Where It Matters to Be the Only One: School Performance Outcomes of Only-children
across 31 Countries

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Abstract

Despite the increasing number and visibility of only-children (children raised without any siblings) in low-fertility societies, our understanding of how they perform relative to children with siblings is surprisingly limited. Especially little is known about how only-children fare in different societies. Using data from the Program for International Student Assessment (PISA) 2000 on 15-year old students from 31 countries, we examine how family socioeconomic status (SES) and cognitive and noncognitive outcomes of only-children vary across countries. In particular, we analyze the importance of the country-level family size composition to explain cross-national differences in only-children's status and performance. Our analysis reveals four patterns: First, we found a substantial variation in the proportion of only-children across countries. Second, only-children in countries where small families are more prevalent are more likely to come from high-SES families than are those in countries where small families are less prevalent. Third, where the proportion of small families is higher, only-children fare consistently better across performance outcomes than do those in countries where the proportion is lower. With regard to cognitive outcomes, such cross-national patterns are largely explained by the cross-national variation in only-children's prestige in family SES. Lastly, we also find important associations between the relative outcomes of only-children and policies, such as educational policies and the school tracking system.

Introduction

Is being an only child an advantage or an obstacle to getting ahead in life? This question becomes increasingly relevant as single-child families emerge as a socially acceptable choice across societies. In much of popular literature, the answer to this question has been clear: a recent parenting book for single-child families states, “Although parenting approaches change, attitudes about only-children remain stuck in the past. The negative stereotypes—lonely, selfish, bossy, spoiled, socially maladjusted—make parents think their child will be at a disadvantage when compared to those who grow up with siblings” (Newman 2011). Such concerns are based on popular but not necessarily correct beliefs about the only child (McKibben 2013; Newman 2011).

Compared to public concerns about only-children, scientific evidence has been inconclusive (Falbo 2012). While there are several country-specific studies for the Netherlands (Belmont and Marolla 1973), the United States (Blake 1981; Bobbitt-Zeher and Downey 2013; Downey and Condrón 2004; Downey, Condrón, and Yucel 2015; Trent and Spitze 2011), South Korea (Doh and Falbo 1999) and, unsurprisingly, studies evaluating the impacts of China’s One Child Policy (OCP) (Cameron et al. 2013; Poston and Falbo 1990; Qian 2009), there is little or weak evidence of systematic differences in outcomes between only-children and children with siblings (Falbo 2012). Prior studies have largely tended to focus on psychological aspects, especially micro-mechanisms within families that explain the impact of being the firstborn child at home and the absence of younger siblings, ignoring the broader social and structural contexts. Moreover, no study so far has taken a cross-national comparative approach.

Another important body of research related to the only child is the literature on sibling effects (Steelman et al. 2002), especially studies on sibship size effects on children's behavioral and educational outcomes. However, their implications regarding only-children seem to be limited. They tend to generalize the difference of an additional sibling at higher birth orders to the entire order of the sibling distribution rather than focus on the difference in going from zero to one sibling (Åslund and Grönqvist 2010; Black, Devereux, and Salvanes 2005; Conley and Glauber 2006), often ignoring the unique performance of only-children (Black et al. 2005; Hauser and Kuo 1998; Wolter 2003). Although the unique position of only-children has been found in several countries, no further endeavor has been made to explain or to examine whether there are systematic cross-national differences in the characteristics and performances of only-children.

In this study, we fill this void in the literature using a large sample of 15-year-old students in 31 countries from the Program for International Student Assessment (PISA) 2000. We compare countries in terms of how only-children fare relative to children with siblings concerning various cognitive and noncognitive outcomes. The only other study (Tanskanen, Erola, and Kallio 2016) that compares the performance of children with and without siblings using cross-national data—also PISA 2000—focuses on within-country differences rather than cross-country differences and employs a country fixed-effects model for a pooled sample. To our knowledge, ours is the first systematic cross-national study on only-children, especially one that incorporates the demographic context as a key factor.

Our study adds to the existing literature in two ways. First, we provide a more comprehensive and generalizable answer than available to date to the question on whether being an only child is good (or bad) for development. The lack of conclusive evidence to answer this question might be attributed to variability across societal contexts. How only-children fare relative to other children might depend on where they live. It may be unwarranted to draw generalizable implications about the characteristics of only-children from single country cases, such as China or the United States. Second, we consider the cross-national variation in the prevalence of small-size families—specifically, the proportion of only-children—as a key societal-level indicator influencing the status and performance of the only-child group. We examine how the country-level family size composition—i.e., the prevalence of only-children—explains cross-national variation in the relative performance of only-children. We do so by exploring multiple student outcomes, including cognitive and noncognitive measures, to consider potentially different ways by which the family size context matters depending on the different outcomes.

Being an Only Child Matters: Why and Where?

Micro-level Explanations about Only-children's Advantages and Disadvantages

Existing research suggests both positive and negative predictions about only-children's educational achievements relative to those of children with siblings. On the one hand, research on sibship size effects suggests that only-children are generally likely to showcase better educational outcomes, including educational attainment and academic performance, because a small sibship size entails advantages. For example, family resources become diluted as the number of siblings who compete for or share those

resources gets larger. Assuming that family resources are limited, the resource dilution thesis predicts a negative monotonic relationship between the number of siblings and educational and development outcomes, as far as the outcomes are significantly influenced by the input of resources (Downey 1995, 2001; Steelman et al. 2002). Only-children would enjoy monopolizing all available family resources, thus benefiting from having no siblings and being likely to display the best performance, *ceteris paribus*. Confluence theory, on the other hand, provides an alternative, positive prediction. An only child interacts exclusively with parental figures at home. This provides him or her with a more intellectual family environment, leading to better intellectual development and performance (Zajonc 1983). Conversely, the presence of younger siblings lowers the scholarly levels of intra-family interactions and environment, resulting in comparatively worse outcomes.

While the resource dilution and confluence theories focus on differences in within-family dynamics assuming that all socioeconomic resources are equally distributed among families, selectivity into small families by parental SES offers another important explanation for the observed benefits of only-children across families. More educated and affluent adults may prefer a smaller number of children than their low-SES counterparts. This negative SES gradient of fertility preference indeed has been a central dynamic of the earlier demographic transition in European countries (Dribe, Oris, and Pozzi 2014) and in developing countries (Bongaarts 2003; Cleland 2002). If such an SES differential in family size preferences holds for the preference for the one-child family, the resulting gross difference in family SES between only-children and children with siblings could explain the observed advantages among only-children.

On the other hand, there are theoretical and empirical grounds that indicate the potential disadvantages of being raised without siblings. Popular ideas about only-children include the beliefs that they are selfish and lack social skills because they do not have the opportunities to learn how to get along with, sympathize with, and help others (Falbo 2012; Newman 2011). Children tend to generalize interpersonal skills that are developed through intensive routine interactions with their siblings, who thereby become an importance resource for developing such social skills. Moreover, they are not easily replaced by other adult and peer figures (Downey and Condrón 2004). Only-children are more likely to suffer from a dearth of soft skills related to a sense of sympathy and cooperation. Negative stereotypes and prejudices regarding their selfishness and lack of sociability and sympathy may also have adverse impacts. Regardless of whether or not such stereotypical notions are grounded on scientific evidence, they may stigmatize only-children and disturb child development (Sorensen 2008). Some positive aspects of having siblings can also serve as disadvantages to only-children. For example, a firstborn's interactions with younger siblings while he or she attempts to tutor them can be an opportunity to develop and refine his or her own cognitive skills and scholarly knowledge (Zajonc 1983; Zajonc and Mullally 1997). The presence of older siblings may also be beneficial because they act as tutors, mentors, and role models. Finally, it has been argued that older siblings may have a positive impact because parents could learn from their earlier experiences of childrearing (McHale, Updegraff, and Whiteman 2012).

To summarize, prior research generally suggests that being an only child may be beneficial in terms of cognitive and educational outcomes, especially when the outcomes depend on finite and divisible resources, while it may be harmful in terms of

developing noncognitive and interpersonal traits, especially because siblings offer the most effective sources for nurturing such outcomes. However, empirical evidence to date has been inconclusive. For example, Wolter (2003) documents that reading literacy is slightly higher among only-children than among children with one sibling in Canada, France, and Germany; slightly lower in Switzerland; and shows little difference in Belgium and Finland. In Sweden, years of education and IQ of only-children are lower than those for children with one sibling and comparable to those of children with two siblings (Black et al. 2005). These findings reveal that the pattern of negative sibship size gradient in educational outcomes cannot be easily applied to only-children.

Evidence on the negative effects is also mixed. For example, Falbo and colleagues found that the impacts of the OCP on Chinese only-children are consistently small and mostly statistically insignificant across various outcomes (Falbo 2012; Poston and Falbo 1990). However, recent quasi-experimental studies have reported contradictory results: only-children are significantly less likely to advance to higher educational stages than those with an additional sibling (Qian 2009) and show lower levels of trustworthiness, willingness to take risks, and competitiveness (Cameron et al. 2013). With regard to American children, based on data from the Early Childhood Longitudinal Study-Kindergarten Class of 1998–1999, Downey and colleagues reported that only-children face significant disadvantages in terms of interpersonal skills, self-control, and behavioral problems than those with siblings (Downey and Condron 2004; Downey et al. 2015). However, such only-child penalties are not replicated in other studies examining different ages and measures of interpersonal outcomes (Bobbitt-Zeher and Downey 2013; Yucel 2014; Yucel and Yuan 2015).

A Comparative Perspective on Only-children

Do these mixed findings suggest that the only child status has little relevance in predicting child outcomes? This would be a premature conclusion because the theoretical and empirical discussions have not considered the societal contexts in which only-children live. We contend that being an only child matters either positively or negatively, depending on which outcome is examined, and that the importance of the only child status varies across countries. Building on the literature of demography and social stratification, we discuss the theoretical reasons as to why the only child status can vary systematically across societies.

Family SES of only-children and the country's family size composition

Demographic research suggests that the family SES of only-children relative to other sibship size groups differs across countries depending on the variation in the SES gradient of fertility. Countries vary by which SES groups have fewer births, and especially by which SES groups are more likely to have just one child. For example, in most advanced low-fertility countries, over the second half of the past century, the two-child family has been a dominant form of the family. Since 1980s, however, countries in Eastern and Southern Europe began to depart from the two-child model with rapidly growing fractions of one-child and even childless families (Frejka 2008; Frejka and Sardon 2007; Wood, Neels, and Kil 2014). This departure is largely driven by highly educated women, especially when they stopped progressing from the first birth to a second birth. By contrast, high-SES women in Western European countries still predominantly prefer a two-child family (Wood et al. 2014).

The emergence of the positive relationship between women's empowerment and fertility as a key variable, predicting whether a country successfully maintains a relatively high level of fertility or falls to the very low level of fertility among advanced societies (Myrskylä, Kohler, and Billari 2009), also suggests that the choices available to highly educated, professional women are a key driving force of the very small family size. That is, among the low fertility countries, high-SES adults primarily lead the growing proportion of small families, especially the one-child family. Where high-SES parents do not lead such a drive, the overall family size does not decline as much, keeping the proportions of small-size families relatively low. From a child-centered perspective, we can formulate a hypothesis about the family SES of only-children.

H1: The family SES of only-children relative to children with siblings will be higher in countries where the proportion of small families (i.e., families with only-children) is greater than where it is smaller.

Only-children's performance outcomes and county-level family size composition

Family SES and resources have positive effects on children's outcomes. Where only-children enjoy socioeconomic prestige in their family background, their family SES advantages would be reflected in their relatively better performance. The prediction of H1, then, can be extended to student performance outcomes, especially those that are positively influenced by family SES and resources, such as cognitive performance (e.g., reading literacy, math literacy). That is, only-children fare better in performance outcomes than do children with siblings in countries where the proportion of small families is higher than in countries where it is lower, thanks to their family origin advantages. These advantages based on family background prestige can also exert a

protective effect when only-children face relatively adverse conditions, especially in interpersonal aspects (Falbo 2012; Newman 2011). For example, the parents of only-children may be more aggressively and effectively engaged in searching for non-sibling peers and building parenting social networks to compensate for their children's disadvantage, especially if they are more educated and have greater access to more resources. Alternatively, if only-children tend to be from more educated and affluent families, which is more likely in countries with a higher proportion of only-children, negative perceptions about the only child may be weaker because of the positive signaling effect.

H2-1: Only-children fare better in cognitive and noncognitive performance outcomes in countries where the proportion of small families is greater than in countries where it is smaller because of their family origin advantages.

