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## When Quality Trumps Quantity: Siblings and the Development of Peer Relationships

Deniz Yucel · Douglas B. Downey

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**Abstract** A growing body of research suggests that individuals raised with siblings gain social skills that facilitate relationship building with others. But while this pattern has been demonstrated among kindergartners and adults, surprisingly it does not replicate among adolescents. We analyze 4188 10–15 years olds from the United Kingdom Household Longitudinal Study (UKHLS) and replicate the previous pattern—number of siblings is unrelated to peer relationship quality. But unlike past studies, we explore how sibling relationship quality matters. It turns out that while the number of siblings is inconsequential, the quality of sibling relationships plays an important role in shaping the quality of peer relationships. While past research implies that siblings play no role in developing the skills necessary for building and maintaining other relationships among youths, our study clarifies how the quality of sibling relationships (but not the quantity) is a meaningful contributor to the development of peer relationships.

**Keywords** Siblings · Peer relationships · Sibling relationship quality · United Kingdom household longitudinal study · Adolescents

How does growing up with brothers and sisters matter? One consequence is that children may gain social skills from sibling interactions. A growing body of evidence is consistent with that position. For example, kindergartners with at least one sibling are evaluated by teachers as exhibiting better social skills than children lacking siblings (Downey and Condrón 2004), and adults are slightly less vulnerable to divorce as their sibship size increases (Bobbitt-Zeher et al., Are there long-term consequences to growing up without siblings? Likelihood of divorce among only children, forthcoming). Oddly, however,

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studies that have explored the relationship between number of siblings and social skills among adolescents have failed to uncover the same pattern. For example, Bobbitt-Zeher and Downey (2013) analyzed 7th–12th graders from the *National Longitudinal Study of Adolescent Health* and found no evidence that numbers of siblings was related to the number of peer nominations of friendship a youth received.

Our study contributes to the growing literature on the relationship between sibship size and the development of social skills by exploring this odd pattern of results—siblings appear to promote social skills among kindergartners and adults, but not adolescents. Does the social skills benefit of siblings really emerge among young children, skip the adolescent period, and then re-emerge among adults? We offer an explanation for this puzzle. Our results suggest that social skills among adolescents are unrelated to the *number* of siblings, but clearly related to the *quality* of sibling relationships, a pattern previously unrecognized because researchers lacked indicators of sibling relationship quality. So while past studies suggest that siblings do not influence peer relationships during adolescence, our work clarifies that position. Positive relationships with siblings appear to facilitate successful peer relationships while poor relationships with siblings are associated with poor peer relationships. By measuring the quality of sibling relationships rather than merely the number of siblings, we provide an explanation for the previously confusing results.

## 1 Siblings and Social Skills

Psychologists have been at the forefront of sibling research, frequently finding associations between sibling characteristics and children's social skills. For example, McClelland et al. (2000) reported that children with fewer siblings were rated as exhibiting poorer early work skills (e.g., “independent work,” “compliance with work instructions,” “memory for instructions,” and “completion of games and activities”) than those with more siblings among a sample of 540 children in Greensboro, North Carolina. But the notion that only children are particularly maladjusted receives little support. Polit and Falbo's (1987) review of 141 studies concluded that there were virtually no statistically significant differences between only children and those with siblings in terms of personality characteristics. And more recently, Falbo (2012) updated his review and concluded that, while there are sometimes differences between only children and those with siblings, these are usually due to factors other than siblings (e.g., more often growing up with a single parent).

This interest in the relationship between siblings and child outcomes has accelerated in the last decade as several researchers have employed high-quality, nationally-representative datasets to assess whether children's social skills are related to the number of siblings. Downey and Condrón (2004) found that among 20,649 kindergartners in the *Early Childhood Longitudinal Study—Kindergarten Cohort of 1998–99*, only children were rated by teachers as exhibiting poorer interpersonal skills, less self-control, and more problem behaviors (e.g., arguing and fighting), than children with at least one sibling. Because this study employed strong measures of social skills rated by a third party (teachers), nationally representative data, and statistical controls for differences between large and small families (e.g., socioeconomic status, family structure, race), it provided significant evidence that siblings at home promote the social skills children bring with them to school.

Since that study, researchers have explored whether the benefit of siblings extends to later stages of life. For example, Trent and Spitze (2011) used data from the National Survey of Families and Households to compare the level of sociability among adults who grew up with any versus no siblings. They found that individuals raised without siblings had less frequent social activities with relatives but that the differences were modest and likely fade with age. Another strategy has been to observe the relationship between number of siblings in childhood and the probability of divorce as an adult. Analyzing over 57,000 adults in the *General Social Surveys 1972–2010*, Bobbitt-Zeher et al. (forthcoming) found that among those ever married, the likelihood of divorce declined three percent with the addition of each sibling. By analyzing adulthood rather than childhood, these studies suggested that the benefits of sibling interactions during childhood might persist into adulthood in a meaningful way. Of course, the patterns were not quite the same as those found among kindergartners. First, the kinds of social skills measured among kindergartners (e.g., getting along with others) were different than those gauged among adults (self-reports of sociability, divorce). Second, Trent and Spitze (2011) and Downey and Condrón (2004) found that the primary distinction was between only children and those with any sibling. In contrast, Bobbitt-Zeher et al., forthcoming reported a linear relationship—each additional sibling was of value in reducing the likelihood of divorce.

