More Girls, Fewer Blues: Peer Gender Ratios and Adolescent Mental Health

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Abstract

Using individual-level data from the Add Health surveys, we leverage idiosyncratic within-school, across-cohort variation in gender composition to study the effects of female peer exposure on students' mental health and school satisfaction. We find that greater exposure to female peers improves mental health for both boys and girls, although it increases school satisfaction only for boys. These effects are strongest for boys from low socioeconomic backgrounds, who are otherwise more likely to encounter disruptive or violent peers. The results suggest mechanisms involving stronger peer relationships for boys and improved self-image and academic performance for girls.

Keywords: peer effects, mental health, gender composition

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1 Introduction

Understanding the determinants of adolescent mental health has become increasingly important for public policy, as the prevalence of mental health issues for this group has reached unprecedented levels. Globally, an estimated 14 percent of individuals aged 10 to 19 report experiencing a mental health disorder (WHO, 2024). In the United States, 29 percent of high school students reported experiencing poor mental health in the past 30 days, and 20 percent reported having seriously considered suicide within the last year (CDC, 2024). Adolescent depression is associated with a range of adverse outcomes, including disruptive behaviors, anxiety, substance use, risky sexual activity, and violence (Fletcher, 2008, 2010; Saluja et al., 2004). Poor mental health is also linked to lower academic achievement and poorer relationships with teachers and peers (Roeser, Eccles, & Strobel, 1998), which can ultimately reduce human capital accumulation over the life course (Ettner, Frank, & Kessler, 1997; Hamilton, Merrigan, & Dufresne, 1997). Because the diagnosis of mental health conditions in adolescents often depends on adult figures recognizing symptoms to initiate treatment (Kuhn et al., 2017), adolescents experience low rates of recognition and diagnosis (Hirschfeld et al., 1997).

The role of school gender composition on adolescent outcomes has gained increasing policy relevance due to several recent trends in the education landscape that contributed to gender imbalances in the classroom. For example, recent increases in single-sex schools (Bigler & Signorella, 2011), as well as recent expansions of school choice policies, which led to gender sorting in magnet and charter schools (Corcoran & Jennings, 2018; Long & Conger, 2013), contributed to gender imbalances of nearby schools.[1] Using individual-level data from the National Longitudinal Study of Adolescent Health (Add Health), we exploit idiosyncratic variation in gender composition across cohorts within schools to identify the effect of exposure to a higher share of female peers. The key identification assumption underlying this strategy is that while families may select schools based on overall school demographics, they do not sort across cohorts within a school based on cohort-specific demographic composition.[2] The goal of this study is threefold. First, we investigate the effect of peer gender composition on mental health using questions from

[1] See Lovenheim and Turner (2017) for a discussion of the increasing prevalence of school choice in the U.S. over time.

[2] This approach was first developed by (Hoxby, 2000), and has been used to study the effect of peer composition along a number of characteristics, such as race, exposure to domestic violence, ability, parental characteristics, and home language (Bifulco, Fletcher, Oh, & Ross, 2014; Bifulco, Fletcher, & Ross, 2011; Carrell, Hoekstra, & Kuka, 2018; Carrell & Hoekstra, 2010; Friesen & Krauth, 2011; Hanushek, Kain, & Rivkin, 2009; Lavy, Paserman, & Schlosser, 2012; Lavy & Schlosser, 2011; Lavy, Silva, & Weinhardt, 2012; Merlino, Steinhardt, & Wren-Lewis, 2019; Olivetti, Patacchini, & Zenou, 2020).

the Center for Epidemiological Studies Depression (CES-D) Scale, which is a widely used clinical measure of adolescent depression and mental health symptoms (Fletcher, 2008, 2010; Radloff, 1977; Roberts, Lewinsohn, & Seeley, 1991). Second, we investigate the effect of classroom gender composition on school satisfaction using five survey questions asking students about school experience, as the gender composition of peers is a school-based measure.[3] Third, we explore potential mechanisms between female peer share and depressive symptoms and school satisfaction.

Our findings can be summarized as follows. First, a 5 percentage point increase in the share of female peers decreases the propensity for boys to meet the clinical threshold for depression by 10.0%. A higher share of girls is associated with improved mental health index scores for boys as well, although estimates are not statistically significant at conventional levels. Additionally, a 5 percentage point increase in the share of female peers improves school experience for boys by 1.0%. For girls, a 5 percentage point increase in the share of female peers improves mental health by 2.4%, although we do not find an effect on the clinical threshold for depression or the index for school satisfaction.[4] Second, heterogeneity analyses indicate that effects of peer gender composition are more salient in middle school than in high school. Furthermore, for boys, we find that the benefits of peer gender ratios are driven among boys from low socioeconomic (SES) households.[5] Third, we explore potential explanations for the link between the share of female peers, mental health, and school satisfaction. Among girls, we find that a higher share of female peers leads to better academic performance and improved self-image. For boys, a higher share of female peers increases the number of school friends, albeit, the analysis on friends is estimated on a small subsample that was asked information about up to five male and five female friends. Regardless of the number and gender composition of school friends, being exposed to a higher share of female peers may foster healthier