The pattern proposed by H2-1, however, does not necessarily rely on variation in only-children's observed family SES and resources. Prior research suggests that such cross-national association between only-children's performance and the prevalence of small families may persist even after controlling for the children's varying levels of family SES and resources. This may occur for a few reasons.

First, unobserved heterogeneity that is related to only-children's observed family SES may come into play. For example, women's aspirations regarding their educational and career prospects may be an important predictor of attaining better SES, as may also be, simultaneously, their preference for a small family (i.e., having only one child) (Upchurch, Lillard, and Panis 2002). Such unobserved confounders can be positively reflected in the performance of such women's only-children. Causal evidence of a much

smaller and often statistically insignificant sibship size effect on educational outcomes (Black et al. 2005; Guo and VanWey 1999) highlights the importance of such unobserved factors. We can, therefore, reasonably expect that, even after controlling for the measures of family SES and resources, the pattern H2-1 predicts can be found.

Another area in which unobserved heterogeneity comes into play is in the resource dilution mechanism. The effect of resource dilution is likely to be greater for high-SES families than for low-SES families, even net of the total amount of family resources because the absolute amount of total resources that is allocated across siblings influences the effect size of the sibsize gap (Downey 2001). For instance, in a family with a limited amount of financial resources for educational investment, benefits from having fewer competitors or even from monopolizing would still be small. Benefits from smaller sibship size, however, increase for families with a larger pool of resources available for investments for their children. In other words, the effectiveness of resource dilution can be stratified across family SES even after controlling for family SES. Such a heterogeneous effect of sibship size (and being an only child) is, therefore, an important source of systematic unobserved heterogeneity.

Second, we can consider social mechanisms that engender only-children's relatively smaller advantage where small-size families are more prevalent. One mechanism is related to social stigma, a major potential threat to only-children (Newman 2011; Sorensen 2008). The literature about the prejudice and stigma against social minority groups suggests that visibility and the possibility of frequent encounters help people better understand and become supportive of minority groups such as immigrants and gay people (Pettigrew and Tropp 2006; Schneider 2008; Wood and

Bartkowski 2004). In other words, the growing proportion of a subpopulation reduces prejudice and stigma. If this relationship applies to the difficulties faced by only-children and their families, we can expect weaker social stigma in societies where only-children are more visible since one-child families are more socially accepted.

Yet another mechanism concerns the varying availability of non-sibling peers who can compensate for the absence of siblings. Siblings matter as long as they offer unique opportunities to engage in intimate and intensive social interaction exercises that help develop interpersonal and behavioral skills (Downey and Condrón 2004; Falbo 2012). However, we can consider that the absence of siblings is at least partially compensated for by the presence of non-sibling peers who act as substitutes. To only-children, other only-children may be the best substitutes for siblings. The potential disadvantage stemming from the absence of siblings is possibly minimized if there are several only-children as non-sibling alternatives. If there are relatively fewer only-children in a society, the number of friends without siblings will also be small and the opportunities to cultivate social skills will be poorer. All in all, the cross-national pattern H2-1 predicts is expected even after controlling for the observed family SES and resources.

H2-2: Only-children fare better in cognitive and noncognitive performance outcomes in countries where the proportion of small families is greater than in countries where it is smaller even after controlling for family origin advantages.

Both H2-1 and H2-2 predict advantages only-children can enjoy where the overall family size is small relative to where it is comparatively large. The key difference lies in the role of family SES and resources. Our empirical focus, therefore, should be to

determine the relative importance of family background factors and especially how such relative importance varies across performance outcomes with different features.

Public policies and institutions

Prior research suggests that sibship size gaps that emerge owing to differences in family SES and within-family dynamics, such as resource dilution, can be moderated or amplified by public policies and institutions. For example, inclusive public policies can narrow gaps in socioeconomic resources and their effectiveness between sibsize groups that are rooted in SES inequality among parents (Gibbs, Workman, and Downey 2016; Park 2008; Xu 2008). Similarly, more stratified and tracked school systems may be effective in boosting family SES gaps in child outcomes, whereas a comprehensive and less stratified system is likely to yield relatively moderate gaps (Van de Werfhorst and Mijs 2010). Therefore, differences in the tracking system may lead to wider or narrower gaps between sibship size groups (Park 2008). We can apply these ideas to gaps between only-children and other children.

H3-1: Public policies on education, families, and more generally the welfare state system may explain cross-national variations in only-children's performance outcomes (to varying degrees depending on which policy and student outcome is examined).

Public policies and institutions are also significantly related to the country's fertility level and, consequently, the overall family size composition. More gender-egalitarian and family-friendly social policies are introduced as part of the efforts to boost fertility in advanced countries (Myrskylä et al. 2009). More inclusive welfare policies may also moderate the SES gradient of family size among young adults. This

indicates that public policies are associated with the country's family size, an important contextual factor influencing the status and performance of only-children.

H3-2: Public policies matter not only as an independent societal factor but also as a confounder or a mediator that explains the relationships between family size composition and the status and performance outcomes of only-children.

For example, welfare regime may work as a confounder explaining the association between a country's family size context and only-children's achievements. Social democratic countries maintain comparatively higher fertility and smaller proportions of only-children largely because of inclusive social systems. Countries of the Mediterranean and post-socialist regimes, by contrast, show markedly lower fertility and plausibly higher proportions of one-child families because of insufficient policy supports (Esping-Andersen 1999; Morgan and Taylor 2006). Some policies or institutional features, such as tracking system variability, may also work as a mediator explaining the relationship between the country's family size context and how only-children fare by inducing different responses between only-children and those with siblings, thereby yielding a premium or penalty for only-children's performance. For instance, highly tracked school systems in Eastern European and some conservative Western countries (e.g., Germany), where fertility rates are very low, may arouse different parental reactions and attitudes depending on the different numbers of children in their children's track placement.

Data and Method

Data

We use data from the PISA 2000, which covers reading, mathematical, and scientific literacy like other PISA follow-ups, but with a focus on reading literacy. It also offers information on various noncognitive measures based on participating students' self-ratings, which capture their attitudes, perceptions, and characters concerning academic environments, work, and social relationships. Crucially, it also contains detailed information on each student's family status, available material and cultural resources and, more importantly, the number of siblings.¹

Totally, 228,784 students from 43 countries, including 28 OECD countries and 15 non-OECD countries participated in the assessment and survey. The sample size of each country was over 3,000 (except Liechtenstein), which was sufficiently large. It mostly ranged from 3,500 to 5,500. PISA 2000 provided nationally representative samples of each country's population of 15-year old, school-attending adolescents in 2000, which means that these children were born approximately in 1985.

We excluded five countries because of either large fractions of missing observations on family background variables (Israel, Japan, Luxembourg, and New Zealand) or small sample size (Liechtenstein). To make our country samples comparable in terms of the demographic context of low fertility, we only considered countries in Europe, Western countries, and East Asian countries, excluding South American and South Asian countries (Argentina, Brazil, Chile, Indonesia, Mexico, Peru, and Thailand). In the analyses of some noncognitive outcomes, such as self-efficacy, perseverance, and cooperativeness, we exclude several more countries because of large fractions of missing observations (Belgium, Canada, France, Greece, Poland, Spain, and the United Kingdom). Table 1 reports the numbers of students in each sample of

individual countries across outcomes. As discussed later in the section on robustness checks, the inclusion or exclusion of countries based on alternative selection criteria did not change the findings.

Table 1 about here

Methods

We took a two-step approach that combines individual-level results from national samples with a systematic comparison at the country-level. First, we fit the OLS model to compute the adjusted means of a student's performance outcome, say y , for sibship size groups in a given country.

$$y_{ic} = \beta_{0,c} + \beta_{1,c}(sib1)_{ic} + \beta_{2,c}(sib2)_{ic} + \beta_{3,c}(sib3)_{ic} + \beta_{4,c}(sib4)_{ic} + \gamma_c X_{ic} + \varepsilon_{ic} \quad \text{Eq. (1)}$$

where the subscript i denotes individual, c denotes country, X is a vector of the control variables, and ε is random error term. In Equation 1, the omitted reference sibsize group is the only-child group, so the adjusted mean of y for only-children is given by $\hat{y}_{0,c} = \hat{\beta}_{0,c} + \hat{\gamma}_c \bar{X}_{c|sib=0}$. Likewise, the adjusted mean of y for children with k siblings ($k=1, 2, 3$, or 4) is given by $\hat{y}_{k,c} = \hat{\beta}_{0,c} + \hat{\beta}_{k,c} + \hat{\gamma}_c \bar{X}_{c|sib=k}$. We fit the individual-level model by considering varying sets of control variables to see how the sibsize-specific adjusted means vary as additional control variables are included. In the baseline model (Model 1), we controlled for basic demographic characteristics such as gender, age, school grade, and immigrant status. In the second model (Model 2), we added the family SES index to examine how the outcome gaps across sibship size groups are explained by family SES and to what extent they remain unexplained. In the third model

(Model 3), we further included the measures of family resources. This last model was expected to identify the role of family resources that are not directly related to family SES and structure in generating sibsize gaps.

As a second step, we examined how the adjusted means of performance outcomes for each sibsize group estimated by Equation 1 varies across countries, especially concerning the measure of country-level family size or other country-level covariates. This country-level analysis was fit by the following OLS model:

$$\hat{y}_{k,c} = \lambda_{k,0} + \lambda_{k,1}Z_c + v_{k,c} \quad \text{Eq. (2)}$$

where $\hat{y}_{k,c}$ is country c 's adjusted mean of student outcome for sibsize k , Z is country-level predictor (i.e., the proportion of only-children, a public policy measure), and v is random noise. The estimate of our primary interest is $\hat{\lambda}_{0,1}$ in comparison with other $\hat{\lambda}_{k,1}$ ($k=1, 2, 3, \text{ or } 4$), which shows how only-children's outcomes are systematically associated with country-level variable Z compared with the outcomes of other sibship size groups. For the same outcome, we fit Equation 2 with the different estimates of $\hat{y}_{k,c}$ that were predicted by the different sets of control variables in the individual-level analysis to see how $\hat{\lambda}_{0,1}$ changes when additional variables are accounted for at the individual level, across Models 1 to 3.

Variables

Student-level Variables

Outcome variables. The major strength of PISA lies in the standardized measures of student outcomes that are comparable across participating countries. These

measures are developed to capture cognitive capacities and skills that are essential for the development of one's potential for professional and social life both as an individual and as a citizen (OECD 2001). We used the scores of reading and math literacy as measures of students' cognitive performance. Since the primary emphasis of the PISA 2000 is on the assessment of reading literacy, math literacy was assessed only for a subsample of randomly selected PISA respondents. For both scores, we used Weighted Likelihood Estimates (WLE).

With regard to noncognitive outcomes, we considered four composite measures that capture different aspects of attitudinal and interpersonal characteristics. We considered two learning-related attitudinal outcomes: *self-confidence* and *perseverance*. The index of self-confidence captures how a student perceives his or her own ability to learn. We measured it as the mean of seven items on a four-point-scale (almost never, sometimes, often, and always). Items include "I'm confident I can do an excellent job on assignments and tests" and "If I decide not to get any bad grades, I can really do it." Perseverance captures the level of effort and perseverance as one's learning strategy, especially when facing challenging tasks. The index of perseverance is a composite measure, which was also computed as the mean of nine items on a four-point scale. The items include "I force myself to check to see if I remember what I have learned" and "I keep working even if the material is difficult."

To measure social and interpersonal aspects of students' noncognitive performance, we considered the outcomes of *school attachment* and *cooperativeness*. For school attachment, we used six items based on which students rated their feelings of being socially connected in school, such as "My school is a place where I make friends

easily” and “My school is a place where I feel like an outsider.” We recoded the items so that higher scores would indicate higher levels of social connectedness. We used the mean of those six items. To measure cooperativeness, we used the mean score of four items that obtained information on student perceptions regarding working with other students while learning, such as “I like to work with other students.” The full set of items that was used for non-cognitive outcomes is listed in Table A1 of the Appendix.²

All the outcome variables were standardized to have a mean of 50 and standard deviation of 10 for each individual country because we intended to eliminate any between-country differences in the absolute level of outcomes across countries to identify how countries differ in terms of the only-child group’s performance relative to other sibsize groups.

Sibship size. The PISA 2000 asked students how many older siblings, younger siblings, and siblings of the same age they have. We recoded the total number of siblings to five categories by setting an upper bound: 0 (i.e., an only child), 1, 2, 3, and 4 or more. The upper bound of 4 was set because all three separate questions about sibship size were upper-bounded at 4.

