



# Leadership at school: Does the gender of siblings matter?<sup>☆</sup>



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## HIGHLIGHTS

- We analyze the effect of the gender composition of siblings on leadership and sports and clubs participation.
- Having only sisters increases the probability of leadership both for males and for females in the USA.
- For Japan we find that having only sisters increases the probability of sport participation for males.

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## ABSTRACT

We use survey data from the USA and Japan to investigate whether having leader positions at middle and high school as well as participating in sports and clubs is affected by the gender composition of siblings. We find that having only sisters at age 15 increases substantially the probability of school leadership in the USA but has no statistically significant effect on leadership in Japan. We also find that parental education matters more for these behaviors in the USA than in Japan, and that in the latter country the oldest sons or daughters are more likely to be leaders in school.

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## 1. Introduction

A growing body of empirical research shows that self-discipline, leadership, motivation, competitiveness, risk aversion and self-esteem have a strong impact on educational attainment and labor market outcomes (Heckman and Rubinstein, 2001; Heckman et al., 2006). There is also evidence that self-discipline, motivation, competitiveness and other non-cognitive skills are correlated to leadership.

On the one hand, Reubena et al. (2012) and Heineck and Anger (2010) show that over-confident and extrovert individuals are more likely to take on leadership roles. On the other hand, recent

evidence suggests that non-cognitive skills can be fostered by holding leadership positions (being a team captain or a class officer) and by being involved in sports or club activities. These activities help to instill self-discipline, motivation, competitiveness and self-esteem (Darling et al., 2005). Both the self-selection into leadership positions according to pre-determined non-cognitive skills and the positive effect that leadership has on the development of these skills may explain why high school leadership and sport involvement are associated with higher education and better academic performance (Barron et al., 2000; Rouse, 2008).

Another well established fact is that females tend to be more risk averse, less competitive and more altruistic than males. There is also evidence of a gender gap in the willingness to behave as a leader and in sport and club participation (see Ertac and Gurdal, 2012). This gap is likely to depend both on social interactions and on genetics. Beaman et al. (2012) use the Indian practice of reserving leadership positions to women in randomly selected village councils to show that female leadership positively affects the career aspirations and educational attainment of adolescent girls. Booth and Nolen (2012) use an experimental setup to examine whether single-sex environments affect the risk preferences of students and find that girls from single-sex schools are less risk averse

<sup>☆</sup> This research uses micro data from the Preference Parameters Study of Osaka University's 21st Century COE Program 'Behavioral Macro-dynamics Based on Surveys and Experiments' and its Global COE project 'Human Behavior and Socioeconomic Dynamics'. We are grateful to Yukiko Abe, Francesca Gioia, Vincenzo Scoppa and Christoph Weiss for comments and to Yoshiro Tsutsui, Fumio Ohtake, and Shinsuke Ikeda for providing the data.

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than girls from mixed-sex schools. They also find that girls are more likely to choose risky outcomes when assigned to all-girls experimental groups.

If the gendered aspects of individual behavior are brought into play by the gender of others with whom they interact, we expect the gender composition of siblings in the family to play an important role in the development of valuable non-cognitive skills. Socialization at home may shape the goals and expectations of girls and boys and family structure may affect parental behavior toward children (Rosenberg and Sutton-Smith, 1968; Stoneman et al., 1986). To illustrate, a girl who only interacts with sisters will not experiment the different attitudes that parents may reserve to sons and daughters, for instance by asking them to spend different amounts of time on household chores (Steelman et al., 2002).

On the one hand, being less exposed to stereotyped behaviors, females growing up in a whole-sisters family may be less inclined to acquire traditional gender roles. On the other hand, the interaction between sisters and brothers could produce relevant externalities, with females learning to male-behave from brothers and brothers learning female attitudes from their sisters. In line with this argument, psychological studies show that girls with older brothers develop more masculine traits, while boys with older sisters are characterized by more feminine traits (Koch, 1955; Brim, 1958).