These modest differences in the pattern of results between studies of kindergartners and adults, however, are overshadowed by a more troubling inconsistency—research on adolescents fails to replicate either the kindergarten or the adult patterns. Analyzing 13,466 youths from the *National Longitudinal Study of Adolescent Health*, Bobbitt-Zeher and Downey (2013) found no evidence that only children (grades 7–12) received fewer peer nominations of friendship than youths with one (or more than one) sibling(s). The authors discussed two potential reasons why they did not replicate Downey and Condrón (2004) finding of an only child social skills deficit among kindergartners. One possibility is that the social skills deficit among only children in kindergarten is overcome by adolescence because of sufficient peer interactions in schools. A second possibility is that the two studies employed different measures of social skills. The kindergarten study relied on teachers' responses to questions like "How well does the child form and maintain friendships?" while the study of adolescence employed peer nominations of friendship. The different patterns may be a result of these varying methods for studying social skills. Nevertheless, a strong social skills advantage for those raised with siblings would likely emerge for both measures of social skills. Further research is needed to determine if differences in measurement may explain the results, but the overall patterns still leave a puzzle—siblings appear to promote social skills among kindergartners and adults, but not adolescence. Does the social skills benefit of siblings really skip the adolescent stage?

## 2 Quality over Quantity

One explanation for this puzzle is that siblings really do matter during adolescence, but it is the quality of siblings (not the quantity) that influence youths' skills. Scholars studying sibship size have been unable to address the quality of sibling relationships

directly because they have lacked appropriate measures. As a result, some have considered indirect ways to think about sibling “quality”. For example, Downey and Condron (2004) study of kindergartners lacked a measure of the “quality” of sibling relationships, but they still discussed the possibility that small sibships would be advantageous over large ones because there would be fewer unsupervised sibling interactions. Parent-supervised sibling interactions would be higher “quality”, the authors posited, because parents could more often supervise the interactions and encourage children to take the role of the other (e.g., “how would you feel if your brother hit you?”) and use effective strategies for reducing conflict (e.g., “use your words”). But Downey and Condron (2004) found no difference in the social skills exhibited by children with few versus many siblings, and so this indirect measure did not support the notion that “quality” of sibling relationships is what matters. More direct ways of gauging sibling quality were unavailable to scholars.

There are several reasons for exploring more directly how the quality, not just the quantity, of sibling relationships promotes social skills development. Although mostly overlooked by scholars of sibship size, there is a considerable literature consistent with the view that children benefit from positive sibling relationships. For example, Stormshak, Bellanti, and Bierman (1996) noted 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) found that children’s moral maturity at age 3–4 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 (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).<sup>1</sup> And social skills built early in life can shape relationships later in life. Shalash, Wood, and Parker (2013) report that patterns of relationship building during adolescence are related to patterns of interaction among adults. Specifically, they found that those who tended to avoid or attack in their sibling relationships, were then more likely to use these same (unproductive) relationship strategies in their marital relationships. They concluded that “conflict styles are found to carry over from one dyadic subsystem in the family of origin to other relationships and across time” (p. 294). There is even some evidence that interventions aimed at improving sibling relationships can be instrumental in preventing adolescent problem behaviors (Sridharan et al. 2013).

An additional set of literature, looking at sibling resemblance, also supports the position that siblings matter. For example, Stocker et al. (2002) studied 80 boys and 56 girls and found that sibling conflict at Time 1 predicted anxiety, depressed mood, and delinquency at Time 2 (2 years later). Similarly, among their study of 135 brother pairs, 142 sister pairs, and 141 mixed-sex pairs, Rowe and Gulley (1992) reported that sibling pairs reporting greater warmth and contact also reported more similarity in terms of substance abuse and delinquency. They interpreted these patterns as representing the influence of one sibling on another, or the influence stemming from common friends. And multiple studies have found that children’s early sexual behavior, use of drugs, and

<sup>1</sup> As the authors of these studies note, however, it is unclear whether these correlations represent causal relationships (see Jenkins and Dunn 2009).



delinquency are risk factors for younger siblings, net of parental characteristics (Ardelt and Day 2002; Slomkowski et al. 2001). The lesson for scholars studying how the number of siblings matter is clear—the literature demonstrating that the quality of sibling relationships is important has received insufficient attention from sibship size scholars.

As a result, the assumption made by sibship size scholars—that both negative and positive sibling interactions contribute to social skills development in roughly equal ways—requires reassessment. For example, Downey and Condron (2004) wrote: “Siblings do not always get along, of course, but conflict at home can be training for negotiating relationships in other contexts by allowing children to hone communication skills and convey feelings or emotions.” (p.335). While there may be some benefit to negotiating negative interactions with siblings at home, we question whether negative and positive sibling interactions have the same value in promoting social skills.

Rather than thinking of negative and positive sibling interactions as contributing in roughly equal ways to social skills development, therefore, it may be that children benefit primarily from healthy, positive sibling interactions (or at least healthy ways of managing conflict). Indeed, negative interaction patterns developed between siblings may make it more difficult to develop good peer relationships if they promote poor interaction habits as Shalash et al. (2013) report. Youths who experience a strained sibling relationship characterized by unhealthy approaches to conflict (e.g., avoidance), may generalize this same pattern of interaction to peer relationships, lowering their chances of developing quality friendships.