Family SES and resources. For family SES, we used the index of Economic, Social and Cultural Status (ESCS), which OECD created for the PISA. The ESCS variable considers parents’ education, occupation, and home possessions as a proxy to family wealth such as having one’s own room or owning a dishwasher, computers, cars, or cellular phones. The index was standardized to have a mean of 0 and a standard deviation of 1 for the pooled student sample inclusive of students from all PISA 2000

countries. We used a within-country decile rank because we were interested in the relative SES statuses of sibsize groups within each country.

We also considered the four types of family resources to explain the gaps between sibsize groups beyond family SES: (1) the frequencies of cultural activities (e.g., visiting museums or art galleries; attending an opera, ballet, or classical concert; and watching live theater) as traditional markers of cultural capital (DiMaggio 1982); (2) the stock of cultural and scholastic items at home (e.g., classical literature, books of poetry, works of art, and the number of books); (3) how students interact with parents as an indicator of parents' commitment and time—key interpersonal resources within the family (Downey 1995) (e.g., how often children discuss social or political issues, books, films, or television shows with parents); and (4) the presence of both parents or parental figures as a critical resource for children's social capital (Coleman 1988).

Demographic variables. In most of our statistical models, we controlled for basic demographic variables as a baseline, such as gender, age, and immigration status. Although all the PISA 2000 participants are supposed to take the PISA assessments at age 15, we controlled for age because there was still a small variation that could affect the outcomes. We controlled for immigration status by including two dummy variables indicating whether a student was a native or a first- or second-generation immigrant.

Table 2 shows the correlation matrix of our outcome variables and main covariates. The pairwise correlation coefficients were estimated from the pooled sample of all country samples, with weighting for equal representativeness across countries to avoid countries with large sample sizes being overrepresented. The matrix suggests that student outcomes are generally positively correlated with family SES and

resources, although the magnitude of the correlations varies depending on the type of outcomes: more strongly for cognitive outcomes and only weakly for social outcomes.

Table 2 about here

Country-level Variables

Family size. Our central country-level variable was the proportion of only-children as an indicator of each country's family size context. A large proportion of only-children indicated that small-size families were prevalent in the country and that the country's overall family size was small. We also considered alternative measures, such as the proportion of children with zero or one sibling and the average sibship size, but the results were highly consistent.

Public policies. To measure public policies and institutions, we considered a series of variables reflecting social policies, the structure of the educational system, and the regime of the welfare state. For social policies, we considered two measures—public expenditures on education and on family (Park 2008). Public expenditure on education was measured by the percentage of GDP that was spent on public education and public subsidies to private education. We used data from the World Development Indicator (WDI) within the World Bank database (<http://databank.worldbank.org/>). We used the ten-year average from 1991 to 2000. Public expenditure on family policies was measured by the percentage of GDP that is used for public support for families including spending for childcare. The data was from the OECD Social Expenditure Database (http://stats.oecd.org/Index.aspx?DataSetCode=SOCX_DET#). We used the average of three specific years: 1990, 1995, and 2000 covering a 10-year period. For the tracking

system of secondary-level education, we used a factor score predicted by three different statistics reflecting different aspects of school tracking systems at the secondary level: the age at first tracking selection, the percentage of the total curriculum that is tracked, and the number of tracks that are available for 15-year-olds, following Bol and Van de Werfhorst (2013).

For the welfare state regime measures, we divided countries into five groups based on Esping-Andersen's classification (Esping-Andersen 1999; Xu 2008) and additional regional and historical legacies: (1) liberal,³ (2) conservative corporatist, (3) Mediterranean, (4) social democratic, and (5) post-communist. Given the relatively small number of countries (31 or 24 depending on outcomes), we included the dummy variables of these five welfare state regimes one-by-one in our regression models. We provide information on country-level variables in Table A3 in the Appendix.

Results

Family Size and Proportion of Only-children

Figure 1 shows the cross-national variation in the proportion of only-children. There is a substantial variation across countries, ranging from 2% to 17%. Some countries, such as Iceland, Sweden, Ireland, the Netherlands, Australia, Norway, and Albania, have very small proportions of only-children—below 5%—while close to 15% of students have no siblings in Russia, Germany, Italy, Austria, Portugal, Romania, and Bulgaria. A casual examination suggests a certain geographical pattern: Nordic and Anglo-Saxon countries tend to have low proportions of only-children, while Central and Eastern European countries have relatively high proportions of them.

Figure 1 about here

In Table 3, we answer whether and to what extent such a different fraction of only-children reflects a country's overall family size. The table represents correlations between the proportions of different sibsize groups and average sibsize across the PISA 2000 countries. The fraction of children without siblings generally increases with the proportion of children with one sibling, but it begins to be negatively correlated with the proportions of children with two or more siblings and the average number of siblings. This pattern suggests that the prevalence of only-children or, alternatively, the proportion of only-children and children with one sibling captures the average family size well.

Table 3 about here

Family SES of Only-children

Figure 2 about here

What, then, is the relative family SES of only-children in each country? In Figure 2, we plot the estimated mean family SES scores of the five sibship size groups, net of gender, age, and immigration status across all countries (see Table A4 in the appendix for the estimates). The countries are sorted by the proportion of only-children. Two general patterns are noticeable. First, among children with siblings, a large sibship size is related to a low average family SES, which confirms our expectation. However, the only-child group behaves in a remarkably different manner. In some countries, particularly where the fraction of only-children is small, they tend to be from relatively low-SES families. Conversely, only-children's relative SES tends to be as high as or even higher

than that of children with one sibling or and highest in countries where only-children are much more common. For example, in four of the five countries with the highest prevalence of only-children (Bulgaria, Romania, Portugal, and Italy), only-children have the highest family SES. On the contrary, in the five countries with the smallest proportions of only-children, their family SES is lowest or second lowest (Iceland, Sweden, Ireland, the Netherlands, and Australia).

Figure 3 and Table 4 about here

In Table 4 and Figure 3, we examine whether this observation reflects more systematic patterns by fitting linear slope lines. In the second row of Table 4, we report the coefficients of the proportion of only-children on family SES for each of five sibship size groups. In Figure 3, we plot the mean family SES indices of five sibship size groups—including only-children—not only against the proportion of only-children but also against the proportion of children with zero or one sibling and the average total number of siblings as the alternative indicators of countries' overall family size. Consistent with the pattern detected in Figure 2, the family SES of only-children is significantly positively associated with the proportion of only-children: $b=8.77$, $p<0.001$. That is, a 1% increase in the proportion of only-children comes with a 0.09 increase in the family SES index or roughly a 0.9 percentile improvement in the family SES of only-children. The second and third plots of Figure 3 indicate that the result does not differ by how we measure country-level family size. The plots predict that the gap in average family-SES of only-children between the country with the smallest family size and the one with the largest family size is about 1.5, roughly equivalent to a 15 percentile difference. This result is consistent with what H1 predicts.

Another remarkable pattern from Table 4 and Figure 3 is that, unlike for only-children, the association with country-level family size is not found in other sibship size groups. What distinguishes non-zero sibship size groups from one another is their systematically varying intercepts rather than slopes, which are generally negative and flatter than that of only-children. Children with one sibling seem to be a peculiar example. Their relative position is largely insensitive to the proportion of only-children ($b=-0.72$, $p=0.20$) or, more generally, the country's overall family size. The family SES indices of children with two or more siblings are more negatively associated. That is, the relative status of large families tends to be lower in countries with a small proportion of only-children and higher in countries with a greater proportion of only-children. This discrepancy across sibsize groups implies an interesting pattern of changing selection into family size by family SES.

Only-children's Cognitive and Noncognitive Performance Outcomes

The next questions we address are how much better or worse only-children fare compared to others in school performance outcomes across countries, especially with varying levels of overall family size, and the extent to which such associations are attributable to only-children's more or less distinguished family SES. The third row (reading literacy) to the bottom row (cooperativeness) of Table 4 report how the performance outcomes of five sibsize groups vary across countries with varying levels of the prevalence of only-children (see Tables A5 to A10 in the appendix for the individual-level coefficients of sibsize groups for individual country samples).

Figure 4 about here

The results presented in Table 4 and Figure 4 reveal that only-children differ remarkably from children with siblings. In countries where only-children are more prevalent, they tend to perform better than they do in countries where they constitute only a small proportion, as we can see from the sizable and significant positive coefficients in the second column of Table 4 (except perseverance). However, nearly all coefficients for non-zero sibsize groups are negative. Some of them are also statistically significant (e.g., reading, math, and self-confidence for children with two siblings). In other words, for children with multiple siblings, school performance is generally better in countries with large overall family sizes but worse in countries where small families are more common. For example, a 1% increase in the proportion of only-children is associated with increases of about 0.15, 0.13, 0.08, 0.04, 0.12, and 0.07 in their reading, math, self-confidence, perseverance, school attachment, and cooperativeness outcomes, respectively. Children with two siblings, however, show decreases in those outcomes by 0.13, 0.11, 0.06, 0.03, 0.04, and 0.01, respectively, for every 1% increase in their proportion. The distinctive and diverging pattern of only-children is significant for two cognitive outcomes (reading and math) and, to a lesser degree, for self-confidence. The pattern for perseverance is consistent but insignificantly weak. Only-children tend to do better in two interpersonal outcomes (school attachment and cooperativeness) in countries where only-children are common, but the patterns for children with multiple siblings are not clear enough to draw a straightforward inference. All in all, the pattern predicted by H2-1 and H2-2 is generally confirmed except for the outcome of perseverance.

To provide a more straightforward visual presentation of the comparison between only-children and others, we merge all the non-zero sibsize groups into one

("1+") in Figure 4 (for the plots without aggregation, see Figure A1 of the appendix). The figure additionally reveals a noteworthy pattern in the intercepts, which we could not recognize when we only focused on the differences in slopes: only-children's generally low levels of two interpersonal outcomes—school attachment and cooperativeness—unlike the intercepts of other outcomes. With regard to non-interpersonal outcomes, only-children generally fare better especially in countries where they are more prevalent. Even in countries with relatively smaller proportions of only-children, we see no distinguishable disadvantages. However, only-children fare as well as those with siblings in two interpersonal outcomes only when the proportion of only-children is comparatively large. Otherwise, their interpersonal outcomes are lower than those of children with siblings. This finding implies that in societies where small families are more prevalent, only-children are as sociable and cooperative as children with siblings, but they are less sociable and less cooperative in societies where small families are less common.

Why, then, do we find this consistent pattern across different outcomes in terms of the sensitivity of only-children's performance to the family size context? Is it explained by the varying family SES levels of only-children across countries with varying family size levels? Table 5 reports how the slopes of family size on those six outcomes change when family SES and resources are controlled for. The coefficients of Model 1 are identical to those in Table 4. Model 2 shows the cross-national associations between only-children's performance and the proportion of only-children and the equivalent associations for children with at least one sibling as comparative references. Any difference between two models captures the role of the cross-national association between family SES and the proportion of only-children, which is illustrated in Figures 2

and 3 and in Table 4. Likewise, Model 3 shows the additional role of family resources beyond the family SES index.

Table 5 about here

Table 5 reveals largely three significant patterns. First, the slopes of family size on reading, math, and self-confidence for the only-child group reduce substantially when family SES and resources are included, by about 49% (reading) to 54% (math and self-confidence). This finding provides empirical support for the prediction of H2-1: only-children's relatively distinguished performance observed in countries with relatively large proportions of only-children is largely because they are born to and raised by high-SES parents.

Second, the slopes of two interpersonal outcomes for only-children are explained only slightly by family SES and family resources (14% for cooperativeness to 29% for school attachment). This suggests that the notable disadvantages that only-children experience in school attachment and cooperativeness are only slightly related to their lower family SES and fewer resources. This shows that, unlike reading, math, and self-confidence, the H2-2 prediction fits better for interpersonal outcomes. Other mechanisms that do not entail family SES disparities across sibsize groups, such as social stigma and the availability of non-sibling peer figures, appear to be better explanations of the cross-national variations for the disadvantages of only-children in interpersonal skills. The correlations reported in Table 2 also provide a clue. The correlations between interpersonal outcomes and family variables are mostly below 0.1. They are not stratified and, therefore, they are not mediated by family backgrounds.

Lastly, unlike the slopes for only-children, those for children with siblings hardly change when additional controls are included for the covariates of family SES and resources. The role of family background does not matter much when explaining the variations in advantages and disadvantages from having siblings across countries, especially in terms of the proportion of only-children.

