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Abstract

Gender segregation in higher education persists across developed countries and is paradoxically stronger in wealthier, more gender-equal societies. Using data from over 500,000 children across 37 Western countries, we show that this segregation has roots in childhood. We document a strong correlation at the country level between segregation in higher education and in childhood friendships. Longitudinal data from 10,000 British households further shows that children with fewer opposite-sex friends at age 7 are significantly more likely to select gender-dominated educational subjects a decade later. The stronger segregation observed in richer countries seems to reflect economic prosperity rather than backlash against gender equality: while children from wealthier households report fewer cross-gender friendships, those whose parents hold more gender-egalitarian views have more opposite-sex friends. We identify two mechanisms explaining this income gradient: affluent families' structured activities that emphasize children's self-expression foster gender-segregated environments, and higher-income children's personality traits reduce demand for cross-gender friendships.

JEL Codes: J16, I21, Z13

Keywords: cross-gender friendships, gender equality paradox, women in STEM

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1 Introduction

Although gender disparities in labor markets have narrowed considerably over recent decades, a persistent gender wage gap remains across developed economies. A substantial portion of this gap has been attributed to gender differences in field of study choices (Bertrand, 2018; Francesconi and Parey, 2018; Card and Payne, 2021).[1] Women tend to select into educational fields that typically yield lower earnings than those predominantly chosen by men. This pattern is most starkly evident in women's consistent underrepresentation in STEM fields, which typically offer substantial wage premiums (Goldin, 2014; Blau and Kahn, 2017).

Gender segregation in higher education has remained stubbornly persistent during the last two decades and in some countries, including the US, has increased slightly (England et al., 2020). Moreover, educational segregation by gender is not lower in more economically developed and gender-equal societies. On the contrary, countries that are wealthier and with greater 'vertical' gender equality (as measured by labor force participation, educational attainment, political representation, or gender norms) often exhibit stronger 'horizontal' gender segregation in educational and occupational choices (Charles and Bradley, 2009; Stoet and Geary, 2018), as well as more pronounced gender differences in preferences and personality measures (Falk and Hermle, 2018). This 'gender-equality paradox' presents a significant puzzle for researchers and policymakers and, to the extent that it reflects barriers to gender-balanced representation across fields, can lead to suboptimal allocation of talent in the economy (Cuberes and Teignier, 2016; Hsieh et al., 2019).[2]

Several explanations have been proposed for the negative correlation between vertical and horizontal measures of gender equality. A prominent theory, advanced by Charles and Bradley (2009), argues that in prosperous societies where material security is widespread, the segregative effect of gender-essentialist beliefs has been intensified by an increased emphasis on self-expression and self-realization. This cultural shift allows individuals to pursue fields aligned with their internalized gender identities rather than making educational choices

1. Field of study plays a substantial role in gender wage disparities. Black et al. (2008) find that among full-time employed US college graduates, differences in major choices explain approximately half of the gender wage gap. Similarly, Francesconi and Parey (2018) find that controlling for field of study reduces the gender wage gap among recent German university graduates by about 50 percent.

2. A recent article by Herlitz et al. (2024) provides a review of the 'gender-equality paradox' literature.

based on economic considerations. Supporting this hypothesis, Siy et al. (2023) observe that American students are more likely to prefer gender-stereotypical careers when encouraged to 'follow their passion' rather than pursue fields offering higher income and job security. In addition to this 'gendered self-expression' explanation, structural economic factors may also play an important role. Gender segregation in educational choices may reflect cross-national differences in the relative returns to various fields of study, stemming from variations in economic structure, the prominence of service sectors (Olivetti and Petrongolo, 2016), and features of fiscal systems that affect work incentives differently across genders (Kleven et al., 2019).

In this paper, we suggest an additional explanation for the persistence of educational gender segregation and its negative correlation with country-level measures of income and 'vertical' gender equality. We argue that segregation in education has its roots in gender segregation in childhood friendships, which is shaped by economic conditions and cultural norms. Our hypothesis draws on several complementary theoretical frameworks that link economic prosperity to childhood friendship patterns and, ultimately, to educational gender segregation. We propose two mechanisms through which economic prosperity may increase childhood gender segregation despite shifts toward more egalitarian gender norms and institutions (such as the decline of single-sex schools). First, as societies become wealthier, a distinctive parenting pattern emerges: increased emphasis on children's self-expression combined with more intensive parental management of children's activities and social environments (Hjalmarsson, 2023; Lareau, 2011). Higher income enables parents to provide substantial organization of children's activities, from sports teams to artistic pursuits to specialized clubs, which are often highly gendered in their composition and content (Anderson, 2008; Leaper, 2022). This combination of a self-expressive value system and concerted cultivation creates fertile ground for gender segregation in children's social worlds, as children express gender-typical preferences within carefully curated, often gender-differentiated environments. This dynamic parallels how self-expression has been linked to stronger gender segregation in educational choices (Charles and Bradley, 2009), but with the added dimension of prosperity-enabled activity organization. Second, economic prosperity may affect the 'demand' for opposite-sex friendships by shaping children's socio-emotional development.

There is causal evidence showing that higher household income decreases children's behavioral and emotional disorders and improves parent-child relationships (Akee et al., 2018).[3] These socio-emotional advantages may reduce children's motivation to form cross-gender friendships through two related pathways. On one hand, well-regulated children with fewer behavioral difficulties may be more satisfied with homogeneous peer groups and less inclined to seek the social challenges of cross-gender relationships. On the other hand, higher family income is associated with delayed pubertal onset, which may postpone the transition to mixed-gender friendship networks that typically accompanies adolescence (Poulin and Pedersen, 2007; Oelkers et al., 2021).[4]

Building on these friendship formation mechanisms, we hypothesize that social network segregation in childhood may ultimately lead to gender-typed educational choices. Drawing on developmental psychology (Brooks, 2003) and network theory (Schelling, 1978; Currarini et al., 2009), we propose that same-gender peer groups amplify gender-typical preferences, ultimately channeling children toward gender-stereotypical educational paths. This may lead to inefficient human capital allocation, as peer influence could deter individuals from pursuing fields that match their abilities rather than their social environment.

Our empirical analysis draws on two main datasets. First, we use the Health Behavior in School-Aged Children (HBSC) survey, a large-scale representative study containing information on over 500,000 children aged 11-15 from 37 European and North American countries across three waves (2002, 2006, and 2010). This survey provides detailed data on both the gender composition of children's friendship networks and the quality of these relationships. We devote particular attention to children aged 11, as this age precedes educational tracking or specialization that might influence social connections. Studying children at this early age also minimizes the influence of economic considerations that may shape behavior in adoles-

3. Akee et al. (2018) exploit an unconditional cash transfer program benefiting some Native American households from the revenues of a new casino on their reservation. There is also abundant descriptive evidence documenting that children from higher-income households tend to have better emotional regulation, stronger cooperation skills, fewer behavioral difficulties, and better relationships with parents (Kiernan and Mensah, 2009; Kelly et al., 2011; Washbrook et al., 2014; Reiss, 2013; Fitzsimons et al., 2017).

4. Previous studies have documented that higher socioeconomic status is associated with later pubertal timing (Oelkers et al., 2021), while research on adolescent development shows that the transition to puberty typically involves an increase in opposite-sex friendships as children develop romantic interests and more complex social dynamics (Poulin and Pedersen, 2007).

cence and adulthood. Second, we complement our analysis with longitudinal data from the Millennium Cohort Study (MCS), which allows us to follow approximately 10,000 British children born in 2000-2001 until age 17. The rich information available in this dataset allows us to investigate both the determinants of cross-gender friendships and their consequences.

HBSC cross-country data shows that, consistent with previous studies, children display strong homophily in their friendship patterns (Leaper, 2022). On average, at age 11 only about 27% of their close friends are of the opposite sex, and children report greater difficulty discussing important issues with opposite-sex friends compared to same-sex friends. Moreover, we observe substantial cross-country variation in these patterns, spanning from Finland, where only 16% of children's friends are of the opposite sex, to Portugal, where the figure reaches 39%. Consistent with our hypothesis that same-gender peer groups channel children toward gender-stereotypical educational paths, we find strong cross-country correlations between childhood friendship patterns and educational segregation. In countries where children have more opposite-sex friendships, women's propensity to graduate in STEM is higher (ρ = 0.43, p-value = 0.02) and Duncan's segregation index is lower (ρ = -0.47, p-value = 0.01).

Individual-level evidence from the MCS reinforces these findings. Children who had fewer opposite-sex friends at age 7 are significantly more likely to select high school subjects dominated by their own gender during ages 14-18. This association remains robust after controlling for children's cognitive and non-cognitive abilities, family socioeconomic characteristics, and parental personality traits. Our analysis identifies several mechanisms underlying this relationship, showing that children with fewer opposite-sex friends at age 7 are more likely to aspire to gender-segregated careers, maintain fewer cross-gender friendships in adolescence, and express more traditional gender attitudes. While our analysis cannot definitively establish causality, the consistent patterns observed at both individual and country levels strongly suggest that gender segregation in higher education has important roots in childhood social dynamics.

What factors determine the gender of children's friends? Mirroring the 'gender equality paradox' in education, we find that children tend to have significantly fewer opposite-sex friends in countries that score higher in measures of vertical gender equality, such as the

Global Gender Gap Index (Pearson's correlation ρ = -0.48, p-value = 0.00), the Gender Inequality Index (ρ = 0.43, p-value = 0.01), and World Value Survey attitudes (ρ = 0.36, p-value = 0.03). Naturally, while striking, these correlations may simply reflect underlying socioeconomic development rather than gender equality per se. Indeed, more consistent with our theoretical framework, cross-gender friendships are also less numerous in countries that are more wealthy (ρ = -0.39, p-value = 0.02) and where parents emphasize children's self-realization (ρ = -0.67, p-value = 0.00). These cross-country patterns – which are not explained by differences in family structure, the prevalence of single-sex schools, or the number and intensity of friendship relationships – align with our hypothesis that the combination of economic prosperity and emphasis on self-realization enables greater expression of gender-typical preferences in childhood social networks.

Analysis at the individual level using the HBSC data reveals that the negative relationship between income and opposite-sex friendships observed at the country level also holds within countries. Children from families with higher socioeconomic status tend to have fewer opposite-sex friends. This pattern is remarkably consistent, appearing in 34 out of 37 countries in our sample. The MCS data confirms the existence of a socioeconomic gradient in opposite-sex friendships. In the UK, children from wealthier families have substantially fewer opposite-sex friends: moving from the lowest to the highest income quintile is associated with a 17 percentage point (36%) decrease in the probability of having a gender-mixed group of friends at age 11. However, children whose parents hold more egalitarian gender views – generally more prevalent among wealthier families – tend to have more opposite-sex friends, suggesting that the cross-country 'gender-equality paradox' in friendship formation likely reflects differences in prosperity rather than differences in gender norms.

Finally, we explore why there is a negative relationship between family income and opposite-sex friendships. While our research design does not allow for causal identification, our descriptive analysis provides empirical support for the theoretical mechanisms outlined above, suggesting two complementary pathways: social environments that limit cross-gender interactions and differences in child characteristics that limit the demand for opposite-sex friends and delay the transition into adolescence. First, higher-income families are more likely to embrace permissive values emphasizing children's self-expression while

simultaneously enrolling them in organized activities that tend to be gender-segregated. In contrast, children from less affluent families spend more unsupervised time with neighborhood peers, fostering more spontaneous cross-gender interactions. This pattern reflects what Lareau (2011) describes as distinct class-based approaches to childhood socialization and aligns with our theoretical framework linking economic prosperity to increased gender segregation through activity organization. Importantly, evidence that affluent children are more popular and satisfied with their predominantly same-gender friendship networks suggests that wealthy parents may be responding to their children's expressed preferences for gender-segregated activities rather than imposing these choices. Second, and supporting our argument about how prosperity shapes socio-emotional development, we find evidence suggesting that the personality profiles associated with higher family income may reduce the demand for opposite-sex friendships. Consistent with previous studies, we observe that higher-income children exhibit better emotional regulation, stronger cooperation skills, fewer behavioral difficulties, and better relationships with parents – traits that generally correlate with more gender-segregated friendship patterns. Furthermore, higher family income is generally associated with delayed pubertal onset, which may postpone the normative transition to more gender-mixed friendship groups that typically occurs during early adolescence.

Taken together, our findings suggest that rising income and more permissive parenting are associated with more gender-segregated childhood friendships, which in turn may shape gender-typed interests before formal educational choices are made.

The rest of the paper is structured as follows. In section 2 we explain how our work contributes to the existing literature. In section 3 we describe the data that we use and, in section 4 we present our empirical analysis. Finally, in section 5 we summarize our main results and discuss possible policy implications.

2 Related literature

Our work contributes to several strands of literature. First, it speaks to the literature on the origins of gender segregation in education. Previous research has identified multiple factors influencing educational segregation, including gender differences in mathematical compara-

tive advantage (Guiso et al., 2008), the lack of role models (Bettinger and Long, 2005; Carrell et al., 2010; Porter and Serra, 2020; Breda et al., 2023), cultural stereotypes about who belongs in certain fields (Cheryan et al., 2017), and gender differences in attitudes toward and expectations about math careers and ability (Breen and García-Peñalosa, 2002; Ceci et al., 2014). Several studies, but not all, have also found that the probability of selecting gender-stereotypical educational tracks increases when there is a larger share of same-sex classmates.[5] Our contribution lies in highlighting how homophily in childhood friendship formation may amplify initial differences in preferences — creating stronger gender-typed interests through peer influence and reduced exposure to cross-gender activities and experiences. This friendship-based mechanism may help explain why gender segregation in education persists even as formal barriers have been removed.

Second, we provide new insights into the 'gender-equality paradox'. Previous studies have documented that more gender-equal and affluent countries exhibit greater gender segregation in higher education (Charles and Bradley, 2009; Stoet and Geary, 2018), larger gender gaps in preferences and competitiveness (Falk and Hermle, 2018; Klinowski and Niederle, 2025), and stronger stereotypes about mathematical ability in adolescence (Breda et al., 2020).[6] Our findings reveal that this paradox emerges earlier than previously recognized – already apparent in friendship patterns at age 11. The presence of this pattern in pre-

5. For example, using large-scale data from Denmark, Brenøe and Zölitz (2020) find that girls exposed predominantly to female peers in high school are significantly less likely to pursue male-dominated degrees. Similarly, Zölitz and Feld (2021) show that in the Netherlands female university students randomly assigned to female-majority sections have a lower probability of selecting male-dominated majors and, in the US context, Hill (2017) presents suggestive evidence that women who study in university with more female peers are less likely to major in STEM fields. In contrast, using data from Austria, Schneeweis and Zweimüller (2012) find that girls are less likely to choose a traditionally female-dominated school type at age 14 if they were exposed to a higher share of girls in previous grades.

6. However, methodological debates exist about some of these findings. Richardson et al. (2020) argue that Stoet and Geary (2018)'s results are not robust to alternative definitions of gender segregation and equality. While Stoet and Geary (2018) measured gender segregation using women's propensity to graduate in STEM (relative to men) and gender equality using the Gender Inequality Index, Richardson et al. (2020) shows that this correlation becomes non-significant when using different measures, specifically, the Basic Index of Gender Inequality (BIGI) for gender inequality and the raw percentage of women among STEM graduates for segregation. In response, Stoet and Geary (2020) questioned the latter measure, arguing that it is important to control for differences in the overall number of women and men who attend college, which varies substantially across countries. A methodological critique has also been advanced by Ilmarinen et al. (2017), who point out that standard studies measuring correlations between gender gaps and gender equality indices inadvertently conflate multiple factors: the mean levels for men and women, the intercorrelation between these mean levels, and their variabilities across countries.

adolescence challenges explanations centered on labor market conditions or deliberate educational choices. Importantly, our individual-level analysis suggests that the lower number of cross-gender friendships observed in countries that are more gender-equal likely reflects the impact of income rather than gender-egalitarian norms.

Third, we contribute to the literature on the factors shaping the gender composition of children's social networks. While extensive literature exists on homophily in friendships (McPherson et al., 2001; Mehta and Strough, 2009; Kalmijn, 2002), studies rarely examine how socioeconomic factors might systematically influence gender segregation in childhood social networks. An exception is Pfaff (2010), who using data from Germany also finds that lower-class children tend to have more opposite-sex friends. Our results are also consistent with Thorne and Luria (1986), who found in a study of four US schools that working-class children begin forming cross-gender friendships at an earlier age than their middle- or upper-middle-class peers. To the best of our knowledge, we provide the first large-scale cross-national evidence showing that children in more affluent families and countries develop more gender-segregated friendship networks. This finding aligns with theories suggesting that increased resources allow greater expression of underlying preferences (Charles and Bradley, 2009), potentially through participation in structured activities that inadvertently reinforce gender segregation (Lareau, 2011). Our results are also potentially related to earlier anthropological work by Whiting and Edwards (1988), who observed that gender segregation in children's friendship networks was relatively lower in societies with limited access to same-age peers, a pattern that may reflect reduced opportunities for the kind of structured, age-homogeneous activities that characterize wealthier societies.[7,8]

Finally, our work relates to a mostly descriptive literature analyzing how childhood friendship gender composition affects preferences and choices. Our results align with work in social psychology arguing that childhood experiences in same-sex groups profoundly influence how members of the two sexes relate to one another in adulthood (Maccoby, 1999). Previous work has also noted that cross-gender friendships are associated with lower gender stereotypes and

7. Whiting and Edwards (1988) collected evidence from children in six diverse cultures in Kenya, India, the Philippines, Japan, Mexico, and the United States.

8. Another line of research has examined how the design of public spaces and playgrounds can influence cross-gender interactions among children (Karsten, 2003; Ferré et al., 2006).

more egalitarian gender role attitudes (Halim et al., 2021; Kretschmer, 2024), and that girls with male friends tend to be more interested in STEM careers (Robnett and Leaper, 2013). We demonstrate that similar patterns are present in the Millennium Cohort Study.[9]

The economics literature on the impact of friends' gender composition is relatively limited, likely due to challenges in establishing causal relationships. A notable exception is Hill (2015), who exploits exogenous variation in the gender composition of schoolmates living nearby. He finds that opposite-sex friends negatively affect academic performance, particularly after age 16. This effect appears to be driven by changes in classroom behavior and the emergence of romantic relationships. In contrast, our work focuses on friendships at earlier ages.[10]

3 Data

Our analysis draws on several sources of secondary data. First, we collect from multiple sources country-level information on 'vertical' gender equality, gender segregation in higher education, income, and parenting values. Second, we use information from the Health Behavior in School-Aged Children (HBSC) study, which includes around half a million children aged 11-15 in 37 countries in Europe and North America. This survey includes friendship information in waves 2002, 2006 and 2010. Third, we use information from the Millennium Cohort Study (MCS), a nationally representative longitudinal survey following approximately 10,000 children born in the UK in 2000-01 from birth until age 17, including friendship information at ages 7, 11 and 14. Below we provide more detailed information on these datasets.

9. We are aware of only one other study using the Millennium Cohort Study to analyze how the gender of friends affects children's behavior. Flouri et al. (2022) examine the relationship between the sex composition of adolescents' friendship groups and their style of decision-making, showing among other results that girls whose friends at age 11 were mainly girls showed better quality of decision-making at age 14.

10. While our work focuses on friendships in childhood and early adolescence, there is also an extensive literature studying the role of friends' gender during later adolescence, with several studies linking it to outcomes such as substance abuse and delinquent behavior during the teenage years (Poulin et al., 2011; Bucci and Staff, 2020; Grard et al., 2018).

3.1 Information at the country level

We focus on the sample of 37 European and North-American countries that participated in the HBSC study in years 2002, 2006 and 2010 (see map in Figure A1).