### 3 Dimensions of the Sibship

Another way that researchers have looked beyond the mere number of siblings is by exploring dimensions of sibship such as the gender composition, density, and type of siblings (e.g., full, step, half). Under some conditions these dimensions matter in important ways. For example, Powell and Steelman (1989) found that while all siblings reduced the amount of money parents saved for college, brothers were more consequential. And more closely spaced sibships appear to have greater consequences for the availability of parental resources than widely spaced siblings (Powell and Steelman 1990).

For our purposes, we expect that some dimensions of sibling configuration are more suitable for promoting social skills than others. For example, we expect that closely spaced siblings have the potential for greater conflict than widely spaced siblings. In addition, we expect that children will benefit more from their interactions with older versus younger siblings because older siblings can more effectively model advanced social skills. In addition, the conditions under which children sometimes need to adapt to step- and half- siblings can be challenging and so we expect these relationships to be more strained and to be less productive for the development of generalizable social skills (versus full siblings). Finally, there is reason to expect that sisters may provide a better training ground for the development of social skills than brothers, in part because they are more engaged in family interactions.

In sum, there are many reasons to expect that the quality of adolescent sibling relationships plays a role in promoting social skills. We recognize that previous



researchers assessing the relationship between the number of siblings and social skills have failed to find support for this position, but we worry that their focus on the *number* of siblings rather than the *quality* of the sibling relationships limits our understanding of how sibling matter.

## 4 Data and Methods

### 4.1 Sample

We use the first wave of the *United Kingdom Household Longitudinal Study* (UKHLS). This data was collected by the Institute for Social and Economic Research (ISER) at the University of Essex. As a multi-topic household survey, the purpose of *Understanding Society* is to understand social and economic change in Britain at the household and individual levels. The study is an annual survey of each adult member of a nationally representative sample. The same individuals are re-interviewed in each wave. If individuals leave their household, all adult members of their new household are interviewed. Each wave was collected over 24 months, such that the first wave of data was collected between January 2009 and January 2011. One person completed the household questionnaire. Each person aged 16 or older answered the individual adult interview and self-completion questionnaire. Young people aged 10 to 15 years were asked to respond to a paper self-completion questionnaire. The sample in this study is taken from wave 1, which interviewed just over 30,000 households, amounting to around 51,000 adult interviews and around 4900 self-completed questionnaires by youths aged 10–15.

Questions relating to peer relationship quality were asked of 4899 youths as part of the Strength and Difficulties Questionnaire (SDQ). We use this sample to create descriptive statistics in Tables 1 and 2. In addition, as part of the youth questionnaire, questions relating to sibling relationship quality were asked of all those who have at least one sibling at home. Our multivariate analyses are restricted to the 4228 children who are between 10 and 15 years of age at the time of the interview and had at least one sibling living in the household. After deleting the sample with missing data on the main dependent variable, peer relationship problems, ( $N=59$ ), the final sample for our multivariate models is 4188.<sup>2</sup>

### 4.2 Dependent Variables

To measure peer relationship quality, we employ the Strengths and Difficulties Questionnaire (SDQ), a well-known instrument used to screen behavioral problems in children aged 3 to 16 years (Goodman 1997). The SDQ was completed by the youth, who responded to five questions: (1) “Usually on own. Generally plays alone or keeps to themselves.” (2) “Has one good friend or more.” (3) “Generally liked by others own

<sup>2</sup> We also estimated our multivariate models with the full sample of 4899. Although we could not ascertain whether sibling quality operates the same for this sample (we had to omit that variable since it is missing for all only children), other aspects of the model operated similarly. For example, there was no relationship between sibship size and peer relationship quality.

**Table 1** Descriptive statistics of all variables from wave 1 of “understanding society” data ( $N=4899$ )

Variables	Mean/ percentages*	Standard deviation	Metric	Description
<b>Dependent variable</b>				
Peer relationship quality	8.26	1.65	0–10	This study uses the Strengths and Difficulties Questionnaire (SDQ). Originally, the SDQ is made up of 25 items, which measures both negative and positive behaviors in children. Each item is scored on a 3-point Likert-type scale. Items are rescaled and positive behaviors were reverse coded. Five items each are aggregated into five subscales (emotional problems, conduct problems, hyperactivity/inattention, peer relationship problems, and pro-social behavior). For this study, we only use the scale on peer relationship problems. To measure peer relationship problems, the following five questions are asked. i) “Usually on own. Generally plays alone or keeps to themselves.” ii) “Has one good friend or more.” iii) “Generally liked by others own age.” iv) “Other children or young people pick on or bully.” v) “Gets on better with adults.” The SDQ was completed by the young person as part of the self-completion questionnaire. The youth responded to questions as “Not true” “Somewhat true” or “Certainly true”. Responses were coded as 0, 1, and 2. Items 1, 4, and 5 are reverse coded. The total scale ranges from 0 to 10, with higher scores indicating better peer relationships. The alpha for this scale is moderate with an alpha of 0.52.
<b>Independent variable</b>				
No sibling	0.14	–	0–1	Having no sibling living in the household (0 = No, 1 = Yes)
One sibling	0.42	–	0–1	Having one sibling living in the household (0 = No, 1 = Yes)
Two siblings	0.27	–	0–1	Having two siblings living in the household (0 = No, 1 = Yes)
Three siblings	0.11	–	0–1	Having three siblings living in the household (0 = No, 1 = Yes)
Four siblings	0.04	–	0–1	Having four siblings living in the household (0 = No, 1 = Yes)
At least five siblings	0.02	–	0–1	Having at least five siblings living in the household (0 = No, 1 = Yes)
Different dimensions of sibship	0.79	0.84	0–3	