Other Macro-level Factors

Table 6 shows whether and to what extent other country-level factors, such as the measures of educational and family policies, school tracking and welfare state regimes, matter in explaining cross-national variations in terms of only-children's family SES and performance outcomes.

Table 6 about here

We present two lines of results in Table 6. First, in the second and third columns under each outcome variable panel, we present how each country-level variable is associated with the outcome of only-children ("unconditional") and how the coefficient changes when controlling for the proportion of only-children ("conditional on % Sib 0"). We detect three notable patterns: (1) Public input into education policies significantly explains the cross-national variations in only-children's family SES and two cognitive outcomes (reading and math). The measure of educational policies is a significant predictor for reading and math even after controlling for the family-size level. However, we do not find such patterns for noncognitive outcomes. This implies that inclusive policy efforts on education, but less evidently policy efforts on family, overcome the cognitive disadvantages of having siblings (Gibbs et al. 2016; Park 2008; Xu 2008). (2)

The variable representing the school tracking structure shows significant explanatory power only for school attachment. Only-children are less likely to feel attached to school socially, but they fare better in countries where secondary schools are more formally tracked. This significant relationship holds even when controlling for the proportion of only-children. One speculation about why we see this pattern is the confounding role of the tracking system. In more tracked schools, especially academically oriented ones, student may feel more attached to their schools. On the other hand, only-children may be more likely to enroll in academic-track schools, even net of family background. (3) Regarding the welfare regime, only-children are relatively better-off in post-communist and Mediterranean countries and worse-off in conservative and social democratic countries. A large part of this pattern is confounded by country-level family size although some of those gaps remain significant even net of country-level family size.

Second, in the second column under each outcome variable panel, we present how the coefficient of the proportion of only-children varies (% Sib 0) depending on the inclusion of other country-level variables, one by one. The results reveal that the documented cross-national relationships between the proportion of only-children and their status and performance outcomes largely hold even after controlling for the variables of policies. Two noteworthy exceptions, however, are educational policies for cognitive outcomes and school tracking for school attachment. With regard to reading and math, including the measure of educational policies explains about 37–38% of the coefficient of the proportion of only-children (from 14.84 and 13.39 to 9.31 and 8.24, respectively). For school attachment, tracking explains the association between the proportion of only-children and their average level of school attachment by about 57%

(from 11.64 to 4.95). None of the welfare state regime dummies substantially change the coefficient of the proportion of only-children.

The results from Table 6 identify which policies and/or institutional features matter and support the predictions of H3 and H3-1: governmental spending on educational policies for gaps in reading and math between only-children and others and the level of school tracking for the gap in school attachment. We find that the welfare state regime matters especially for family SES, reading, and math, but it does so largely through cross-national differences in the proportion of only-children. By contrast, the difference in the proportion of only-children is important beyond its association with a welfare regime type.

Robustness Checks

We checked the robustness of our findings to our choices concerning the country sample and alternative measures of family size. With regard to country choice, we examined whether our decision to exclude countries with rather high fertility, such as Mexico, countries in South America (Brazil, Argentina, Chile, and Peru) and Southeast Asia (Indonesia, Thailand), drives our findings. Our analyses with a sample of the full set of countries, including these high-fertility countries, yielded completely consistent results but with slightly weaker associations. We believe that this minor sensitivity does not undermine our main findings because we intend to draw inferences for countries with low fertility. We excluded some countries with too many missing observations on some major variables (see the earlier section for data description). We also found that those decisions do not change our results substantially. Regarding the measure of country-level family size composition, we used the proportion of only-children

throughout our analyses. To ensure that our results can be generalized to country-level family size composition rather than be unique to the proportion of only-children, as suggested earlier (see Table 3 and Figure 3), we conducted the analyses with two alternative measures—the proportion of only-children plus children with one sibling and average sibship size. The main results are similar to those derived from the alternative measures.⁴

Summary and Discussion

We examined how only-children fare in cognitive and non-cognitive performances compared to children with siblings and how these performance differentials vary systematically across 31 low-fertility countries of the PISA 2000. Our analyses uncovered four key findings. First, we found substantial variations in the proportion of only-children across countries, from 2% to 17%. Second, only-children grow up in comparatively better-off families in countries where small families prevail, but such family advantages are not shared by only-children where the overall family size is large. Third, only-children in countries where the proportion of small-size families is large perform better in cognitive and noncognitive outcomes than do only-children in countries where the proportion of small-size families is small. With regard to cognitive performance (reading and math) and self-confidence, such relative advantages are largely explained by the relative advantage in family SES and resources. For two interpersonal outcomes, the advantages of living in a society with a relatively high proportion of small families remain unexplained by family background factors, which imply the importance of other social mechanisms such as stigma and the availability of non-sibling peers. Lastly, educational policies measures and school tracking systems

matter for cross-national variations in only-children's family SES and two cognitive outcomes (education policies) and school attachment (tracking system) respectively. In most cases, however, the variability of overall country-level family-size remains an important predictor even after controlling for an additional policy measure. This suggests strongly that the importance of the demographic context in our understanding of only-children cannot be reduced to any single policy or institutional characteristic.

What does this study contribute to our existing knowledge? What implications does this study make? We select a few points. To begin with, going back to our opening question: "Is being an only child an advantage or an obstacle to getting ahead in life?", we provide a more comprehensive answer. Our answer, based on this study, is that it depends on where he or she lives. Being an only child will be fine and even advantageous if there are many other only-children but will be disadvantageous without any benefits if only-children are rare in that particular society. Moreover, our findings suggest that this answer can partly be restated as follows: "Being an only child will be fine or even a positive thing if such children are born to better-off parents but will be a negative thing without any benefits otherwise" since much of the advantages from being an only child come from the parents' fertility decisions. The inconsistencies in the performance of only-children reported by prior studies can be largely attributed to the variability in the societal and demographic contexts.

Our study also reveals that the predictions that were proposed and documented in prior research—only-children outperform those with siblings in cognitive outcomes and underperform those with siblings in social and interpersonal outcomes—generally correspond with findings based on our data, but they do so conditionally. Only-

children's cognitive advantages are manifest when small families are more common, and their interpersonal disadvantages appear only when small families are rare. Therefore, our study does not falsify findings of previous studies; rather, we elaborate on them using cross-national evidence. In this sense, our study extends the existing scholarly and popular knowledge regarding only-children.

An important theoretical implication of our study is the need to update the notion of a quantity-quality tradeoff in the transition of family size. The quantity-quality tradeoff thesis states that parents increasingly prefer to pursue the quality of their children (i.e., small-size families) over the quantity of children (i.e., large-size families) in the process of socioeconomic development. Our findings suggest that, in some countries, this tradeoff does not cover the decision to stop at the first and only child. In those countries, where we observe relatively low proportions of small-size families, having just one child is a categorically different decision from those based on a quantity-quality tradeoff. Some parents may believe that having at least two children should be a definite baseline of family size. However, in other societies, parents consider stopping at the first child if they want to focus more exclusively on the quality of the only child. In other words, the quantity-quality tradeoff thesis as a general account of family size decision should be understood conditionally when it is applied to individual contexts. Our study can be viewed as a cross-national example of this.

Finally, our study illustrates how demographic changes may matter for a better understanding of intergenerational transfer during child development. Previous research has documented that differences in sibship configuration is a channel through which socioeconomic (dis)advantages of families are transmitted (Steelman et al. 2002).

Our study shows that the macro-demographic context of fertility transition, which is captured by variations in the overall family size compositions across countries, shapes how sibship matters with regard to a child's performance and development outcomes. The empirical evidence of such a relationship between the demographic transition context and sibship size effects has rarely been explored, especially from a cross-national perspective. We believe that this adds a meaningful contribution to the recently growing literature on social stratification that seeks to incorporate intergenerational reproduction and demographic processes, such as differentials in marriage and fertility (Lawrence and Breen 2016; Maralani 2013; Song and Mare 2017), by combining historical and comparative perspectives.

Endnotes

1. Regrettably, PISA stopped collecting information about the number of siblings after 2000, so the 2000 wave is currently the best and only comparative source for studying relationships between sibling configuration and student performances.
2. Our use of the noncognitive items (as well as of family resource items) follows the batteries of individual items designed by the PISA 2000 (Adams and Wu 2002) with some modifications based on our research purpose. See the technical report for the PISA 2000 (Adams and Wu 2002) for the reliability of composite measures from the batteries of items in the PISA 2000. We also report our own Cronbach's alpha estimates in Table A2 in the Appendix.
3. We classified Hong Kong and South Korea into the liberal regime.
4. The results from the robustness checks are available upon request.

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Figure 1: The Proportions of Sibship Size Groups across PISA 2000 Countries

Note: Countries are sorted by the proportion of only-children.

Figure 2: Mean Family SES by Sibship Size Groups (0, 1, 2, 3, 4+) across PISA 2000 Countries

Note: Sibship Size Groups are indicated with numbers 0, 1, 2, 3, and 4+. The right-hand y-axis illustrates the percentage of only-children in each PISA 2000 country. Countries are sorted by the proportion of only-children.

Figure 3: Association between Mean Family SES Levels of Sibship Size Groups and Country's Overall Family Size Composition

Note: Sibship Size Groups are indicated with numbers 0, 1, 2, 3, and 4+. Shaded areas show the 95% confidence intervals.

Figure 4: Student Performance Outcomes of Only-children and Children with One or More Siblings by Proportion of Only-children in the Country

Note: Shaded areas show the 95% confidence intervals.

Table 1: Sample Sizes of 31 PISA 2000 Countries across Different Student Outcomes

	Reading Literacy	Math Literacy	Self- confidence	Perseverance	Sociability	Cooperative -ness
Albania	4101	2285	4056	4052	4002	4004
Australia	4917	2710	4869	4866	4904	4811
Austria	4425	2459	4407	4407	4412	4391
Belgium	6109	3418	na	na	6093	na
Bulgaria	4001	2245	3944	3942	3993	3918
Canada	27601	15304	na	na	27570	na
Czech Rep.	5068	2822	4963	4959	5056	4899
Denmark	3923	2212	3897	3895	3906	3862
Finland	4663	2575	4646	4645	4625	4620
France	4242	2362	na	na	4228	na
Germany	4660	2574	4652	4655	4659	4592
Greece	4315	2391	na	na	4305	na
Hong Kong	4264	2356	4266	4266	4272	4254
Hungary	4632	2637	4577	4570	4620	4500
Iceland	3113	1727	3094	3092	3109	3067
Ireland	3691	2037	3662	3660	3680	3671
Italy	4568	2530	4558	4557	4555	4551
Latvia	4820	2671	4820	4820	4819	4818
Netherlands	3638	1995	3628	3626	3626	3540
Norway	2394	1319	2391	2391	2389	2383
Poland	3792	2115	3727	3728	3778	3675
Portugal	3186	1712	na	na	3165	na
Romania	4268	2385	4251	4251	4253	4247
Russia	4475	2483	4433	4434	4464	4391
South Korea	6011	3317	5974	5969	6000	5919
Spain	5655	3112	na	na	5648	na
Sweden	4257	2388	4228	4228	4253	4227
Switzerland	5665	3140	5613	5614	5617	5571
Macedonia	3610	2032	3545	3544	3607	3513
UK	8679	4795	na	na	8671	na
US	3250	1778	3157	3151	3243	3054
Total	161993	89886	101358	101322	161522	100478

Table 2: Correlation Matrix of Individual-level Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Family SES Index (ESCS)	1.00										
(2) Reading Literacy	0.27	1.00									
(3) Math Literacy	0.26	0.65	1.00								
(4) Self-confidence	0.16	0.24	0.23	1.00							
(5) Perseverance	0.09	0.19	0.13	0.64	1.00						
(6) Sociability	0.09	0.08	0.07	0.21	0.17	1.00					
(7) Cooperativeness	0.01	0.08	0.04	0.19	0.27	0.22	1.00				
(8) Cultural Activities	0.34	0.24	0.19	0.19	0.17	0.1	0.08	1.00			
(9) Cultural Possessions	0.25	0.20	0.14	0.17	0.18	0.08	0.1	0.32	1.00		
(10) Number of Books	0.36	0.24	0.22	0.16	0.11	0.04	0.02	0.36	0.26	1.00	
(11) Interactions with Parents	0.18	0.20	0.13	0.24	0.28	0.14	0.15	0.28	0.28	0.18	1.00

Note: The correlation coefficients are computed from the pooled student-level sample with equal weighting by country.