Empirical research has investigated the effects of siblings (their size, birth order and gender composition) on individual educational outcomes. While the negative relationship between the number of siblings, birth order and educational outcomes is well documented (see Steelman et al., 2002, for a review), the results are less conclusive on the role played by the sex composition of siblings (Butcher and Case, 1994; Hauser and Kuo, 1998).

In this paper, we use rather unique survey data to investigate whether the gender composition of siblings at age 15 contributes to explaining school leadership and individual participation in extracurricular activities – clubs and sports – in secondary school. Understanding the sources of individual differences in leadership is important for at least two reasons. First, leadership affects important outcomes such as wages and educational attainment. Second, since most policy-relevant decisions are made in committees, understanding the determinants of leadership can shed some light also on decision-making in groups.

Our data are from the “Preferences Parameters Study”, conducted by Osaka University both in the USA and in Japan, which contains information on individual participation in leadership positions, sports and clubs in middle and high school and on the gender composition of siblings at age 15. We find that having only sisters or only brothers at age 15 has different effects in the USA and Japan. In the USA, having only sisters increases the probability of taking up a school leadership position by 11.4% points. Having only brothers has smaller (and imprecisely estimated) effects on leadership but increases the participation in clubs and sports by 11.1% points. In Japan, the gender composition of siblings has no statistically significant effect on leadership and participation in extracurricular activities. In the USA, leadership in school depends also on parental education. In Japan, it increases with perceived relative height and among oldest sons and daughters. We speculate that one reason why the gender composition of siblings is less important for school leadership and for participation in extracurricular activities in Japan than in the USA is that young Japanese spend a substantially higher share of their time in school than young Americans. Because of this, their interactions with schoolmates may be more important than those with their siblings.

The paper is organized as follows. Section 2 describes the data. Section 3 discusses our main results and Section 4 concludes.

## 2. Data

Our data source is the “Preferences Parameters Study (PPS)”, a household survey conducted on a yearly basis by Osaka University. The purpose of this survey is to collect information on individual preferences and behavior to verify whether the premise in economics that people act rationally to maximize utility has empirical support. Compared to other data-sets that provide information on individual preferences, such as the US Health and Retirement Study or the US Panel Study for Income Dynamics, this survey has also information on the gender composition of siblings when the interviewed individual was 15 years old.

While in the USA the survey is administered by mail to the US My Survey panel, a non-representative sample of consumers who have voluntarily joined the panel to participate to consumer surveys, in Japan the survey is carried out by interviewers, who visit the households selected by a two-stage stratified random sample. Since the US sample is non-representative, it is useful to compare its main characteristics to those of the March Current Population Survey (CPS) sample. Focusing on 2007, we find that in the former sample the proportion of females is slightly higher than in the latter (52.2 versus 51.8) and that the distribution by education is heavily skewed toward those with at least a college degree, who are 49.6% in the PPS and 27.2% in the CPS.<sup>1</sup>

We use the 2007 wave in either country because it contains the same questions on leadership and extracurricular activities in secondary school as well as information on siblings at age 15. We retain only individuals aged between 20 and 65 and obtain a final sample of 1523 individuals in the USA and 2480 individuals in Japan. In the USA, 19.6% of the selected sample had only sisters at 15, 22.7% had only brothers, 43.9% had both brothers and sisters and 12.8% were single children. In Japan, 27.3% of the selected sample had only sisters, 31.1% had only brothers, 36.6% had both brothers and sisters and only 4% were single children.