3.1.1 Vertical Gender Inequality

We use three complementary indicators that have been widely used in the literature to quantify gender equality from a 'vertical' perspective. First, the Global Gender Gap Index (GGGI), developed by the World Economic Forum, measures gender-based disparities across four dimensions: economic participation and opportunity, educational attainment, health and survival, and political empowerment. The index ranges from 0 to 1, with higher values indicating greater gender equality. Second, we use the Gender Inequality Index (GII), developed by the United Nations Development Program, which captures disparities across three dimensions: reproductive health, empowerment, and labor market participation. The GII ranges from 0 to 1, with lower values indicating greater gender equality. Third, we use attitudinal data from the Integrated Values Surveys.[11] Specifically, we consider responses to the statement 'When jobs are scarce, men should have more right to a job than women', with possible responses being 'disagree', 'neither', or 'agree', which we code as 1, 2 and 3 respectively. The value of this measure is lowest in Iceland with an average of 1.1 and highest in Turkey, where it is 2.3. These different measures of vertical gender inequality are strongly correlated (see Figure A2). For instance, the correlation between the Integrated Values Surveys measure and the Gender Inequality Index is 0.79 (p-value<0.01), and between the Integrated Values Surveys and the Global Gender Gap Index is -0.83 (p-value<0.01). In our sample, these three measures of vertical gender equality tend to be highest in Nordic countries and lowest in Eastern and Southern Europe.

11. The Integrated Values Surveys combines data from the World Value Survey (WVS) and the European Value Study (EVS), two large-scale, cross-national, and repeated cross-sectional longitudinal survey research programs. We use EVS/WVS 1981-2022 trend file (v4.0; Jun 30, 2024). Information on this question is missing for Israel.

3.1.2 Gender segregation in higher education

We collect data from the UNESCO Institute for Statistics on the number of male and female university graduates by field of study.[12] The data reveal substantial gender segregation across fields. As has been repeatedly documented in the literature, we observe that men are relatively more likely to graduate in STEM fields (Science, Technology, Engineering and Mathematics) and women in HEAL fields (Healthcare, Education, Administration, Literacy).[13] More precisely, while 55% of female graduates studied HEAL fields, only 13% chose STEM disciplines. The pattern is reversed for male graduates, with 37% graduating in STEM fields compared to 29% in HEAL (see Table A1).[14]

To measure gender segregation while accounting for differences between men and women in their propensity to attend university, we use the following index which captures women's propensity to graduate in field i relative to men:

$$\text{Female propensity to field } i = \frac{\frac{f_i}{F}}{\frac{m_i}{M}},$$

where m_i and f_i represent the number of male and female graduates in field i respectively, and M and F represent the total male and female graduate population. This measure, also known as the 'Gender Parity Index', reveals that female graduates are approximately three times less likely than men to graduate in STEM, and twice as likely to graduate in HEAL. The only area that appears gender balanced is Business, Administration and Law.

Beyond these indicators, we also employ the Duncan Segregation Index to capture vari-

12. Data from the UNESCO Institute for Statistics is available at https://data.uis.unesco.org/index.aspx?queryid=3830 (accessed June 24, 2025). Tertiary degrees include short-cycle tertiary education, bachelor's degrees or equivalent, master's degrees, and doctoral degrees.

13. The UNESCO Institute for Statistics classifies fields in the following subgroups: (i) Education, (ii) Arts and Humanities, (iii) Social Sciences, Journalism and Information, (iv) Business, Administration and Law, (v) Natural Sciences, Mathematics and Statistics, (vi) Information and Communication Technologies, (vii) Engineering, Manufacturing and Construction, (viii) Agriculture, Forestry, Fisheries and Veterinary, (ix) Health and Welfare, and (x) Services. STEM includes Science, Technology, Engineering and Mathematics. HEAL fields comprise Education; Humanities and Arts; Social Sciences, Journalism and Information; and Health and Welfare. More detailed information about the composition of each field is available at https://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf (accessed June 24, 2025).

14. There is also variation within these fields. As discussed in Ceci et al. (2014), women's underrepresentation in STEM is concentrated in the math-intensive fields.

ation in gender composition across all fields of study. This index measures the minimum proportion of students of either gender who would need to change fields to achieve an equal gender distribution. The index ranges from 0 to 1, where 0 indicates complete integration and 1 indicates complete segregation. Using the UNESCO 1-digit level classification system, which categorizes higher education into ten distinct fields, the index is calculated as:

$$Duncan = \frac{1}{2} \sum_{i=1}^{10} \left| \frac{m_i}{M} - \frac{f_i}{F} \right|,$$

In our sample, the average Duncan segregation index is approximately 0.30. Finland has the highest segregation with an index of 0.40, while Turkey has the lowest at 0.20.

While vertical gender inequality has decreased substantially over the past two decades, horizontal gender segregation in higher education has remained remarkably stable during this same period (Figure 1). The average GII decreased from 0.22 in 2000 to 0.11 in 2021, but the Duncan segregation index measuring field-of-study segregation remained stable at a value around 0.30.

3.1.3 Income

We use information on GDP per capita in Purchasing Power Parity (PPP) (constant 2021 international $) from the World Bank's World Development Indicators dataset. The poorest country in the sample is Ukraine, with an average GDP per capita of around $16,400. At the other end of the spectrum is Luxembourg, with more than $130,000. In addition, we measure income inequality using the 90th-to-10th percentile ratio in the gross earnings of full-time dependent employees from the OECD.

As shown in Figure A3, countries with higher levels of (vertical) gender inequality tend to be poorer (ρ=0.69, p-value<0.01) and also have higher levels of income inequality (ρ=0.68, p-value<0.01).

3.1.4 Parenting Styles

Building on the established parenting styles framework developed by Baumrind (1967), we adopt a three-category classification: authoritarian, authoritative, and permissive. Following Doepke and Zilibotti (2017), we operationalize these concepts using data from the World

Value Survey (WVS), where respondents were asked which childhood qualities they considered most important through the following question: 'Here is a list of qualities that children can be encouraged to learn at home. Which, if any, do you consider to be especially important? Please choose up to five!' As in Doepke and Zilibotti (2017), we categorize parents as authoritarian if they choose obedience among their selected qualities. For those not selecting obedience, we identify as authoritative any parent who values hard work. The remaining parents who choose independence or imagination (but not obedience or hard work) are classified as permissive. We focus on individuals from countries that participated in the HBSC study, with a total sample of 153,213 respondents from years 2000-2021. In the average country, approximately 29% of respondents are classified as authoritarian, 39% as authoritative, and 32% as permissive (see Table A1).[15]

Consistent with previous studies, we observe that permissive parenting is more prevalent in countries that are wealthier (ρ=0.59, p-value<0.01) and have lower income inequality levels (ρ=-0.58, p-value<0.01) (see Figure A4). Moreover, we also observe a strong correlation with the level of vertical gender equality. Countries with higher levels of permissive parenting tend to be more gender equal, as measured by the GII (ρ=-0.72, p-value<0.01). The opposite pattern applies to the authoritative parenting style and, to a lesser extent, to the authoritarian one.

3.1.5 The gender-equality paradox in higher education

Several scholars have argued that higher levels of vertical gender equality not only fail to translate into lower horizontal gender segregation in education or labor markets, but actually correlate negatively with such outcomes (Charles and Bradley, 2009; Stoet and Geary, 2018). We re-examine this relationship using various measures of vertical and horizontal gender equality for the 37 countries that participated in the HBSC survey, using data for years 2000-2021.

Our data confirm the existence of a 'gender-equality paradox' in educational choices. As shown in Figure 2, countries with lower levels of educational segregation in higher education

15. As in Doepke and Zilibotti (2017), we excluded from the analysis approximately 10% of respondents who were not classified in any of these three groups.

exhibit higher (vertical) gender inequality, whether measured by the Gender Inequality Index (upper panel), Global Gender Gap Index (second panel), or attitudes toward gender discrimination in employment (third panel). More precisely, in countries that are more gender-equal according to these standard measures, women are relatively less likely to graduate in STEM fields (left column) and the Duncan segregation index is larger (right column). The negative correlations between these different measures of 'vertical' and 'horizontal' gender equality range between 43% and 58% depending on the combination, and are significant at the 1% level in all cases.

While these correlations are striking, they do not necessarily imply causation, as other country-specific factors might simultaneously influence both dimensions of gender equality. Educational gender segregation has been linked to an increased emphasis on self-expression in Western countries, which creates opportunities for the expression of 'gendered selves' (Charles and Bradley, 2009). This emphasis aligns with permissive parenting styles, which encourage children to make choices according to their natural inclinations. Consistent with this hypothesis, Figure A5 shows that gender segregation in education is stronger in countries where a higher share of individuals favor permissive parenting values ($\rho = 0.35$, p-value $= 0.04$) and in countries with higher GDP per capita ($\rho = 0.44$, p-value $= 0.01$).

3.2 Health Behavior in School-Aged Children (HBSC) study

The HBSC is a World Health Organization collaborative cross-national survey examining adolescent health and well-being. This survey is administered in schools using paper questionnaires to a representative sample of 11-, 13-, and 15-year-old children. Within each country, classes are randomly selected from targeted school years to ensure representativeness, with approximately 5,000 observations per country and wave. Our analysis focuses on the years 2002, 2006, and 2010, the only waves when HBSC collected information on the gender of friends. The sample includes 539,797 observations from 37 countries.[16]

The survey collects comprehensive information about students' lives, including demographic characteristics, family structure, school environment and health outcomes. Follow-

16. The initial HBSC dataset includes 581,838 observations. We excluded observations with missing information on age (1% of the original sample) and friend data (6%), as well as observations from Greenland (0.5%) and Armenia (0.4%) due to the unavailability of country-level and individual-level data.

ing the survey's design, the sample is evenly distributed across three academic levels that, while labeled differently across countries, correspond to US grades 6 (ages 11-12), 8 (ages 13-14), and 10 (ages 15-16), with one-third of students in each level. Table A2 provides descriptive information on the sample. Girls comprise 51% of the sample and about 61% of children report living with a sibling of the opposite sex and 60% with a sibling of the same sex. While almost all participants live with their biological mother (94%), fewer live with their biological father (78%).

HBSC assigns children's parents a socioeconomic status level between 1 (low) and 5 (high) based on children's answers to an open question on their occupation. Using a standardised coding system, around 69% of fathers and 59% of mothers receive an indicator of socioeconomic status.[17] In our analysis we use the maximum of these two values, with a socioeconomic status level available for 77% of the sample. We also observe information on the quality of the relationship between parents and children, measured by a question asking 'How easy is it for you to talk to your mother/father about things that really bother you?'. On a scale of 1 ('Very difficult') to 5 ('Very easy'), the average value for mothers is 4.2 and for fathers 3.6. Furthermore, there is information about the gender composition of classmates. Very few students (2%) attend single-sex schools and, for the average student in the sample, 47% of classmates are of the opposite sex.[18]

3.2.1 Gender of friends

The survey provides information on both the quantity of male and female close friends and on the intensity of these friendships. Students are asked 'At present, how many male/female close friends do you have?' with response options ranging from '0 to 3 or more'. The quality of these relationships is assessed through the question 'How easy is it for you to talk to male/female friends about things that really bother you?' with responses ranging from 'Very easy' to 'Very difficult', and an additional option for students without such friends.

Data from both dimensions reveals strong homophily in friendships. As shown in Fig-

17. No socioeconomic status level is assigned when occupations cannot be matched based on the standardised coding system; parents are sick, retired, students, looking for a job, or homeworkers; or when children do not know their parents' occupation or do not reply.

18. We calculate the gender of classmates based on the gender of participants in the survey who belong to the same class.

ure A6, children at age 11 are far more likely to have same-sex than opposite-sex close friends. While only 2% report having no same-sex friends, 21% have no opposite-sex close friends. At the other end of the distribution, 84% report having three or more same-sex close friends, compared to just 53% with three or more opposite-sex friends. The quality of these friendships shows a similar pattern: more than 75% of students find it easy or very easy to discuss important issues with same-sex friends, compared to only around 40% for opposite-sex friends (see Figure A7).

Given that many students select the option of three or more close friends, in our empirical analysis we use data at the individual level and directly address censoring issues through an ordered probit specification. In this section, to provide descriptive statistics, we consider information only from students with uncensored information on the number of friends (i.e. reporting fewer than 3 friends of each gender), implicitly assuming that their friendship patterns are representative of the overall population. According to this measure, 28% of friends are of the opposite sex.[19]

In addition to homophily, the descriptive analysis reveals three notable patterns in cross-gender friendship data. First, the share of opposite-sex friends tends to increase with age. It increases from 27% at age 11 to 29% at age 13 and 35% at age 15. Second, both the prevalence and intensity of cross-gender friendships vary substantially across countries. As shown in Figure A9, Finland and Portugal represent opposite ends of the spectrum. The share of opposite-sex close friends at age 11 is more than twice as large in Portugal (39%) than in Finland (16%). This pattern persists when examining the share of children who report having no opposite-sex close friends: 41% in Finland and only 6% in Portugal. Third, gender segregation in friendships appears stable over time. During the period covered by our HBSC data (2002-2010), gender segregation in childhood friendships showed minimal change (Figure 1).

The availability of information on the 'intensity' of relationships allows us to investigate the possibility that, in countries where children report more opposite-sex friendships, they

19. We have also considered two alternative methods to calculate country-level shares of opposite-sex close friends, both yielding similar results. First, imputing a value of 3 when students reply '3 or more' (for students reporting fewer than 3 friends of either gender) yields 30% opposite-sex friends, with 94% correlation to our main measure (Figure A8). Second, assigning 50% to students reporting '3 or more friends' of both genders likely introduces upward bias but shows 87% correlation with the other measures.

hold lower standards for whether an opposite-sex friend qualifies as a close friend. Instead, we find evidence of the opposite pattern. As shown in Figure A10, children tend to report that communicating with opposite-sex friends is easier in countries where they report having more opposite-sex close friends (ρ=0.54, p-value<0.01).

3.3 Millennium Cohort Study

While the HBSC data provide broad cross-national coverage, they offer limited information on individual and family characteristics that might explain friendship patterns. To address this limitation, we complement our analysis with detailed longitudinal data from the Millennium Cohort Study (MCS), which provides comprehensive information on development, family circumstances, and well-being for a sample of children born in the UK in 2000-01, tracked at several points throughout their lives. The MCS started with 18,818 children in the first wave. These children were followed across multiple waves of data collection, with the initial survey conducted at 9 months and subsequent sweeps at ages 3, 5, 7, 11, 14, and 17 years. There is attrition across waves and, at age 17, around 10,000 children remained in the study. Below we describe the sample in terms of (i) main household characteristics, (ii) parental gender norms, (iii) parenting values and practices, (iv) psychological and behavioral assessments, (v) gender of friends, (vi) occupational aspirations and gender norms, and (vii) academic information.

3.3.1 Household characteristics

As shown in Table A3, 49% of participants are girls. The average child has 1.6 siblings and 58% of children have an opposite-sex sibling in the household. Around 19% of children do not live with their biological father. Parents have on average 12 years of education.[20]

The Millennium Cohort Study (MCS) derives a continuous measure of *Family Income* based on participants' responses to a banded income question and imputation using other observable household characteristics (Centre for Longitudinal Studies, 2020). This measure

20. To measure years of education, we consider the information provided when the child was 9 months old. We assign 0 years for 'No qualifications', 11 for 'GCSE grades D-G', 12 for 'O level / GCSE grades A-C', 13 for 'A / AS / S levels', 14 for 'Diplomas in higher education', 16 for 'First degree' and 18 for 'Higher degree'. Information on fathers is only available for around 70% of households.

is also adjusted for family size using OECD equivalence scales.[21] According to this measure, the median (equivalised) household income is around £400 pounds per week.

Additionally, the MCS collected information on the personality traits of parents using the 'Big 5' inventory when their children were 14. The personality profile of higher-income parents shows distinctive patterns, with higher scores on openness, conscientiousness, and extraversion, but lower levels of neuroticism (see Table A4). These personality differences may further reinforce distinct parenting approaches across socioeconomic strata.

3.3.2 Gender Norms

The survey also collects information on parents' gender norms, gathered when the child was 9 months old. Parents were asked whether they agree with the following four statements: 'Mother is happier if she works', 'Family life suffers when woman has full-time job', 'Child suffers if mother works before school', and 'Couples who have children should not separate'. Responses were measured on a 5-point scale from 'Strongly disagree' (1) to 'Strongly agree' (5). The average response across all four variables is around 3, 'Neither agree nor disagree'. Due to low response rates among fathers, we focus on mothers' answers. We summarize the information from these four questions using a standardized index of *Maternal Gender Egalitarianism*, which is constructed by summing up all the answers.[22]

3.3.3 Parenting Values and Practices

We measure parenting values using mothers' responses to a question about which qualities are the most important for their child to learn in preparation for life, asked when the child was 3 years old.[23] The collection of parental preferences at this early age minimizes concerns regarding reverse causality. We focus on the top two choices. We classify as 'authoritarian' parents those who selected 'To obey parents'. For the remaining parents, we classify them as

21. Each scale sets the family's needs relative to those of a couple with no children whose scale is set equal to 1. In the modified OECD scale, the first adult receives a weight of 0.67; the spouse, 0.33; each dependent child age aged 14-18 years old, 0.33; and each child aged under 14 years, 0.20. Around 1,500 MCS families, at each sweep, did not provide banded income data.

22. We reversed the coding for the statement 'Mother is happier if she works' so that higher values consistently represent more egalitarian gender attitudes.

23. The MCS offered six possible choices: 'To think for yourself', 'To obey parents', 'To work hard', 'To help others when they need help', 'To be well liked or popular' and 'To learn religious values'.

'authoritative' if they selected 'To work hard' and, finally, we label as 'permissive' parents the remaining ones who selected the option 'To think for themselves'. Based on this classification, around 27% of parents are classified as authoritarian, 33% as authoritative and 36% as permissive (see Table A5). In our empirical analysis, we exclude around 4% of families who do not fall into any of these three groups. Furthermore, we also identify religious parents if they selected 'To learn religious values' as one of their two top options (7%).

Additionally, we also gather information on the relationship between parents and children. Children reply at ages 11 and 14 to the question 'How do you feel about your family?', with answers ranging between 'Completely happy' to 'Completely unhappy'. Children tend to be satisfied with their family, with 63% selecting 'Completely happy'

We also observe participation in clubs or classes outside school lessons at age 7. Participation in these structured activities is substantial, with 41% of children reporting their attendance at least once a week. While we do not observe the specific clubs in which they participate, more detailed information on club participation by siblings indicates that these activities tend to be gender-segregated.[24] For instance, girls account for approximately 80% of children taking dance classes outside school, 66% in music lessons, and 59% in drawing classes. Sports clubs are slightly more popular among boys (55%) and, while we cannot observe the actual gender composition of each sport club, previous evidence suggests that, with few exceptions, they tend to be largely organized along gender lines (Anderson, 2008; Leaper, 2022). Furthermore, we also observe that at age 11, around 45% of children are allowed to spend unsupervised time with friends outside their home most weekends and 27% most days. When questioned about their motivations, parents cited three primary reasons for limiting independent time with peers: they believed their children were too young for unsupervised socializing, they had alternative activities occupying their time, or they had concerns about their safety.

Using the above information, we investigate how the parenting values of parents correlate with family characteristics and parenting practices. As shown in Table A6, compared to parents who support authoritative or authoritarian values, 'permissive' parents (i.e. parents

24. The Millennium Cohort Study does not include information on the specific clubs attended by participants, but it provides detailed information on the clubs attended by their older siblings when participants were 5.

who value that their children think for themselves) tend to be richer, more educated, more likely to be white, less religious, and they hold more gender egalitarian views. In terms of parenting practices, they are more likely to enroll their children in structured extracurricular activities, while simultaneously limiting unsupervised time outside the home. 'Permissive' mothers also tend to talk more frequently with their children.

This information indicates that in our sample parents who value most that their children think for themselves adopt practices closer to the 'concerted cultivation' approach that Lareau (2011) described as common in high-income families. Children's development appears to be actively managed through organized, adult-supervised activities rather than the 'natural growth' approach more common in lower-income families, characterized by more autonomous, unstructured peer interaction. However, the fact that these parents did not select 'to work hard' among the most desired values suggests that these organized activities may be oriented more toward children's leisure and self-expression rather than explicit human capital accumulation, in contrast to authoritative parents.