Table 3: Correlation Matrix of Family Size Composition in 31 PISA 2000 Countries

	(1)	(2)	(3)	(4)	(5)	(6)
(1) % Only child	1.00					
(2) % One sibling	0.70	1.00				
(3) % Two siblings	-0.79	-0.84	1.00			
(4) % Three siblings	-0.80	-0.97	0.83	1.00		
(5) % Four siblings or more	-0.64	-0.88	0.54	0.86	1.00	
(6) Average sibship size	-0.80	-0.96	0.76	0.96	0.95	1.00

Note: All correlation coefficients are statistically significantly different from zero.

Table 4: OLS Coefficients of the Proportion of Only-children on Family SES and Performance Outcomes across Sibsize Groups

Dependent Variables	Only-children	One sibling	Two siblings	Three siblings	Four siblings or more	Country N
Family SES Index (ESCS)	8.77 (2.09)***	-0.72 (0.84)	-6.09 (1.27)***	-4.92 (1.63)**	-5.84 (1.78)**	31
Reading Literacy	14.84 (5.21)**	-0.83 (3.45)	-13.3 (3.18)***	-14.74 (4.16)**	-18.40(5.70)**	31
Math Literacy	13.39 (4.53)**	-0.82 (3.20)	-10.55 (3.73)**	-10.47 (5.05)*	-12.51 (6.49)	31
Self-confidence	8.42 (3.69)*	-3.34 (1.36)*	-5.98 (2.33)*	-2.41 (3.00)	-1.19 (3.70)	24
Perseverance	4.44 (3.98)	-1.83 (1.27)	-3.25 (2.05)	-2.15 (2.54)	-0.02 (4.21)	24
School Attachment	11.64 (3.99)**	2.02 (1.86)	-3.53 (1.78)	-7.50 (3.36)*	-6.59 (3.77)	31
Cooperativeness	6.54 (3.46)†	0.96 (1.89)	1.43 (1.59)	-1.20 (2.79)	3.07 (4.32)	24

Note: Numbers in parentheses are standard errors. ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$, †: $p < 0.1$.

Table 5: OLS Coefficients of the Proportion of Only-children on Performance Outcomes of Only-children and Children with One or More Siblings Controlling by Adjustment of Family Covariates

Dependent variable	Only-children (sibsize 0)			Children with at least one sibling (sibsize 1-4+)			Country N
	Model 1 Coef.	Model 2 Coef. (%Δ)	Model 3 Coef. (%Δ)	Model 1 Coef.	Model 2 Coef. (%Δ)	Model 3 Coef. (%Δ)	
Reading Literacy	14.84**	6.89 (-54)	7.63 (-49)	-1.26	-0.06 (.)	0.05 (.)	31
Math Literacy	13.39**	6.28 (-53)	6.10 (-54)	-0.47	0.54 (.)	0.59 (.)	31
Self-confidence	8.42*	2.41 (-71)	3.85 (-54)	-0.82	-0.04 (.)	0.15 (.)	24
Perseverance	4.44	1.28 (.)	2.41 (.)	-0.24	0.13 (.)	0.36 (.)	24
Sociability	11.64**	8.10* (-30)	8.23* (-29)	-0.29	0.30 (.)	0.46 (.)	31
Cooperativeness	6.54†	5.72† (-13)	5.6† (-14)	0.45	0.57 (.)	0.79 (.)	24
Control variables	Basic demographics (gender, immigrant status, age)	Model 1 + Family SES index (ESCS)	Model 2 + Measures of family resources	Basic demographics (gender, immigrant status, age)	Family SES index (ESCS)	Family SES index (ESCS) + Measures of family resources	

Note: Numbers in parentheses are percentage changes in the coefficient in comparison with the coefficient of Model 1. We report the percentage changes only when the Model 1 coefficient is statistically significant at the 0.05 level. ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$, †: $p < 0.1$.

Table 6: OLS Coefficients of the Measures of Public Policies and the Proportion of Only-children on Only-children's Status and Performance Outcomes

Dependent variable	Family SES Index (ESCS)			Reading Literacy			Math Literacy		
	% Sib0	Confounder (Z)		% Sib0	Confounder (Z)		% Sib0	Confounder (Z)	
		Un-conditional	Conditional on % Sib0		Un-conditional	Conditional on % Sib0		Un-conditional	Conditional on % Sib0
Confounder (Z)									
Unconditional (no Z)	8.77***			14.84*			13.39*		
Education Policies	6.77***	-0.24***	-0.14	9.31	-0.53***	-0.40*	8.24	-0.48***	-0.32*
Family Policies	5.73	-0.18	-0.12	14.14	-0.34	-0.19	10.42	-0.27	-0.12
School Tracking	8.69***	0.09	-0.07	20.17***	0.05	-0.32	16.82*	0.11	-0.16
Welfare State Regime									
Liberal	8.40***	-0.32	-0.12	14.60*	-0.43	-0.08	14.49***	0.02	0.7
Conservative	9.21***	-0.27	-0.37	16.47***	-1.19*	-1.36***	14.91***	-1.11*	-0.91*
Social democratic	7.9***	-0.58*	-0.18	12.60	-1.09	-0.46	10.2	-1.17*	-0.71
Mediterranean	8.32***	0.43	0.2	11.49*	1.84***	1.53*	11.29*	1.27*	0.7
Post-communist	6.93***	0.62***	0.41*	12.11*	0.98*	0.61	10.84*	0.90*	0.14

Dependent variable	Self-confidence			School Attachment			Cooperativeness		
	% Sib0	Confounder (Z)		% Sib0	Confounder (Z)		% Sib0	Confounder (Z)	
		Un-conditional	Conditional on % Sib0		Un-conditional	Conditional on % Sib0		Un-conditional	Conditional on % Sib0
Confounder (Z)									
Unconditional (no Z)	8.42*			11.64*			6.54		
Education Policies	7.85	-0.17	-0.04	10.54*	-0.22	-0.08	9.14*	0.04	0.19
Family Policies	4.46	0.01	0.06	11.41	0.00	0.12	7.16	-0.10	-0.01
School Tracking	3.46	0.32	0.25	4.95	0.49***	0.40*	6.41	0.20	0.07
Welfare State Regime									
Liberal	8.33*	-0.23	-0.04	10.40*	-0.66	-0.41	6.41	-0.20	-0.06
Conservative	8.23*	0.31	0.23	11.48*	0.26	0.14	6.05	0.66	0.60
Social democratic	8.20	-0.49	-0.04	9.81*	-0.87	-0.38	6.22	-0.40	-0.06
Mediterranean	9.68*	-0.13	-0.6	11.74*	0.27	-0.04	6.47	0.35	0.04
Post-communist	7.97	0.39	0.11	9.4*	0.79*	0.50	8.19*	-0.08	-0.37

Note: The slopes of the proportion of only-children (% Sib0) on only-children's family SES and performance outcomes (reading to cooperativeness) are from Table 4. We omit perseverance because the slope of % Sib0 is small and statistically insignificant. ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$.

**Where It Matters to Be the Only One: School Performance Outcomes of Only-children
across 31 Countries**

Online Appendix

Table A1: Items for Non-cognitive Outcomes and Family Resources

	Items
Self-confidence	<ul style="list-style-type: none"> • I'm certain I can understand the most difficult material presented in texts. • I'm confident I can do an excellent job on assignments and tests. • I'm certain I can master the skills being taught. • When I sit myself down to learn something really difficult, I can learn it. • If I decide not to get any bad grades, I can really do it. • If I decide not to get any problems wrong, I can really do it. • If I want to learn something well, I can.
Perseverance	<ul style="list-style-type: none"> • I work as hard as possible. • I keep working even if the material is difficult. • I try to do my best to acquire the knowledge and skills taught. • I put forth my best effort. • I start by figuring out exactly what I need to learn. • I force myself to check to see if I remember what I have learned. • I try to figure out which concepts I still haven't really understood. • I make sure that I remember the most important things. • When I don't understand something I look for additional information to clarify this.
Sociability	<ul style="list-style-type: none"> • I feel like an outsider in school. • I make friends easily in school. • I feel like I belong to school. • I feel awkward and out of place in school. • Other students seem to like me in school. • I feel lonely in school.
Cooperativeness	<ul style="list-style-type: none"> • I like to work with other students. • I learn most when I work with other students. • I like to help other people do well in a group. • It is helpful to put together everyone's ideas when working on a project.
Cultural Possessions	<ul style="list-style-type: none"> • In home, I have classical literature. • In home, I have books of poetry. • In home, I have works of art (e.g., paintings.)
Cultural Activities	<ul style="list-style-type: none"> • During the past year, I visited a museum or art gallery. • During the past year, I attended an opera, ballet, or classical symphony concert. • During the past year, I watched live theatre.
Interactions with Parents	<ul style="list-style-type: none"> • How often do your parents discuss political or social issues with you? • How often do your parents discuss books, films or television programmes with you? • How often do your parents listen to classical music with you? • How often do your parents discuss how well you are doing at school? • How often do your parents eat the main meal with you around a table? • How often do your parents spend time just talking to you?

Table A2: Cronbach's Alpha Coefficients of Scale Reliability for Non-cognitive Outcomes and Family Resources

	Non-cognitive outcomes				Family resources		
	Self-confidence	Perseverance	Sociability	Cooperativeness	Cultural possessions	Cultural activities	Interactions with parents
Albania	0.78	0.67	0.44	0.59	0.40	0.50	0.50
Australia	0.89	0.87	0.83	0.64	0.65	0.60	0.70
Austria	0.82	0.79	0.80	0.61	0.58	0.67	0.65
Belgium	0.74	0.58	0.57	0.63			
Bulgaria	0.80	0.71	0.59	0.62	0.59	0.64	0.57
Canada	0.85	0.64	0.61	0.68			
Czech Republic	0.84	0.81	0.70	0.64	0.55	0.64	0.63
Denmark	0.84	0.83	0.75	0.59	0.60	0.61	0.66
Finland	0.86	0.88	0.83	0.67	0.65	0.62	0.62
France	0.75	0.62	0.54	0.61			
Germany	0.84	0.81	0.79	0.67	0.60	0.64	0.65
Greece	0.72	0.48	0.52	0.62			
Hong Kong	0.88	0.83	0.74	0.64	0.56	0.63	0.76
Hungary	0.83	0.81	0.75	0.57	0.56	0.66	0.61
Iceland	0.84	0.88	0.83	0.64	0.57	0.59	0.67
Ireland	0.88	0.85	0.84	0.65	0.58	0.54	0.64
Italy	0.85	0.80	0.72	0.67	0.55	0.57	0.55
Latvia	0.85	0.83	0.69	0.60	0.54	0.65	0.74
Netherlands	0.79	0.76	0.70	0.65	0.54	0.65	0.61
Norway	0.83	0.80	0.76	0.60	0.57	0.59	0.66
Poland	0.86	0.88	0.82	0.70	0.69	0.62	0.69
Portugal	0.65	0.54	0.67	0.69			
Romania	0.86	0.83	0.69	0.64	0.62	0.56	0.63
Russia	0.81	0.80	0.67	0.68	0.51	0.60	0.57
South Korea	0.84	0.80	0.71	0.66	0.48	0.67	0.60
Spain	0.71	0.59	0.55	0.65			
Sweden	0.86	0.87	0.80	0.62	0.65	0.62	0.66
Switzerland	0.86	0.80	0.76	0.63	0.62	0.58	0.65
Macedonia	0.82	0.80	0.65	0.57	0.54	0.54	0.60
UK	0.83	0.66	0.63	0.66			
US	0.90	0.87	0.84	0.76	0.64	0.64	0.73
Mean	0.82	0.76	0.70	0.64	0.58	0.61	0.64