We define leadership as a dummy equal to one if the interviewed individual was class president, captain of a sport team or a club or student council member in middle or high school, and to zero otherwise. The percentage of those who had a leadership position in middle or high school turns out to be much higher in Japan (43.1%) than in the USA (20.1%). As expected, in both countries college graduates are more likely to have been leaders (26.9% in the USA and 56.7% in Japan) than those without a college degree (15.6% in the USA and 38.8% in Japan).<sup>2</sup>

The survey measures participation in sport and other clubs with the following question: “Were you involved in any school club activities in middle school or high school? If you were in more than one club, answer for the one you had put in the most effort”. Individuals could choose one among the following answers: (a) I actively participated in a sports team; (b) I somewhat participated in a sports team; (c) I actively participated in a club other than sports team; (d) I somewhat participated in a club other than sports team; (e) I did not participate in any sports team or club activities.

We define the dummy variable *Sports and Clubs* as equal to one if the individual chooses options (a) to (d) and to zero otherwise. The percentage of individuals who engaged in these activities in middle and high school is 60% in the USA and 88.3% in Japan.<sup>3</sup>

<sup>1</sup> Further details on the design of the PPS survey are available at the website <http://www.iser.osaka-u.ac.jp/coe/data-e/data.html>.

<sup>2</sup> The percentage of males and females with a school leadership position is 43.5 and 42.8 in Japan, and 19.1 and 21.0 in the USA.

<sup>3</sup> The percentage of males and females engaging in sports and clubs is 88.3% and 88.4% in Japan, and 59.4% and 60.7% in the USA.

**Table 1**  
Participation in extracurricular activities at age 15. By gender. USA 2007. Marginal effects. Probit.

Covariates	US		Japan	
	Leadership	Clubs and sports	Leadership	Clubs and sports
Only sisters	0.114*** (0.033)	0.060 (0.042)	−0.016 (0.020)	−0.003 (0.013)
Only brothers	0.062* (0.033)	0.111*** (0.041)	−0.016 (0.029)	0.028 (0.018)
No brothers or sisters	0.003 (0.041)	0.056 (0.051)	−0.018 (0.028)	0.015 (0.037)
Oldest son or daughter	−0.026 (0.025)	0.007 (0.031)	0.069*** (0.022)	−0.005 (0.014)
Taller than average at 15	0.017 (0.024)	0.030 (0.030)	0.101*** (0.022)	0.019 (0.014)
More than two siblings at 15	0.027 (0.029)	0.029 (0.037)	−0.031 (0.030)	−0.026 (0.018)
Parents with some college	0.047** (0.022)	0.119*** (0.027)	0.017 (0.024)	−0.028* (0.015)
Household wealth at 15	−0.008 (0.021)	−0.018 (0.026)	0.033 (0.021)	−0.018 (0.013)
Female	0.027 (0.021)	0.015 (0.025)	−0.016 (0.020)	−0.003 (0.013)
Observations	1523	1523	2480	2480

Note: robust standard errors within parentheses. Each regression includes a constant and age cohort dummies.

\* Statistical significance at 10% level of confidence.

\*\* Statistical significance at 5% level of confidence.

\*\*\* Statistical significance at 1% level of confidence.

### 3. Results

We regress the three measures of extracurricular activities on three dummies capturing the gender composition of siblings in the household at age 15 – only sisters, only brothers, neither brother nor sister – and on the following additional covariates: a dummy equal to one if the individual is the oldest brother or sister and to zero otherwise; a dummy equal to one if the number of siblings is higher than two and to zero otherwise; a dummy indicating whether the individual was taller than average at age 15; a dummy equal to one if either parent had at least some college education and to zero otherwise; a dummy equal to one if household wealth at age 15 is higher than 5 in a range between 0 for the poorest and 10 for the wealthiest, and to zero otherwise, and a set of age cohort dummies—which capture the different periods when interviewed individuals were in secondary school.

