	
Asian	0.07		0.00 to 1.00	
Other race	0.06		0.00 to 1.00	
Female	0.49		0.00 to 1.00	
Parents married	0.73		0.00 to 1.00	
Parents separated/widowed/divorced	0.18		0.00 to 1.00	
Parents never married	0.09		0.00 to 1.00	

Note. Means and standard deviations come from one of the five data sets with imputed missing values; minimum and maximum values come from data set prior to imputing.

*Interpersonal skills* (five items) gauged children's skills in "forming and maintaining friendships; getting along with people who are different; comforting or helping other children; expressing feelings, ideas, and opinions in positive ways; and showing sensitivity to the feelings of others." *Externalizing problem behaviors* (five items) originally measured "the frequency with which a child argues, fights, gets angry, acts impulsively, and disturbs ongoing activities," and included a sixth item in the third- and fifth-grade waves, "the frequency with which a child talks during quiet study time." *Self-control* (four items) tapped into "the child's ability to control behavior by respecting the property rights of others, controlling temper, accepting peer ideas for group activities, and responding appropriately to pressure from peers." For all of the above quotations, see U.S. Department of Education (2006, pp. 2-23).

The primary independent variable is the *number of siblings*. We measured sibship size using information from parental interviews. Parents were asked about all members of the focal child's household; from this household roster information ECLS-K created a composite measure of the focal child's total number of full, half, adopted/foster, and step siblings. The interviewer told parents to count only people who normally live in the household and to exclude people who stay in the household temporarily while usually living elsewhere<sup>5</sup>. From the composite measure, we created five dichotomous sibship size variables indicating whether the child has zero siblings, one sibling, two siblings, three siblings, or four or more siblings. As Table 1 indicates, the modal response is one sibling (41%), followed by two siblings (29%), no siblings (14%), three siblings (11%), and four or more siblings (5%). We used these dichotomous measures of sibship size to test the possibility, noted above, that the effect of number of siblings is nonlinear.

Beyond the *number* of siblings, we examined several other aspects of the sibship. Parents were asked for detailed descriptions of all household members, including information on siblings such as the relationship of the household member to the target child, the type of siblings the child has, and the age of each member in the household. Based on this information, we identified other dimensions of the sibship such as the number of brothers, sisters, full siblings, step siblings, half siblings, adopted and foster siblings. And because other scholars have found evidence that closely spaced siblings are more detrimental than widely spaced ones (Powell & Steelman, 1993), we identify siblings as falling into one of the following categories: (a) 3 or more years older, (b) 1 or 2 years older, (c) within 1 year, (d) 1 or 2 years younger, and (e) 3 or more years younger.

Associations between sibship size and our social skills measures may not represent causal relationships but rather preexisting differences in the kinds of families that have many versus few children. Definitively resolving this

causality issue remains a challenge for sibship size studies, but we attempt to reduce the problem by statistically controlling for several family and child characteristics potentially related to both sibship size and interpersonal skills. We control for the family's socioeconomic status (derived from information on parents' education level, occupational prestige, and income), the child's sex (whether the child is female; 0 = *no*, 1 = *yes*), the child's race (White, Black, Hispanic, Asian, or other; 0 = *no*, 1 = *yes*), whether the child is raised by both biological parents (0 = *no*, 1 = *yes*), parents' age (the average of the mother's and father's ages in years), and parents' marital status (coded dichotomously to indicate whether the parents were married, separated, divorced, or widowed, or never married; 0 = *no*, 1 = *yes*)—all family characteristics that can be related to both sibship size and children's social skills. Parents may discontinue having children if the first child exhibits particular problems, so we include statistical controls for: whether the child has a disability (0 = *no*, 1 = *yes*), the child's health (a scale of 0 = *poor* to 4 = *excellent*), and the child's birth weight (measured in pounds). We also include indicators of child's age (measured in months) and receiving nonparental care outside their homes (0 = *no*, 1 = *yes*) in our models because these factors may influence social skills. Finally, we included two time-variant measures that, if unmeasured, could bias the estimates. First, we computed a variable that gauges the change in sibship size from kindergarten to fifth grade (sibship size at kindergarten is subtracted from sibship size at fifth grade). Second, we computed a dichotomous indicator of whether the focal child's family structure changed from living with both biological parents to some other family structure between kindergarten and fifth grade (0 = *no*, 1 = *yes*).