Table A3: List of Country-level Variables

	Family Size Composition						Public Policies			
	% Sib0	% Sib1	% Sib2	% Sib3	% Sib4+	Avg. Sibsize	Welfare State Regime	Education Policies	Family Policies	School Tracking
Albania	0.05	0.37	0.28	0.14	0.16	2.07	Post-communist	3.40		
Australia	0.05	0.34	0.33	0.17	0.12	2.04	Liberal	5.07	2.38	-1.08
Austria	0.13	0.43	0.26	0.10	0.07	1.56	Conservative	5.53	2.77	1.75
Belgium	0.11	0.40	0.27	0.12	0.11	1.8	Conservative	4.19	2.30	1.04
Bulgaria	0.17	0.70	0.10	0.02	0.01	1.03	Post-communist	4.11		-0.08
Canada	0.07	0.40	0.30	0.13	0.10	1.85	Liberal	6.38	0.78	-1.31
Czech Republic	0.08	0.54	0.25	0.07	0.06	1.52	Post-communist	4.06	1.97	1.67
Denmark	0.06	0.40	0.30	0.13	0.12	1.92	Social Democratic	7.54	3.46	-0.93
Finland	0.06	0.35	0.32	0.15	0.11	1.98	Social Democratic	6.56	3.34	-0.93
France	0.08	0.39	0.31	0.11	0.11	1.83	Conservative	5.43	2.67	-0.48
Germany	0.13	0.45	0.26	0.09	0.07	1.58	Conservative	4.42	1.98	1.79
Greece	0.08	0.57	0.23	0.07	0.05	1.48	Mediterranean	2.77	0.88	-0.48
Hong Kong	0.12	0.47	0.26	0.09	0.06	1.51	Liberal	2.78		-0.20
Hungary	0.11	0.53	0.23	0.07	0.06	1.5	Post-communist	5.22	3.00	1.30
Iceland	0.02	0.18	0.40	0.22	0.19	2.5	Social Democratic	5.64	2.28	-0.88
Ireland	0.04	0.19	0.29	0.22	0.25	2.59	Liberal	4.70	1.99	-0.13
Italy	0.13	0.54	0.25	0.06	0.03	1.32	Mediterranean	4.47	0.87	0.18
South Korea	0.09	0.64	0.18	0.05	0.03	1.3	Liberal	3.38	0.07	-0.48
Latvia	0.12	0.45	0.24	0.09	0.10	1.69	Post-communist	5.48	0.75	-0.48
Netherlands	0.05	0.40	0.32	0.13	0.11	1.91	Conservative	4.73	1.40	0.97
Norway	0.05	0.33	0.35	0.14	0.13	2.05	Social Democratic	7.14	3.05	-1.08
Poland	0.09	0.45	0.27	0.10	0.10	1.76	Post-communist	4.74	1.29	-0.04
Portugal	0.14	0.52	0.19	0.07	0.08	1.49	Mediterranean	4.73	0.79	-0.04
Romania	0.16	0.44	0.19	0.09	0.12	1.66	Post-communist	3.12		
Russia	0.13	0.51	0.19	0.06	0.11	1.71	Post-communist	2.94		-0.25
Spain	0.10	0.51	0.25	0.08	0.06	1.51	Mediterranean	4.22	0.55	-0.80
Sweden	0.04	0.32	0.32	0.16	0.16	2.17	Social Democratic	6.31	3.49	-1.06
Switzerland	0.09	0.44	0.30	0.11	0.06	1.65	Conservative	4.95	1.23	-0.02
Macedonia	0.09	0.61	0.17	0.06	0.07	1.47	Post-communist	4.73		
UK	0.06	0.38	0.28	0.14	0.13	1.98	Liberal	4.51	2.16	-1.08
US	0.06	0.28	0.27	0.16	0.23	2.41	Liberal	4.88	0.61	-1.31

Note: Education policies and family policies are measured by the government expenditures on education and family, respectively, as percentage of GDP. The index of school tracking is the factor scores provided by Bol and Van de Werfhorst (2013). A higher score indicates a more tracked structure.

Table A4: The OLS Coefficients of Sibship Size on Family SES index (ESCS) by Country

	Sib 1		Sib 2		Sib 3		Sib 4+	
	Coef.	(SE)	Coef.	(SE)	Coef.	(SE)	Coef.	(SE)
Albania	0.5	(0.28)	-0.11	(0.29)	-0.82*	(0.34)	-1.48***	(0.30)
Australia	0.57*	(0.23)	0.58*	(0.23)	-0.31	(0.22)	-0.33	(0.27)
Austria	0.08	(0.13)	0.01	(0.16)	-0.44*	(0.20)	-0.82***	(0.22)
Belgium	0.67***	(0.12)	0.83***	(0.15)	0.49**	(0.16)	-0.5**	(0.18)
Bulgaria	-0.81***	(0.16)	-1.71***	(0.26)	-1.65***	(0.31)	-2.49***	(0.51)
Canada	0.28**	(0.09)	0.22*	(0.10)	0.02	(0.12)	-0.51***	(0.12)
Czech Republic	-0.15	(0.15)	-1.02***	(0.16)	-1.14***	(0.24)	-1.65***	(0.23)
Denmark	0.24	(0.20)	0.45*	(0.20)	-0.21	(0.24)	-0.31	(0.24)
Finland	-0.01	(0.18)	-0.1	(0.18)	-0.66***	(0.19)	-0.75***	(0.20)
France	0.33*	(0.17)	0.05	(0.17)	-0.35	(0.20)	-1.32***	(0.24)
Germany	0.35	(0.18)	0.23	(0.21)	-0.3	(0.24)	-0.42	(0.22)
Greece	-0.58**	(0.18)	-1.39***	(0.21)	-1.87***	(0.28)	-1.92***	(0.36)
Hong Kong	-0.71***	(0.14)	-1.5***	(0.15)	-1.86***	(0.18)	-2.34***	(0.25)
Hungary	0	(0.15)	-0.69***	(0.20)	-1.58***	(0.24)	-1.84***	(0.24)
Iceland	0.78*	(0.31)	0.68*	(0.31)	0.57	(0.31)	-0.05	(0.33)
Ireland	1.19***	(0.26)	1.12***	(0.26)	0.68**	(0.26)	0.01	(0.26)
Italy	-0.24	(0.14)	-0.67***	(0.15)	-0.69**	(0.22)	-1.26***	(0.36)
South Korea	0.53***	(0.14)	-0.23	(0.17)	-0.69**	(0.26)	-1.21***	(0.31)
Latvia	-0.13	(0.17)	-0.73***	(0.21)	-0.86***	(0.25)	-1.28***	(0.21)
Netherlands	0.17	(0.31)	0.28	(0.31)	0.06	(0.34)	-1.08**	(0.36)
Norway	1.26***	(0.23)	1.05***	(0.22)	0.68**	(0.24)	0.26	(0.25)
Poland	-0.76***	(0.19)	-1.56***	(0.23)	-2.22***	(0.25)	-2.08***	(0.28)
Portugal	-0.34*	(0.16)	-0.8***	(0.18)	-1.37***	(0.25)	-2.27***	(0.24)
Romania	-0.73***	(0.14)	-2.12***	(0.17)	-3.06***	(0.25)	-3.83***	(0.20)
Russia	-0.22	(0.14)	-1.03***	(0.18)	-0.94***	(0.20)	-1.02***	(0.18)
Spain	-0.24	(0.15)	-0.61***	(0.16)	-0.97***	(0.21)	-1.67***	(0.30)
Sweden	0.32	(0.23)	0.14	(0.23)	-0.32	(0.24)	-0.56*	(0.22)
Switzerland	-0.36*	(0.14)	-0.42**	(0.16)	-0.75***	(0.18)	-1.25***	(0.24)
Macedonia	-0.03	(0.18)	-0.78***	(0.22)	-0.29	(0.29)	-1.2***	(0.31)
UK	0.58***	(0.17)	0.25	(0.18)	-0.19	(0.19)	-0.98***	(0.24)
US	0.51*	(0.25)	0.2	(0.26)	-0.7**	(0.26)	-1.11***	(0.27)

Note: Gender, age (squared), and immigrant status are controlled for. Those coefficients are omitted. The omitted reference group is only-children (Sib 0). Numbers in parentheses are school-clustered standard errors. ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$.

Table A5: The OLS Coefficients of Sibship Size on Reading Literacy Score by Country

	Sib 1			Sib 2			Sib 3			Sib 4+		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Albania	0.83	0.39	0.22	-0.68	-0.55	-0.52	-3.14***	-2.32**	-2.23**	-6.05***	-4.71***	-4.57***
Australia	0.45	-0.11	0.39	0.06	-0.53	-0.04	-2.08*	-1.66	-1.24	-2.96**	-2.49**	-2.12*
Austria	0.08	-0.01	0.12	-0.23	-0.21	-0.03	-1.36*	-0.91	-0.97	-2.74***	-1.90**	-1.82**
Belgium	0.52	-0.17	-0.23	-0.05	-0.89	-1.02*	-1.35**	-1.85***	-2.11***	-4.38***	-3.71***	-3.90***
Bulgaria	-1.40**	-0.24	-0.07	-4.13***	-2.05**	-1.83**	-3.63**	-1.19	-0.59	-5.70*	-2.58	-2.08
Canada	-0.28	-0.54	-0.35	-0.89*	-1.12**	-0.90*	-1.23**	-1.26**	-1.11**	-3.10***	-2.54***	-2.54***
Czech Republic	-1.17*	-1.01*	-0.80	-2.45***	-1.32*	-1.16*	-3.40***	-2.16***	-1.93**	-4.98***	-3.10***	-2.88***
Denmark	0.45	0.06	0.32	-0.09	-0.68	-0.24	-0.83	-0.73	-0.61	-1.83*	-1.66*	-1.08
Finland	-0.05	-0.05	0.10	-0.54	-0.45	-0.27	-0.71	-0.16	0.01	-2.37**	-1.74*	-1.80*
France	0.19	-0.14	-0.26	-0.10	-0.15	-0.38	-2.94***	-2.55***	-2.75***	-4.34***	-2.94***	-3.24***
Germany	-0.02	-0.34	-0.20	-0.55	-0.78	-0.76	-2.15***	-1.93**	-1.97**	-2.88***	-2.48***	-2.47***
Greece	-3.14***	-2.44***	-2.19***	-4.24***	-2.72***	-2.54***	-5.96***	-3.95***	-3.51***	-7.47***	-5.50***	-5.17***
Hong Kong	-1.05*	-0.52	-0.39	-2.73***	-1.62***	-1.30**	-4.75***	-3.43***	-3.05***	-7.97***	-6.29***	-5.88***
Hungary	-0.44	-0.45	-0.64	-2.12**	-1.18*	-1.29*	-3.99***	-1.86**	-2.16**	-6.70***	-4.27***	-4.29***
Iceland	-0.09	-0.61	-0.29	-0.31	-0.76	-0.38	-1.10	-1.49	-1.18	-1.33	-1.30	-0.94
Ireland	0.08	-1.02	-1.10	0.22	-0.84	-0.95	-0.43	-1.04	-1.10	-2.93**	-2.93**	-3.19***
Italy	-2.37***	-2.12***	-2.15***	-3.84***	-3.23***	-3.24***	-5.31***	-4.70***	-4.91***	-8.13***	-7.00***	-7.19***
South Korea	0.55	0.12	-0.03	-1.38*	-1.19	-1.25*	-2.17*	-1.55	-1.50	-4.00***	-2.94**	-2.87**
Latvia	0.69	0.84	0.88	-0.64	0.00	0.05	-1.70*	-0.91	-1.08	-3.55***	-2.45**	-2.52**
Netherlands	2.98**	2.77**	2.79**	2.54*	2.23*	2.41*	2.69*	2.65*	2.97**	0.05	1.20	1.02
Norway	0.51	-0.52	-0.47	0.45	-0.41	-0.38	-0.07	-0.59	-0.45	-2.36*	-2.56**	-2.39**
Poland	-0.81	0.15	0.09	-2.64***	-0.79	-0.88	-5.29***	-2.82**	-2.91***	-3.55***	-1.15	-1.33
Portugal	-2.38***	-2.01***	-1.77***	-3.69***	-2.97***	-2.56***	-5.44***	-4.10***	-3.56***	-9.48***	-7.22***	-6.41***
Romania	-1.11*	-0.77	-0.71	-3.42***	-1.95***	-1.93***	-4.48***	-2.2**	-2.15*	-7.02***	-3.92***	-3.84***
Russia	-1.15*	-0.94*	-0.80	-3.61***	-2.62***	-2.33***	-4.94***	-4.05***	-3.74***	-4.49***	-3.58***	-3.28***
Spain	-1.19*	-0.90	-0.63	-2.44***	-1.73**	-1.34*	-4.32***	-3.15***	-2.60***	-5.69***	-3.68***	-3.13***
Sweden	0.35	0.08	0.36	-0.01	-0.13	0.16	-0.73	-0.46	-0.10	-3.05***	-2.56**	-2.26**
Switzerland	-0.41	-0.02	-0.05	-0.33	0.13	-0.08	-1.51*	-0.69	-1.03	-3.75***	-2.31**	-2.62**
Macedonia	1.20*	1.39*	1.49**	-2.35**	-1.49*	-1.23	-5.15***	-4.67***	-4.63***	-4.96***	-3.87***	-3.61***
UK	-0.22	-0.95	-0.88	-1.99***	-2.31***	-2.05***	-2.61***	-2.45***	-2.23***	-5.16***	-4.05***	-3.97***
US	1.33	0.63	0.69	0.08	-0.31	-0.20	-2.12**	-1.49*	-1.18	-3.94***	-2.92***	-2.94***

Note: Gender, age (squared), and immigrant status are controlled for. Those coefficients are omitted. The omitted reference group is only-children (Sib 0). In Model 2, family SES index is controlled for. In Model 3, the measures of family resources are additionally included. ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$.