[3] A priori, the effect of peer gender composition on mental health and school satisfaction is ambiguous. On one hand, given the particularly strong preference for same-sex friendships among boys (Anelli & Peri, 2019; Brenøe & Zölitz, 2020; Hill, 2015; Rose & Rudolph, 2006), a higher share of female peers may lead to fewer (more) school friends among boys (girls), which may potentially affect school satisfaction differentially between boys and girls. On the other hand, because boys are more likely to engage in classroom disruption and violence (Lavy & Schlosser, 2011), a higher share of female peers may improve school satisfaction among both boys and girls. Simultaneously, a higher share of female peers may intensify unfavorable dynamics in the school dating market for girls (Arcidiacono, Beauchamp, & McElroy, 2016) and body-image (Simmons & Rosenberg, 1975).

[4] Even though we only observe a change in the probability of meeting the clinical threshold for depression among boys, we observe a reduction in CES-D scores among boys and girls. While the decrease in CES-D scores is higher for girls, the fact that we only observe changes in meeting the threshold for depression diagnoses among boys suggests that boys on the margin of depression may be more responsive to exposure to a higher share of female peers.

[5] These findings are consistent with those of Lavy and Schlosser (2011), which finds that students from low-SES backgrounds benefit more academically from a higher share of female peers.

friendships, to the extent that a higher share of girls mechanically leads to a less violent school environment, as girls on average display levels of violent and disruptive behaviors than boys.

This study relates to a growing body of economics research examining the determinants of mental health, which has explored a wide range of factors, including socioeconomic shocks, social safety net generosity, family leave policies, environmental pollution, exposure to violence, prenatal maternal stress, social media use, and religiosity.[6] Related to our study are a few papers looking at the role of school environment on mental health outcomes. Kiessling and Norris (2023) assess the effects of the relative ability rank of a student relative to their cohort on mental health, finding that a higher rank leads to improved mental health. Giulietti, Vlassopoulos, and Zenou (2022) look at whether exposure to peer depression during adolescence affects a student's own long term mental health and find that peer depression exposure increases the propensity for depression in adulthood for girls, but not for boys. Our study contributes to the literature investigating the role of peers on mental health outcomes in the following three ways. First, our paper examines a different dimension of peer influence on mental health: gender composition. Understanding this channel is especially relevant given the increasing policy attention to and relevance of peer gender composition in educational settings, as discussed earlier. Second, our study focuses on self-reported measures of mental health. A key advantage of self-reported measures over data on formal diagnoses is the ability of the former measure to separate actual mental health outcomes from help-seeking behavior (Currie & Stabile, 2009). Third, the Add Health surveys includes questionnaires about school experiences, relationships with school peers, perception of safety, belonging and happiness at school, among other school-based measures. This allows us to study the related measure of school satisfaction, which is particularly relevant since peer gender ratios are inherently a school-based phenomenon. Comparisons between mental health and school satisfaction outcomes help shed light on whether gender composition affects depressive symptoms in tandem with school experiences, or if the two are not necessarily closely linked.

[6]Socioeconomic shocks: Adhvaryu, Fenske, and Nyshadham (2019); Angelucci and Bennett (2024); Baird, de Hoop, and Özler (2013); Haushofer and Shapiro (2016); McInerney, Mellor, and Nicholas (2013); Schaller and Zerpa (2019). Social safety net generosity: Baker, Koebel, and Stabile (2024); Dahl and Gielen (2021); Grossman, Tello-Trillo, and Willage (2022); Milligan and Stabile (2011); Schmidt, Shore-Sheppard, and Watson (2023). Family leave policies: Bütikofer, Riise, and Skira (2021); Chatterji and Markowitz (2005); Coile, Rossin-Slater, and Su (2025). Pollution: Chen, Oliva, and Zhang (2024); Gillingham and Huang (2024). Violence: Bhuller, Dahl, Løken, and Mogstad (2023); Rossin-Slater, Schnell, Schwandt, Trejo, and Uniat (2020); Singhal (2019). Prenatal maternal stress Persson and Rossin-Slater (2018). Social media exposure: Braghieri, Levy, and Makarin (2022). Religiosity: Fruehwirth, Iyer, and Zhang (2019).

This study also relates to work on the effects of peer gender composition.[7] Our paper contributes to this work in the following ways. First, while most studies have focused on the effects of peer gender composition on education and labor market outcomes, we focus on behavioral and non-cognitive outcomes.[8] Second, this is the first study to examine the relationship between peer gender ratios and mental health in the U.S. Most closely related to our work, Getik and Meier (2022) examine the effects of peer gender composition in Swedish classrooms and find that a higher share of female classmates increases the incidence of formal mental health diagnoses, particularly among boys. Our study is especially important since our findings differ from those of Getik and Meier (2022), suggesting that institutional context is an important moderator of mental health, as the U.S. setting is characterized by greater socioeconomic inequality and more fragmented healthcare access compared to Scandinavian countries.[9]

In the remainder of the paper, Section 2 presents the data and Section 3 discusses the empirical strategy. Main results and robustness checks are shown in Section 4, with heterogeneity analyses and mechanisms exploration in Sections 5 and 6, respectively. Finally, Section 7 concludes.