### *Analytic Strategy*

Our main goal is to assess whether only children's social skills *improved* more than those of children with siblings between kindergarten and fifth grade. Accordingly, we estimated generalized least squares regression models predicting children's social skills in fifth grade while controlling for the kindergarten teacher's evaluation of the same social skills concept, along with other covariates. If the 5 years in between kindergarten and fifth grade resulted in greater increases in social skills for only children versus children with siblings, we should observe statistically significant coefficients for our indicators of siblings (one, two, three, four or more vs. the reference category of zero siblings). In addition, we estimated models where sibship size is represented via numbers of brothers and numbers of sisters, closely and widely spaced siblings, and full, step-, half-, adopted, and foster siblings to assess the consequences of other sibship dimensions.

## Results

Table 1 presents descriptive statistics for all measures used in the study and gives us a sense of the sample demographics. In the case of dichotomous measures coded 0 or 1, the means indicate the proportion of students coded 1. Multiplying those proportions by 100 to obtain percentages, we see that 14% of the sample had no siblings, 41% had one sibling, 29% had two siblings, 11% had three siblings, and 5% had four or more siblings. The sample was 57% White, 11% Black, 19% Hispanic, 7% Asian, and 6% of another race/ethnicity. In terms of sex, the sample was 49% female and 51% male. Around two thirds of the ECLS-K sample lived in a household with two biological parents. In terms of parents' marital status, 73% of the sample had parents who were married, 18% had parents who were separated/widowed or divorced, and 9% of the sample had parents who were never married.

Do only children gain more social skills between kindergarten and fifth grade than their counterparts with siblings? Table 2 presents the results of testing this question for children's interpersonal skills. Controlling for initial interpersonal skills at kindergarten, Model 1 suggests that children without siblings (the reference category) did not gain more interpersonal skills than children with one, two, three, or four or more siblings. Specifically, those with one and two siblings gained more in interpersonal skills between kindergarten and fifth grade than children without siblings ( $b = .08, p < .001$ ;  $b = .04, p < .05$ , respectively). In Model 2, where both interpersonal skills from kindergarten and a wide range of covariates are included, the significant positive effect of having two siblings disappears, whereas the coefficient for those with one sibling remains significant. Children with one sibling gained more interpersonal skills between kindergarten and fifth grade than children without siblings ( $b = .04, p < .05$ ). In Models 3 to 5, we assess the effects of various other sibling configurations (brothers and sisters, widely vs. closely spaced siblings, and full vs. half- or step-siblings, respectively). The only pattern that reaches statistical significance notes that half siblings are associated with fewer gains in interpersonal skills ( $b = -.03, p < .05$ ), suggesting that, in general, these nuances of sibling configuration have little effect on whether children gained interpersonal skills. Other covariates in these models behave as expected. Children from higher socioeconomic groups exhibit greater interpersonal skills, as do girls, those from two-parent family structures, those with better health, and those without a disability. In addition, we do observe some race effects. Specifically, Black children exhibit lower interpersonal skills, whereas Asian and Hispanic children exhibit greater interpersonal skills compared to White children.

**Table 2. Generalized Least Squares Estimates of K-5 Changes in Children's Interpersonal Skills (n = 10,555).**

Independent variables	Model 1		Model 2		Model 3		Model 4		Model 5	
	b	SE b	b	SE b	b	SE b	B	SE b	b	SE b
One sibling (vs. none)	0.08***	0.02	0.04*	0.02						
Two siblings (vs. none)	0.04*	0.02	0.01	0.02						
Three siblings (vs. none)	0.05	0.03	0.03	0.03						
Four or more siblings (vs. none)	0.04	0.03	0.03	0.03						
Number of brothers					-0.01	0.01				
Number of sisters					0.01	0.01				
Siblings ≥3 years older							-0.00	0.01		
Siblings 1-2 years older							0.01	0.01		
Siblings within 1 year							-0.00	0.02		
Siblings 1-2 years younger							0.01	0.01		
Siblings ≥3 years younger							-0.01	0.01		
Full siblings									0.00	0.01
Stepsiblings									0.03	0.03
Half siblings									-0.03*	0.01
Adopted and foster siblings									-0.03	0.02
Kindergarten interpersonal skills									0.24***	0.01
Change in number of siblings from K to 5	0.33***	0.01	0.24***	0.01	0.24***	0.01	0.24***	0.01	-0.00	0.01
Socioeconomic status									0.09***	0.01
Parents' age									-0.00	0.00
Child has a disability (vs. does not)									-0.16***	0.02
Child's age									-0.00	0.00
Child receives nonparental care outside home (vs. does not)									-0.00	0.02
Child's health									0.02*	0.01