3.3.4 Psychological and Behavioral Assessments

The MCS employs multiple standardized instruments to assess children's psychological development. Our analysis focuses on two measurement tools completed by parents when cohort members were 7 years old: the Strengths and Difficulties Questionnaire (SDQ) and the Child Social Behavior Questionnaire (CSBQ).

The SDQ is a widely-used behavioral screening instrument designed to evaluate psychological adjustment in children and adolescents. It comprises 25 items organized into five distinct dimensions: Emotional Symptoms (anxiety, worry, unhappiness), Conduct Problems (disruptive behaviors, disobedience), Hyperactivity/Inattention (restlessness, poor concentration, impulsivity), Peer Relationship Problems (difficulties with social interactions and friendships), and Prosocial Behavior (consideration for others, helpfulness).

The CSBQ, as implemented in the MCS, measures three essential aspects of children's social development: Independence-Self Regulation (ability to work autonomously and self-direct), Emotional-Dysregulation (difficulties managing emotions and impulses), and Cooperation (rule-following and collaborative behaviors). This assessment provides valuable

insights into children's social competencies within educational environments.

3.3.5 Gender of friends

The MCS provides information on the gender composition of friends at ages 7, 11 and 14 (Table A7). At age 7, the majority of children (56%) report having predominantly same-sex friends, 41% have a mixed-gender friend group, and 3% have a majority of opposite-sex friends. The number of cross-gender friendships is higher at age 11, with 45% of children reporting that most of their friends are of the same-sex, 53% that there is a mixture of boys and girls and 2% a majority of opposite-sex friends. At age 14 the question is phrased slightly differently and it does not provide an option for 'A mixture of boys and girls'. Most children report having mostly same-sex friends (64%), 24% have no opposite-sex friends and 13% have a majority of opposite-sex friends.

3.3.6 Occupational aspirations and gender norms

Information on children's career aspirations suggests that traditional gender attitudes emerge early in childhood. When asked at age 7 'when you grow up, what would you like to be?', the average child expresses preference for an occupation where only 32% of workers are of the opposite sex (Table A7).[25] Gender role attitudes at the household level show more egalitarian patterns. When presented at age 14 with the statement 'Men and women should do the same jobs around the house', 44% of children strongly agree, with 48% agreeing and 8% disagreeing. Similarly, when asked about whether 'it is less important for women to work,' approximately 50% strongly disagree, 40% somewhat disagree, and 11% agree. We create a standardized measure of children's gender norms combining the answers to these two questions.

3.3.7 Academic information

We use information on participants (i) cognitive assessments, (ii) school type and (iii) gender segregation in secondary education.

25. The Millennium Cohort team coded the femininity/masculinity of each aspiration using the proportion of UK working age women in that occupation. See more details in Flouri et al. (2012).

The MCS administered several standardized cognitive and academic assessments to evaluate the cohort members' educational development. We use two measures collected at age 7. The British Ability Scales Word Reading test assesses verbal abilities by measuring children's capacity to read and pronounce single words, providing an indicator of literacy skills. The Progress in Mathematics test evaluates mathematical proficiency through a series of age-appropriate problems covering number concepts, operations, and mathematical reasoning. These standardized assessments offer objective measures of cognitive development and academic achievement, complementing the psychological and behavioral data.

We also take into account in the analysis whether the child attends a single-sex school, as this is likely to strongly influence the gender composition of peers. The share of children attending a single-sex school in the UK at age 11 is relatively large, around 6% compared to 2% in the sample of 37 European and North American countries participating in the HBSC study.

We measure gender segregation in educational choices at two levels: the General Certificate of Secondary Education (GCSE, ages 14-16) and Advanced Level (A-levels, ages 16-18) examinations. GCSE students typically complete 8-12 subjects. In addition to compulsory subjects in English, Mathematics, and Science, students can select several elective subjects. The potential for gender segregation is higher at the A-level, where students select any 3-4 subjects aligned with their university and career aspirations. This represents a crucial decision point, as A-level subject choices strongly influence which university degrees students can subsequently pursue.

For each GCSE and A-level subject, we calculate its degree of feminization as the proportion of female students selecting that subject within the Millennium Cohort Study sample. The data reveal substantial gender segregation. For instance, at GCSE level women constitute 70% of Art and Design students but only 21% of those in Computer Science (Table A8). This pattern intensifies at A-level, where women represent 80% of Sociology students but just 14% of Computer Science students (Table A9). Economics also shows significant gender imbalance, with women comprising only 29% of students at A-level, making it among the most male-dominated fields after Computer Science and Physics. For each student, we quantify how gendered their choice of subjects is by using the average share of opposite-sex

students in their selected subjects.

The survey also suggests that friends directly influence educational choices, with approximately 22% of students explicitly reporting they received advice from friends when deciding their post-16 educational options. Given the strong gender homophily in friendships documented above, this direct influence likely reinforces gender-typical educational choices. Moreover, friendship networks may shape social norms and personal identity through more subtle interpersonal dynamics, potentially steering educational choices even without explicit advice.

3.3.8 Puberty

The MCS measures several indicators of puberty at ages 11 and 14. Parents report whether children have experienced a growth spurt, skin changes, or body hair development. Additionally, they provide information on gender-specific changes: voice changes and facial hair growth for boys, and breast development and menstruation for girls. We aggregate these measures into a standardized index of puberty onset.

4 Empirical Analysis

Our empirical analysis proceeds in three steps. First, using HBSC data, we analyze the factors associated with children's friendship gender composition (section 4.1). We examine both cross-country relationships with measures of gender equality, income, and parenting values, and within-country variation across families of different socioeconomic status. Second, we use longitudinal data from the Millennium Cohort Study to investigate the mechanisms underlying the relationship between family characteristics and friendship patterns (section 4.2). Third, we examine whether gender segregation in childhood friendships predicts gender segregation in higher education, using both cross-country HBSC analysis and individual-level MCS data (section 4.3).

4.1 Friends in childhood: Evidence from the HBSC

4.1.1 Role of Country Characteristics

Using the HBSC data, we investigate the relationship between country level characteristics and the prevalence of cross-gender friendships in childhood through two complementary approaches. First, using data from individuals with uncensored friendship information, we analyze country-level correlations to identify broad patterns. Second, to leverage our complete sample, we conduct individual-level regression analysis that addresses several measurement challenges inherent in friendship data: (1) the coarse categorization of friendship counts (0, 1, 2, or 3 or more friends) that likely represents an underlying continuous measure of friendship intensity, (2) right-censoring at '3 or more friends', and (3) potential cross-country variation in how children conceptualize and report close friendships.

Analysis at the Country Level We measure the prevalence of opposite-sex friendships at the country level using the average share of opposite-sex friends, relying on observations with uncensored information. Mirroring the pattern observed for gender segregation in education (section 3.1.5), we find that children tend to have more opposite-sex friends in countries with higher gender inequality. This relationship holds across multiple measures: the Gender Inequality Index (GII) (ρ = 0.43, p-value = 0.01), the Global Gender Gap Index (GGGI) (ρ = -0.48, p-value = 0.00), and the share of individuals who agree that men should have priority for jobs (ρ = 0.36, p-value = 0.03) (see Figure 3).[26]

These relationships are not necessarily causal and may reflect other cross-country differences. Indeed, gender segregation in friendships is also weaker in countries with higher GDP per capita (ρ = -0.39, p-value = 0.02) and higher income inequality (ρ = 0.44, p-value = 0.01). Most notably, we observe a strong negative correlation with permissive parenting values (ρ = -0.67, p-value = 0.00), suggesting that countries emphasizing children's autonomy and self-expression tend to have more gender-segregated childhood friendships.

26. Recent work using Facebook network data has shown that adults in more gender-equal countries (as measured by World Value Survey indicators and female labor force participation) have relatively more cross-gender connections (Bailey et al., 2025). We examine the correlation between these adult cross-gender connections and the HBSC data on childhood friendships. Interestingly, as shown in Figure A11, we find no significant correlation between these measures. This disconnect between childhood and adult patterns may reflect either fundamental differences in the nature of childhood versus adult social relationships, or a cohort effect where today's adults developed friendship patterns under different societal conditions than contemporary children.

Analysis at the Individual Level The previous analysis only included individuals with uncensored information (i.e. reporting fewer than 3 friends of each gender). To exploit all available data and to account for possible non-linearities, we now turn to individual-level analysis. Our main outcome variable – the number of opposite-sex close friends – takes four discrete values (0, 1, 2, or 3 or more). We employ an ordered probit model that accounts for the ordinal nature of this variable while avoiding the assumption of equal intervals between response categories, as the psychological difference between having no opposite-sex friends and having one might be substantially different from the change between having one versus two, or between two versus three or more. Specifically, we estimate:

$$Y_{ict} = \alpha_t + X_i\beta + \gamma \text{NumberFriends}_i + \lambda \text{Z}_{ct} + \epsilon_{ict} \tag{1}$$

where Y_{ict} represents a latent (unobserved) continuous measure of opposite-sex friendship intensity for child i in country c and year t. The model includes survey year fixed effects (α_t) and individual-level controls for gender and age (X_i), as well as for the total number of close friends (NumberFriends_i).[27] Our main variable of interest are country-level measures of income and vertical gender inequality (Z_{ct}). We cluster standard errors at the country level.

As shown in Table 1, this analysis confirms our previous findings using data at the country level. Children tend to have more opposite-sex friends in countries with higher vertical gender inequality, regardless of whether it is measured using the Gender Inequality Index (top panel), the Global Gender Gap Index (second panel), or the proportion of people who believe men should be favored when jobs are scarce (third panel). This pattern is highly significant across the overall sample (column 1), for both boys and girls (columns 2 and 3), and for children at each age (columns 4-6). Similarly, the share of opposite-sex friends is significantly lower in countries with higher income (fourth panel) and more permissive parenting styles (fifth panel), a result that also holds consistently across all subsamples (columns 1-6).

In terms of magnitudes, the ordered probit marginal effects (Table A10) show that a one standard deviation increase in the Gender Inequality Index (GII, σ=0.099), towards higher

27. The variable *total number of friends* is constructed as the sum of the number of male and female close friends, where 'three or more friends' is coded as equal to three.

gender inequality, is associated with a 1.1 percentage point decrease in the probability of having no opposite-sex friends (a 7% decrease relative to the baseline of 16%), no significant impact on the probability of having just one opposite-sex friend, a 0.6 percentage point decrease in the probability of having two (a 4% decrease relative to the baseline of 14%), and a 1.7 percentage point increase in the probability of having three or more (a 3% increase relative to the baseline of 56%). The magnitude of economic development effects is similar: a one standard deviation increase in GDP per capita (approximately $22,000) is associated with a 7% increase in the probability of having no opposite-sex friends, a 5% increase in the probability of having two, and a 3% decrease in the probability of having three or more.

4.1.2 Role of Individual Characteristics

HBSC provides information on a number of relevant individual characteristics including family structure and socioeconomic status, the gender composition of schools and the intensity of friendship relationships. We use this information to address two questions. First, exploiting only within country variation, we analyze whether these characteristics are related to the gender composition of friends. Second, we study whether the cross-country differences that we observed earlier might be 'explained' by systematic variation across countries in these dimensions.

Within-country variation To better understand the role of individual characteristics, we first examine the relationship between the number of opposite-sex friends and children's observable characteristics within each country.

We use an ordered probit estimation similar to the one described in equation 1, adding country and wave fixed effects in addition to controls for gender, age, and total number of friends. As shown in Table 2, column (1), the number of opposite-sex friends is slightly higher for girls and increases with age. This positive age-gradient between 11 and 15 years of age is consistent with previous work documenting that the number of opposite-sex friends tends to increase as children approach adolescence (Poulin and Pedersen, 2007; Mehta and Strough, 2009).

In column (2), we control for family socioeconomic status (SES), which was coded by the

HBSC team based on parental occupation. Mirroring our findings at the country level, which showed that children have fewer cross-gender friendships in richer countries, we find that, within countries, children from higher SES families tend to report fewer opposite-sex friends. Further analysis by country shows that this pattern holds in 34 of the 37 countries in the sample (Figure A12, left panel). Furthermore, children who report having good relationships with their parents, as measured by ease of communication, tend to have fewer opposite-sex friends (column 3). This relationship may reflect underlying parenting styles, consistent with our hypothesis that permissive parenting approaches are associated with fewer cross-gender friendships. This pattern also holds across virtually all countries in the sample (Figure A12, right panel).

In column (4) we add controls for family structure and the quality of household relationships. The number of opposite-sex friendships increases with the number of opposite-sex siblings, and decreases with the number of same-sex ones.[28] The presence at home of the biological father also decreases opposite-sex friendships, perhaps reflecting its impact on the onset of puberty (Deardorff et al., 2011).

In column (5) we control for single-sex schools which, as expected, have a strong negative impact on cross-gender friendships. Finally, to account for possible differences across children in the probability that they consider somebody a close friend, in column (6) we control for the self-reported ease of communication with opposite-sex and same-sex friends. Children who find it easier to talk to opposite-sex (same-sex) friends report having more opposite-sex (same-sex) close friends, confirming that the relevance of the latter measure.

Controlling for Individual Characteristics in Cross-Country Regressions Next, we examine whether individual controls can account for the observed cross-country differences. To facilitate comparison, in column 1 of Table A11 we report the baseline results from estimating equation 1 for each country-level measure, controlling only for gender, age, and number of friends. In column 2, we control for socioeconomic status. All results remain unchanged, presumably reflecting that this variable is largely country-specific. Furthermore,

28. This positive correlation between sibling gender and friendship patterns may potentially reflect two different mechanisms: children might report their siblings among their close friends, and siblings likely facilitate access to their own same-gender peer networks.

in column 3 we add controls for household characteristics and the relationship with parents, in column 4 for school characteristics, and in column 5 for the quality of relationships with same- and opposite-sex friends. None of our previous results is affected by these additional controls. In sum, while these individual controls explain significant variation within countries, they cannot account for the cross-country patterns. One potential explanation is that these variables may have aggregate effects at the country level that are not captured by individual-level variation.

4.1.3 Robustness

Other specifications, sub-samples and weights In our main analysis we relied on an ordered probit specification. In Table A12, we verify the robustness of these results using several alternative specifications. In column 1 we use a tobit specification, in column 2 a simple OLS, and in column 3 a censored Poisson. Additionally, we estimate our main specification using an ordered probit on a restricted sample containing children with fewer than three opposite-sex or same-sex friends (column 4) and with both fewer than three opposite-sex and three same-sex friends (column 5). Finally, in columns (6) and (7) we take into account survey weights and country weights respectively. All specifications yield qualitatively similar estimates which are highly significant.

Total number of friends The observed variation in the share of opposite-sex close friends across countries could potentially be related to cross-country differences in the total number of close-friends. For instance, perhaps we observe a smaller share of opposite-sex friends in countries that are richer and more gender equal because in these countries children tend to have fewer friends, which tend to be of the same sex, while in other countries children have a more extended set of friends, including some additional opposite-sex friends. As we show below, we do not find support for this hypothesis. We study this issue using the following equation:

$$I(\text{NumberFriends}_{ict} \geq N) = \alpha_t + X_i\beta + \lambda \text{Z}_{ct} + \epsilon_{ict}, \tag{2}$$

where $I(\text{NumberFriends}_{ict} \geq N)$ is an indicator that takes value 1 if child i reports N or more friends. We control for survey year fixed effects (α_t) and individual-level controls for gender and age (X_i), and the main variables of interest are country-level characteristics Z_{ct}. Standard errors are clustered at the country level.

We consider four thresholds: having six or more friends (which is satisfied by 52% of children), five or more (65%), four or more (76%) and three or more (89%). As shown in Table A13, there is no systematic relationship between the total number of friends reported by children and country-level measures of income or vertical gender equality, except for the probability of having three or more friends, which tends to be slightly higher in richer and more gender-equal countries.

4.2 Friends in Childhood: Evidence from the Millennium Cohort Study

The analysis of the HBSC data shows that children tend to have fewer opposite-sex friends in countries with higher income, more egalitarian gender norms, and more permissive parenting practices. We also observed that, within countries, children from higher socioeconomic backgrounds had fewer opposite-sex friends. Other individual factors that predicted within-country individual variation, such as family structure and the type of school, did not explain either the observed cross-country patterns or the socioeconomic gradient.

The detailed longitudinal information provided by the Millennium Cohort Study (MCS) allows us to expand our analysis in several ways. We analyze first which predetermined family characteristics predict the gender composition of children's friendships using a richer set of covariates, including parents' income, education, and gender norms. Second, to investigate the mechanisms behind socioeconomic differences in friendship patterns, we use extensive available information on parenting values and practices, personality traits, and cognitive ability.

4.2.1 Understanding the socioeconomic gradient: The role of parental characteristics

We first examine graphically the relationship between the gender composition of friends and parental income, excluding families from ethnic minorities for homogeneity. As shown in Figure 4, the share of children who report having opposite-sex friends at age 11 decreases with

family income. Specifically, children in the lowest income quintile report having opposite-sex friends about 36% more frequently than children in the highest income quintile (65.6% vs. 48.2%). This pattern remains consistent when we exclude children attending single-sex schools (see Figure A13).

We obtain similar results when conducting regression analysis controlling for children's gender, date of birth, ethnicity, and region of residence. We examine the gender composition of friends at all three time periods when we observe it: ages 7, 11, and 14. We estimate the following equation using a probit model:

$$Y_{it} = \alpha_t + X_{it}\beta + \epsilon_{it} \tag{3}$$

where Y_{it} is a dummy variable that takes value one if child i reports having some opposite-sex friends at age t (7, 11, or 14) and X_{it} is a vector of individual and family characteristics, which we extend in each additional column.[29] Standard errors are clustered at the individual level. Table 3 reports marginal effects from these estimations. As shown in column 1, a one standard deviation increase in family income is associated with a 3.9 percentage point (approximately 7%) decrease in the probability of having opposite-sex friends.

To better understand what drives this income gradient in cross-gender friendships, we examine the separate effects of different parental characteristics that tend to be associated with income. In column 2, we add parental gender-egalitarian views, measured when the child was nine months old, as a control variable. This variable, which is positively correlated with parental income, exhibits a positive relationship with opposite-sex friendships: children with more gender-egalitarian parents tend to have more opposite-sex friends (β=0.008, s.e.=0.004). This pattern holds consistently across all ages we examine. When we conduct the analysis separately for ages 7, 11, and 14 (see Table A14), we find that at each age children whose parents have lower income and more egalitarian gender norms are more likely

29. In the MCS, children report at ages 7 and 11 whether their group of friends is 'predominantly same-sex', 'mixed-gender', or 'predominantly opposite-sex'. We combine children with 'mixed-gender' and 'predominantly opposite-sex' friends into one single category. At age 14, there are four possible categories for the gender composition of friends: 'None of them are opposite-sex', 'Some of them are opposite-sex', 'Most of them are opposite-sex', and 'All of them are opposite-sex'. We combine the latter three categories into a single one.

to have opposite-sex friends, with the association being strongest at age 11.

The negative association between income and opposite-sex friendships mirrors our previous findings using HBSC data, both across and within countries. However, the role of gender norms at the individual level contrasts sharply with our country-level findings. While children in more egalitarian countries tend to have fewer opposite-sex friends, the Millennium Cohort Study reveals that this relationship reverses at the individual level: within countries, children of parents with more egalitarian views are more likely to form cross-gender friendships.

Next, we investigate whether these patterns can be explained by differences in other family characteristics. We control for mother's education, her working status, and whether the child lives with the biological father (Table 3, column 3). The probability of having cross-gender friends is lower for children with more educated mothers but does not vary significantly with maternal working status. Furthermore, consistent with our HBSC findings, children in single-parent households tend to have more opposite-sex friends. The introduction of these controls, which are highly correlated with family income, reduces the association between income and opposite-sex friends by approximately one third (from 3.9 to 2.4 percentage points).