[7]This literature generally finds that exposure to a higher share of female peers improves educational and labor market outcomes for girls, with mixed results for boys. See: Anelli and Peri (2019); Balestra, Sallin, and Wolter (2023); Black, Devereux, and Salvanes (2013); Borbely, Norris, and Romiti (2023); Brenøe and Zölitz (2020); Briole (2021); Eren (2017); Getik and Meier (n.d.); Hoxby (2000); Hu (2015); Lavy and Schlosser (2011); Lu and Anderson (2015); Mouganie and Wang (2020); Schneeweis and Zweimüller (2012); Schøne, Simson, and Strøm (2020); Whitmore (2005).

[8]In related work, Lavy and Schlosser (2011) find no significant effect on individual behavior but do observe reductions in classroom disruption and violence when the gender composition shifts. Querejeta (2024) shows that a higher proportion of female peers is associated with more progressive gender norms among boys and reduced domestic labor among girls. Orr (2023) finds that a higher share of female peers in a school improves reported self-worth and sense of belonging for boys. Shin (2025) looks at the effects of attending single-sex schools compared to co-ed schools and finds that boys in all-boys schools show improvement in socio-emotional skills compared to co-ed peers, but girls in all-girls schools do not show consistent improvements.

[9]Specifically, there are several key differences between our paper and Getik and Meier (2022). First, we look directly at self-reported mental health status, while Getik and Meier (2022) look at formal mental health diagnoses. Effects of peer gender composition on formal mental health diagnoses may reflect both direct effects on mental health, or it could be reflecting changes on the propensity to seek professional help. Second, with respect to institutional differences in healthcare access, Sweden has universal healthcare and significantly higher prescription rates for mental health disorders compared to the U.S., while the U.S. has higher diagnosis and suicide rates (Diehm, 2024). Mental healthcare is also less stigamtized in Sweden compared to most other developed countries like the U.S. (Diehm, 2024).

2 Data and Descriptive Statistics

2.1 Data

We use data from the National Longitudinal Study of Adolescent Health (Add-Health), a school-based longitudinal survey of adolescents in the U.S. who were in grades 7-12 between September 1994 and April 1995. The first wave of the survey has an in-school and an in-home component. The in-school survey was administered between September 1994 and April 1995, when students were between the ages of 10 and 19. The survey included students from 80 high schools and 52 middle schools in the United States. The sample includes both public and private schools and is representative of schools in the U.S. with respect to geographic region, urbanicity, size, type, and ethnic composition. The in-school component was administered to all students who were in school on the day the survey was administered. This survey includes questions about students' demographic characteristics, including gender. After the in-school survey was given, 17 males and 17 females from each school and grade were randomly selected to participate in the in-home survey, which was administered between April 1995 and December 1995. The in-school component surveys, in principal, the universe of students in a school, which is crucial for assigning a concurrent gender ratio each school-grade.

The in-school sample is composed of 144 schools and 90,118 respondents. Among the 90,118 respondents in the in-school component, we delete the 731 observations withmissing gender information, and the 579 observations with missing grade level information, whether that is because the school does not separate school grades or because it is missing, and we are left with 88,808 observations. Finally, we drop the 168 observations where the school-grade cohort size is at most 5 individuals. We use these remaining 88,640 observations to compute cohort gender ratio given school-grade. We drop the single-gender school, which leads to a final subsample of 142 schools, 499 cohorts (school-grade), and 87,367 observations. We also use the in-school file to compute the demographic composition of a cohort: cohort size, cohort racial composition, cohort mean age, and the share of US-born students in the cohort.

Since the in-school component only collects a limited amount of information on the census of students in the sample schools, we complement our study with the rich information about health behaviors, school environment, family environment provided in the in-home survey. Among the 20,745 respondents originally included in the in-home sample, 18,769 are matched to their respective school and grade-specific sex ratio and have non-missing demographic controls. After dropping the observations with missing covariates, or any missing components of the outcome variable, our final sample consists

of 17,441 observations in 133 schools, with 8,516 boys and 8,925 girls.

2.1.1 CES-D score

Previous literature (Fletcher, 2008, 2010; Kiessling & Norris, 2023) has used the Center for Epidemiological Studies Depression Scale (CES-D) to measure depressive symptoms and depression. We use the 19 CES-D self-reported measures of depressive symptoms from the Add Health in-home survey listed in Table A1. These questions asked students how frequently they experienced each of these depression symptoms in the past week, and the potential answers range between 0 to 3, where 0 corresponds to never or rarely, 1 for sometimes, 2 for a lot of the time, and 3 for most of the time or all of the time. For most measures, agreement signals poor mental health.[10]

Following previous literature (Fletcher, 2008, 2010; Kiessling & Norris, 2023), we compute the CES-D score as the sum of these responses. The first measure of mental health we evaluate is the CES-D score. Possible scores range from 0 to 57, with higher CES-D scores indicating more depressive symptoms, corresponding to worse mental health. Our second measure of mental health is an indicator variable that takes a value of one if an individual meets the clinical threshold for depression and zero otherwise. These thresholds correspond to a score of 22 or above for male adolescents and a score of 24 or above for female adolescents, following Roberts et al. (1991).