**Table 1** (continued)

Variables	Mean/ percentages*	Standard deviation	Metric	Description
Number of brothers				Total number of brothers living in the household
Number of sisters	0.77	0.81	0–3	Total number of sisters living in the household
Full siblings	1.38	1.06	0–4	Total number of full siblings living in the household
Half siblings	0.11	0.39	0–2	Total number of half siblings living in the household
Step siblings	0.02	–	0–1	Having a step sibling living in the household (0 = No, 1 = Yes)
Adopted or foster siblings	0.01	–	0–1	Having adopted/foster sibling living in the household (0 = No, 1 = Yes)
Siblings who are under 10 years old	0.58	0.81	0–3	Total number of siblings living in the household who are under 10 years old
Siblings who are between 10 and 15 years old	0.59	0.65	0–2	Total number of siblings living in the household who are between 10 and 15 years old
Siblings who are older than 15 years old	0.41	0.64	0–2	Total number of siblings living in the household who are older than 15 years old
Sibling relationship quality	25.35	5.87	8–32	Target children were asked: “How often do any of your brothers or sisters do any of the following to you at home?” with the options “hit, kick, or push you”, “take your belongings”, “call you nasty names” and “make fun of you”. Response categories determine the frequency of each option: “never”, “not much (1–3 times in the last 6 months)”, “quite a lot (more than 4 times in the last 6 months)”, “a lot (a few times every week)”. These items are first reverse coded and then added so that higher number on this scale indicates less victimization of sibling bullying. Following these questions, children were asked whether they were the perpetrator of bullying towards their siblings “How often do you do any of the following to your brothers or sisters at home?” with the same options and response categories as mentioned above. These items are first reverse coded and then added so that higher number on this scale indicates less report of being a perpetrator of sibling bullying. These two groups of questions (being the victim and

**Table 1** (continued)

Variables	Mean/ percentages*	Standard deviation	Metric	Description
Child's age in years	12.78	1.40	10–15	perpetuator of sibling bullying) were added together. Alpha = .80. Child's age in years. (Target child is between 10 and 15 years of age).
Parent's age	42.53	5.71	25–65	Average of both parent's age (in years)
Mother with a degree	0.20	–	0–1	(0 = No, 1 = Yes)
Mother with A levels or higher	0.32	–	0–1	(0 = No, 1 = Yes)
Mother with GCSE O level	0.26	–	0–1	(0 = No, 1 = Yes)
Mother with less than GCSE level (reference)	0.22	–	0–1	(0 = No, 1 = Yes)
Father with a degree	0.24	–	0–1	(0 = No, 1 = Yes)
Father with A levels or higher	0.31	–	0–1	(0 = No, 1 = Yes)
Father with GCSE O level	0.21	–	0–1	(0 = No, 1 = Yes)
Father with less than GCSE level (reference)	0.24	–	0–1	(0 = No, 1 = Yes)
Socioeconomic status (log of family income)	7.96	0.87	0–20,000 British Pound	Gross monthly household income (month before the interview). It has a skewed distribution, therefore I took the log of the income measure.
White (reference)	0.73	–	0–1	(0 = No, 1 = Yes)
Asian	0.14	–	0–1	(0 = No, 1 = Yes)
Other race	0.13	–	0–1	(0 = No, 1 = Yes)
Male	0.50	–	0–1	(0 = No, 1 = Yes)
Number of friends	5.58	2.71	0–9	"How many close friends do you have?"
Mother's health	3.44	1.09	1–5	(1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Excellent)
Father's health	3.53	1.06	1–5	(1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Excellent)
Two biological parents	0.59	–	0–1	1 = Lives with two biological parents, 0 = everything else.
	3.17	0.50	1.5 to 4	

**Table 1** (continued)

Variables	Mean/ percentages*	Standard deviation	Metric	Description
Parent–child relationship				As part of the youth questionnaire; children are asked the following six questions. 1) “How often do you quarrel with your mother?” 2) “How often do you quarrel with your father?” 3) “How often do you talk to mother about things that matter?” 4) “How often do you talk to father about things that matter?” The answer categories are from “most days”, “more than once a week”, “less than once a week” and “hardly ever.” In addition, the following two questions are asked. 5) “How often are your parents interested in how you do at school?” 6) “How often do your parents attend parent’s evenings at school?” The answer categories for these two questions are “always or nearly always”, “sometimes”, “hardly ever”, and “never.” Questions 2–6 are reverse coded so that higher scores indicate better parent–child relationship. These six items are summed and averaged. Higher number on this scale represents better parent–child relationship. Alpha of the six questions 0.63, which indicates an acceptable consistency.