In column 4, we control for single-sex school attendance, which in the UK tends to attract children from wealthier households. Single-sex schools are, as expected, strongly associated with fewer opposite-sex friends, but the coefficients for income and gender norms remain practically unchanged, reflecting the relative rarity of such schools.

Finally, in column 5, we examine whether our findings reflect differences in parental personality traits using the 'Big Five' inventory. Children whose parents are more extroverted tend to have more opposite-sex friendships. While this personality trait is positively associated with income, the income coefficient remains stable with the inclusion of these personality measures. Results are generally similar when we conduct separate analyses for girls and boys (see Tables A15 and A16).

4.2.2 Parenting Values and Practices

Parenting values We investigate the role of parenting values, which were elicited when the child was three years old. We estimate equation (3), including dummy variables for permissive and authoritative families, with authoritarian families as the baseline. In all regressions, we control for age, gender, ethnicity, region, and religiosity. Standard errors are clustered at the individual level. As shown in column 1 of Table 4, children whose parents hold permissive values are 3 percentage points (s.e. = 0.8) less likely to have opposite-sex friends compared to children of authoritarian parents. This result is consistent with our cross-country evidence showing that children have fewer opposite-sex friends in more permissive countries. In columns 2 and 3, we examine how including parenting values affects the correlation between family income and opposite-sex friendships. Adding parenting values reduces slightly the coefficient of *Family income* but the decrease is relatively small: approximately 4% (from 0.0336 to 0.0323).

Parenting practices Next, we investigate the role of parenting practices. Due to data availability, we focus on children's friends at age 11. As shown in column 1 of Table 5, children who attended clubs outside school (measured at age 7), a practice more common in wealthier families, tend to have fewer opposite-sex friends. In contrast, children who meet friends in unsupervised environments, a practice associated with lower income, tend to have more opposite-sex friends (column 2). Furthermore, having a better relationship with parents, also more common in wealthier households, is negatively associated with having opposite-sex friends (column 3). The inclusion of these variables reduces the coefficient on income by around 13% (columns 4 and 5).

These correlations are difficult to interpret, as in addition to omitted variable biases and measurement error, they might suffer from reverse causality. Nonetheless, the observed patterns are consistent with the hypothesis that parenting practices may affect the gender composition of children's friendship networks.

4.2.3 Children's Personality Traits and Cognitive Ability

We explore whether the income gradient in the gender composition of children's friends may be explained by income-related differences in personality traits and cognitive ability. As we show below, the profile typical of higher-income children predominantly includes cognitive and non-cognitive traits that correlate with more gender-segregated friendship networks, potentially explaining why socioeconomic advantage might reinforce gender segregation in social relationships.

Consistent with previous literature, Table A17 documents systematic differences across income levels. Higher-income children experience fewer behavioral and emotional challenges (as measured by the Strengths and Difficulties Questionnaire), score lower on Independence-Self Regulation, display better emotional regulation, exhibit stronger cooperation skills, and perform better on math and verbal tests (columns 1-3). Crucially, all of these traits – except 'Emotional Symptoms' – correlate with having fewer opposite-sex friends (columns 3-6). Furthermore, family income is negatively associated with the onset of puberty, which is associated with an increase in cross-gender friendships.

We quantify how these individual characteristics mediate the income-friendship relationship in Table 6. Controlling for behavioral and emotional challenges reduces the income coefficient by 14% (from -0.036 to -0.031 p.p.). Adding cooperation and emotional regulation measures further reduces it to -0.030, primarily because cooperation skills strongly predict same-gender friendship preferences. Including cognitive test scores produces an additional 10% reduction. In total, personality traits and cognitive ability explain approximately 25% of the income gradient in opposite-sex friendships. These results suggest that affluent children's social advantages – better emotional regulation, stronger cooperation skills, and higher academic achievement – paradoxically channel them toward more gender-segregated social networks. Results are unchanged when we add as an additional control an index of puberty development at age 11 (column 5).

4.2.4 Preference or Constraint? Social Status and Friendship Satisfaction

Our analysis has identified two key mechanisms explaining the income gradient in opposite-sex friendships: parenting practices that create more structured, gender-segregated environ-

ments, and personality traits that reduce demand for cross-gender relationships. However, a fundamental question remains: do these patterns reflect children's preferences or external constraints on their social choices? This distinction is crucial for interpreting our findings. If wealthy children want cross-gender friendships but face barriers to forming them, this would suggest that structured activities and personality differences create unwanted social limitations. Alternatively, if they are satisfied with their predominantly same-gender networks, this would support our hypothesis that prosperity enables children to better implement their underlying gender-typical preferences. To distinguish between these explanations, we examine children's social status and satisfaction with their friendships. As shown in Table A18, family income is positively associated with children's popularity and social integration at school (columns 1-3). Moreover, children from higher-income families report greater satisfaction with their existing friendship networks (columns 4-6). These findings strongly support the preference explanation. Wealthier children possess the social capital and opportunities necessary to form diverse friendships but choose predominantly same-gender networks. This evidence reinforces our interpretation that the mechanisms we have identified – structured activities and advantageous personality traits – do not constrain children's social options but rather enable them to express gender-typical preferences more effectively.

4.3 Friends in Childhood and Gender Segregation in Higher Education

Having established that children from higher-income families have fewer opposite-sex friends — partly explained by parenting practices and personality differences — we now examine whether childhood friendship patterns predict gender segregation in educational choices. We analyze this relationship first at the country level using HBSC data and then at the individual level using longitudinal MCS data.

4.3.1 Cross-country Analysis Using HBSC Data

We estimate cross-country correlations between gender segregation in children's friendships and higher education. As shown in Figure 5, countries where children have more opposite-sex friends exhibit less gender segregation in higher education. Specifically, in countries where children tend to have more opposite-sex friends, women's propensity to graduate in STEM

is higher (ρ = 0.43, p-value = 0.02) and the Duncan segregation index is lower (ρ = -0.47, p-value = 0.01).

The individual-level analysis confirms these patterns. Table 1 shows significant correlations between opposite-sex friendships and educational segregation, whether measured by women's propensity to graduate in STEM or the Duncan index. These relationships are qualitatively similar across gender and age subgroups (columns 2-6), though estimates for girls are one third smaller and not statistically significant at conventional levels.

4.3.2 Individual Longitudinal Analysis Using MCS Data

The MCS allows us to directly examine whether these cross-country correlations reflect individual-level patterns. We examine the relationship between opposite-sex friendships at age 7 and educational choices in secondary education at ages 14-18. Table 7 reveals systematic associations. Children with opposite-sex friends at age 7 select more gender-atypical subjects in both GCSE (column 1) and A-level examinations (column 3). These associations become remain robust when controlling for psychological traits (SDQ and CSBQ measures), cognitive test scores, school type, family income, and maternal gender norms measured at age 7 or earlier (columns 2 and 4). Specifically, compared to children with predominantly same-gender friends, those with mixed-gender groups chose subjects where the opposite-sex share is 0.067 standard deviations higher for GCSEs (p-value<0.01) and 0.072 standard deviations higher for A-levels (p-value=0.05). As shown in Table A19, the relationship is stronger for boys, consistent with our previous results at the country level.

We observe evidence consistent with several possible mechanisms linking childhood friendship patterns to educational choices. First, as shown in column 5, children who have opposite-sex friends at age 7 are also significantly more likely to have them at age 14 (β= 0.06 p.p., p-value<0.01). This channel is consistent with an extensive literature suggesting that peers affect educational choices. Second, we observe a strong correlation with gender norms: children who had opposite-sex friends at age 7 tend to hold more gender-egalitarian views at age 14, with a 0.09 standard deviation (p-value<0.01) increase in egalitarianism (column 7). Third, having opposite-sex friends at age 7 correlates with children's occupational aspirations – children with opposite-sex friends aspire to occupations with approximately 3

percentage points (p-value<0.01) more opposite-sex workers (columns 9). These correlations between age-7 friendship patterns and subsequent friendship composition, gender attitudes, and occupational aspirations remain largely unaffected when controlling for cognitive and non-cognitive abilities and school and family characteristics (columns 6, 8, and 10).

Beyond the relationship between the gender of friends in childhood and educational choices in adolescence, higher levels of gender segregation in friendships in childhood may have relevant effects in other domains. For instance, we also observe a strong correlation between the existence of cross-gender friendships at age 7 and the probability that individuals are involved in a romantic relationship or are sexually active at age 17 (see Table A20).

While we cannot establish causality, the magnitude and consistency of these relationships suggest that childhood friendship patterns contain meaningful information for predicting later gender-related attitudes and choices. Two interpretations of these patterns are possible. First, friendship patterns may directly influence later outcomes through socialization processes, whereby children learn gender norms and preferences through their peer interactions. Second, friendship patterns at age 7 may reflect underlying personality traits and preferences that persist over time, continuing to influence educational choices throughout adolescence. Our findings are consistent with both mechanisms, and the true relationship likely involves elements of each.

5 Conclusion

This paper provides new insight into why gender segregation in education persists even as societies have made substantial progress in promoting gender equality and advancing women's rights. We show that the well-documented gender-equality paradox, where more affluent and by conventional measures more gender-egalitarian societies show higher levels of horizontal gender segregation, emerges well before educational or labor market decisions are made. In both cross-national and within-country data, children in families and societies that are wealthier and with more permissive parenting values tend to form fewer opposite-sex friendships. These differences in early peer environments are strongly associated with subsequent gender-typed educational choices.

Longitudinal evidence from the UK's Millennium Cohort Study suggests that this phenomenon primarily reflects higher household income rather than gender-egalitarian norms. Although children from wealthier families have fewer opposite-sex friends, those with parents holding more egalitarian gender values develop more cross-gender friendships, supporting the interpretation that economic prosperity, rather than gender attitudes, drives the observed paradox in childhood friendships and educational segregation.

Our analysis provides suggestive evidence for two complementary mechanisms behind this socioeconomic gradient. First, higher-income families often embrace permissive parenting values that emphasize children's self-expression while simultaneously enrolling them in structured extracurricular activities that tend to be gender-segregated. Second, the personality profiles associated with higher family income – fewer behavioral problems and stronger cooperation skills – may reduce children's propensity to form cross-gender friendships. Additionally, children from wealthier families tend to experience delayed entry into adolescence, which may further postpone interest in cross-gender social relationships.

Individuals with fewer opposite-sex friends in childhood express more gender-traditional attitudes, aspire to more gender-segregated occupations, and select educational paths dominated by their own gender. Although we cannot definitively establish causality, these patterns suggest that childhood social networks may be a critical mechanism through which initial gender differences in preferences become amplified into the substantial segregation observed in higher education.

These findings have complex implications for policy interventions aimed at reducing gender segregation. If gender segregation is partially driven by expressive motivations and developmental processes rather than merely instrumental factors, traditional policy interventions focused solely on access or incentives may not suffice. Effective policies should target the early developmental contexts and peer interactions where gender-typed preferences form and become reinforced.

Our findings suggest potential avenues for intervention. Mixed-gender group activities that foster meaningful collaboration across traditional gender boundaries could broaden children's social experiences and reduce the association between gender identity and specific interests. Equally important is creating inclusive and supportive spaces for children with

counter-stereotypical interests, providing validation and protection against social isolation. Such strategies would combine exposure to diversity with environments that affirm individual choices.

From a theoretical point of view, our results underline the value of integrating developmental psychology, social network theory, and labor economics. We show that educational gender segregation emerges from early endogenous social processes shaped by affluence, parenting styles, and peer dynamics, rather than solely from labor market incentives or institutional constraints. Future research could further explore how these early friendship patterns interact with educational environments, media influences, and digital socialization, and whether targeted interventions at critical developmental stages could durably influence gender-typed trajectories.

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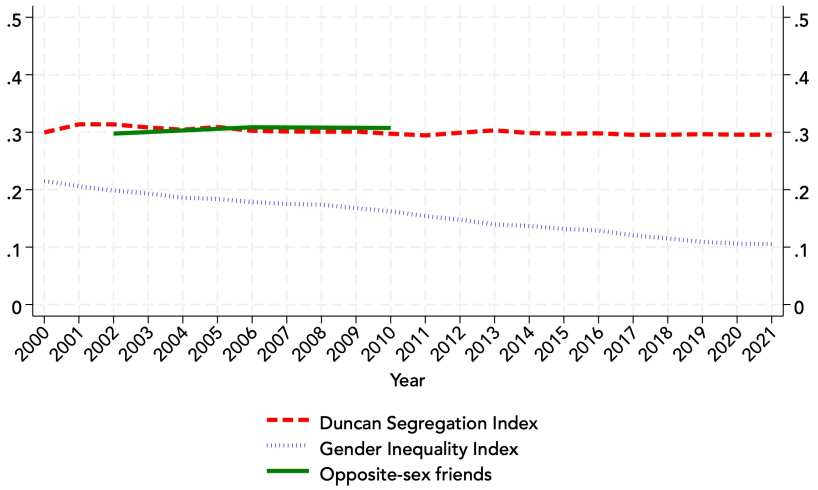
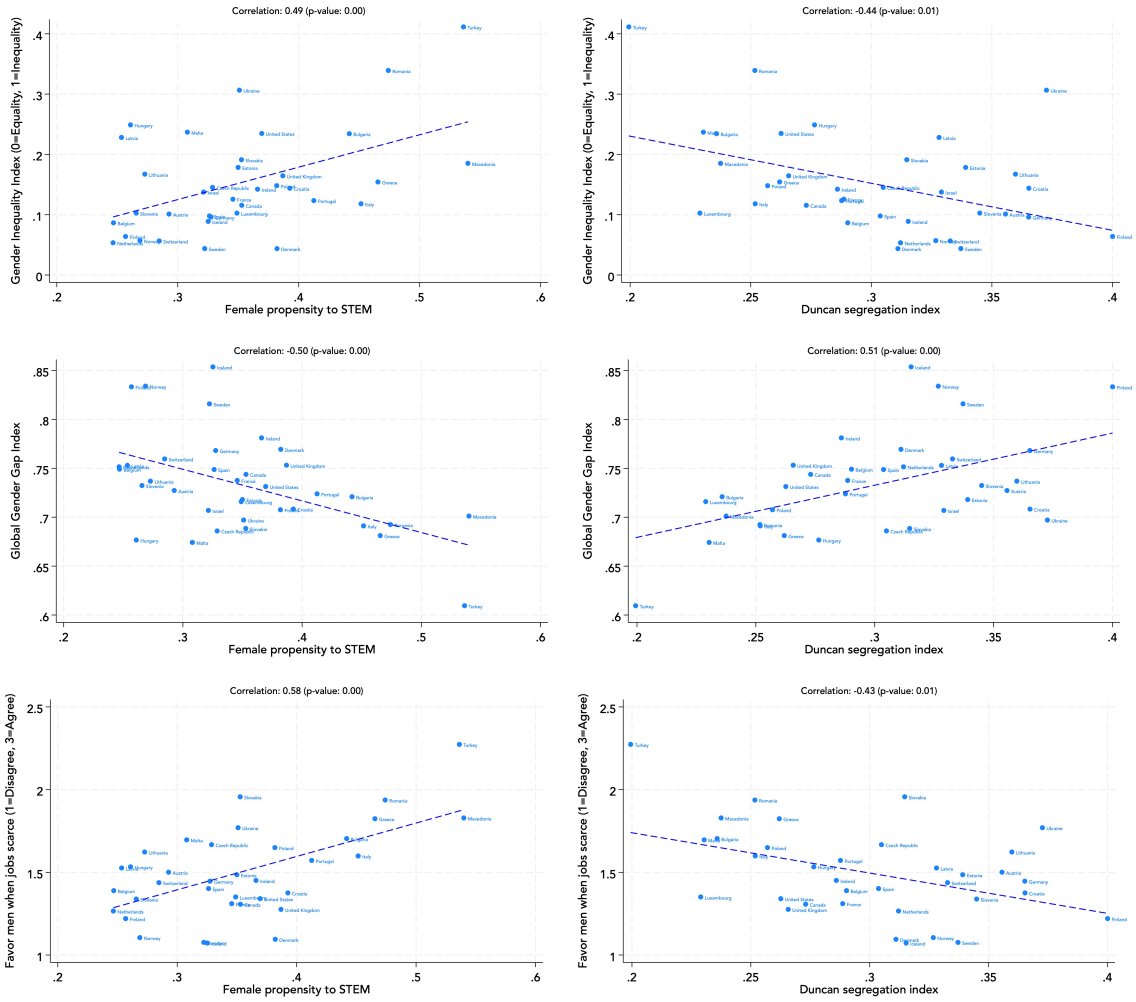
Figures

Figure 1: Evolution of Gender Segregation and Gender Inequality, 2000-2021



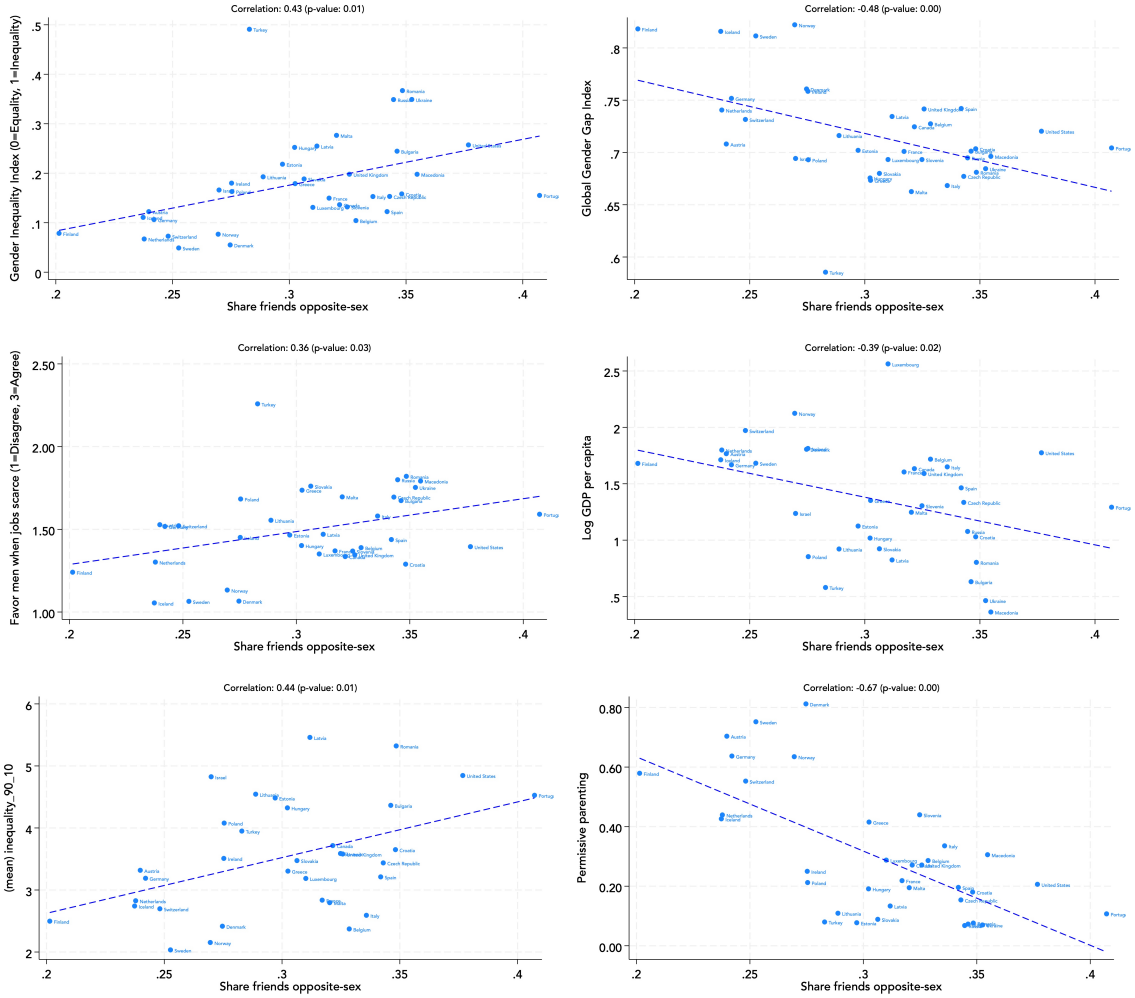
Notes: The figure shows the evolution of gender segregation in higher education (*Duncan Segregation Index*), vertical gender inequality (*Gender Inequality Index*) and segregation in childhood friendships (*Opposite-Sex Friends*). Data cover 37 European and North American countries participating in the HBSC study. The *Duncan Segregation Index* measures the minimum proportion of students of either gender who would need to change fields to achieve equal gender distribution in higher education. The *Gender Inequality Index* captures disparities in reproductive health, empowerment, and labor market participation, with lower values indicating greater gender equality. *Opposite-sex friends* is the average proportion of opposite-sex friends among children aged 11-15 participating in the HBSC study, calculated using the sample with uncensored information on friends. This measure is only available for years 2002, 2006 and 2010.