(continued)

Table 2. (continued)

Independent variables	Model 1		Model 2		Model 3		Model 4		Model 5	
	b	SE b	b	SE b	b	SE b	B	SE b	b	SE b
Child's birth weight			0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
Child lives with both biological parents (vs. all other family types)			0.11***	0.02	0.11***	0.02	0.11***	0.02	0.10***	0.02
Child's family structure changed from K to 5			-0.00	0.02	-0.00	0.02	-0.00	0.02	-0.01	0.02
Black (vs. White)			-0.10**	0.03	-0.10**	0.03	-0.10**	0.03	-0.10**	0.03
Hispanic (vs. White)			0.05**	0.02	0.05**	0.02	0.05**	0.02	0.05**	0.02
Asian (vs. White)			0.12***	0.03	0.12***	0.03	0.13***	0.03	0.12***	0.03
Other race (vs. White)			-0.01	0.03	-0.01	0.03	-0.01	0.03	-0.01	0.03
Female (vs. male)			0.24***	0.01	0.24***	0.01	0.24***	0.01	0.24***	0.01
Parents separated/widowed/divorced (vs. married)			0.05*	0.02	0.05*	0.02	0.05*	0.02	0.05*	0.02
Parents never married (vs. married)			0.00	0.03	-0.00	0.03	-0.00	0.03	0.00	0.03
Intercept	2.00***	0.04	2.17***	0.20	2.21***	0.20	2.20***	0.20	2.23***	0.20

\*p < .05. \*\*p < .01. \*\*\*p < .001 (two-tailed tests).

We find a similar pattern when extending this model to externalizing problem behaviors (Table 3). Recall that externalizing problem behaviors is coded such that higher scores represent more problematic behavior. If our hypothesis was correct, that only children improve their skills more than children with siblings, we should observe positive and statistically significant coefficients for the sibling variables. Contrary to our expectations, controlling for initial externalizing problem behaviors at kindergarten, Model 1 suggests that only children gained more in externalizing problem behaviors between kindergarten and fifth grade compared to those with one sibling ( $b = -.05, p < .05$ ). In Model 2, where both externalizing problem behaviors from kindergarten and a wide range of covariates are included, the coefficients all fail to reach statistical significance, indicating that children's externalizing problem behaviors did not change differentially by sibship size between kindergarten and fifth grade. In Models 3 to 5, we assess the effects of different dimensions of sibship on externalizing problem behaviors. There is some indication that older siblings (vs. younger;  $b = .02, p < .05$ ) and half- and adopted/foster siblings ( $b = .03, p < .01$ ;  $b = .08, p < .01$ , respectively) are associated with greater increases in externalizing problem behaviors. Children from higher socioeconomic groups exhibit lower externalizing problem behaviors, as do girls, those from two-parent family structures, and those without a disability. In addition, Black children exhibit higher externalizing problem behaviors, whereas Asian children exhibit lower externalizing problem behaviors compared to White children.

Finally, we estimate fifth grade self-control (Table 4). Contrary to our expectations, controlling for initial self-control at kindergarten, Model 1 suggests that those with one sibling ( $b = .10, p < .001$ ) and two siblings ( $b = .06, p < .01$ ) gained more in self-control between kindergarten and fifth grade compared to children without siblings. In Model 2, which includes both self-control from kindergarten and a wide range of covariates, the coefficient for one sibling still remains statistically significant ( $b = .06, p < .01$ ), but is in the opposite direction of our expectations. Children with one sibling improved their self-control between kindergarten and fifth grade more than children without any siblings. Coefficients for other sibship size variables were also positive but failed to reach statistical significance. In Models 3 to 5, we assess the effects of different dimensions of sibship on self-control. The results suggest that half- and adopted/foster siblings were associated with less improvement in self-control ( $b = -.03, p < .05$ ;  $b = -.06, p < .05$ , respectively). Children from higher socioeconomic groups exhibit higher self-control, as do girls, those from two-parent family structures, those with better health, and those without a disability.

**Table 3.** Generalized Least Squares Estimates of K-5 Changes in Children's Externalizing Problem Behaviors ( $n = 10,722$ ).