\* Percentages rather than means are presented for the nominal (categorical) variables. These unweighted descriptive statistics are derived from one of the five datasets with imputed missing values

age.” (4) “Other children or young people pick on or bully.” (5) “Gets on better with adults.” The SDQ was completed by the young person as part of the self-completion questionnaire. The youth responded to questions with either “Not true” “Somewhat true” or “Certainly true”. With five questions and responses ranging in value from 0 to 2, the total scale ranges from 0 to 10 with higher values representing better peer-related social skills. The alpha for this scale is moderate (0.52), an issue we return to in the discussion.

#### 4.3 Independent Variables

We created the variable “number of siblings” using the data on household composition. We developed six sibship size binary variables: 0, 1, 2, 3, 4, and 5+ siblings. We also created a measure for the type of siblings the target child has (full siblings, step siblings, half siblings, and adopted or foster siblings). And we developed variables indicating the number of sisters and number of brothers. Finally, we created measures for the age and spacing of the siblings relative to the target child (number of siblings who are less than 10 years old, number of siblings who are within the same age group as the target child (i.e., 10–15 years old), and number of siblings who are older than 15 years old).

The second main independent variable is *sibling relationship quality*. As part of the youth questionnaire, target children were asked: “How often do any of your brothers or sisters do any of the following to you at home?” with the options “hit, kick, or push you”, “take your belongings”, “call you nasty names” and “make fun of you”. Response categories included: “never”, “not much (1–3 times in the last 6 months)”, “quite a lot (more than 4 times in the last 6 months)”, “a lot (a few times every week)”. In addition, children were asked: “How often do you do any of the following to your brothers or sisters at home?” with the same options and response categories as mentioned above. We coded all items so that higher numbers indicate better sibling relationships, and summed them. This scale has an alpha of 0.80.

#### 4.4 Control Variables

This literature struggles with a classic problem in the social sciences—determining whether the observed correlations represent causal relationships. Social skills differences might be a product of unmeasured differences in families rather than any causal effect that emerged as a result of siblings. The common approach for addressing this issue is to statistically control for some of the obvious differences between families (e.g., socioeconomic status, family structure) but this strategy only reduces the problem—it does not resolve it. Some experimental and quasi-experimental evidence, however, suggests that sibling size patterns may be causal. For example, 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, patterns

**Table 2** Mean level of peer relationship quality, sibling relationship quality, and parent relationship quality by sibship size (1–5+)

Sibship size	Mean youth-peer relationship quality (higher number on the scale indicates BETTER child-peer relationship)	Mean youth-sibling relationship quality (higher number on the scale indicates BETTER child-sibling relationship)	Mean youth-parent relationship quality (higher number on the scale indicates BETTER child-parent relationship)
0	8.13	–	3.18
1	8.29	25.66	3.19
2	8.32	24.76	3.17
3	8.22	25.05	3.15
4	8.16	25.72	3.22
5+	7.99	25.92	3.18
N	4899	4188	4899

According to F tests, there is no significant relationship between sibship size and peer relationship quality; no significant relationship between sibship size and sibling relationship quality; and no significant relationship between sibship size and parent–child relationship quality

that led them to discuss the possibility of “sibling deprivation” (Cameron, Erkal, Gangadharan, and Meng 2013).<sup>3</sup>

In our models we cannot definitively resolve this issue but we address it the best we can with the data available. We reduce the problem by accounting for several individual and parental characteristics, and contextual factors that are potentially related to sibship size and developmental outcomes (Bobbitt-Zeher and Downey 2013; Downey and Condron 2004; Guo and Van Wey 1999). As a result, we include a wide range of covariates in our multivariate models: race/ethnicity, gender, gross monthly household income, family structure, health status of parents, age of parents, and educational level of parents. In addition, the models also control for the youth’s age, number of youth’s close friends, and parent-youth relationship quality because these factors may influence peer relationship quality and be related to sibship size.

#### 4.5 Analytical Strategy

We begin by observing the bivariate relationship between number of siblings and sibling, peer, and parental relationship quality. We then restrict the sample to those with at least one sibling and predict peer relationship quality with a series of Ordinary Least Squares models. In our first model, we start by including four dummy variables (representing those with two, three, four, and five or more siblings) to observe the association between these binary variables and peer relationship quality. Youths with one sibling are the referent. We then include covariates to see how this association changes. Finally, we enter sibling relationship quality into the model to assess how it is related to peer relationship quality.

We also estimate models that employ alternative measures for siblings. For example, to determine how gender of sibling might matter, we use the number of brothers and sisters in one specification. In another we gauge birth order and spacing characteristics of the sibship. And finally, we estimate a model that distinguishes among types of siblings; such as full, half, step, or adopted and foster siblings.

There is missing data for a modest percentage of our data, a problem we handled through multiple imputation (Allison 2002). Our imputation models included all variables in the multivariate analyses. Approximately 1 % of the sample ( $N=59$ ) has missing information on peer relationship quality. After multiple imputation analysis, the 59 cases missing on the dependent variable were deleted, resulting in a sample of 4188 cases. This approach, where all cases are used for imputation but, following imputation, cases with imputed Y values are excluded from the analyses, is called multiple imputation, then deletion (MID). This method gives more accurate standard-error estimates (von Hippel 2007, p.85).