2.1.2 School satisfaction score

Add Health includes six self-reported measures of school satisfaction, in which students are asked about their satisfaction with various aspects of their school experience. These self-reported measures of school well-being ask students the extent to which they agree with each measure of school experience in the most recent school year. The potential answers to each of these statements range between 1 and 5, where 1 corresponds to strongly agree, 2 corresponds to agree, 3 corresponds to neither agree nor disagree, 4 corresponds to disagree and 5 corresponds to strongly disagree. The specific measures are listed in Table A2.[11] The index for school satisfaction is the sum of the scores to those six questions, with a higher score corresponding to lower levels of school satisfaction. The components of the school satisfaction index focus on students' well-being just like

[10] For four measures (numbers 4, 8, 11, 15), agreement signals better mental health, and these measures are reverse-coded.

[11] For one measure, agreement corresponds to a less positive school experience, so this measure is reverse-coded. While most measures represent the school satisfaction of the respondent, some reflect the environment of others around.

the CES-D index does. However, the school index differs from the CES-D measures in that they explicitly focus on school-specific experiences, which we are interested in, given that peer gender ratios are a school-related phenomenon. For example, a component of the CES-D score states, "You were happy", while an analogous component of the school satisfaction score states "You are happy to be at your school."

2.2 Descriptive statistics

Table 1 presents summary statistics for key variables in the data by gender. Panel A indicates that the average share of girls in student's cohort is about one half for both boys and girls in the sample. Panel B presents summary statistics for the dependent variables. Girls have more depressive symptoms than boys, with an average CES-D score of 11.87 for girls and 10.03 for boys. Consistent with this, we also find a higher rate of depression for girls, with 9% of girls in the sample meeting the clinical threshold for depression and 6% of boys meeting the threshold. Panel B indicates that boys and girls have very similar scores of school satisfaction, with boys having a slightly lower index value of 14.55 and girls having an index value of 14.74.

Panel C of Table 1 reports the summary statistics of control variables in the preferred specification. The demographic composition among respondents is very similar between boys and girls, and the summary statistics among boys can be summarized as follows. The average age is 15.50, and the racial/ethnic composition is 65% White, 15% Black, 4% Asian, 12% Hispanic, and 5% some other race.[12] The share of respondents that are U.S. born is 94%.

Regarding the school-grade control variables, the mean school-grade cohort size is 212 students, the mean cohort age is 14.82, and the mean share of US-born peers in a cohort is 93%. The average share of White peers is 58%, share of Black peers is 14%, share of Asian peers is 3%, share of Hispanic peers is 14%, and share of other race peers is 11%.

Next, since our study relies on variation in gender composition across cohorts, we look at the distribution of peer gender share across cohorts in our sample. First, Figure 1 shows the overall distribution of the share of girls in a cohort. We find that there is quite a bit of variation in the share of girls in the sample, which is necessary for identification. However, since our identification relies on variation in gender ratios within schools, we next look at the within-school variation in the share of girls across cohorts in Figure 2.

[12] Add Health asks respondents to report their race but they do not have to be mutually exclusive. We re-categorize these into mutually exclusive categories for White non-Hispanic, Black non-Hispanic, Hispanic, Asian, and other, where "Other" includes multiracial respondents.

Specifically, we take the difference between the share of girls in a given cohort and the mean share of girls for the entire school to calculate the residualized share of girls in the cohort after de-meaning from the school mean. Reassuringly, as shown in Figure 2, we observe a sizable amount of variation in the share of girls across cohorts within a given school as well.

3 Empirical strategy

We estimate the following specification to assess how the share of female peers in a student's cohort affects mental health and school satisfaction:

$$Y_{i,s,g} = \beta_0 + \beta_1 ShareFem_{s,g} + \mathbf{X}_i'\beta_2 + \mathbf{X}_{s,g}\beta_3 + \alpha_s + \alpha_g + \epsilon_{i,s,g} \quad (1)$$

where $Y_{i,s,g}$ is the outcome of interest for student i in school s and grade g. Our three outcomes of interest are (i) CES-D index score, (ii) an indicator variable that takes a value of one if a student's CES-D score meets the clinical threshold for depression, and (iii) school satisfaction index score.[13] The explanatory variable of interest is $ShareFem_{s,g}$, which represents the share of students that are female in grade g of school s. The vector $\mathbf{X}_i$ controls for individual characteristics, which include indicators for age, race and ethnicity, whether an individual is US-born, birth month, and interview month. The vector $\mathbf{X}_{s,g}$ controls for school-grade composition characteristics, including cohort size, mean cohort age, the share of the respondents' school-grade peers who are US-born, and the share of peers that are White, Black, Asian, Hispanic, and other race.