Independent variables	Model 1		Model 2		Model 3		Model 4		Model 5	
	<i>b</i>	SE <i>b</i>	<i>b</i>	SE <i>b</i>	<i>b</i>	SE <i>b</i>	<i>B</i>	SE <i>b</i>	<i>b</i>	SE <i>b</i>
One sibling (vs. none)	-0.05*	0.02	-0.01	0.02						
Two siblings (vs. none)	-0.02	0.02	0.01	0.02						
Three siblings (vs. none)	-0.01	0.02	0.01	0.02						
Four or more siblings (vs. none)	0.02	0.03	0.03	0.03						
Number of brothers					0.01	0.01				
Number of sisters					0.01	0.01				
Siblings $\geq 3$ years older							0.02*	0.01		
Siblings 1-2 years older							0.02	0.01		
Siblings within 1 year							0.01	0.02		
Siblings 1-2 years younger							-0.02	0.01		
Siblings $\geq 3$ years younger							-0.01	0.01		
Full siblings									0.00	0.00
Stepsiblings									0.04	0.03
Half siblings									0.03**	0.01
Adopted and foster siblings									0.08**	0.03
Kindergarten externalizing problem behaviors									0.36***	0.01
Change in number of siblings from K to 5	0.43***	0.01	0.36***	0.01	0.36***	0.01	0.36***	0.01	0.36***	0.01
Socioeconomic status			-0.00	0.01	-0.00	0.01	0.01	0.01	-0.00	0.01
Parents' age			-0.05***	0.01	-0.05***	0.01	-0.05***	0.01	-0.05***	0.01
Child has a disability (vs. does not)			-0.00	0.00	-0.00	0.00	-0.00	0.00	-0.00	0.00
Child's age			0.11***	0.02	0.11***	0.02	0.11***	0.02	0.11***	0.02
Child receives nonparental care outside home (vs. does not)			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			0.02	0.01	0.02	0.01	0.03*	0.01	0.02	0.01

(continued)



**Table 3. (continued)**

Independent variables	Model 1		Model 2		Model 3		Model 4		Model 5	
	b	SE b	b	SE b	b	SE b	B	SE b	b	SE b
Child's health			-0.01	0.01	-0.01	0.01	-0.01	0.01	-0.01	0.01
Child's birth weight			-0.00	0.00	-0.00	0.00	-0.00	0.00	-0.00	0.00
Child lives with both biological parents (vs. all other family types)			-0.10***	0.02	-0.10***	0.02	-0.10***	0.02	-0.08***	0.02
Child's family structure changed from K to 5			-0.02	0.02	-0.02	0.02	-0.02	0.02	-0.01	0.02
Black (vs. White)			0.12***	0.02	0.12***	0.02	0.12***	0.02	0.13***	0.02
Hispanic (vs. White)			-0.03	0.02	-0.03	0.02	-0.03	0.02	-0.03	0.02
Asian (vs. White)			-0.12***	0.02	-0.12***	0.02	-0.12***	0.02	-0.12***	0.02
Other race (vs. White)			-0.01	0.02	-0.01	0.02	-0.02	0.02	-0.02	0.02
Female (vs. male)			-0.17***	0.01	-0.17***	0.01	-0.17***	0.01	0.17***	0.01
Parents separated/widowed/divorced (vs. married)			-0.03	0.02	-0.03	0.02	-0.04	0.02	-0.02	0.02
Parents never married (vs. married)			0.03	0.02	0.03	0.02	0.03	0.02	0.04	0.02
Intercept	0.97***	0.02	0.93***	0.19	0.91***	0.19	0.93***	0.19	0.90***	0.19

\*p < .05. \*\*p < .01. \*\*\*p < .001 (two-tailed tests).