#### 4.6 Results

Table 1 presents the descriptive statistics for the dependent variable and all independent variables for the whole sample (i.e., that also includes those with

<sup>3</sup> Van Lange et al. (Van Lange et al. 1997) found that children with siblings behaved in a more prosocial way in laboratory games (i.e., more likely to cooperate and trust others) than those without siblings.



no siblings). Around 14 % of the sample has no siblings, 42 % has one sibling, 27 % has two siblings, 11 % has three siblings, 4 % has four siblings, and 2 % has at least five siblings living in the household. The sample is 73 % White, 14 % Asian, and 13 % identifying with “other race.” Around 59 % of the sample lives in a household with two biological parents. The children, on average, are about 13 years old, whereas parents are about 42 years old. Overall, parents are well educated. More than half of both mothers and fathers in this sample has completed some A levels or higher (similar to the first year of the 4-year US college). Youths typically report having about six close friends. On average, mothers and fathers report reasonably high health status and involvement with children.

Table 2 presents the means for relationship quality among the youth and peers, youth and siblings, and youth and parents across sibship size. At this bivariate level, there is no significant relationship between sibship size and peer relationship quality, sibship size and sibling relationship quality, or between sibship size and parent–child relationship quality per F-tests—a pattern replicating past studies that found sibship size unrelated to peer relationship quality among adolescents. Next, we move on to multivariate analyses predicting peer relationship quality.

#### 4.7 Number of Siblings and Peer Relationship Quality

Table 3 shows the results of OLS regression models predicting peer relationship quality. Model 1 presents the zero-order relationship between sibship size and peer relationship quality. The results suggest that sibship size is not associated with peer relationship quality. More specifically, there is no difference in peer relationship quality between any of the categories for sibship size compared to those who have one sibling. The adjusted model, Model 2, shows that after taking into account the control variables, sibship size dummies remain statistically insignificant. Model 3 includes the measure of youth-sibling relationship quality. Importantly, better sibling relationship quality is significantly associated with better peer relationships ( $b=0.021$ ,  $p<.001$ ), net of sibship size and a wide range of additional covariates.

Further models demonstrate that exploring specific dimensions of sibship is sometimes useful. In Model 4, having an additional sister or brother is not associated with better peer relationship quality but model 5 indicates that having an additional half sibling is significantly associated with worse peer relationship quality ( $b=-0.175$ ,  $p<0.01$ ). In Model 6, having an additional sibling who is less than 10 years old is associated with worse peer relationship quality ( $b=-0.090$ ,  $p<0.01$ ). Consistent across Models 4–6, better sibling relationship quality continues to be significantly associated with better peer relationship quality.

We gain confidence in these models by observing that the control variables generally operate as expected. The more friends the youth has, the better health status of mothers, and better parent–child relationship quality are all significantly associated with better peer relationship quality. In addition, on average, females have significantly better peer relationship quality compared to males.

Overall, the results suggest that while sibship size has no effect on peer relationship quality among early adolescents, sibling-relationship quality is consistently associated with peer-relationship quality. And we find some evidence that measuring siblings in alternative ways (either as brothers/sisters, or as full/step/half/adopted or foster, or as younger/older) modifies this pattern in expected directions. Specifically, there is evidence that having an additional half sibling and younger siblings negatively affect the peer relationship quality.

## 5 Discussion

Previous research suggested that merely having siblings, regardless of relationship quality, produced better social skills. Oddly, however, this pattern was observed among kindergartners and adults, but not among adolescents. Our study suggests that knowing something about the quality of the sibling relationship helps resolve that puzzle. Having good sibling relationships appears to promote good peer relationships in the way scholars thought. But the opposite is also true—poor sibling relationships can lead to poor peer relationships. This pattern suggests that the view emerging from some sibship size research—that merely having siblings is what matters—merits rethinking.

Of course, while our patterns highlight the usefulness of “quality” over “quantity” measures of sibship, they raise questions about how siblings matter over the lifecourse. Why are “quantity” indicators sufficient for uncovering sibship effects at some stages of life but not others? The effects of sibship “quantity” appear to be restricted to studies of children and adults. One possibility is that the influence of siblings does not necessarily weaken during adolescence but its “quality” becomes more critical. Sibling relationships may be more complex during adolescence than during early childhood, and less intense (because of geographic distance) during adulthood than adolescence. If this is the case, it may be more important to focus on the “quality” of sibling relationships during adolescence than it is during other stages of life. Another possibility is that “quality” always matters but that adolescence is a stage of life when sibling influences are more modest (relative to early childhood and adulthood). If the overall influence of siblings is weaker during adolescents, the “quantity” of siblings may be too blunt an indicator to gauge siblings’ influence while “quality” measures are still successful at uncovering sibling effects. A fruitful avenue of inquiry would be to explore how the effects of sibship “quantity” and “quality” shift across different stages of life.

Why does sibling relationship quality matter? Our survey data are less suited for exploring the precise mechanisms involved, but we can consider potential processes. We suspect that interaction patterns developed at home with siblings—both positive and negative—provide a basis upon which peer interactions depend. That means that merely having sibling interactions is insufficient for developing social skills—quality sibling relationships are what matter. Positive habits developed through resolving conflicts with siblings can be useful in developing friendships and pro-social relationships with peers. In the same way, however, poor interaction routines between siblings developed during childhood may be difficult to abandon and therefore impede positive peer relationships.