A key identification concern is that correlations between the share of female peers and our outcomes of interest could be driven by student sorting along unobserved characteristics. For example, if parents of girls are more likely than parents of boys to relocate in order to place their daughters in safer schools, then schools in safer neighborhoods would tend to have a disproportionately higher share of female students. This would mechanically generate a positive correlation between the share of female peers and the quality of the school environment, which could in turn influence our outcome measures. We include school fixed effects, α_s, to account for time-invariant unobserved differences across schools that may influence our outcomes, such as some schools being in better neighborhoods, or having fewer incidents of violence.[14]

[13] Details on how outcomes variables (i) and (ii) are constructed can be found in Section 2.1.1, and details on how outcome variable (iii) is constructed can be found in Section 2.1.2.

[14] A related concern is that there may be time-varying factors affecting school environments, such as some neighborhoods slowly becoming more violent, which could affect sorting over time. Unfortunately,

Another potential threat to identification is that factors varying across grade levels, such as physical and mental development, changes in curriculum, or shifts in expectations from teachers and parents, may influence students' school experiences. Some of these grade-level changes may also be correlated with gender ratios. For example, if boys and girls differ in their probability of dropping out over time, this could create a correlation between gender composition and grade level. Such correlations could bias our estimates if mental health systematically varies by grade. To address this concern, we include grade fixed effects, α_g. After controlling for school and grade fixed effect, our approach leverages idiosyncratic variation in the share of female students across cohorts within a school for identification.

The coefficient of interest, $\beta_1/100$, measures the effect of a one–percentage point increase in the share of girls in a cohort on the outcome of interest. Standard errors are clustered at the school level to account for potential correlations in the error term within schools. To examine heterogeneity in the effects of female peer share across demographic groups, we estimate Equation 1 separately by gender. This approach addresses potential systematic differences in the quality of education experienced by boys and girls within the same school and relaxes the assumption that school and grade fixed effects are homogeneous across genders (Hanushek et al., 2009).

A potential concern with relying on cohort variation after including school and grade fixed effects and an extensive set of controls in Equation 1 is that these fixed effects and controls may absorb much of the variation in gender ratios. This could in turn leave limited meaningful residual variation with which to identify the effect of exposure to a higher share of female peers (Angrist & Lang, 2004). In other words, one might be concerned that multicollinearity could undermine our estimates. To assess this possibility, we estimate an auxiliary regression of gender peer ratios on the full set of fixed effects and controls used in Equation 1. The resulting R-squared values are 0.50 for the full sample, 0.52 for boys, and 0.50 for girls, implying a variance inflation factor (VIF= $\frac{1}{1-R^2}$) of approximately 2. This value is well below the commonly cited threshold of 10 for problematic collinearity (Kennedy, 2008).

we are not able to include school-specific time trends since our data are cross-sectional in nature.

4 Results

4.1 Validity of the identification strategy

Our key identification assumption is that variation in the share of female peers within a school is uncorrelated with other factors that influence school experience or mental health. Since our strategy relies on idiosyncratic variation in peer gender composition across cohorts within the same school, a potential threat is that these variations might coincide with cohort-specific changes in other confounding variables. We address these potential concerns in the following ways.

First, if the identifying assumption holds and the share of female peers across cohorts within a school is random, we would expect that the share of female peers in a cohort is not predictive of other student characteristics, conditional on school. We evaluate the possibility of sorting based on sex ratios of the contemporaneous (above) cohort by regressing the share of female peers in the contemporaneous (above) cohort on indicators for whether the respondent is male, White, Black, Asian, Hispanic, other race, U.S. born, as well as on the age of the respondent.[15] In addition to testing for sorting on contemporaneous cohort characteristics, we also include balance tests for sorting on above cohort characteristics since parents are only able to observe the contemporaneous gender composition of any given school at any given time. Thus, it may be that parents use the gender composition in the grade above their child's to predict gender composition in the upcoming year at the time their child enters school. The balance tests presented in Panel A of Table 2 indicate that a higher share of female peers does not affect the observable demographic composition of either respondents in the cohort above or the contemporaneous cohort.[16] These findings provide support that our key identifying assumption is valid in this setting.[17]

Relatedly, if greater exposure to female peers leads to a cohort with fewer behavioral issues, stronger academic performance, or better classroom management, parents who are particularly involved in their children's well-being may select on these characteristics and be attracted to these schools. Reassuringly, results in Panel B of Table 2 shows that the gender composition of a cohort is not related to cohort size or average family

[15] For the outcome male, we address the bias that arises due to the fact that an individual cannot be their own peer by implementing the correction developed in Guryan, Kroft, and Notowidigdo (2009).

[16] Tables A7 and A8 show additional balance tests by type of school and by income.