FIGURE 2: GENDER SEGREGATION IN HIGHER EDUCATION AND VERTICAL GENDER EQUALITY



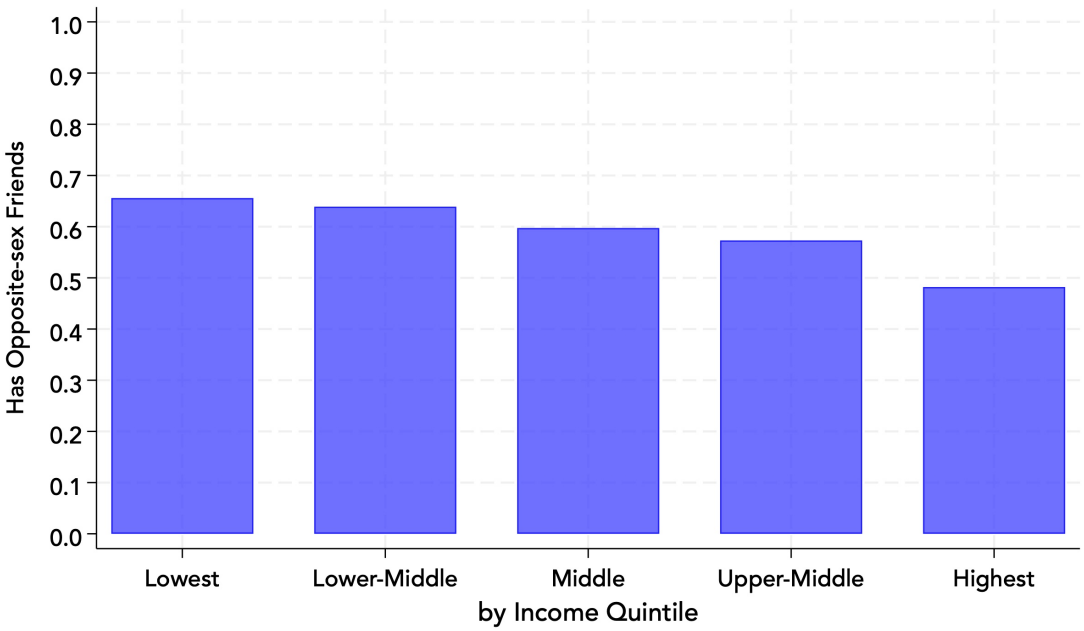
Notes: Cross-country correlations between measures of 'vertical' gender inequality (y-axes) and gender segregation in higher education (x-axes). Data cover 37 European and North American countries participating in the HBSC study. All variables are averaged over the 2000-2021 period, except the *Global Gender Gap Index*, which is only available since 2005. 'Vertical' gender inequality is measured using the *Gender Inequality Index* (top panel), the *Global Gender Gap Index* (second panel), and the *World Value Survey* responses to 'When jobs are scarce, men should have more right to a job than women', coded as: agree=1, neither=2, disagree=3 (third panel). Educational segregation is measured using *Female propensity to STEM* (left panels) and the *Duncan segregation index* across UNESCO 1-digit fields (right panels), which ranges from 0 (complete integration) to 1 (complete segregation). Each point represents a country average; dashed lines show fitted linear regressions.

Figure 3: Gender segregation in children's friendships and country characteristics



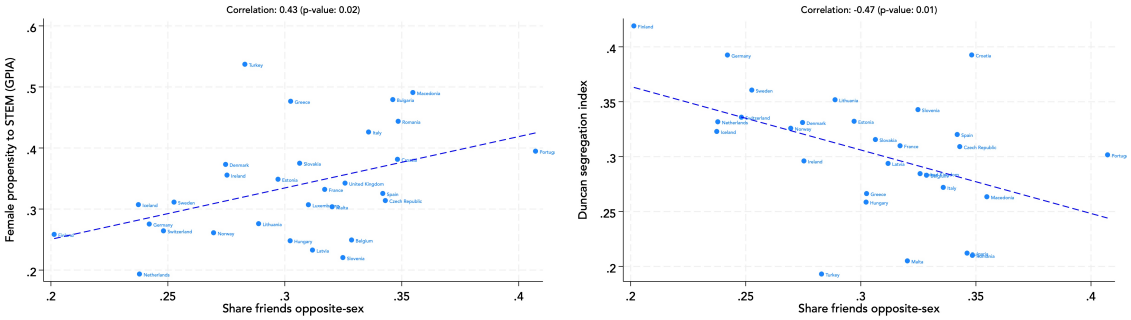
Notes: Cross-country correlations between measures of 'vertical' gender equality and income (y-axes) and the share of opposite-sex friendships among children (x-axes). Data cover 37 European and North American countries participating in the HBSC study. All variables are averaged over the 2002-2010 period, except the *Global Gender Gap Index*, which is only available since 2005. 'Vertical' gender inequality is measured using the *Gender Inequality Index* (top left), the *Global Gender Gap Index* (top right), and *World Value Survey* responses to 'When jobs are scarce, men should have more right to a job than women' — coded as agree=1, neither=2, disagree=3 (middle left). Other measures include: *GDP per capita* in PPP-adjusted, constant 2021 international dollars (middle right); *income inequality*, measured by the 90/10 income ratio (bottom left); and the share of parents with *permissive parenting* in the country (bottom right). The share of opposite-sex friends is computed as the ratio of opposite-sex friends to total friends, using only individuals with uncensored information on friend counts. Each point represents a country average; dashed lines show fitted linear regressions.

Figure 4: Opposite-Sex Friends by Family Income, Millennium Cohort Study



Notes: The graph shows the share of Millennium Cohort participants who reported at age 11 having opposite-sex friends ('a mixture of boys and girls' or 'mostly opposite-sex' vs. 'mostly same-sex'), by family income quintile (OECD equivalised income). The sample excludes families from ethnic minorities for homogeneity.

Figure 5: Gender segregation in children's friendships and in higher education



Notes: The figures show cross-country correlations between measures of gender segregation in education (y-axes) and the average share of opposite-sex friends (x-axes), averaged over 2002-2010, for 30 European and North American countries that participated in the HBSC study with available educational segregation data during this period. Educational segregation is measured using *Female propensity to STEM* (left figure) and the *Duncan segregation index* across UNESCO 1-digit fields (right figure), which ranges from 0 (complete integration) to 1 (complete segregation). The share of opposite-sex friends is computed as the ratio of opposite-sex friends to total friends, using only individuals with uncensored information on friend counts. Each point represents a country average; dashed lines show fitted linear regressions.

Tables

Table 1: Country Characteristics and Opposite-Sex Friends (HBSC)

	Outcome variable: Number of opposite-sex close friends					
	(1)	(2)	(3)	(4)	(5)	(6)
	All	Male	Female	Age=11	Age=13	Age=15
Gender Inequality Index	1.439***	1.283***	1.558**	1.440***	1.563***	1.348***
	(0.522)	(0.410)	(0.680)	(0.546)	(0.519)	(0.468)
Observations	539797	261908	277889	175000	184913	179884
Global Gender Gap Index	-2.624***	-2.362***	-2.832***	-2.730***	-2.840***	-2.351***
	(0.833)	(0.605)	(1.066)	(0.874)	(0.801)	(0.769)
Observations	386896	187943	198953	123585	132120	131191
Favor men when jobs scarce	0.526**	0.423**	0.608*	0.566**	0.564**	0.468**
	(0.240)	(0.168)	(0.314)	(0.251)	(0.238)	(0.214)
Observations	284266	137854	146412	91051	95832	97383
GDP p.c. (10k)	-0.0667***	-0.0620***	-0.0699***	-0.0785***	-0.0683***	-0.0537***
	(0.0224)	(0.0196)	(0.0263)	(0.0232)	(0.0243)	(0.0199)
Observations	539797	261908	277889	175000	184913	179884
Permissive	-0.843***	-0.843***	-0.836***	-0.923***	-0.858***	-0.728***
	(0.131)	(0.134)	(0.157)	(0.161)	(0.135)	(0.108)
Observations	510812	248187	262625	166062	174499	170251
Female propensity to STEM	1.104**	1.418***	0.812	1.290**	1.245**	0.777*
	(0.508)	(0.491)	(0.566)	(0.568)	(0.557)	(0.407)
Observations	415991	203123	212868	136494	142145	137352
Duncan segregation index	-1.907**	-2.284***	-1.568	-2.085**	-2.143**	-1.543**
	(0.846)	(0.728)	(0.991)	(0.928)	(0.867)	(0.691)
Observations	412559	201424	211135	135569	140786	136204

Notes: Each cell reports the coefficient from an ordered probit regression where the dependent variable is the number of opposite-sex friends and the independent variable is the country-level characteristic listed in each row. Column (1) includes all HBSC participants from 2002, 2006, and 2010. Columns (2) and (3) report results separately for boys and girls. Columns (4)-(6) report results separately by grade. All regressions include controls for gender, age, survey year fixed effects, and the total number of friends. Standard errors clustered at the country level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.10

Table 2: Opposite-sex Friends and Individual Characteristics (HBSC)

	Outcome variable: Number of opposite-sex close friends					
	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.06*	0.06*	0.05	0.04	0.03	0.10***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Age	0.08***	0.08***	0.08***	0.08***	0.08***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Parental socio-economic status (z-score)		-0.04***	-0.04***	-0.04***	-0.04***	-0.04***
		(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
Relationship mother (z-score)			-0.03***	-0.03***	-0.03***	-0.03***
			(0.00)	(0.01)	(0.00)	(0.00)
Relationship father (z-score)			-0.03***	-0.02***	-0.01***	-0.03***
			(0.01)	(0.01)	(0.01)	(0.01)
Siblings opposite-sex				0.03***	0.03***	0.02**
				(0.01)	(0.01)	(0.01)
Siblings same-sex				-0.01	-0.01	-0.00
				(0.01)	(0.01)	(0.01)
Father in main home				-0.11***	-0.11***	-0.08***
				(0.01)	(0.01)	(0.01)
Single-sex school					-0.16***	-0.16***
					(0.03)	(0.03)
Relationship opposite-sex friends (z-score)						0.39***
						(0.02)
Relationship same-sex friends (z-score)						-0.22***
						(0.01)
Observations	539797	417111	397676	328646	314315	297853

Notes: Each column reports coefficients from an ordered probit regression where the dependent variable is the number of opposite-sex friends. The sample includes all HBSC participants from 2002, 2006, and 2010 with available data for the corresponding variables. All regressions include controls for survey year, and total number of friends. Standard errors clustered at the country level are shown in parentheses. *** p<0.01, ** p<0.05, * p<0.10

Table 3: Opposite-sex friends and parental characteristics (MCS)

	Outcome variable: Has opposite-sex friends				
	(1)	(2)	(3)	(4)	(5)
Family income (z-score)	-0.039***	-0.039***	-0.024***	-0.023***	-0.024***
	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
Maternal gender egalitarianism (z-score)		0.008**	0.008**	0.007**	0.007*
		(0.004)	(0.003)	(0.004)	(0.004)
Maternal education (z-score)			-0.022***	-0.020***	-0.020***
			(0.004)	(0.005)	(0.005)
Working mother			0.012	0.011	0.009
			(0.007)	(0.008)	(0.008)
Father not in household			0.027***	0.026***	0.023***
			(0.008)	(0.009)	(0.009)
Single sex school				-0.154***	-0.155***
				(0.014)	(0.014)
Extraversion mother (z-score)					0.024***
					(0.004)
Agreeableness mother (z-score)					-0.004
					(0.004)
Conscientiousness mother (z-score)					-0.001
					(0.004)
Neuroticism mother (z-score)					0.006
					(0.004)
Openness to Experience mother (z-score)					-0.004
					(0.004)
N	22547	22547	22547	22547	22547
Mean	0.59	0.59	0.59	0.59	0.59
Predicted R-squared	0.08	0.08	0.08	0.09	0.09

Notes: Each column reports marginal effects estimates from a probit regression in a panel of participants in the MCS, observed at ages 7, 11 and 14. The sample includes all participants with available information on variables included in the regression reported in column (5). The outcome variable takes value one if the child has a mixture of friends of both sexes or a majority of opposite-sex friends (vs. having a majority of same-sex friends). *Family income* is the standardized (OECD equivalised) weekly family income, measured at the corresponding age. *Maternal Gender Egalitarianism* is a standardized index constructed using the responses to four questions on gender norms collected when the child was 9 months old. The maternal *Big Five* personality traits were collected when the child was 14. All five dimensions have been standardized. All regressions include controls for gender, date of birth, ethnicity, and region. Standard errors clustered at the child level in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table 4: Opposite-sex Friends and Parenting Values (MCS)

	Outcome variable: Has opposite-sex friends		
	(1)	(2)	(3)
Permissive	-0.0300***		-0.0177**
	(0.0079)		(0.0079)
Authoritative	-0.0080		-0.0022
	(0.0080)		(0.0080)
Family Income (z-score)		-0.0336***	-0.0323***
		(0.0031)	(0.0031)
N	29665	29665	29665
Mean	0.59	0.59	0.59

Notes: Each column reports marginal effects estimates from a probit regression in a panel of participants in the MCS, observed at ages 7, 11 and 14. The sample includes all participants with available information on variables included in the regression reported in column (3). The outcome variable takes value one if the child has a mixture of friends of both sexes or a majority of opposite-sex friends (vs. having a majority of same-sex friends). *Permissive* and *Authoritative* are dummy variables that have been constructed using mothers' responses to a question on 'which qualities are the most important for the child to learn', asked when the child was 3 years old. The reference category are *Authoritarian* families. *Family income* is the standardized (OECD equivalised) weekly family income, measured at the corresponding age. Regressions in all columns include controls (non reported) for gender, date of birth, region (12 groups), ethnicity (6 groups) and religiosity. Standard errors clustered at the child level in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table 5: Opposite-sex Friends and Parenting Practices (MCS)

	Outcome variable: Has opposite-sex friends				
	(1)	(2)	(3)	(4)	(5)
Clubs outside school (z-score)	-0.021***				-0.010*
	(0.005)				(0.005)
Unsupervised time allowed (z-score)		0.033***			0.024***
		(0.007)			(0.007)
Relationship family (z-score)			-0.014**		-0.010*
			(0.005)		(0.005)
Family Income (z-score)				-0.074***	-0.062***
				(0.006)	(0.006)
N	9283	9283	9283	9283	9283
Mean	0.56	0.56	0.56	0.56	0.56

Notes: Each column reports marginal effects estimates from a probit regression in a panel of participants in the MCS, observed at age 11. The sample includes all participants with available information on variables included in the regression reported in column (5). The outcome variable takes value one if the child has a mixture of friends of both sexes or a majority of opposite-sex friends (vs. having a majority of same-sex friends). *Family income*, measured at age 11, is the standardized (OECD equivalent) weekly family income. *Clubs outside school* is the number of clubs or classes outside school attended weekly at age 7. Information on whether children are allowed *Unsupervised time outside the house* combines the answers to two questions, one for weekdays and another for weekends. Regressions in all columns include controls (non reported) for gender, date of birth, region (12 groups), ethnicity (6 groups) and religiosity. Columns (2) and (5) also include controls for the frequency of meeting friends (ranging from 'Not at all' to 'Every day or almost every day'). Standard errors clustered at the child level in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table 6: Opposite-sex Friends, Personality Traits and Cognitive Ability (MCS)

	Outcome variable: Has opposite-sex friends				
	(1)	(2)	(3)	(4)	(5)
Family Income (z-score)	-0.036***	-0.031***	-0.030***	-0.027***	-0.026***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
Emotional Symptoms (SDQ)		-0.020***	-0.019***	-0.020***	-0.019***
		(0.004)	(0.004)	(0.004)	(0.004)
Conduct Problems (SDQ)		0.025***	0.019***	0.018***	0.018***
		(0.004)	(0.005)	(0.005)	(0.005)
Hyperactivity/Inattention (SDQ)		0.022***	0.019***	0.016***	0.017***
		(0.004)	(0.005)	(0.005)	(0.005)
Peer Problems (SDQ)		0.008*	0.006	0.006	0.004
		(0.004)	(0.004)	(0.004)	(0.004)
Prosocial (SDQ)		0.032***	0.035***	0.034***	0.032***
		(0.004)	(0.004)	(0.004)	(0.004)
Independence-Self Regulation (CSBQ)			0.005	0.008*	0.006
			(0.004)	(0.004)	(0.004)
Emotional-Dysregulation (CSBQ)			0.007	0.007	0.005
			(0.005)	(0.005)	(0.005)
Cooperation (CSBQ)			-0.012**	-0.013***	-0.012**
			(0.005)	(0.005)	(0.005)
Maths score				-0.001	0.000
				(0.004)	(0.004)
Verbal abilities score				-0.015***	-0.015***
				(0.004)	(0.004)
Puberty index (z-score)					0.027***
					(0.003)
N	25240	25240	25240	25240	25240
Mean	0.58	0.58	0.58	0.58	0.58

Notes: The outcome variable takes value one if the child has, at age 11, a mixture of friends of both sexes or a majority of opposite-sex friends. *Family income*, measured at age 11, is the standardized (OECD equivalent) weekly family income. *Maternal Gender Egalitarianism* is a standardized index constructed using the responses to four questions on gender norms when the child was 9 months old. The *Strengths and Difficulties Questionnaire (SDQ)* and the *Child Social Behavior Questionnaire (CSBQ)* were assessed at age 7 by parents, typically the mother. *Maths* and *Verbal abilities* were assessed at age 7 through a test. The *Puberty Index* is a standardized measured based on six different questions asked at age 11. Regressions in all columns include controls (non reported) for gender, date of birth, region (12 groups), ethnicity (6 groups). Standard errors clustered at the child level in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table 7: Opposite-sex Friends in childhood and future outcomes