**Table 3** OLS regression model predicting peer relationship quality

Independent variable	Model 1 (sibship size only)	Model 2 (sibship size and control variables)	Model 3 (sibship size, control variables and child-sibling relationship quality)	Model 4 (gender of siblings, control variables and child-sibling relationship quality)	Model 5 (type of sibling, control variables and child-sibling relationship quality)	Model 6 (birth order and age spacing of siblings, control variables and child-relationship quality)
	Unstandardized coefficient	Unstandardized coefficient	Unstandardized coefficient	Unstandardized coefficient	Unstandardized coefficient	Unstandardized coefficient
Two siblings	0.023 (0.058)	0.044 (0.056)	0.061 (0.056)			
Three siblings	-0.071 (0.080)	0.012 (0.080)	0.027 (0.080)			
Four siblings	-0.137 (0.122)	-0.057 (0.121)	-0.043 (0.120)			
At least five siblings	-0.304 (0.161)	-0.188 (0.161)	-0.174 (0.161)			
Different dimensions of sibship						
Number of Brothers				0.010 (0.032)		
Number of Sisters				-0.047 (0.033)		
Full siblings					0.016 (0.029)	
Half Siblings					-0.175** (0.064)	
Step Siblings					-0.082 (0.149)	
Adopted or foster siblings					0.024 (0.217)	
Siblings who are under 10 years old						-0.090** (0.033)
Siblings who are between						0.039 (0.039)

**Table 3** (continued)

Independent variable	Model 1 (sibship size only)	Model 2 (sibship size and control variables)	Model 3 (sibship size, control variables and child-sibling relationship quality)	Model 4 (gender of siblings, control variables and child-sibling relationship quality)	Model 5 (type of sibling, control variables and child-sibling relationship quality)	Model 6 (birth order and age spacing of siblings, control variables and child-relationship quality)
	Unstandardized coefficient	Unstandardized coefficient	Unstandardized coefficient	Unstandardized coefficient	Unstandardized coefficient	Unstandardized coefficient
10 and 15 years old						
Siblings who are older than 15 years old			0.021*** (0.004)	0.020*** (0.004)	0.021*** (0.005)	0.008 (0.041)
Sibling relationship quality						0.021*** (0.005)
Control variables						
Child's age	0.034 (0.019)		0.031 (0.018)	0.030 (0.018)	0.032 (0.019)	0.023 (0.019)
Parent's age	0.011* (0.005)		0.010 (0.005)	0.009 (0.005)	0.008 (0.005)	0.006 (0.006)
Mother with less than GCSE level (reference)						
Mother with GCSE O level	0.085 (0.085)		0.100 (0.085)	0.102 (0.084)	0.125 (0.084)	0.108 (0.085)
Mother with A levels or higher	0.156 (0.082)		0.174* (0.082)	0.175* (0.082)	0.195* (0.082)	0.174* (0.082)
	0.088 (0.097)		0.114 (0.097)	0.116 (0.097)	0.133 (0.096)	0.114 (0.097)

Table 3 (continued)

Independent variable	Model 1 (sibship size only)	Model 2 (sibship size and control variables)	Model 3 (sibship size, control variables and child-sibling relationship quality)	Model 4 (gender of siblings, control variables and child-sibling relationship quality)	Model 5 (type of sibling, control variables and child-sibling relationship quality)	Model 6 (birth order and age spacing of siblings, control variables and child-relationship quality)
	Unstandardized coefficient	Unstandardized coefficient	Unstandardized coefficient	Unstandardized coefficient	Unstandardized coefficient	Unstandardized coefficient
Mother with a degree						
Father with less than GCSE level (reference)						
Father with GCE O level	0.149 (0.140)	0.163 (0.140)	0.164 (0.139)	0.167 (0.138)	0.165 (0.139)	
Father with A levels or higher	0.133 (0.125)	0.142 (0.126)	0.143 (0.126)	0.146 (0.127)	0.142 (0.127)	
Father with a degree	0.040 (0.115)	0.053 (0.118)	0.055 (0.118)	0.053 (0.118)	0.061 (0.118)	
Socioeconomic status (log of family income)	0.022 (0.031)	0.024 (0.031)	0.026 (0.031)	0.035 (0.031)	0.023 (0.031)	
White (reference)						
Asian	0.022 (0.080)	0.004 (0.081)	0.006 (0.081)	-0.021 (0.081)	0.016 (0.080)	

Table 3 (continued)

Independent variable	Model 1 (sibship size only)	Model 2 (sibship size and control variables)	Model 3 (sibship size, control variables and child-sibling relationship quality)	Model 4 (gender of siblings, control variables and child-sibling relationship quality)	Model 5 (type of sibling, control variables and child-sibling relationship quality)	Model 6 (birth order and age spacing of siblings, control variables and child-relationship quality)
	Unstandardized coefficient	Unstandardized coefficient	Unstandardized coefficient	Unstandardized coefficient	Unstandardized coefficient	Unstandardized coefficient
Other race	0.187* (0.079)	0.182* (0.079)	0.176* (0.079)	0.164* (0.078)	0.189* (0.078)	
Male	-0.129** (0.049)	-0.129** (0.049)	-0.131** (0.049)	-0.126** (0.049)	-0.126** (0.049)	
Number of friends	0.143*** (0.009)	0.144*** (0.009)	0.143*** (0.009)	0.143*** (0.009)	0.143*** (0.009)	
Mother's health	0.121*** (0.025)	0.124*** (0.025)	0.123*** (0.025)	0.120*** (0.025)	0.126*** (0.025)	
Father's health	0.023 (0.035)	0.018 (0.035)	0.016 (0.035)	0.018 (0.035)	0.018 (0.035)	
Parent-child relationship	0.323*** (0.060)	0.246*** (0.063)	0.246*** (0.063)	0.246*** (0.063)	0.245*** (0.063)	
Family structure	0.161** (0.054)	0.156** (0.054)	0.155** (0.054)	0.104 (0.058)	0.155** (0.054)	
Sample	4188	4188	4188	4188	4188	4188