[17] While we cannot rule out the possibility that the share of female peers is correlated with unobservable confounding variables, Altonji, Elder, and Taber (2005) demonstrates that the degree of selection on observables is informative of the degree of selection on unobservables. Thus, balance tests provide some reassurance that selection on unobservable characteristics is unlikely to be driving results, given the lack of correlation between the share of female peers and potential observable confounding variables.

income for either the contemporaneous or above cohort. This suggests that the gender composition of a cohort does not increase enrollments for the next cohort or attract higher income students. Furthermore, a cohort with a smaller share of female students (higher share of male students) may be driven by a larger share of retained male students. If this is the case, we would observe a cohort with a smaller share of female peers that has a disproportional amount of behavioral issues since the sex ratios would have been driven by the retained students. We address this concern by conducting a balance test where we estimate individual-level regressions similar to Equation 1 in Table 2, with school fixed effects and grade fixed effects, where the dependent variable is the share of the cohort that is older than the modal age, as well as the share of boys and girls that are older than the modal age. We present these results in Panel B of Table 2 as well and find that the share of female peers in the cohort is not related to having older students (boys or girls), indicating that fluctuations in the share of female peers are not driven by retained students.

Finally, we conduct Monte Carlo simulations for the sample to evaluate whether the observed within-school fluctuations in the share of girls across cohorts are consistent with what would be expected under random cohort-level gender assignment. Following Lavy and Schlosser (2011), for each school, we simulate cohort-level gender assignments by drawing student genders from a binomial distribution with a success probability equal to the school's average female share across all observed years. We then calculate the within-school standard deviation of the share of female students and repeat this procedure 1,000 times. Results of the actual observed distribution in the within-school standard deviation in the share of female students, as well as simulation results, are shown in Figure 3. Reassuringly, the figure indicates that the actual distribution closely mirrors the variation generated by the simulations.

4.2 Main results

Table 3 reports the effects of sex ratios on (i) the CES-D mental health score (Panel A), (ii) an indicator for depression based on the CES-D score (Panel B), and (iii) the school satisfaction index (Panel C). All specifications include school and grade fixed effects. We first estimate Equation 1 separately by gender using a baseline model that includes individual demographic controls (age, month of birth, month of interview, race/ethnicity indicators−White, Black, Asian, Hispanic, other−, and an indicator for being US-born), in addition to school and grade fixed effects (columns 1 and 3). In columns 2 and 4, we add cohort-level controls from the in-school file: cohort size, aver-

age cohort age, racial/ethnic composition, and the share of the cohort that is US-born. We treat columns 2 and 4 as our preferred specifications.

Panel A of Table 3 shows that a higher share of female peers is associated with lower CES-D scores for both boys and girls, indicating fewer depressive symptoms and better mental health. A 5 percentage point increase in the share of female peers corresponds to a 1.51% decrease in the CES-D score for boys ($.0151 = \frac{-3.127*0.05}{10.389}$) and a 2.37% decrease for girls ($0.237 = \frac{-5.847*0.05}{12.316}$), relative to their respective means. The effect for girls is statistically significant; the effect for boys is not, though it is consistent with a beneficial impact. This pattern aligns with Panel B, which shows that a higher female peer share reduces the likelihood that boys meet the clinical threshold for depression by 10.0%. For girls, the estimated reduction is 2.16%, but the result is not statistically significant. Taken together, the results suggest that exposure to a higher share of female peers improves mental health for both boys and girls. While the reduction in CES-D scores is more pronounced for girls, the decrease in the likelihood of meeting the clinical threshold for depression is larger for boys. This pattern implies that a higher share of girls in a cohort may have a greater impact on boys who are near the margin of clinical depression.

Finally, Panel C indicates that a higher share of girls in a cohort improves school satisfaction for boys. Specifically, we find that a 5 percentage point increase in the share of girls in a cohort improves a student's school experience score by 0.98% relative to the mean. In contrast, we do not observe peer gender composition affecting school experience for girls: Estimated magnitudes are significantly smaller than those for boys and statistically insignificant at conventional levels.

Overall, our findings indicate that increasing the share of female peers improves mental health scores among boys and girls, even though school satisfaction only improves among boys.[18]

Nonlinearities

We also examine whether there are nonlinearities in the effects of peer gender composition on mental health and well-being across the gender share distribution.[19] To assess for nonlinear effects, we estimate a variant of Equation 1 in which we substi-

[18]Table A8 re-estimates this regression with an extended set of controls about household socioeconomic variables (i.e., parental education, total household income) and composition (i.e. two-parent household, and any siblings in the household). Even though the sample is smaller as those socioeconomic variables are only available on a subsample, the results remain largely unchanged.

[19]Some prior research has found evidence of nonlinearities in the effects of peer gender composition on academic outcomes (Hoxby, 2000).

tute $ShareFem_{s,g}$ with four quartile interactions (i.e., $ShareFem_{s,g}$ interacted with an indicator for whether $ShareFem_{s,g}$ is in each of the four quartiles). This alternative specification allows us to estimate whether a given increase in the share of female peers affects mental health and school satisfaction differently when the share of female peers is lower or higher.

The coefficients presented in Table A3 indicate that the effects of female peer share on mental health outcomes, as measured by CES-D score and the likelihood of being classified as depressed, and school satisfaction are similar across quartiles. Overall, we find no strong evidence of nonlinear effects, indicating our main results are not driven by cohorts in a particular region of the peer gender composition distribution.

4.3 Additional robustness checks

In this section, we perform additional robustness checks to further assess the soundness of our findings.