	Opposite-sex GSCE Age 14-16		Opposite-sex A-levels Age 16-18		Opposite-sex friends Age 14		Egalitarian views Age 14		Opposite-sex occupation Age 7	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Opposite-sex friends (age 7)	0.061***	0.067***	0.066*	0.072**	0.061***	0.053***	0.086***	0.097***	0.027***	0.029***
	(0.020)	(0.020)	(0.036)	(0.036)	(0.010)	(0.010)	(0.023)	(0.022)	(0.005)	(0.005)
Emotional Symptoms (SDQ)		0.005		0.009		-0.010***		-0.004		-0.002
		(0.007)		(0.013)		(0.003)		(0.008)		(0.002)
Conduct Problems (SDQ)		0.002		-0.013		0.008*		-0.017		-0.001
		(0.011)		(0.020)		(0.005)		(0.011)		(0.002)
Hyperactivity/Inattention (SDQ)		0.002		0.005		0.008***		-0.007		0.002
		(0.006)		(0.011)		(0.003)		(0.006)		(0.001)
Peer Problems (SDQ)		0.000		0.024		-0.002		0.010		0.004*
		(0.008)		(0.017)		(0.004)		(0.009)		(0.002)
Prosocial (SDQ)		0.007		-0.006		0.014***		0.036***		0.000
		(0.008)		(0.013)		(0.004)		(0.009)		(0.002)
Independence-Self Regulation (CSBQ)		0.076**		0.015		0.015		0.046		0.010
		(0.035)		(0.063)		(0.016)		(0.038)		(0.008)
Emotional-Dysregulation (CSBQ)		-0.033		-0.075		0.003		0.006		-0.003
		(0.030)		(0.056)		(0.015)		(0.034)		(0.007)
Cooperation (CSBQ)		-0.013		0.091		-0.011		0.023		0.008
		(0.044)		(0.076)		(0.020)		(0.046)		(0.010)
Maths score		0.002**		0.002		0.000		0.004***		-0.000
		(0.001)		(0.001)		(0.000)		(0.001)		(0.000)
Verbal abilities score		0.001		0.001		-0.000		0.005***		0.000**
		(0.001)		(0.001)		(0.000)		(0.001)		(0.000)
Single-sex school		0.129		0.175		-0.097**		-0.139		0.065***
		(0.112)		(0.157)		(0.042)		(0.101)		(0.023)
Family income (z-score)		0.010		0.017		0.000		0.008		0.007**
		(0.012)		(0.020)		(0.006)		(0.013)		(0.003)
Maternal Gender Egalitarianism		-0.003		0.006		0.000		0.017***		-0.001
		(0.004)		(0.007)		(0.002)		(0.004)		(0.001)
Years of maternal education		0.005		0.008		-0.006***		0.025***		0.003***
		(0.004)		(0.007)		(0.002)		(0.005)		(0.001)
Father not in main home		-0.019		-0.022		0.051***		0.010		0.009
		(0.029)		(0.053)		(0.013)		(0.029)		(0.006)
Working mother		-0.005		-0.042		-0.010		0.057**		-0.005
		(0.022)		(0.040)		(0.011)		(0.025)		(0.005)
N	5537	5537	2536	2536	7271	7271	7407	7407	8217	8217
Mean	0.00	0.00	-0.01	-0.01	0.77	0.77	0.05	0.05	0.32	0.32
Adjusted R-squared	0.43	0.43	0.21	0.22			0.05	0.10	0.20	0.21

Notes: The table reports results from OLS regressions, except in columns 5 and 6 which report marginal effects from a probit regression. In columns 1 and 2 the outcome variable is the (standardized) share of opposite-sex children in the subjects selected by the child in GSCE and, in columns 3 and 4, for subjects selected in A-labels. In columns 5 and 6 the outcome variable *Opposite-sex friends (Age 14)* is a dummy that takes value 0 for 'None of them', and 1 for 'Some of them', 'Most of them' and 'All of them'. In columns 7 and 8 the outcome variable is a standardized index of child's *Gender Egalitarianism*, which was constructed using the responses to two questions on gender norms when the child was 14. In columns 9 and 10 the outcome variable is the share of opposite-sex individuals in the occupation reported by the child when asked at age 7 'when you grow up, what would you like to be?'. All right-hand side variables are measured at age 7, except for maternal gender egalitarianism and years of maternal education, which were measured when the child was 9 months old. The outcome variables are as follows. The variable *Opposite-sex friends (age 7)* takes value zero if, at age 7, most friends are of the same sex as the respondent, and value 1 if there is a mixture of friends of both sexes or if they are mostly of the opposite-sex. The *Strengths and Difficulties Questionnaire (SDQ)* and the *Child Social Behavior Questionnaire (CSBQ)* were assessed by parents, typically the mother. *Maths* and *Verbal abilities* were assessed through a test. Regressions in all columns include controls (non reported) for gender, date of birth, region (12 groups), ethnicity (6 groups) and the total number of friends at age 7 (not many/some/lots). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

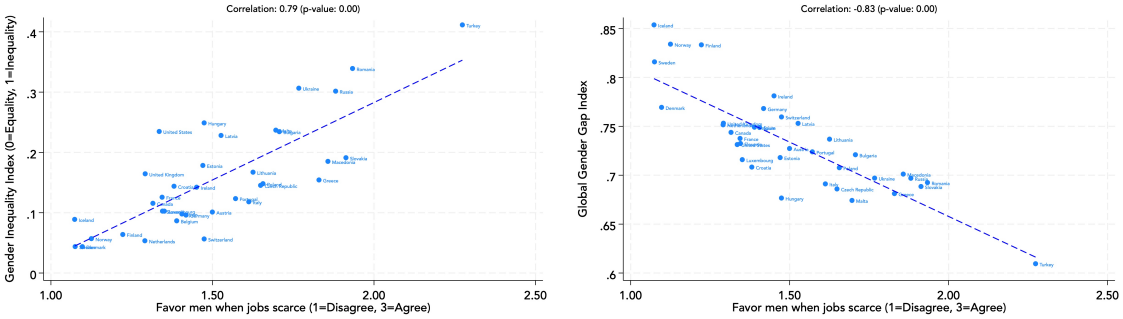
A Appendix

This appendix contains additional figures and tables.

Figure A1: Countries participating in HBSC

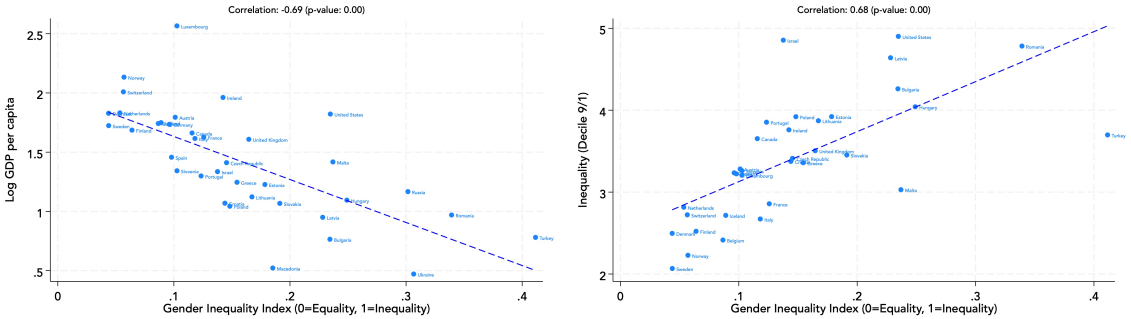
Notes: The map shows 37 European and North American countries that participated in the Health Behavior in School-Aged Children (HBSC) study in years 2002, 2006 or 2010.

Figure A2: Correlation between different measures of vertical gender inequality



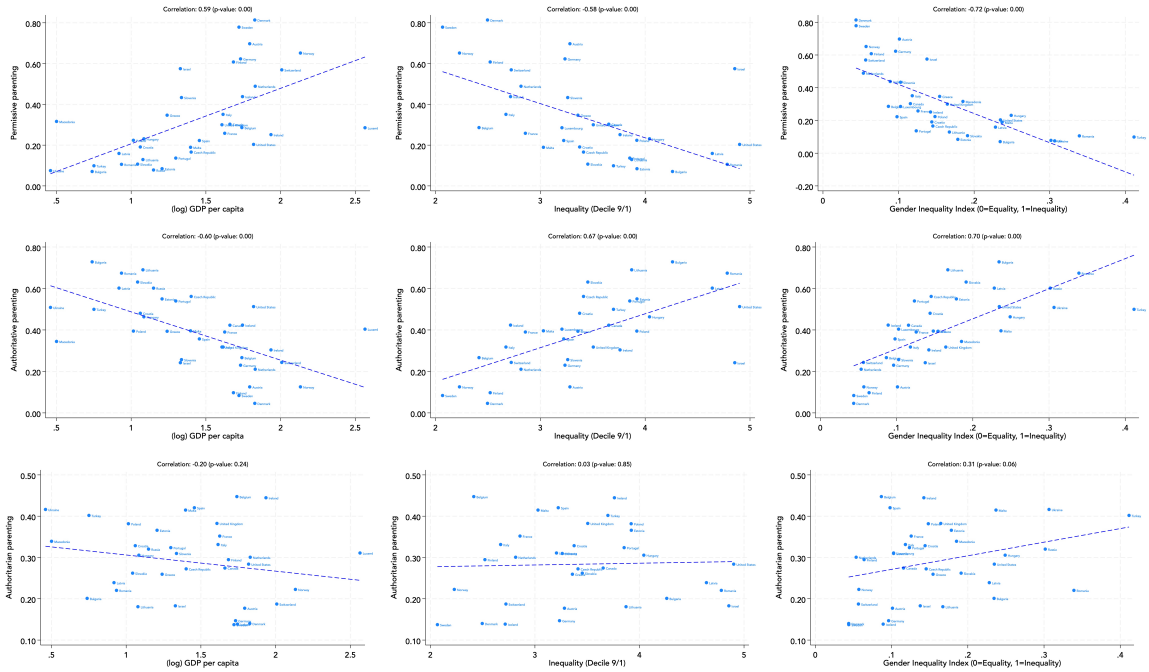
Notes: Average values for years 2000-2021, for the sample of countries that participated in the Health Behavior in School-Aged Children (HBSC) study in 2002, 2006, or 2010. The left graph shows the relationship between the Gender Inequality Index (y-axis; higher values indicate greater inequality) and average responses to the World Values Survey question "When jobs are scarce, men should have more right to a job than women" (x-axis; 1=disagree, 2=neither, 3=agree, where higher values indicate greater support for male job priority). The right graph shows the relationship between the Global Gender Gap Index (y-axis; higher values indicate greater gender parity) and the same World Values Survey measure (x-axis).

FIGURE A3: GDP PER CAPITA AND GENDER INEQUALITY INDEX



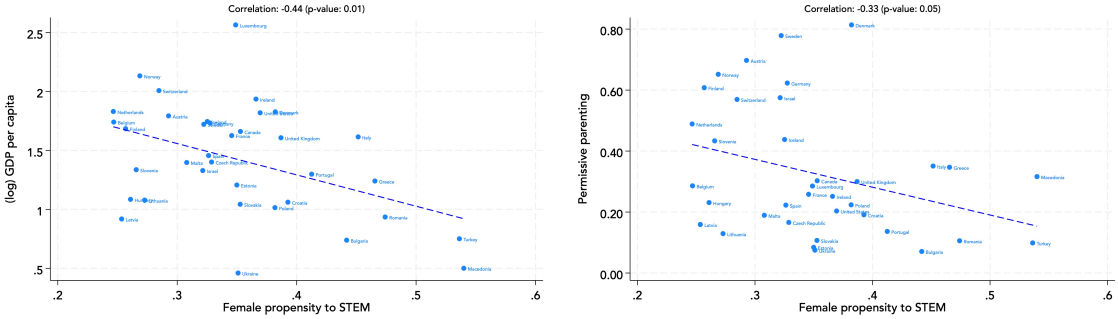
Notes: The above graphs show data for years 2000-2021 for the sample of countries that participated in the Health Behavior in School-Aged Children (HBSC) study. The left-hand graph shows cross-country correlations between the (log) GDP per capita and the Gender Inequality Index. The right-hand graph shows correlations between Income Inequality (90—10 earnings ratio) and the Gender Inequality Index.

FIGURE A4: PARENTING STYLES, INCOME AND GENDER INEQUALITY



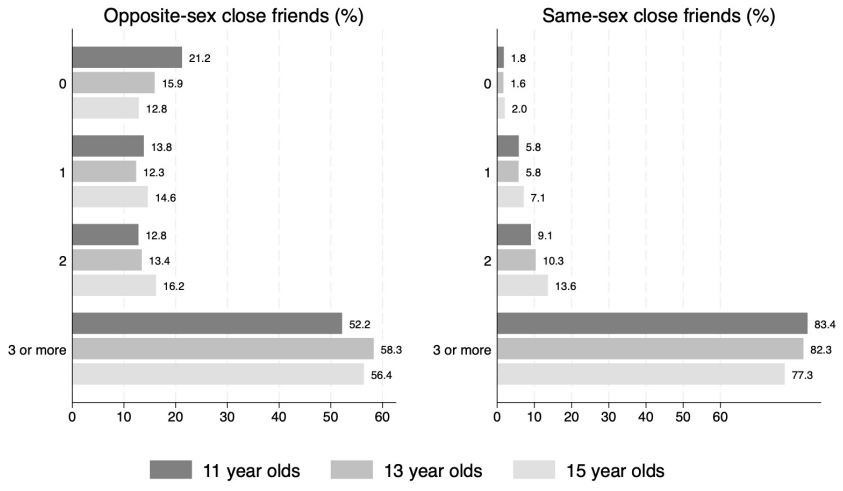
Notes: The above graphs show data for years 2000-2021 for the sample of countries that participated in the Health Behavior in School-Aged Children (HBSC) study in 2002, 2006 and 2010. The y-axis in the upper panel shows the share of individuals who support *Permissive* parenting, in the middle panel *Authoritative*, and in the bottom panel *Authoritarian*. The x-axis in the left panel shows the *log GDP per capita*, in the middle column *income inequality (90—10 earnings ratio)*, and in the right column the *Gender Inequality Index*.

FIGURE A5: GENDER SEGREGATION IN HIGHER EDUCATION, INCOME, AND PERMISSIVE PARENTING



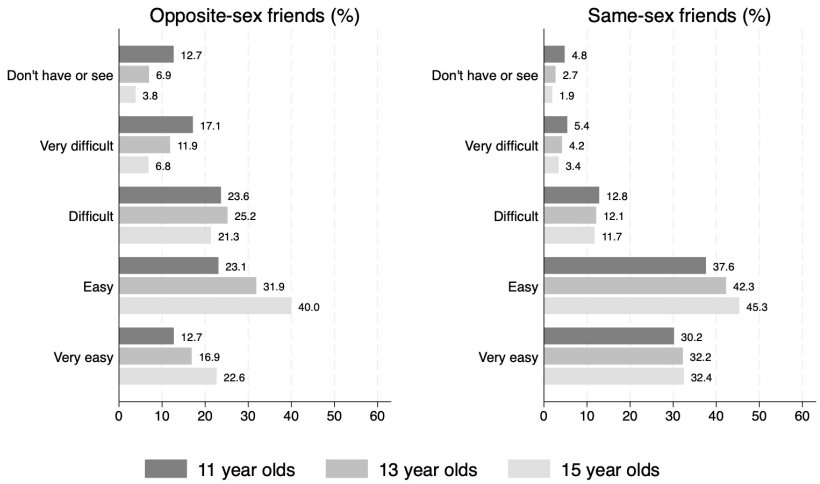
Notes: The left-hand graph shows cross-country correlations between the (log) GDP per capita and educational segregation, as measured by the *Female propensity to STEM*. The right-hand graph shows correlations between the share of individuals supporting a *Permissive* parenting style and the *Female propensity to STEM*. Each point represents a country average for years 2000-2021 for the sample of countries that participated in the Health Behavior in School-Aged Children (HBSC) study. Dashed lines show fitted linear regressions.

FIGURE A6: NUMBER OF CLOSE FRIENDS



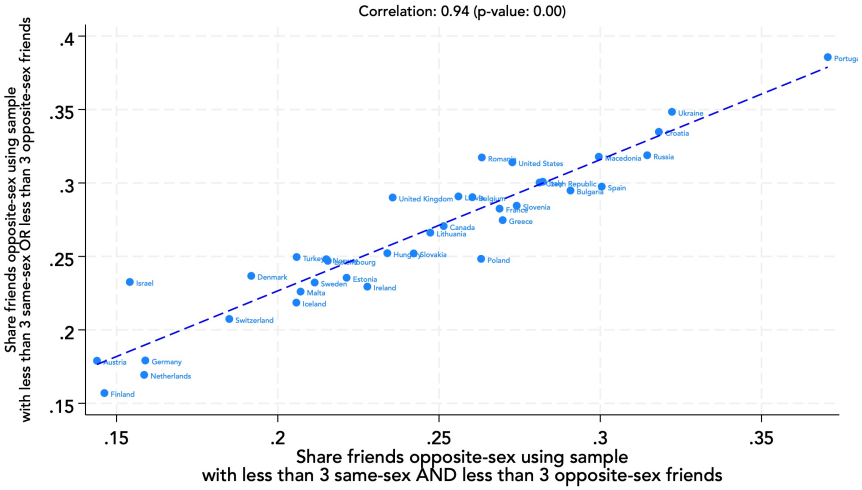
Notes: The graph provides information for children aged 11, 13, and 15 in the sample of 37 countries that participated in the Health Behavior in School-Aged Children (HBSC) study in years 2002, 2006 or 2010.

FIGURE A7: HOW EASY IS TO TALK TO FRIENDS ABOUT THINGS THAT REALLY BOTHER YOU?



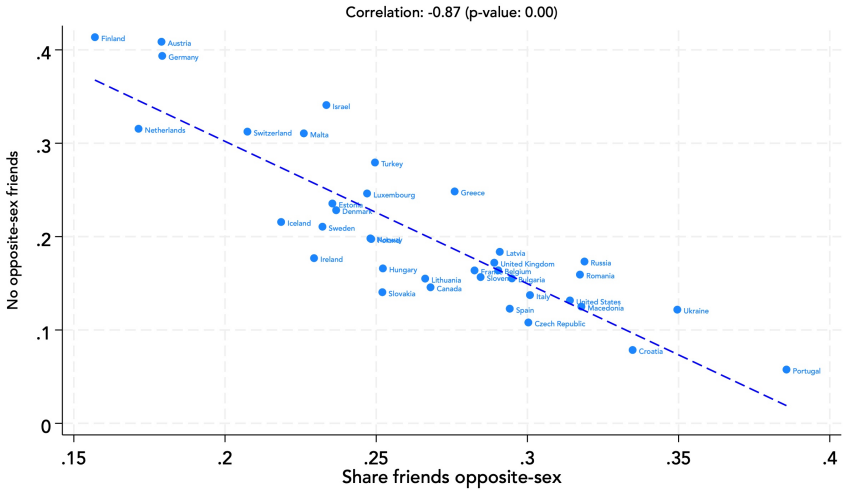
Notes: The graph provides information for children aged 11, 13, and 15 in the sample of 37 countries that participated in the Health Behavior in School-Aged Children (HBSC) study in years 2002, 2006 or 2010.

FIGURE A8: OPPOSITE-SEX FRIENDS, DIFFERENT MEASURES (I)



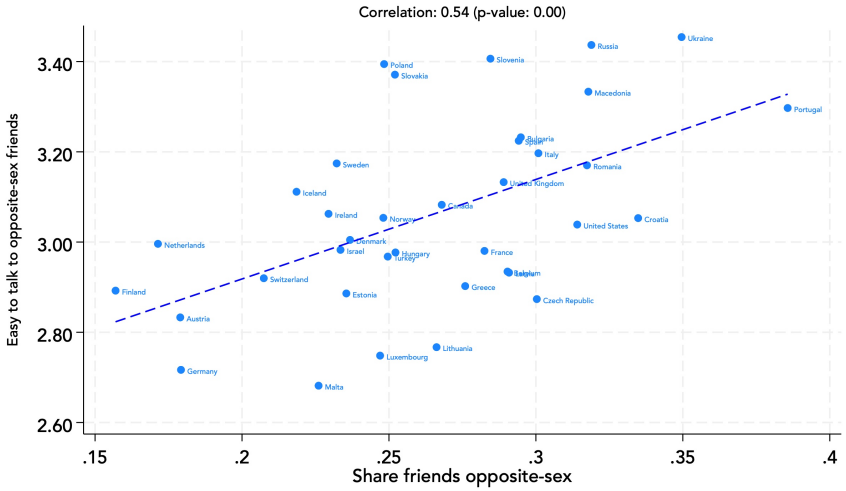
Notes: The graph includes information for children aged 11 for countries participating in the HBSC survey in years 2002, 2006 and 2010. The x-axis shows the share of opposite-sex friends at the country level for the sub-sample of children reporting fewer than 3 female and fewer than 3 male friends. The y-axis shows the share of opposite-sex friends using information from children who report either fewer than 3 male friends or fewer than 3 female friends, assigning a value of 3 to '3 or more'.