We pool our data by gender and test whether the interactions of all covariates with a gender dummy are jointly statistically significant. Since we cannot reject the null (no statistically significant interactions), we perform our regressions on the pooled sample after adding a gender dummy. We first verify whether school leadership in our data affects educational attainment and find that the probability of having attained a college degree is 10.8% and 11.7% points higher among those who had a leadership position at school in the USA and Japan respectively. These results confirm that school leadership matters.<sup>4</sup>

Next, we report in Table 1 our estimates of the effects of the gender composition of siblings on school leadership and participation in extracurricular activities. Consider first leadership (columns (1) and (3)). In the USA, we find that having only sisters as siblings increases the probability of being a leader at school by 11.4% points with respect to having both brothers and sisters (the baseline).<sup>5</sup>

There is also some evidence that having only brothers matters to a lesser extent, albeit the estimated effect is not statistically significant at the 5% level of confidence. Given that the percentage of individuals with leadership in secondary school is close to 20%, these are very large effects.<sup>6</sup> We also find that having only brothers increases significantly (+11.1% points) the participation in sports and clubs. It could be that having a brother in the pre-school reference group encourages individuals to participate in “boy” activities, such as sports (see AAUW Educational Foundation Report, 1992). We also find that better parental education increases both this participation and leadership.

In contrast, we find that the gender composition of siblings does not have statistically significant effects on school leadership or on extracurricular activities in Japan.<sup>7</sup> Compared to the USA, being the oldest brother or sister or being taller than average in Japan matter more for leadership in school than the gender composition of siblings, and parental education matters less.<sup>8</sup>

### 4. Concluding remarks

Kuhn and Weinberger, 2005, have shown that individuals who had leadership positions in high school earn between 4% and 24% higher wages 10 years later. Barron and co-authors, 2000, have found that athletic participation in school affects wages later on. Although leadership is an important “soft skill”, economists know very little about how it is acquired. An obvious candidate is parental background. Dhuey and Lipscomb, 2008, show that an additional factor is the child's relative age among her cohort.

While Booth and Nolen, 2012, have focused on the gender composition of schoolmates (single-sex schools versus mixed-sex

<sup>4</sup> We also find that school leadership affects the probability of being a manager or an entrepreneur in adult life in the USA but not in Japan.

<sup>5</sup> The effect on leadership of having only sisters is observed for both genders. There are, however, some gender-specific effects. In particular, we find that in the USA the positive effect of parental education on leadership is statistically significant only for boys.

<sup>6</sup> In our sample, the number of siblings ranges from 0 to 5. Our results hold also when we restrict the sample to individuals with at most two siblings or to individuals aged 20–45 (results available from the authors upon request).

<sup>7</sup> Having only brothers reduces the likelihood of having a leadership position in school among Japanese males.

<sup>8</sup> To capture the role of traditional gender norms, we have interacted the sibling gender variables with a dummy for residence at age 15 in Southern states for the USA and in metropolitan areas for Japan. However, these interactions are never statistically significant.

schools) as a shaper of non-cognitive skills, in this paper we have considered instead the social interactions within the household and highlighted the potential importance of the gender composition of siblings. Our evidence from countries as different as the USA and Japan shows that gender composition matters in the former country but not in the latter.

We have found that having only sisters at age 15 in the USA increases substantially the probability that secondary school students take up leader positions at school, even after controlling for parental education. We speculate that, being less exposed to stereotyped behaviors, females growing up in a whole-sisters family may be less inclined to acquire traditional gender roles, and therefore more willing to take up leadership position at school. On the other hand, males growing up in a whole-sisters family may be more inclined to take up traditional gender roles. If leadership is a male prerogative, they are likely to exercise this prerogative to a higher extent at school.

We believe that a candidate reason why the gender composition of siblings matters less for school leadership in Japan than in the USA is the longer time that Japanese secondary school students spend in schools. According to [Juster and Stafford, 1991](#), the average number of weekly hours spent at school in Japan was 46.6 in junior high schools and 41.5 in high schools. In contrast, time spent at school was much shorter in the USA (28.7 in junior high and 26.2 in high school). Because of this longer time, social interactions with school mates in Japan may be more important than the interactions with siblings in shaping individual preferences and behaviors.

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