4.3.1 Randomization inference

We first conduct a placebo test in which we randomly assign a share of female peers to each respondent that falls within the observed range of exposure in the data.[20] We then estimate Equation 1 with the randomly assigned share of female peers. We iterate on this 500 times and display our results in Figure 4. Each panel of Figure 4 displays the estimate of our preferred specification in the first iteration (large diamond) and the coefficient for each of the 500 iterations (small dots), which are placebo estimates. The goal of this exercise is to assess how likely it is for us to observe our estimated coefficients from Table 3 due to spurious correlation, in the absence of any actual peer effects.

Intuitively, if our placebo estimates, with the randomly assigned share of female peers, were similar to th actual estimated coefficient, that would suggest that that our findings are likely driven by features of the model specification or the data, rather than by the share of female peers.

Reassuringly, results for boys (Panels A, C and E) in Figure 4 indicate that none of the placebo estimates reach the magnitude of the main estimated effects of share of female peers. Similarly, the estimate for CES-D score for girls (Panel B) does not reach the magnitude of the respective placebo estimates. Taken together, these results provide reassurance that our estimates are very unlikely to have occurred due to features of the

[20] The observed share of female peers ranges between 0.26 and 0.8.

data that do not reflect the relationship between gender composition and mental health and well-being outcomes.[21]

4.3.2 Leave-one-out analysis

Next, we assess whether our estimates are driven by one or a few particular schools that may be non-representative of the sample as a whole. To do so, we re-estimate Equation 1 while sequentially excluding one school at a time from the sample in a 'leave-one-out' analysis, and we present the results in Figure 5. For each outcome and for both boys and girls, we present a different panel in which we plot each leave-one-out coefficient estimate. Results in Figure 5 indicate that the coefficient of interest remains largely unchanged to the exclusion of each school, indicating that our results are not driven by any particular school.

4.3.3 Trimming outliers

Our main sample is restricted to school-grade cohorts with at least five students, which mechanically excludes cohorts with disproportionately large or small shares of female peers due to small sample sizes leading to higher variances on average. We conduct additional analyses to assess whether our results are robust to excluding remaining schools with outlier peer gender composition shares. To do so, we re-estimate Equation 1 excluding observations with a female peer share in the top or bottom one percent of the distribution. We present our results in Table 4. We find that our results remain consistent when dropping outlier observations.

4.4 Components of the index

4.4.1 Components of CES-D score

As discussed in Section 2, the CES-D index for mental health is computed using 19 measures about the respondent's experiences in the prior week, which are listed in Table A1. Potential answers range between 0 to 3, where 0 corresponds to never or rarely, 1 for sometimes, 2 for a lot of the time, and 3 for most of the time or all of the time. We reverse-code four measures so that higher values of responses indicate poorer

[21] Another potential placebo test is to examine whether gender ratios in the cohort below or above affect student outcomes (Lavy & Schlosser, 2011). However, a key concern with this approach is that the gender composition of adjacent cohorts may itself influence students' mental health, as middle- and high-school students often form cross-grade friendships and romantic relationships (Arcidiacono et al., 2016). This concern is especially salient given that our mechanism analysis suggests the effects may operate through interpersonal relationships.

mental health for all measures. In our preferred estimations, we sum each of these 19 components to compute an individual's CES-D score.

We assess each of these measures separately in Table A4 in the appendix. Each cell in the table corresponds to a separate regression that estimates the effect of increasing the share of female peers on each component of CES-D index. The outcome in columns 1 and 2 is the score for the individual measure, which ranges from 0 to 3. The outcome in columns 3 and 4 is an indicator variable that takes a value of one if the student responds with 0 to the statement (corresponding qualitatively to never or rarely). As expected, results in Table A4 indicate that exposure to a higher share of female peers decreases several of the components of the CES-D score. Not all estimates are statistically significant, but most estimates are negative in sign. Additionally, we find that a higher share of girls increases the probability that students report having never or rarely experienced any of these symptoms of poor mental health. These results are consistent with our overall finding that a higher share of girls in a cohort improves mental health.

4.4.2 Components of index for school satisfaction

We compute the index for school satisfaction using information about the extent to which the respondent agrees with six statements about their school experience, which are listed in Table A2. The potential answers to each of these statements range between 1 and 5, where 1 corresponds to strongly agree, 2 corresponds to agree, 3 corresponds to neither agree nor disagree, 4 corresponds to disagree, and 5 corresponds to strongly disagree. We reverse-code one measure for which agreement corresponds to school dissatisfaction. The index of school satisfaction is the sum of the scores for these six questions. A lower score corresponds to more agreement with the statements about school experience listed in Table A2, and hence more school satisfaction through having a more positive school experience.