FIGURE A9: OPPOSITE-SEX FRIENDS, DIFFERENT MEASURES (II)



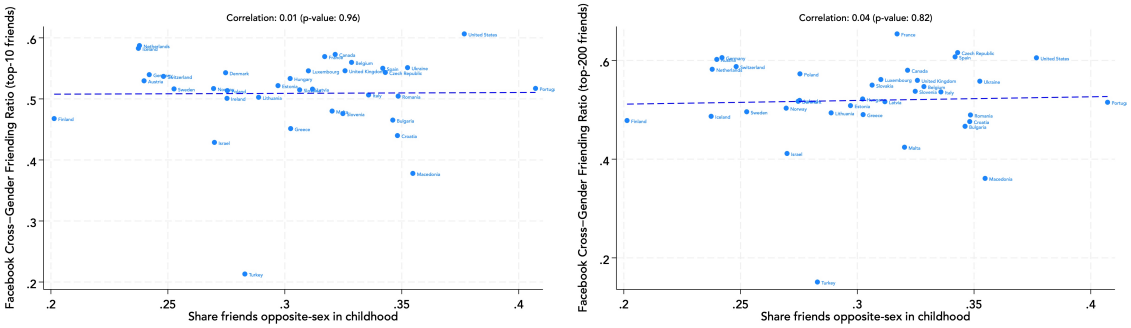
Notes: The graph includes information for children aged 11 for countries participating in the HBSC survey in years 2002, 2006 and 2010. The y-axis shows the share of children who report that they have no opposite-sex close friends. The x-axis displays the share of opposite-sex friends for the sub-sample of children reporting fewer than 3 female and fewer than 3 male friends.

FIGURE A10: EASINESS TO TALK TO OPPOSITE-SEX FRIENDS AND SHARE OF OPPOSITE-SEX FRIENDS



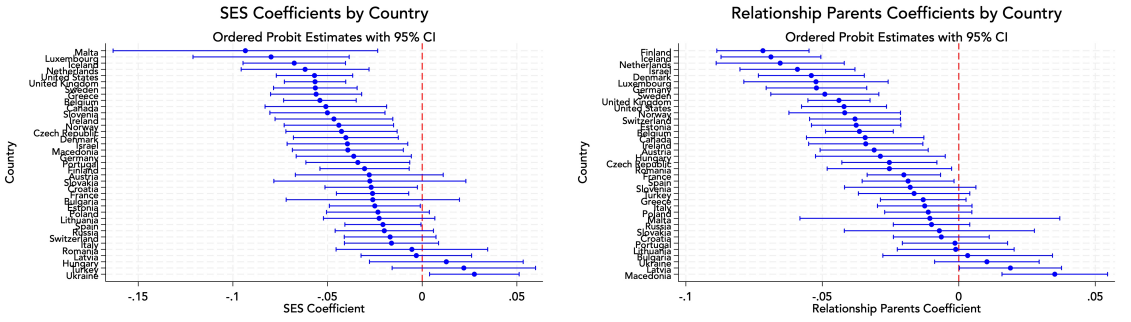
Notes: The graph includes information for children aged 11 for countries participating in the HBSC survey in years 2002, 2006 and 2010. The y-axis shows the average reply to the question 'How easy is it for you to talk to (male/female) friends about things that really bother you?', with responses ranging from 'Very difficult' to 'Very easy', coded from 1 to 5 respectively. The x-axis includes information on the share of opposite-sex friends for the sub-sample of children reporting less than 3 female and less than 3 male friends.

FIGURE A11: GENDER OF CHILDHOOD FRIENDS AND FACEBOOK LINKS



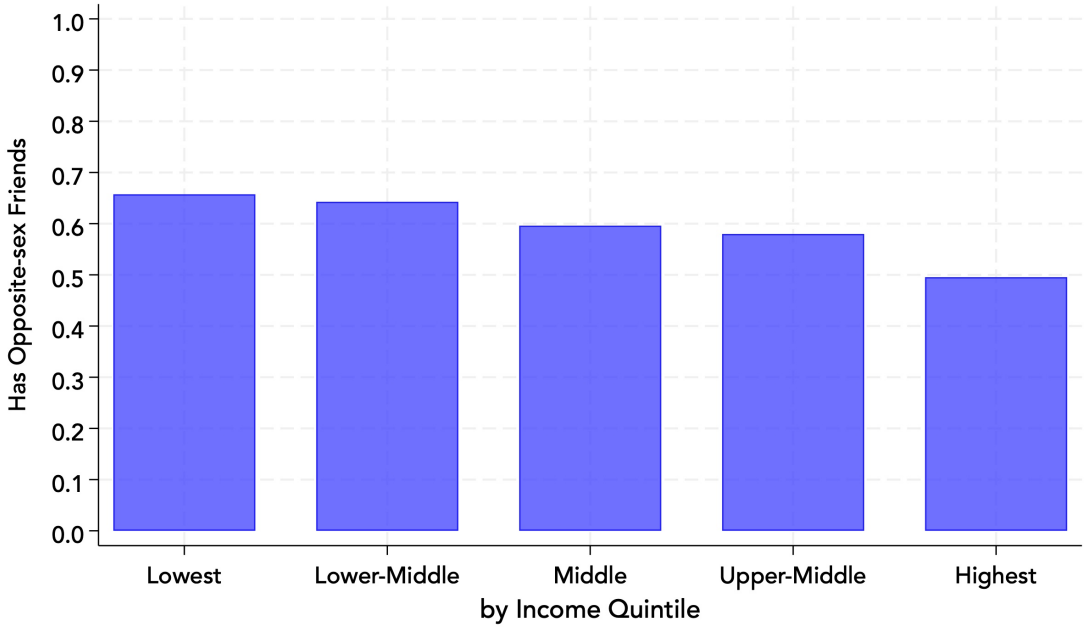
Notes: The above figures show cross-country correlations between the share of opposite-sex friends in childhood (HBSC) and the gender of friends in Facebook among adults (Bailey et al., 2025). The sample includes 37 European and North American countries that participated in the HBSC study. The share of opposite-sex friends is computed as the ratio between the number of opposite-sex friends and the total number of friends, for the sample of individuals with uncensored information. In the left figure the gender of Facebook friends is calculated using the top-10 links, while in the right figure it is based on information from the top 200 links. Each point represents a country average. Dashed lines show fitted linear regressions.

FIGURE A12: SOCIOECONOMIC STATUS, RELATIONSHIP WITH PARENTS AND OPPOSITE-SEX FRIENDS, BY COUNTRY



Notes: The left figure displays ordered probit coefficients for socioeconomic status (SES) from country-specific regressions. Similarly, the right figure displays ordered probit coefficients for a variable that measures the relationship with parents, constructed as the sum of the variables 'How easy is to talk with father' and 'How easy is to talk with mother'. In both graphs, each regression controls for gender, age, survey year fixed effects, and total number of friends. The dependent variable is the number of opposite-sex close friends (0, 1, 2, or 3+). Horizontal lines represent 95% confidence intervals. Positive coefficients indicate a positive association with opposite-sex friendships, while negative coefficients indicate the opposite relationship. The vertical dashed line at zero indicates no effect.

Figure A13: Opposite-Sex Friends by Family Income, excluding single-sex schools



Notes: The graph shows the share of Millennium Cohort participants who reported at age 11 having opposite-sex friends ('a mixture of boys and girls' or 'mostly opposite-sex' vs. 'mostly same-sex'), by family income quintile (OECD equivalised income). The sample excludes children attending a single-sex school, who account for around 10% of the sample, as well as families from ethnic minorities.

Table A1: Country level information - Descriptive statistics

	(1) N	(2) mean	(3) min	(4) max
Opposite-sex friends (%)	37	0.30	0.20	0.41
Female graduates in STEM (%)	36	12.9	6.80	18.8
Male graduates in STEM (%)	36	37.1	26.2	52.9
Female graduates in HEAL (%)	36	55.3	42.2	72.6
Male graduates in HEAL (%)	36	28.6	16.5	41.1
Female propensity to STEM	36	0.35	0.25	0.54
Female propensity to HEAL	36	2.00	1.53	2.74
Duncan segregation index	36	0.30	0.20	0.40
Global Gender Gap Index	37	0.73	0.61	0.85
Gender Inequality Index (0=Equality, 1=Inequality)	37	0.16	0.044	0.41
Favor men when jobs scarce (1=Disagree, 3=Agree)	36	1.51	1.07	2.27
GDP per capita (10k)	37	4.61	1.60	13.0
Permissive	37	0.32	0.071	0.81
Authoritarian	37	0.29	0.14	0.45
Authoritative	37	0.39	0.046	0.73

Notes: The variable *Opposite-sex friends (%)* provides information on gender of friends for children aged 11-15, in years 2002, 2006 and 2010, for 37 European and North American countries that participated in the HBSC survey. All other variables represent averages for the period 2000-2021. Missing values have been linearly interpolated whenever information was available before and after that year. Following UNESCO's classification, STEM includes ISCED fields of education number 4 (Life sciences, Physical sciences, Mathematics and statistics, Computing) and 5 (Engineering and engineering trades, Manufacturing and processing, Architecture and building). HEAL fields comprise ISCED fields of education 1 (Education), 2 (Humanities and arts), 3 (Social Sciences, Journalism and Information) and 7 (Health and welfare). UNESCO data on the gender of graduates is not available for the Russian Federation. More information on variables definition and sources is available in section 3.1.

Table A2: HBSC survey - Individual characteristics and family structure

	(1) N	(2) mean	(3) min	(4) max
Female	539,797	0.51	0	1
Age group = 11	539,797	0.32	0	1
Age group = 13	539,797	0.34	0	1
Age group = 15	539,797	0.33	0	1
Siblings opposite-sex	476,665	0.61	0	1
Siblings same-sex	477,551	0.60	0	1
Father in main home	526,152	0.78	0	1
Mother in main home	531,393	0.94	0	1
SES = Low	417,111	0.12	0	1
SES = Lower-middle	417,111	0.26	0	1
SES = Middle	417,111	0.30	0	1
SES = Upper-middle	417,111	0.21	0	1
SES = High	417,111	0.11	0	1
Relationship father	519,298	3.62	1	5
Relationship mother	518,880	4.17	1	5
Single-sex school	513,311	0.021	0	1
Opposite-sex classmates	391,432	0.47	0	1

Notes: Female is coded based on respondents' answer to the question *Are you a boy or a girl?*. *Age group* refers to the modal age in the class. *Siblings opposite-sex* and *Siblings same-sex* are dummy variables that take value one if the respondent has at least one sibling of the opposite-sex or the same sex respectively. *Father/mother in main home* are coded based on the answer to the question *Please mark all the people who live in your main or your only home*. Childrens' *socioeconomic status (SES)* is the maximum of their father's and mother's SES, which was assigned by HBSC based on the occupation reported by children. 'Relationship with mother' and 'Relationship with father' take values ranging between 1 ('Very difficult') and 5 ('Very easy'), based on a question on how easy is to talk to parents about important things. The variable *Opposite-sex classmates* measures the gender composition of participants in the survey from the same school and grade.

Table A3: Millennium Cohort Study - Household and Parental Characteristics

	Mean	Min	Max	Observations
Female	0.49	0	1	19351
Year birth	2000.72	2000	2002	18777
Siblings				
Number	1.59	0	10	13439
At least one opposite-sex sibling	0.58	0	1	13439
At least one same-sex sibling	0.58	0	1	13439
Biological father not in household	0.19	0	1	15073
Weekly household income	0.40	0	1	13439
Years of education mother	11.68	6	18	18680
Years of education father	11.86	6	18	13332
Maternal gender norms				
Family suffers mother full-time job	3.00	1	5	17501
Mother happier if she works	2.75	1	5	17218
Child suffers mother works before school	2.85	1	5	17554
Couples with children should not separate	2.98	1	5	17381
Maternal Big Five				
Extraversion	4.76	1	8	10949
Agreeableness	6.06	1	8	10949
Conscientiousness	5.86	1	8	10949
Neuroticism	4.00	1	8	10949
Openness to Experience	4.67	1	8	10949

Notes: The table provides information for participants in the Millennium Cohort Study. *Siblings* indicates the number of siblings in household and it was measured at age 11. *Biological father not in household* was measured at age 3. *Weekly household income* was measured when the child was 11 and is adjusted for family size using OECD equivalence scales. *Years of education* indicates the number of years of education reported by the mother and father when the child was 9 months old. Information on maternal gender norms was gathered when the child was 9 months old and responses were measured on a 5-point scale from 'Strongly disagree' (1) to 'Strongly agree' (5). *Maternal Big Five* was measured when the child was 14.

Table A4: Correlation matrix, Millennium Cohort Study

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Family income	1.000								
(2) Education mother	0.557	1.000							
(3) Gender norms mother	0.141	0.142	1.000						
(4) Single-sex school	0.046	0.076	-0.050	1.000					
(5) Openness	0.088	0.123	-0.027	0.032	1.000				
(6) Conscientiousness	0.091	0.058	0.034	0.001	0.237	1.000			
(7) Extraversion	0.088	0.063	0.058	0.009	0.281	0.251	1.000		
(8) Agreeableness	-0.031	-0.030	-0.018	-0.007	0.204	0.395	0.160	1.000	
(9) Neuroticism	-0.093	-0.075	-0.031	-0.016	-0.108	-0.154	-0.238	-0.067	1.000

Notes: The table displays the correlation between different parental characteristics. *Family income* was measured when the child was three and is calculated as the standardized (OECD equivalent) weekly family income. *Education mother* is the number of years of education. *Gender norms mother* is an standardized index constructed using the responses to the four questions on gender norms answered when the child 9 months by the main respondent in the household, typically the mother. Higher values indicate stronger gender egalitarianism. Information on parental *Big Five* was collected when the child was 14. The five dimensions have been standardized.

Table A5: Millennium Cohort Study - Parenting Values and Practices

	Mean	Min	Max	Observations
Parenting values				
Authoritarian (To obey)	0.27	0	1	14241
Authoritative (To work hard)	0.33	0	1	14242
Permissive (To think for yourself)	0.36	0	1	14239
Religious	0.07	0	1	14238
Clubs outside school	0.63	0	5	13390
Unsupervised time outside allowed				
Weekend, age 11	2.80	1	4	12702
Weekend, age 14	3.36	1	4	11495
Weekdays, age 11	3.04	1	5	12701
Weekdays, age 14	3.40	1	5	11492

Notes: The table provides information for participants in the Millennium Cohort Study. Parents were classified as *permissive*, *authoritative* and *authoritarian* based on a question about which qualities mothers considered most important for their child's life (respectively 'To think for themselves', 'to work hard' or 'to obey parents'). *Religious* is a dummy that takes value one if parents value that the child learns religious values. *Clubs outside school* indicates the number of clubs or classes outside school attended weekly at age 7. Information on whether children can play *unsupervised outside* combines the replies to two questions, one for weekdays and another for weekends.

Table A6: Main Features of Different Parenting Values

	Omitted group: Authoritarian							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	log Income	Years education	White	Religious	Egalitarian gender norms	Unsupervised socialization	Clubs outside school	Talk to mother
Permissive	0.341***	1.692***	0.146***	-0.242***	0.231***	-0.062**	0.159***	0.105***
	(0.015)	(0.065)	(0.007)	(0.016)	(0.022)	(0.025)	(0.024)	(0.024)
Authoritative	0.158***	0.781***	0.085***	-0.291***	0.227***	0.034	0.050**	0.083***
	(0.015)	(0.067)	(0.008)	(0.015)	(0.023)	(0.025)	(0.024)	(0.025)
Constant	5.410***	11.083***	0.789***	0.384***	-0.116***	0.044**	-0.051***	-0.054***
	(0.011)	(0.050)	(0.007)	(0.014)	(0.017)	(0.019)	(0.018)	(0.019)
N	13574	13642	13642	13669	12161	10269	10781	10410
Mean	5.59	11.98	0.87	0.19	0.05	0.03	0.03	0.01

Notes: The table shows results from OLS regressions. Parents were classified as *Permissive*, *Authoritative* and *Authoritarian* based on their responses to a question about which qualities are most important for a child's life (selecting 'To think for themselves', 'to work hard' or 'to obey parents', respectively), asked when the child was three years old. The omitted group in regressions is *Authoritarian*. *Log Income* is the log of the (OECD equivalent) weekly family income, measured when the child was three. *Years education* corresponds to maternal education. *Religious* is a dummy that takes value one if parents value learning religious values. *Egalitarian gender norms* is standardized and was measured when the child was 9 months old based on the mother's answers to four questions. *Unsupervised socialization* is standardised and is based on questions asked at age 11, combining answers to two questions on whether children are allowed unsupervised time with friends outside the house, one for weekdays and another for weekends. *Clubs outside school* is the (standardized) number of clubs or classes outside school attended weekly at age 7. *Talk to mother* is the (standardized) frequency with which the child talks to her mother, with values ranging from 'Not at all' to 'Everyday'.

Table A7: Millennium Cohort Study - Children's Friends, Personality Traits and Cognitive Ability

	Mean	Min	Max	Observations
Friends age 7				
Mostly same sex	0.56	0	1	12606
A mixture of boys and girls	0.41	0	1	12606
Mostly opposite sex	0.03	0	1	12606
Friends age 11				
Mostly same sex	0.45	0	1	12536
A mixture of boys and girls	0.53	0	1	12536
Mostly same sex	0.02	0	1	12536
Friends age 14				
All same sex	0.24	0	1	10723
Mostly same sex	0.64	0	1	10723
Mostly opposite sex	0.12	0	1	10723
All opposite sex	0.01	0	1	10723
Opposite-sex in aspired occupation	0.32	0	1	11321
Gender norms - children				
Men and women same housework	3.36	1	4	11466
Less important for women to work	3.37	1	4	11346
Strengths Difficulties Questionnaire (SDQ)				
Emotional Symptoms	1.54	0	10	13589
Conduct Problems	1.40	0	10	13618
Hyperactivity/Inattention	3.38	0	10	13568
Peer Problems	1.24	0	10	13598
Prosocial	8.58	0	10	13622
Child Social Behaviour Questionnaire (CSBQ)				
Independence-Self	2.50	1	3	13634
Emotional-Dysregulation	1.73	1	3	13635
Cooperation	2.59	1	3	13636
Cognitive ability				
Maths	97.67	69	136	13718
Verbal abilities	111.28	55	145	13553
Single-sex school	0.06	0	1	16045
Received advice from friends on post-16 options	0.22	0	1	9973

Notes: The table provides information for participants in the Millennium Cohort Study. Information on *Opposite-sex at desired occupation (%)*, *Strengths and Difficulties Questionnaire* (SDQ), *Child Social Behavior Questionnaire* (CSBQ), and *cognitive ability* was collected at age 7. *Single-sex school* is recorded at age 11. Children's *gender norms* were measured at age 14. *Received advice from friends on post-16 options* was asked at age 17.

Table A8: Share of women by subject of GCSE exams

SUBJECT OF GCSE EXAM	Female Share (%)	N
Art and Design	70	1813
Drama	63	849
Language: French	61	1913
Language: Spanish	60	1183
Music	58	711
Religious Studies	56	3886
Language: German	56	608
Additional Science	55	2684
History	54	3379
Language: English Literature	54	6946
Combined Science	54	823
Applied Science	53	418
Language: English Language	53	7467
Science	53	3066
Mathematics - Numeracy	52	981
Mathematics	51	7665
Media Studies	51	488
Biology	51	2529
Chemistry	51	2512
Physics	50	2488
Geography	50	2975
Information and Communication Technology (ICT, IT)	44	1473
Language: English	43	412
Physical Education (PE)	42	1323
Business Studies	40	740
Design and Technology	33	445
Computing	29	427
Computer Science	21	505

Notes: Table shows the percentage of female students and total number of students by GCSE subject. Authors' calculations using information from the Millennium Cohort Study. Only subjects with more than 400 observed individuals are included.