**Table 4.** Generalized Least Squares Estimates of K-5 Changes in Children's Self-Control ( $n = 10,678$ ).

Independent variables	Model 1		Model 2		Model 3		Model 4		Model 5	
	<i>b</i>	SE <i>b</i>	<i>b</i>	SE <i>b</i>	<i>b</i>	SE <i>b</i>	<i>b</i>	SE <i>b</i>	<i>b</i>	SE <i>b</i>
One sibling (vs. none)	0.10***	0.02	0.06**	0.02						
Two siblings (vs. none)	0.06**	0.02	0.03	0.02						
Three siblings (vs. none)	0.05	0.03	0.02	0.03						
Four or more siblings (vs. none)	0.02	0.03	0.01	0.03						
Number of brothers					-0.01	0.01				
Number of sisters					-0.00	0.01				
Siblings $\geq 3$ years older							-0.01	0.01		
Siblings 1-2 years older							-0.01	0.01		
Siblings within 1 year							-0.01	0.02		
Siblings 1-2 years younger							0.02	0.01		
Siblings $\geq 3$ years younger							-0.01	0.01		
Full siblings									-0.00	0.01
Stepsiblings									0.02	0.03
Half siblings									-0.03*	0.01
Adopted and foster siblings									-0.06*	0.03
Kindergarten self-control									0.25***	0.01
Change in number of siblings from K to 5	0.32***	0.01	0.25***	0.01	0.25***	0.01	0.25***	0.01	0.25***	0.01
Socioeconomic status									0.01	0.01
Parents' age									0.07***	0.01
Child has a disability (vs. does not)									0.00	0.00
									-0.16***	0.02
									-0.16***	0.02

(continued)

**Table 4. (continued)**

Independent variables	Model 1		Model 2		Model 3		Model 4		Model 5	
	b	SE b	b	SE b	b	SE b	b	SE b	b	SE b
Child's age	-0.00	0.00	-0.00	0.00	-0.00	0.00	-0.00	0.00	-0.00	0.00
Child receives nonparental care outside home (vs. does not)	-0.03*	0.02	-0.03*	0.02	-0.03*	0.02	-0.03*	0.02	-0.03*	0.02
Child's health	0.02*	0.01	0.02*	0.01	0.02*	0.01	0.02*	0.01	0.02*	0.01
Child's birth weight	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Child lives with both biological parents (vs. all other family types)	0.10***	0.02	0.11***	0.02	0.11***	0.02	0.11***	0.02	0.10***	0.02
Child's family structure changed from K to 5	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Black (vs. White)	-0.14***	0.03	-0.14***	0.03	-0.14***	0.03	0.14***	0.03	0.14***	0.03
Hispanic (vs. White)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Asian (vs. White)	0.16***	0.02	0.16***	0.02	0.16***	0.02	0.16***	0.02	0.16***	0.02
Other race (vs. White)	-0.02	0.03	-0.03	0.03	-0.03	0.03	-0.03	0.03	-0.02	0.03
Female (vs. male)	0.18***	0.01	0.18***	0.01	0.18***	0.01	0.18***	0.01	0.18***	0.01
Parents separated/widowed/divorced (vs. married)	0.05*	0.02	0.05*	0.02	0.05*	0.02	0.05*	0.02	0.05*	0.02
Parents never married (vs. married)	-0.00	0.03	-0.01	0.03	-0.01	0.03	-0.01	0.03	-0.01	0.03
Intercept	2.12***	0.04	2.29***	0.20	2.35***	0.20	2.33***	0.20	2.36***	0.20

\*p < .05. \*\*p < .01. \*\*\*p < .001 (two-tailed tests).

## Discussion

Previous research with the ECLS-K data documented a social skills deficit among America's only children at kindergarten entry (Downey & Condrón, 2004). Our study extends this line of inquiry by demonstrating that this deficit did not significantly change after 5 years of schooling. Our models predicting fifth-grade interpersonal skills, self-control, and externalizing behavior problems, while controlling for kindergarten measures of the same concepts, consistently failed to show greater improvements among only children. Indeed, the only statistically significant pattern we found was that children with one sibling extended their advantage over only children with respect to interpersonal skills and self-control. We anticipated that several years of school-based peer and teacher interactions would boost the social skills of only children more so than those of others. Our thinking was that only children had the most to gain by attending school, by mixing with other children, and thereby improving their social skills. Our results, however, did not support this expectation.

This is important news for several reasons. First, it suggests that when it comes to children's development of social skills, the family influence may trump the school influence. We may have overestimated the extent to which school-based interactions matter. Although schools are a significant socialization agent, children spend less than 25% of their waking hours per year in school (Downey, Hippel, & Hughes, 2008). The patterns here are consistent with the view that children's social skills develop primarily as a result of family-based, rather than school-based, interactions.

Second, this result suggests that only children's early deficit at the beginning of kindergarten may be highly consequential. It may be that the early gaps observed in kindergarten are difficult to overcome, even with 5 years of school-based peer interactions. Past studies have articulated the socialization benefits of siblings (Brody, 1998; Dunn, 1988; Dunn et al., 1995; Stormshak et al., 1996; Zukow-Goldring, 1995); and our study hints at the possibility that sibling interactions may have a unique place in development, providing some socialization benefits that peers do not. If this is the case then we need to know more about the precursors to only children's early deficit and the conditions under which only children can gain social skills similar to other children. What is it about sibling relationships prior to age five that results in a deficit of social skills among only children?