Table A6: The OLS Coefficients of Sibship Size on Math Literacy Score by Country

	Sib 1			Sib 2			Sib 3			Sib 4+		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Albania	1.25	0.63	0.56	0.69	0.57	0.65	-2.33	-1.92	-1.80	-4.27***	-3.48**	-3.40**
Australia	0.10	-0.49	0.08	-1.17	-1.85	-1.28	-3.10*	-2.66*	-2.12	-2.26	-2.28	-1.89
Austria	0.22	0.13	0.32	1.00	1.08	1.10	-1.07	-0.78	-0.98	-2.49*	-1.57	-1.45
Belgium	0.80	0.13	0.15	0.71	-0.22	-0.20	-1.22	-1.90**	-2.02**	-3.54***	-3.02***	-3.31***
Bulgaria	-1.08*	-0.06	-0.13	-3.29**	-1.32	-1.47	-3.57*	-1.97	-1.66	-3.03	-0.54	0.10
Canada	-0.40	-0.72	-0.63	-0.79	-1.08*	-0.98*	-1.64***	-1.70***	-1.64***	-3.11***	-2.89***	-2.90***
Czech Republic	-0.62	-0.53	-0.59	-2.23**	-1.17	-1.29	-3.40***	-2.00*	-1.99*	-4.89***	-2.63**	-2.79***
Denmark	1.16	1.09	1.33	0.21	-0.03	0.35	0.29	0.48	0.68	-1.37	-0.88	-0.35
Finland	0.77	0.79	0.87	0.39	0.50	0.63	0.23	0.98	1.11	-0.76	-0.11	-0.12
France	0.69	0.53	0.34	1.16	1.12	0.83	-1.69	-1.35	-1.60*	-2.98**	-1.80	-2.15*
Germany	0.54	0.20	0.17	-0.04	-0.40	-0.58	-0.77	-0.41	-0.58	-1.08	-0.71	-0.99
Greece	-1.44*	-0.91	-0.90	-2.75**	-1.31	-1.55	-4.74***	-2.81**	-2.78**	-4.00**	-2.40	-2.69*
Hong Kong	-1.46	-0.99	-0.90	-2.77***	-1.88*	-1.66*	-4.61***	-3.67***	-3.43***	-8.07***	-6.76***	-6.46***
Hungary	0.13	0.39	0.17	-1.09	-0.49	-0.74	-3.08**	-0.98	-1.31	-5.66***	-2.95**	-3.10**
Iceland	0.06	-0.49	-0.11	0.33	-0.15	0.23	-0.83	-1.30	-1.04	-1.29	-1.40	-1.32
Ireland	1.33	0.28	0.02	0.90	-0.06	-0.36	0.83	0.27	-0.15	-1.38	-1.34	-1.93
Italy	-1.98**	-1.84**	-1.88**	-2.84**	-2.37**	-2.46**	-4.25***	-3.81**	-4.06***	-5.39**	-4.78**	-5.21**
South Korea	0.87	0.31	0.16	-1.43	-1.20	-1.40	-2.07	-1.87	-2.11	-4.75**	-3.69**	-3.62**
Latvia	0.71	0.87	0.99	-1.11	-0.58	-0.44	0.60	1.30	1.30	-3.49**	-2.54*	-2.51*
Netherlands	1.65	1.62	1.35	0.86	0.79	0.46	0.78	0.85	0.48	-0.90	0.38	-0.55
Norway	0.88	0.16	0.01	1.57	1.02	0.74	1.56	1.34	0.99	-2.68*	-2.61*	-2.66*
Poland	0.05	0.91	0.72	-1.38	0.30	-0.01	-3.63**	-1.49	-1.80	-2.83*	-0.73	-1.00
Portugal	-1.77*	-1.42*	-1.16	-2.74**	-1.94*	-1.71*	-3.97***	-2.92**	-2.25*	-8.97***	-6.95***	-6.01***
Romania	-0.24	0.07	0.13	-3.2***	-1.80	-1.81*	-3.63***	-1.30	-1.34	-5.76***	-2.97**	-2.90**
Russia	-0.79	-0.55	-0.61	-2.21**	-1.47*	-1.35	-3.01**	-2.27*	-2.15*	-3.86***	-2.89***	-2.70***
Spain	-0.15	0.22	0.33	-1.38	-0.65	-0.47	-4.36***	-2.90***	-2.70**	-4.52***	-2.68**	-2.60**
Sweden	0.48	0.48	0.58	0.17	0.31	0.34	-0.43	0.07	0.14	-2.50*	-1.81	-1.77
Switzerland	1.35	1.45	1.26	1.68	1.84	1.41	0.93	1.46	0.91	-1.12	-0.15	-0.62
Macedonia	0.63	0.88	0.94	-2.96**	-2.09	-1.86	-4.36**	-3.78**	-3.71**	-4.49**	-3.42*	-3.21*
UK	-1.10	-1.83*	-1.85*	-2.28**	-2.58***	-2.33**	-3.61***	-3.36***	-3.32***	-5.73***	-4.53***	-4.50***
US	2.92**	1.86	1.63	1.27	0.36	0.11	-0.11	0.35	0.27	-2.40*	-1.62	-2.21*

Note: Gender, age (squared), and immigrant status are controlled for. Those coefficients are omitted. The omitted reference group is only-children (Sib 0). In Model 2, family SES index is controlled for. In Model 3, the measures of family resources are additionally included. ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$.

Table A7: The OLS Coefficients of Sibship Size on Self-confidence by Country

	Sib 1			Sib 2			Sib 3			Sib 4+		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Albania	2.14*	1.90*	1.67	2.23*	2.32*	2.32**	1.64	2.10*	2.18*	1.28	2.04*	2.28*
Australia	0.16	-0.17	0.42	-0.26	-0.61	-0.03	-1.52	-1.27	-0.65	-0.64	-0.37	0.13
Austria	-0.07	-0.12	-0.01	-0.60	-0.65	-0.40	-0.55	-0.48	-0.31	-1.52	-1.34	-1.14
Belgium												
Bulgaria	-1.01*	-0.58	-0.45	-0.97	-0.13	0.16	-1.93	-0.97	-0.42	-2.24	-0.98	-0.40
Canada												
Czech Republic	-0.81	-0.72	-0.49	-1.6**	-1.04	-0.74	-2.31**	-1.70*	-1.29	-2.35**	-1.40	-0.92
Denmark	1.20	0.83	1.08	0.92	0.33	0.78	0.79	0.78	0.93	0.01	0.06	0.63
Finland	-0.54	-0.60	-0.11	-0.67	-0.68	-0.07	-1.98**	-1.59*	-0.83	-1.43	-0.95	-0.32
France												
Germany	-0.62	-0.80	-0.44	-1.76***	-1.92***	-1.59**	-1.19	-1.17	-1.00	-0.36	-0.25	0.42
Greece												
Hong Kong	-0.93	-0.44	-0.33	-1.74**	-0.71	-0.43	-1.88**	-0.64	-0.34	-2.99***	-1.41	-1.16
Hungary	-0.80	-0.80	-0.74	-1.82**	-1.49*	-1.38*	-2.19**	-1.41	-1.15	-1.85*	-0.95	-0.64
Iceland	0.80	0.06	0.31	0.17	-0.46	-0.16	-0.56	-1.11	-0.83	-2.11*	-2.07*	-1.57
Ireland	0.35	-0.47	-0.19	0.11	-0.67	-0.29	-0.04	-0.49	0.18	-1.13	-1.14	-0.73
Italy	0.99	1.10	1.10	1.89**	2.18**	2.21***	0.94	1.22	1.03	-1.76	-1.24	-1.21
South Korea	0.76	0.30	0.05	-0.13	0.02	-0.21	-1.72	-1.19	-1.18	-0.65	0.27	0.02
Latvia	-0.29	-0.17	0.29	-1.15	-0.70	-0.11	-0.35	0.19	0.48	-1.59	-0.83	-0.21
Netherlands	-1.27	-1.34	-1.20	-1.11	-1.21	-0.89	-1.27	-1.28	-0.62	-1.68	-1.29	-1.06
Norway	1.39	0.35	0.34	1.17	0.26	0.30	0.23	-0.31	-0.03	-0.85	-1.06	-0.81
Poland												
Portugal	-1.38*	-1.14*	-0.87	-1.78**	-1.30*	-0.83	-2.19**	-1.30	-0.71	-3.79***	-2.31**	-1.30
Romania	-0.67	-0.39	-0.23	-1.37*	-0.20	-0.09	-2.82**	-1.03	-0.83	-0.90	1.53	1.80*
Russia	-0.72	-0.59	-0.10	-1.89***	-1.24*	-0.57	-1.70*	-1.11	-0.46	-2.14***	-1.54**	-0.79
Spain												
Sweden	0.35	0.06	0.73	0.17	0.01	0.77	-0.74	-0.52	0.38	-1.51	-1.06	-0.10
Switzerland	0.09	0.18	0.27	-0.37	-0.30	-0.27	-0.97	-0.83	-0.91	-0.91	-0.57	-0.49
Macedonia	0.60	0.73	0.99	-1.59*	-1.00	-0.44	-0.95	-0.63	-0.60	-1.80	-1.07	-0.40
UK												
US	1.09	0.64	0.80	1.01	0.76	1.02	-1.03	-0.69	-0.20	-0.03	0.51	0.80

Note: Gender, age (squared), and immigrant status are controlled for. Those coefficients are omitted. The omitted reference group is only-children (Sib 0). In Model 2, family SES index is controlled for. In Model 3, the measures of family resources are additionally included. ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$.

Table A8: The OLS Coefficients of Sibship Size on Perseverance by Country

	Sib 1			Sib 2			Sib 3			Sib 4+		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Albania	1.79*	1.58	1.29	2.20**	2.24**	2.13*	1.09	1.49	1.44	1.03	1.69	1.88*
Australia	-0.51	-0.78	-0.32	-0.86	-1.14	-0.66	-1.63	-1.44	-0.88	-1.30	-1.10	-0.66
Austria	-0.11	-0.13	0.00	-0.66	-0.68	-0.33	-0.97	-0.95	-0.63	-1.10	-1.04	-0.74
Belgium												
Bulgaria	-0.59	-0.52	-0.44	-0.24	0.07	0.50	-1.14	-0.78	-0.29	0.87	1.38	1.88
Canada												
Czech Republic	-0.45	-0.40	-0.24	-1.19	-0.84	-0.53	-1.43	-1.04	-0.56	-2.36*	-1.75	-1.15
Denmark	0.18	-0.02	0.19	-0.68	-0.99	-0.57	0.85	0.80	0.97	-0.59	-0.60	0.05
Finland	-1.90**	-1.93**	-1.36*	-1.98**	-1.97**	-1.24*	-2.93***	-2.67***	-1.73*	-1.96*	-1.64*	-0.81
France												
Germany	-1.58	-1.72*	-1.39	-2.49**	-2.60**	-2.25**	-2.48**	-2.39*	-2.21*	-1.70	-1.55	-0.74
Greece												
Hong Kong	-1.01*	-0.57	-0.47	-1.92***	-1.00	-0.63	-2.39**	-1.30	-0.88	-3.86***	-2.48**	-2.08**
Hungary	0.00	-0.01	0.18	-1.04	-0.78	-0.53	-0.76	-0.15	0.33	-0.97	-0.29	0.20
Iceland	1.88	1.53	1.67	0.65	0.35	0.48	0.94	0.68	0.87	-0.12	-0.12	0.43
Ireland	-1.14	-1.60	-1.20	-1.08	-1.50	-0.99	-1.47	-1.72	-0.85	-1.85*	-1.83*	-1.17
Italy	0.59	0.66	0.68	0.78	0.97	1.05	-0.01	0.17	0.04	-1.09	-0.77	-0.66
South Korea	0.71	0.30	0.12	-0.15	0.00	-0.12	-0.85	-0.34	-0.14	-0.44	0.43	0.32
Latvia	-0.83	-0.77	-0.34	-1.34	-1.11	-0.54	-1.12	-0.84	-0.63	-0.57	-0.18	0.46
Netherlands	-1.21	-1.27	-1.16	-1.57	-1.63	-1.22	-0.93	-0.91	-0.09	-1.54	-1.25	-0.80
Norway	0.61	-0.01	-0.08	0.51	-0.04	-0.05	-0.55	-0.87	-0.52	-0.52	-0.64	-0.39
Poland												
Portugal	-1.27*	-1.08*	-0.76	-2.59***	-2.18***	-1.57**	-2.54***	-1.77**	-0.99	-4.40***	-3.12***	-1.89*
Romania	-0.05	-0.07	0.11	-0.50	-0.10	0.02	-0.60	0.16	0.34	-1.39	-0.24	0.03
Russia	-0.37	-0.29	0.18	-1.49**	-0.96	-0.35	-1.15	-0.67	-0.08	-1.21*	-0.72	0.05
Spain												
Sweden	-0.11	-0.36	0.24	-0.39	-0.50	0.21	-1.28	-1.12	-0.24	-1.53	-1.18	-0.15
Switzerland	0.50	0.54	0.48	0.28	0.27	0.16	-0.10	-0.10	-0.28	0.01	0.14	0.12
Macedonia	0.48	0.53	0.71	-0.44	-0.13	0.34	-0.20	-0.04	-0.07	-1.27	-0.85	-0.21
UK												
US	-0.16	-0.54	-0.37	-0.66	-0.89	-0.61	-1.86*	-1.58	-1.09	-1.13	-0.69	-0.30