Table A9: Share of women by subject of A-levels exams

SUBJECT OF A-LEVELS EXAM	Female Share (%)	N
Sociology	80	483
Religious Studies	77	194
English Literature	76	530
Psychology	76	836
Art and Design ETC	74	394
Language: Spanish	74	106
Biology	64	855
Philosophy (including Philosophy and Ethics)	64	111
Language: English Language	63	175
Language: French	63	106
Law	63	156
History	56	709
Chemistry	55	729
Media Studies	53	222
Politics	53	125
Geography	52	467
Government and Politics	49	129
Mathematics	41	1110
Business	40	161
Business Studies	35	239
Further Mathematics	33	165
Physical Education (PE)	30	119
Economics	29	355
Physics	24	501
Computer Science	14	118

Notes: Table shows the percentage of female students and total number of students by A-levels subject, using information from the Millennium Cohort Study. Only subjects with more than 100 observed individuals are included.

Table A10: Marginal Effects on Number of Opposite-Sex Friends

Panel A: Gender Inequality Index			
Number of opposite-sex friends	Marginal Effect	Std. Error	P-value
None	-0.108	0.039	0.005
One	-0.002	0.003	0.470
Two	-0.064	0.023	0.005
Three or more	0.174	0.062	0.005
Panel B: GDP per capita			
Number of opposite-sex friends	Marginal Effect	Std. Error	P-value
None	0.005	0.002	0.003
One	0.000	0.000	0.499
Two	0.003	0.001	0.004
Three or more	-0.008	0.003	0.003

Notes: The table reports average marginal effects from ordered probit models. Standard errors are clustered at the country level. Each panel shows results from a separate regression with the same controls: gender, age, survey year fixed effects, and total number of friends. GDP per capita is measured in thousands of 2021 PPP dollars.

Table A11: Country Gender Inequality and Opposite-sex Friends

	Number of opposite-sex friends				
Gender Inequality Index	1.439***	1.441***	1.346***	1.305**	1.408**
	(0.522)	(0.498)	(0.497)	(0.619)	(0.557)
Observations	539797	417111	328646	220926	211339
Global Gender Gap Index	-2.624***	-2.820***	-2.735***	-2.756***	-2.875***
	(0.833)	(0.773)	(0.714)	(0.753)	(0.666)
Observations	386896	288633	227868	211850	202573
Favor men when jobs scarce	0.526**	0.553**	0.532**	0.489**	0.530***
	(0.240)	(0.236)	(0.226)	(0.226)	(0.201)
Observations	284266	215496	170260	147819	141590
GDP p.c. (10k)	-0.0667***	-0.0717***	-0.0685***	-0.0672***	-0.0678***
	(0.0224)	(0.0210)	(0.0213)	(0.0239)	(0.0234)
Observations	539797	417111	328646	220926	211339
Permissive	-0.843***	-0.836***	-0.824***	-0.837***	-0.842***
	(0.131)	(0.136)	(0.135)	(0.145)	(0.144)
Observations	510812	396833	312014	208404	199376
Female propensity to STEM	1.104**	1.153**	1.198**	1.010*	1.146**
	(0.508)	(0.527)	(0.543)	(0.561)	(0.525)
Observations	415991	334263	263009	180050	172560
Duncan segregation index	-1.907**	-1.977**	-2.187***	-2.046**	-2.168***
	(0.846)	(0.866)	(0.835)	(0.881)	(0.833)
Observations	412559	332206	261316	178469	171065
Controls:					
Individual	Yes	Yes	Yes	Yes	Yes
SES	No	Yes	Yes	Yes	Yes
Household	No	No	Yes	Yes	Yes
School	No	No	No	Yes	Yes
Friendship quality	No	No	No	No	Yes

Notes: Each cell of the table reports the main estimate from a different ordered probit estimations. All regressions include controls for gender, age, year and the total number of friends. Colums 2-5 include socioeconomic status. Columns 3-5 include controls for same-sex and opposite-sex siblings, whether the biological father lives at home, and how easy children find to talk to their parents. Columns 4-5 include a dummy for single-sex schools. Finally in column 5 we control for how easy is to talk to same- and opposite-sex friends. Standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.10

Table A12: Country Characteristics and Opposite-sex Friends - Robustness

	Outcome variable: Opposite-sex close friends						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Tobit	OLS	Poisson	Opposite-sex friends<3	Same and opposite-sex friends<3	Survey weights	Country weights
Gender Inequality Index	0.853***	0.462**	0.580***	1.408**	1.214***	1.437***	1.202**
	(0.282)	(0.171)	(0.215)	(0.583)	(0.339)	(0.521)	(0.522)
Observations	539797	539797	539797	239298	84258	539797	539797
Favor men when jobs scarce	0.291**	0.161**	0.212**	0.550*	0.411**	0.526**	0.448*
	(0.126)	(0.0764)	(0.0958)	(0.283)	(0.175)	(0.240)	(0.240)
Observations	284266	284266	284266	127616	45721	284266	284266
Female labor force participation	-0.00670***	-0.00381**	-0.00437***	-0.0152**	-0.00732**	-0.0121***	-0.0101**
	(0.00243)	(0.00149)	(0.00169)	(0.00627)	(0.00359)	(0.00466)	(0.00469)
Observations	539797	539797	539797	239298	84258	539797	539797
GDP p.c. (10k)	-0.0400***	-0.0219***	-0.0263***	-0.0740***	-0.0457***	-0.0665***	-0.0531**
	(0.0131)	(0.00715)	(0.00875)	(0.0269)	(0.0168)	(0.0223)	(0.0216)
Observations	539797	539797	539797	239298	84258	539797	539797
Female propensity to STEM	0.594**	0.352**	0.386**	1.375**	0.757*	1.104**	1.003**
	(0.280)	(0.163)	(0.183)	(0.659)	(0.395)	(0.508)	(0.464)
Observations	415991	415991	415991	182116	62650	415991	415991
Duncan segregation index	-1.169**	-0.651**	-0.663**	-2.130**	-1.973***	-1.910**	-1.604**
	(0.488)	(0.296)	(0.313)	(0.991)	(0.646)	(0.847)	(0.729)
Observations	412559	412559	412559	180515	62015	412559	412559

Notes: All regressions include controls for gender, age, year and a set of dummies for the total number of friends. Standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.10

Table A13: Total number of friends

	Number of close friends:			
	(1)	(2)	(3)	(4)
	6 or more	5 or more	4 or more	3 or more
Gender Inequality Index	0.0414	0.0178	0.0183	-0.128*
	(0.144)	(0.144)	(0.120)	(0.0637)
Observations	539797	539797	539797	539797
Global Gender Gap Index	0.0532	0.0748	0.0335	0.347***
	(0.300)	(0.300)	(0.257)	(0.119)
Observations	386896	386896	386896	386896
Favor men when jobs scarce	-0.0228	-0.0332	-0.0249	-0.0674***
	(0.0579)	(0.0592)	(0.0502)	(0.0242)
Observations	284266	284266	284266	284266
GDP p.c. (10k)	-0.000316	0.00112	0.000903	0.00871**
	(0.00557)	(0.00561)	(0.00441)	(0.00382)
Observations	539797	539797	539797	539797
Female propensity to STEM	0.0284	0.0560	0.0346	-0.116
	(0.195)	(0.188)	(0.155)	(0.0843)
Observations	415991	415991	415991	415991
Duncan segregation index	-0.450	-0.467	-0.369	0.0127
	(0.392)	(0.390)	(0.332)	(0.118)
Observations	412559	412559	412559	412559

Notes: Estimates from OLS regressions. All regressions include controls for gender, age and year. Standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.10

Table A14: Friends in childhood and parental characteristics, Millennium Cohort

	Opposite-sex friends		
	Age 7	Age 11	Age 14
	(1)	(2)	(3)
Maternal Gender Egalitarianism (z-score)	0.007	0.018***	0.007
	(0.005)	(0.005)	(0.005)
Family income at age 7 (z-score)	-0.019***		
	(0.005)		
Family income at age 11 (z-score)		-0.065***	
		(0.005)	
Family income at age 14 (z-score)			-0.035***
			(0.005)
N	10067	10107	8705
Mean	0.44	0.56	0.77

Notes: Each column reports marginal effects estimates from a probit regression in a panel of participants in the MCS, observed at age 7 (column 1), 11 (column 2) and 14 (column 3) The outcome variable takes value one if the child has a mixture of friends of both sexes or a majority of opposite-sex friends (vs. having a majority of same-sex friends). *Maternal Gender Egalitarianism* is an standardized index constructed using mother's answers to four questions on gender norms when the child 9 months. Household economic status is assessed using the OECD-adjusted weekly family income at the corresponding age, standardized to have zero mean and standard deviation equal to one. All regressions include controls for gender, date of birth, ethnicity and region. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table A15: Friends in childhood and parental characteristics, girls

	Outcome variable: Has opposite-sex friends				
	(1)	(2)	(3)	(4)	(5)
Family income (z-score)	-0.041***	-0.042***	-0.021***	-0.018***	-0.020***
	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)
Maternal gender egalitarianism (z-score)		0.009	0.010**	0.009*	0.009
		(0.005)	(0.005)	(0.005)	(0.005)
Maternal education (z-score)			-0.030***	-0.028***	-0.028***
			(0.006)	(0.006)	(0.006)
Working mother			0.000	-0.002	-0.005
			(0.011)	(0.011)	(0.011)
Father not in household			0.028**	0.026**	0.022*
			(0.012)	(0.013)	(0.013)
Single sex school				-0.193***	-0.195***
				(0.018)	(0.018)
Extraversion mother (z-score)					0.030***
					(0.005)
Agreeableness mother (z-score)					-0.012**
					(0.006)
Conscientiousness mother (z-score)					0.001
					(0.006)
Neuroticism mother (z-score)					0.000
					(0.005)
Openness to Experience mother (z-score)					-0.006
					(0.005)
N	11451	11451	11451	11451	11451
Mean	0.61	0.61	0.61	0.61	0.61
Predicted R-squared	0.05	0.05	0.05	0.06	0.06

Notes: The table reports results from OLS regressions in the sample of girls participating in the MCS. The outcome variable takes value one if the child has a mixture of friends of both sexes or a majority of opposite-sex friends. *Family income*, measured at the corresponding age, is the standardized (OECD equivalent) weekly family income. *Maternal Gender Egalitarianism* is an standardized index constructed using the responses to four questions on gender norms when the child had 9 months. Information on maternal *Big Five* was collected when the child was 14. The five dimensions have been standardized. All regressions include controls for gender, date of birth, ethnicity and region. Standard errors clustered at the individual level in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table A16: Friends in childhood and parental characteristics, boys

	Outcome variable: Has opposite-sex friends				
	(1)	(2)	(3)	(4)	(5)
Family income (z-score)	-0.036***	-0.037***	-0.027***	-0.027***	-0.027***
	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)
Maternal gender egalitarianism (z-score)		0.009*	0.008*	0.007	0.007
		(0.005)	(0.005)	(0.005)	(0.005)
Maternal education (z-score)			-0.014**	-0.013**	-0.013**
			(0.006)	(0.006)	(0.006)
Working mother			0.023**	0.023**	0.024**
			(0.010)	(0.011)	(0.011)
Father not in household			0.029**	0.028**	0.026**
			(0.011)	(0.012)	(0.012)
Single sex school				-0.086***	-0.086***
				(0.021)	(0.021)
Extraversion mother (z-score)					0.017***
					(0.005)
Agreeableness mother (z-score)					0.004
					(0.005)
Conscientiousness mother (z-score)					-0.003
					(0.006)
Neuroticism mother (z-score)					0.013**
					(0.005)
Openness to Experience mother (z-score)					-0.001
					(0.005)
N	11096	11096	11096	11096	11096
Mean	0.57	0.57	0.57	0.57	0.57
Predicted R-squared	0.13	0.13	0.13	0.13	0.13

Notes: The table reports results from OLS regressions in the sample of boys participating in the MCS. The outcome variable takes value one if the child has a mixture of friends of both sexes or a majority of opposite-sex friends. *Family income*, measured at the corresponding age, is the standardized (OECD equivalent) weekly family income. *Maternal Gender Egalitarianism* is an standardized index constructed using the responses to four questions on gender norms when the child had 9 months. Information on maternal *Big Five* was collected when the child was 14. The five dimensions have been standardized. All regressions include controls for gender, date of birth, ethnicity and region. Standard errors clustered at the individual level in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table A17: Friends in childhood, income, personality traits, and cognitive ability

	Income				Opposite-sex friends			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Emotional Symptoms (SDQ)	-0.040***				-0.017***			
	(0.009)				(0.004)			
Conduct Problems (SDQ)	-0.146***				0.027***			
	(0.010)				(0.004)			
Hyperactivity/Inattention (SDQ)	-0.061***				0.023***			
	(0.010)				(0.004)			
Peer Problems (SDQ)	-0.098***				0.009**			
	(0.009)				(0.004)			
Prosocial (SDQ)	-0.040***				0.033***			
	(0.009)				(0.004)			
Independence-Self Regulation (CSBQ)		-0.018**				0.007*		
		(0.009)				(0.004)		
Emotional-Dysregulation (CSBQ)		-0.186***				0.020***		
		(0.009)				(0.004)		
Cooperation (CSBQ)		0.052***				-0.008**		
		(0.010)				(0.004)		
Maths score			0.088***				-0.004	
			(0.009)				(0.004)	
Verbal abilities score			0.210***				-0.023***	
			(0.009)				(0.004)	
Puberty index (z-score)				-0.054***				0.032***
				(0.009)				(0.004)
N	29569	29569	29569	25244	29569	29569	29569	25240
Mean	0.12	0.12	0.12	0.18	0.58	0.58	0.58	0.58

Notes: Sample includes all Millennium Cohort Study participants. There are up to three observations per child, one at each age (ages 7, 11, and 14). The table presents two sets of results: OLS regressions with standardized weekly family income (OECD equivalent) as the dependent variable (columns 1-4), and probit regressions with marginal effects where the dependent variable is an indicator for having opposite-sex friends (columns 5-8). All regressions control for gender, date of birth, region of residence, and ethnicity. Standard errors clustered at the individual level in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table A18: Friends in childhood, popularity and satisfaction with friends

	Liked by other children			Satisfaction with friends		
	Age 7	Age 11	Age 14	Age 7	Age 11	Age 14
	(1)	(2)	(3)	(4)	(5)	(6)
Family income (z-score)	0.099***			0.041***		
	(0.012)			(0.010)		
Family income (z-score)		0.157***			0.031***	
		(0.013)			(0.010)	
Family income (z-score)			0.111***			0.054***
			(0.012)			(0.011)
Observations	7691	6522	9366	11371	11423	10007

Notes: The table reports results from OLS regressions using the Millennium Cohort Study sample. All regressions control for gender, date of birth, region of residence, and ethnicity. All outcome variables have been standardized. The underlying scales are as follows: columns 1-3 use teacher assessments of whether the child is liked by others (1=Not true, 2=Somewhat true, 3=Certainly true); column 4 uses child reports of enjoying playing with friends (1=do not like it, 2=like it a bit, 3=like it a lot); columns 5-6 use child reports of happiness with friends (1=not at all happy to 7=completely happy). *Family income* is standardized weekly family income using OECD equivalence scales.

Table A19: Opposite-sex Friends in Childhood and Future Outcomes, by Gender

	Male Sample									
	Opposite-sex GSCE Age 14-16		Opposite-sex A-levels Age 16-18		Opposite-sex friends Age 14		Egalitarian views Age 14		Opposite-sex occupation Age 7	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Opposite-sex friends (age 7)	0.114***	0.115***	0.066*	0.072**	0.061***	0.053***	0.086***	0.097***	0.027***	0.029***
	(0.030)	(0.030)	(0.036)	(0.036)	(0.010)	(0.010)	(0.023)	(0.022)	(0.005)	(0.005)
N	2673	2673	2536	2536	7271	7271	7407	7407	8217	8217
Mean	0.64	0.64	-0.01	-0.01	0.77	0.77	0.05	0.05	0.32	0.32
Adjusted R-squared	0.02	0.01	0.21	0.22			0.05	0.10	0.20	0.21
	Female Sample									
	Opposite-sex GSCE Age 14-16		Opposite-sex A-levels Age 16-18		Opposite-sex friends Age 14		Egalitarian views Age 14		Opposite-sex occupation Age 7	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Opposite-sex friends (age 7)	0.011	0.023	0.066*	0.072**	0.061***	0.053***	0.086***	0.097***	0.027***	0.029***
	(0.027)	(0.027)	(0.036)	(0.036)	(0.010)	(0.010)	(0.023)	(0.022)	(0.005)	(0.005)
N	2864	2864	2536	2536	7271	7271	7407	7407	8217	8217
Mean	-0.60	-0.60	-0.01	-0.01	0.77	0.77	0.05	0.05	0.32	0.32
Adjusted R-squared	0.00	0.02	0.21	0.22			0.05	0.10	0.20	0.21
Demographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Parental characteristics	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Personality traits	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Academic performance	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

Notes: The table reports marginal estimates from probit regressions separately for male (top panel and for girls (bottom panel). The variable *Opposite-sex friends (age 7)* takes value zero if, at age 7, most friends are of the same sex as the respondent, and value 1 if they have a mixture of friends of both sexes or friends are mostly of the opposite-sex. All right-hand side variables are measured at age 7, except for *Maternal Gender Egalitarianism* and *Years of maternal education*, which were measured when the child had 9 months. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table A20: Opposite-sex Friends in Childhood and Relationships in Adolescence

	Romantic partner Age 17		Sexually active Age 17	
	(1)	(2)	(3)	(4)
Opposite-sex friends (age 7)	0.045***	0.038***	0.044***	0.036***
	(0.012)	(0.012)	(0.012)	(0.012)
Emotional Symptoms (SDQ)		-0.012***		-0.011***
		(0.004)		(0.004)
Conduct Problems (SDQ)		0.016***		0.033***
		(0.006)		(0.006)
Hyperactivity/Inattention (SDQ)		0.005		0.003
		(0.003)		(0.003)
Peer Problems (SDQ)		-0.002		-0.019***
		(0.005)		(0.005)
Prosocial (SDQ)		0.009**		0.007
		(0.004)		(0.005)
Independence-Self Regulation (CSBQ)		0.003		0.037*
		(0.020)		(0.020)
Emotional-Dysregulation (CSBQ)		0.005		0.001
		(0.018)		(0.019)
Cooperation (CSBQ)		-0.003		-0.017
		(0.024)		(0.025)
Maths score		0.001		0.001**
		(0.000)		(0.000)
Verbal abilities score		-0.001**		-0.002***
		(0.000)		(0.000)
Single-sex school		-0.011		0.013
		(0.055)		(0.058)
Family income (z-score)		-0.020***		-0.000
		(0.007)		(0.007)
Maternal Gender Egalitarianism		0.002		0.001
		(0.002)		(0.002)
Years of education mother		-0.006**		-0.009***
		(0.002)		(0.002)
Father not in main home		0.041***		0.086***
		(0.015)		(0.015)
Working mother		0.011		-0.003
		(0.013)		(0.013)
N	6570	6570	6534	6534
Mean	0.33	0.33	0.42	0.42
Pseudo R-squared	0.03	0.04	0.05	0.07

Notes: The table reports marginal estimates from probit regressions. In columns 1 and 2 the outcome variable is a dummy variable if the participant has a boyfriend/girlfriend at age 17. In columns 3 and 4 the outcome variable is a dummy that takes values one if there was a positive reply to the question 'Have you ever had sexual intercourse with someone?' at age 17. The variable *Opposite-sex friends* takes value zero if, at age 7, most friends are of the same sex as the respondent, and value 1 if they have a mixture of friends of both sexes or friends are mostly of the opposite-sex. All right-hand side variables are measured at age 7, except for *Maternal Gender Egalitarianism* and *Years of maternal education*, which were measured when the child had 9 months. The *Strengths and Difficulties Questionnaire (SDQ)* and the *Child Social Behavior Questionnaire (CSBQ)* were assessed by parents, typically the mother. *Maths* and *Verbal abilities* were assessed through a test. Regressions in all columns include controls (non reported) for gender, date of birth, region (12 groups), ethnicity (6 groups) and the total number of friends at age 7 (not many/some/lots). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.