Third, given the lack of progress observed here, there is reason to explore further only children's ability to form and maintain relationships in adolescence, to work successfully in group settings, and to form long-term, stable adult relationships. If only children have not closed the social skills gap by

fifth grade, do they ever catch up? Perhaps they will close the gap in a few more years. Bobbitt-Zeher and Downey (2013) have considered whether only children receive fewer peer friendship nominations than others among adolescents in the *National Longitudinal Study of Adolescent Health*. They report little evidence of a social skills deficit employing this alternative strategy, suggesting that just a few years after our fifth grade sample was assessed, singleton teenagers may have resolved their earlier social-skills deficit. Because the Bobbitt-Zeher and Downey (2013) study assesses social skills via peer nominations, however, it is unclear whether teacher evaluations, the method we use here, would produce similar results.

While the quality of research on sibship size and social skills has improved in important ways in the last decade, there are still several limitations that prevent more definitive conclusions. We must remain cautious about interpreting the associations observed here as causal relationships. The longitudinal models we estimated are better than cross-sectional models at reducing many preexisting differences between children from various sibships that may bias our estimates, but they do not eliminate all of the limitations of observational data. Some studies have employed unique strategies to address this issue. For example, Cameron et al. (2013) used an instrumental variable derived from the one-child policy in China to obtain better estimates of the causal effects of only child status. Their conclusions are gloomy, suggesting that “little emperor” behavior (e.g., more selfishness, less trusting) is significantly more common among adults raised as only children than those raised with siblings.

Although the move toward smaller families in the United States has not been as abrupt as that in China<sup>6</sup>, nevertheless there has been a steady increase in the number of American children who grow up without siblings. What are the consequences, at a societal level, of an increasing number of children growing up without siblings? If the only child deficit in social skills among kindergartners has not been resolved by fifth grade, will it persist into adolescence and adulthood? Will only children be less capable of developing and maintaining meaningful peer relationships? If they have fewer skills for understanding others’ thoughts and feelings, will they be more likely to divorce? And if this group continues to grow, new questions may arise such as, “What are the consequences of having significantly smaller extended families?” When children grow up without siblings, their own offspring will lack uncles, aunts, and cousins, a pattern with consequences for family dynamics throughout the life course.

Ehrlich’s 1968 book, *The Population Bomb*, directed demographers’ attention toward global overpopulation for several decades. But more recently, concerns regarding overpopulation have been more nuanced, targeted primarily toward developing countries in Africa that have not yet progressed

through the demographic transition and finally acknowledging societal-level problems that may emerge as a result of low fertility in Europe. Most of the work considering the negative consequences of low fertility highlights potential labor shortages (Börsch-Supan, 2003) and the stress it can put on the medical system. But as we continue to broaden our understanding of how changes in societal-level fertility matter, there is an additional cost to consider—how declining fertility shapes social skills.

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### **Notes**

1. There were a few notable exceptions to this pattern. For example, Gomes (1984) found that sibship size was positively related to years of education attained in Kenya. Others have found that the negative effect of siblings on attainment of education is more modest among Mormons than Protestants in the United States (Downey & Neubauer, 1998).
2. The studies were awarded one point each for possessing the following characteristics: (a) large sample (>500), (b) probability sampling, (c) controls for extraneous variables, (d) multivariate analysis, and (e) reliable measurement.
3. Twins themselves are typically not compared to singletons because twins often endure specific challenges such as low birth weight.
4. In addition, even putting this causal relationship aside, the patterns for sibship size and educational outcomes do not unambiguously support dilution claims. Strictly speaking, the dilution model predicts that the most deleterious sibling added to the family should be the second child—this child reduces the distribution of parental resources most dramatically by cutting them in half. In contrast, adding the fourth sibling (or fifth child) to the family merely reduces existing children's resources by 5%, from 25% to 20%. Yet this predicted  $1/x$  relationship between sibship size and educational outcomes is not typically observed. Indeed, children with one sibling often outperform only children.
5. Because nonresidential siblings are not captured with this measure, we recognize that any socialization benefits that accrue from interaction with this group are not measured in our study.
6. The proportion of only children in China increased from 27% in 1975 to 91% in 1983 (Cameron et al., 2013).

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