+  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$  (two-tailed tests). Standard errors are in parentheses

Not all sibling types promote peer relationships in the same way. There is some evidence in our models that younger siblings and half-siblings promote peer relationships less than other siblings. These patterns, consistent with our expectations, bolster our confidence that something about sibling interactions at home promotes social skills used among peers. For example, we would not expect younger siblings to be able to provide the conditions for the development of pro-social skills in the same way that older siblings can.

Of course, the associations we observe here may not represent a causal relationship. Our discussion so far largely assumes that sibling relationships influence peer relationships rather than the other way around. It is possible, however, that the associations we observed represent the opposite causal pathway. Youths could gain relationship building skills from peers, and then use these to promote better relationships with siblings. While this interpretation is certainly plausible, we privilege the alternative because sibling relationships are nearly always developed prior to peer relationships. We also recognize that, rather than affecting the target child directly, youths with difficult siblings may endure a penalty from peers. In other words, while the sibling relationship may not directly affect the skills needed to develop peer relationships, it could affect the youths' attractiveness as a friend.<sup>4</sup>

In addition, it is possible that these associations represent the influence of a third, common factor—unmeasured in our models—that produces both strong sibling relationships *and* peer relationships. For example, it is likely that children who exhibit more pleasant personalities also produce better sibling *and* peer relationships. These characteristics of the individual may be what produce the associations here and represent a challenge for future researchers. One way to reduce the magnitude of this problem would be to assess how changes in sibling relationships are related to changes in peer relationships. In this way, each individual youth would serve as their own control and all time-invariant characteristics (e.g., pleasant personality) would be controlled. If sibling relationships really affect peer relationships, we would expect that youths who enjoy improving sibling relationships would be more likely to enjoy improving peer relationships.<sup>5</sup>

And we acknowledge that our measure of peer relationship quality is limited. The five questions constructing the scale (“Usually on own. Generally plays alone or keeps to themselves.” “Has one good friend or more.” “Generally liked by others own age.” “Other children or young people pick on or bully.” “Gets on better with adults.”) correlate only moderately among themselves and produce a moderate alpha (.52). Our use of this scale represents a classic tradeoff in the social sciences between internal and external validity. Our study enjoys high external validity (generalizability) as one of the few large-scale studies to provide a measure of sibling quality. But this comes at the

<sup>4</sup> We are also aware that we analyzed a British sample while past studies of sibship size have typically employed American data. Our motivation was practical—the United Kingdom Household Longitudinal Study is the first large-scale study (we are aware of) with good measures of the quality of sibling relationships. But previous research that has focused on just sibship size has found similar patterns across the U.S. and UK and so we see little reason to expect that our results are unique to Britain.

<sup>5</sup> In addition, we had to exclude only children from the multivariate analysis because there is no way to measure their relationship quality with siblings. In supplemental analyses, however, we estimated the models in Table 3 without sibling relationship quality and produced largely similar results. Specifically, sibship size was still unrelated to peer relationship quality.



cost of lower internal validity—the results would be more persuasive if the scale of peer relationships were stronger.<sup>6</sup> For scholars to make more progress in this area they need to think hard about how to gauge peer relationship quality in a more meaningful way.

We have two suggestions for improving the measurement of peer relationships. First, we recommend a more straightforward approach via questions such as “How well do you get along with your siblings?” “Do you think your relationship with your siblings has made it easier for you to make friends?” Second, while the youth’s self-reports of peer relationship quality may provide the most important information, it is also useful to know how peers view an individual. For this reason, there is value in supplementing self-reports with sociometric data—where peer relationship quality is gauged by the number of peers nominating an individual as a friend (Bobbitt-Zeher and Downey 2013).

Despite these limitations, these results prompt us to reconsider the conclusion from previous studies—that the mere number of siblings promotes better social outcomes. If we applied the quality approach used here to the kindergartners and adults from previous studies, what would we find? If our results are any indication, we would expect that the quality of the relationship with siblings is much more important than the number of siblings, a potentially important modification to existing knowledge. For example, if each sibling reduces the probability of divorce by about three percent (Bobbitt-Zeher et al., forthcoming), what might that estimate be if we were able to distinguish high-quality from low-quality siblings? One plausible outcome is that high-quality siblings would reduce the possibility of divorce at an even higher rate, while low-quality siblings might have no influence, or even increase the likelihood of divorce. To understand how siblings matter, knowing the quality of the sibling relationship may be critical.

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<sup>6</sup> It is noteworthy that even the sibling scholarship based on small samples has tended to use self-reports of sibling relationship quality similar to our own. So while the internal validity of most past studies is in question, the external validity is also suspect.

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