Note: Gender, age (squared), and immigrant status are controlled for. Those coefficients are omitted. The omitted reference group is only-children (Sib 0). In Model 2, family SES index is controlled for. In Model 3, the measures of family resources are additionally included. ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$.

Table A9: The OLS Coefficients of Sibship Size on Sociability by Country

	Sib 1			Sib 2			Sib 3			Sib 4+		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Albania	1.43	1.35	1.26	1.54	1.55	1.46	0.78	0.88	0.79	0.50	0.68	0.67
Australia	0.38	0.21	0.43	0.53	0.35	0.63	0.28	0.39	0.82	0.40	0.53	0.94
Austria	-0.55	-0.55	-0.58	-0.43	-0.40	-0.31	-1.09	-0.99	-0.78	-0.82	-0.66	-0.51
Belgium	0.41	0.26	0.37	0.91	0.72	0.90	-0.06	-0.18	0.09	0.58	0.71	1.03
Bulgaria	-0.30	0.12	0.14	-0.43	0.37	0.53	-0.87	0.05	0.51	-2.06	-0.88	-0.66
Canada	0.78*	0.71*	0.76*	0.95*	0.89*	1.06**	0.77	0.76	1.00*	0.32	0.47	0.62
Czech Republic	0.00	0.04	0.29	-0.90	-0.58	-0.23	-0.95	-0.58	-0.18	-2.45**	-1.91*	-1.32
Denmark	1.40	1.33	1.33	1.56	1.47	1.53	1.23	1.30	1.35	1.48	1.55	1.72
Finland	0.64	0.66	0.83	-0.23	-0.20	0.07	-0.34	-0.26	0.12	-0.93	-0.83	-0.44
France	1.08	1.01	1.00	-0.15	-0.13	-0.15	1.35	1.50*	1.72*	0.09	0.47	0.67
Germany	-0.46	-0.53	-0.40	-0.18	-0.21	-0.06	-1.77*	-1.64*	-1.57*	-0.63	-0.48	-0.09
Greece	-0.13	-0.11	0.16	-0.48	-0.42	-0.13	-0.28	-0.19	0.43	0.31	0.40	1.18
Hong Kong	0.36	0.64	0.68	-0.10	0.47	0.75	-1.21	-0.53	-0.23	-0.45	0.43	0.75
Hungary	0.28	0.28	0.39	0.13	0.48	0.67	-1.59	-0.80	-0.49	-0.74	0.15	0.49
Iceland	2.33	2.00	1.84	2.68*	2.41	2.24	2.38	2.17	2.09	1.91	1.99	2.20
Ireland	-1.08	-1.16	-0.98	-0.91	-0.98	-0.76	-0.79	-0.83	-0.46	-0.56	-0.54	-0.14
Italy	0.50	0.53	0.56	0.67	0.75	0.84	0.99	1.08	1.08	-0.54	-0.37	-0.04
South Korea	1.36**	1.11*	1.05*	1.52*	1.62**	1.64**	-0.89	-0.54	-0.24	-0.06	0.55	0.57
Latvia	1.93**	2.04***	2.16***	0.48	0.85	1.02	-0.77	-0.32	-0.38	-1.05	-0.40	-0.21
Netherlands	-0.10	-0.19	-0.12	0.32	0.22	0.52	-0.97	-0.95	-0.32	-1.40	-0.98	-0.33
Norway	1.78*	1.34	1.50	1.39	1.03	1.27	0.59	0.41	0.84	-0.63	-0.65	-0.40
Poland	-0.49	-0.13	-0.14	-1.64	-0.86	-0.82	-3.82***	-2.76*	-2.63*	-2.28**	-1.19	-1.29
Portugal	-0.53	-0.36	-0.02	-1.97**	-1.59**	-1.06	-2.64**	-1.95*	-1.29	-4.45***	-3.29***	-2.35**
Romania	-0.51	-0.30	-0.17	-1.52*	-0.56	-0.46	-2.42**	-0.92	-0.72	-2.81***	-0.75	-0.52
Russia	0.40	0.46	0.70	-0.45	-0.04	0.35	-1.10	-0.72	-0.38	-0.98	-0.60	-0.15
Spain	0.56	0.60	0.67	1.35**	1.45**	1.69**	0.44	0.61	1.07	0.34	0.63	1.29
Sweden	-0.24	-0.36	-0.17	0.26	0.24	0.51	-0.74	-0.69	-0.33	-1.33	-1.17	-0.72
Switzerland	0.32	0.39	0.21	0.25	0.35	0.15	-0.10	0.06	-0.15	-1.52	-1.27	-1.44
Macedonia	-0.22	-0.16	-0.04	-1.87**	-1.62*	-1.30	-2.57*	-2.42*	-2.39*	-3.38***	-3.07***	-2.61**
UK	1.88**	1.71*	1.90**	1.96**	1.89**	2.17**	0.98	1.03	1.44	1.10	1.39	1.70*
US	2.15*	1.88*	1.73*	2.07*	1.92*	1.86*	2.24*	2.49*	2.45*	0.63	1.03	1.20

Note: Gender, age (squared), and immigrant status are controlled for. Those coefficients are omitted. The omitted reference group is only-children (Sib 0). In Model 2, family SES index is controlled for. In Model 3, the measures of family resources are additionally included. ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$.

Table A10: The OLS Coefficients of Sibship Size on Cooperativeness by Country

	Sib 1			Sib 2			Sib 3			Sib 4+		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Albania	1.72	1.75*	1.66	2.40**	2.39**	2.29**	2.46**	2.40**	2.31*	2.43*	2.33*	2.36*
Australia	0.03	0.01	0.38	0.50	0.48	0.87	0.39	0.39	0.88	0.73	0.73	1.16
Austria	0.22	0.23	0.30	0.62	0.65	0.88	0.22	0.30	0.56	0.78	0.91	1.15
Belgium												
Bulgaria	-0.40	-0.19	-0.06	0.00	0.52	0.92	-0.99	-0.38	0.10	1.62	2.45	2.78
Canada												
Czech Republic	1.06	1.07	1.22*	0.74	0.90	1.21	0.92	1.11	1.49	0.05	0.34	0.84
Denmark	0.41	0.38	0.38	0.07	0.05	0.12	0.80	0.88	0.94	-0.06	0.02	0.28
Finland	-0.39	-0.34	0.11	-0.86	-0.77	-0.21	-1.06	-0.83	-0.09	-0.43	-0.18	0.45
France												
Germany	-0.67	-0.73	-0.43	-0.51	-0.55	-0.20	-1.06	-1.01	-0.81	-0.13	-0.05	0.56
Greece												
Hong Kong	0.17	0.35	0.45	0.29	0.68	1.05	-0.03	0.44	0.87	-0.32	0.28	0.73
Hungary	0.55	0.55	0.70	0.95	0.98	1.15*	1.13	1.19	1.59*	0.38	0.45	0.81
Iceland	0.75	0.60	0.55	1.45	1.34	1.28	1.84	1.76	1.76	2.02	2.09	2.25
Ireland	1.01	1.13	1.26	1.06	1.19	1.31	0.61	0.67	1.05	1.12	1.15	1.54*
Italy	0.51	0.49	0.49	0.96	0.90	0.96	0.29	0.24	0.29	-0.44	-0.52	-0.29
South Korea	1.26*	1.07	0.87	0.39	0.51	0.31	0.75	1.09	1.09	-0.05	0.53	0.36
Latvia	0.69	0.73	1.01	-0.52	-0.37	0.06	-1.26	-1.06	-0.97	-0.47	-0.21	0.19
Netherlands	-1.06	-1.09	-0.97	-0.46	-0.49	-0.17	-1.55	-1.55	-0.94	-1.37	-1.26	-0.83
Norway	1.63	1.35	1.37	1.19	0.95	1.02	0.18	0.04	0.39	1.01	0.96	1.19
Poland												
Portugal	-0.13	-0.13	0.22	-0.36	-0.30	0.22	-0.40	-0.32	0.25	-1.12	-0.94	-0.11
Romania	0.99*	0.87	0.91	1.66**	1.52*	1.47*	1.77*	1.65*	1.73*	1.64*	1.57*	1.65*
Russia	0.62	0.68	1.05*	0.77	1.08*	1.54**	0.69	0.97	1.38*	0.33	0.62	1.18
Spain												
Sweden	1.74*	1.68*	1.98*	1.43	1.42	1.78*	2.03**	2.04**	2.50**	0.93	0.99	1.50
Switzerland	0.63	0.64	0.63	0.99	1.01	1.04	1.02	1.05	1.07	0.25	0.26	0.43
Macedonia	-1.46*	-1.44*	-1.45*	0.04	0.07	0.22	0.72	0.75	0.66	2.08*	2.11*	2.41*
UK												
US	0.99	0.76	0.56	0.94	0.82	0.76	0.35	0.57	0.58	-0.15	0.21	0.38

Note: Gender, age (squared), and immigrant status are controlled for. Those coefficients are omitted. The omitted reference group is only-children (Sib 0). In Model 2, family SES index is controlled for. In Model 3, the measures of family resources are additionally included. ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$.

Table A11: The Correlation Coefficients between the Proportion of Only-children and Performance Outcomes of Only-children and Children with One Sibling or More Controlling by Adjustment of Family Covariates

Dependent variable	Sib 0 (Only-children)			Sib 1+ (Children with at least one sibling)			Country N
	Model 1 Coef.	Model 2 Coef. (%Δ)	Model 3 Coef. (%Δ)	Model 1 Coef.	Model 2 Coef. (%Δ)	Model 3 Coef. (%Δ)	
Reading Literacy	0.47	0.27 (-43)	0.30 (-36)	-0.12	-0.01	0.00	31
Math Literacy	0.48	0.26 (-46)	0.28 (-42)	-0.05	0.05	0.06	31
Self-confidence	0.44	0.15 (-66)	0.26 (-41)	-0.22	-0.01	0.04	24
Perseverance	0.23	0.07	0.16	-0.06	0.03	0.09	24
Sociability	0.48	0.38 (-21)	0.41 (-15)	-0.10	0.10	0.15	31
Cooperativeness	0.37	0.34 (-8)	0.36 (-3)	0.18	0.23	0.31	24
Control variables	Basic demographics (gender, immigrant status, age)	Model 1 + Family SES index (ESCS)	Model 2 + Measures of family resources	Basic demographics (gender, immigrant status, age)	Model 1 + Family SES index (ESCS)	Model 2 + Measures of family resources	

Note: Numbers in parentheses are percentage changes in the correlation coefficient in comparison with the coefficient of Model 1. We report the percentage changes only when the Model 1 coefficient is statistically significant at the 0.05 level.

Figure A1: The Performance Outcomes and the Proportion of Only-children by Sibship Size Groups

Note: Shaded areas show the 95% confidence intervals.