We assess each component of school satisfaction separately in Table A5. Each cell in the table corresponds to a different regression for each component of the school satisfaction index. The outcome in columns 1 and 2 is the score for the individual well-being measure, which ranges from 0 to 5, and a lower number implies school satisfaction. The outcome in columns 3 and 4 is an indicator variable that takes a value of one if the student responds with 1 or 2 (agree or strongly agree, respectively), and the outcome in columns 5 and 6 is an indicator variable that takes a value of one if the student responds with 1 (strongly agree). We find that being exposed to a higher share of girls in the cohort consistently improves school satisfaction among boys, and this pattern is consistent across the components of the school satisfaction index. In particular, a 5 percentage

point increase in the share of female peers increases the probability of boys agreeing that they feel close to people at school by 7.1%, they feel part of the school by 8%, they are happy to be at school by 7%, and agree that teachers treat students fairly by 6.8%.[22]

5 Heterogeneity

5.1 Heterogeneity by cohort size

Statistically, smaller cohorts are more likely to see large variations in gender ratios across cohorts. If that is the case and there are heterogeneous effects of peer gender composition by school size, then our results would disproportionately reflect the effects of peer gender ratios in small schools. We investigate this by assessing for heterogeneity in the effects of peer gender ratios by cohort size. Specifically, we modify Equation 1 to replace the share of female peers with four variables consisting of share female peers interacted with an indicator for whether the student's cohort size is in the first, second, third or top quartile.[23] Figure A1 shows a histogram of cohort size.

Panel A of Table 5 indicates that the effect of sex ratios on CES-D scores and depression categories are fairly constant across quartiles of cohort size. In particular, results indicate that a 5 percentage point increase in the share of girls in a cohort leads to a 2.25% (2.82%) decrease in CES-D score among girls in the smallest (largest) quartile of cohort size.

While effect of an increase in the share of girls in a cohort on CES-D scores is smaller in magnitude and not statistically significant at the conventional level among boys, we do see significant effects on the likelihood of meeting the clinical threshold for depression in Panel B. Specifically, a 5 percentage point increase in the share of girls in a cohort leads to a 9.19% (9.04%) decrease in the probability of being categorized as depressed among boys in the smallest (largest) quartile of cohort size.

Finally, Panel C of Table 5 indicates that a 5 percentage point increase in the share of female peers leads to a 0.99% (0.33%) improvement in the school satisfaction index among boys in the smallest (largest) quartile of cohort size.

[22] One exception is the measure asking students whether peers at school are prejudiced. This measure is more likely to reflect the school environment rather than reflecting a student's own experience, and the coefficient is not statistically significant at the conventional level.

[23] The average cohort size is 254 with a median of 210. The cutoffs for each quartile are 130 (Q1), 210 (Q2), and 351 (Q3). The mean and variance of female peer share for each quartile of cohort size is: First quartile: Mean female share=0.5067 (SD=0.0817). Second quartile: Mean female share=0.4948 (SD=0.0537). Third quartile: Mean female share=0.5054 (SD=0.0378). Fourth quartile: Mean female share=0.4995 (SD=0.0362).

Taken together, the estimates support our main findings that while the effect of peer gender ratios on CES-D scores is higher among girls, gender ratios move the needle on depression classification and school satisfaction more for boys. Furthermore, these effects are fairly consistent across cohort sizes.

5.2 Heterogeneity by grade

Next, we look at heterogeneity in the effects of peer gender composition on mental health and well-being by grade level. Specifically, we estimate a variant of Equation 1 where we replace the share of female peers with two interaction terms. The first is the share of female peers interacted with an indicator for whether a student is in middle school, and the second is the share of female peers interacted with an indicator for whether a student is in high school.

Results presented in Panel A of Table 6 indicate that a higher exposure to female peers in a cohort improves mental health, particularly among middle school students. A 5 percentage point increase in the share of female peers improves mental health, as measured by CES-D scores, by 2.67% among middle-school boys and by 3.52% among middle-school girls, and these coefficient estimates are statistically significant. On the other hand, the effect is smaller among high school boys (0.76%) and high school girls (1.7%), and estimates are not statistically significant at conventional levels.

In Panel B, we find that a 5 percentage point increase in the share of female peers decreases the probability that an individual's CES-D score will meet the clinical threshold for depression for boys or girls in middle school or high school, and the largest effect is among middle school boys. Coefficient estimates for all groups are negative despite losing power, suggesting that a higher share of girls in a cohort improves mental health overall.

Finally, Panel C indicates that a higher share of female peers also leads to better measures of school satisfaction for middle school boys, but not high school boys. In particular, a 5 percentage point increase in the share of female peers leads to a 2.37% improvement in school satisfaction among middle-school boys. However, the effect on high school boys is statistically insignificant and very small in magnitude.

Taken together, these results indicate that a higher share of female peers improves mental health for girls and boys in middle school and also improves school satisfaction for middle school boys. In contrast, while coefficient estimates for high school students suggest that a higher share of girls is beneficial for mental health and well-being as well, effect sizes are much smaller and statistically indistinguishable from zero.

While it is beyond the scope of this paper to identify the precise reasons for the grade-

level heterogeneity in our results, several mechanisms may be at play. One possibility is that cohort-level peer gender composition is more salient in middle school, where students have less discretion over their course selection. In contrast, high school involves a greater scope elective offerings, leading to more sorting into courses (Merritt, 2021). Thus, variation in cohort-level gender composition may have a weaker effect on the actual gender mix of classmates that high school students interact with daily. Another possibility is that middle school students may simply be more sensitive to peer gender composition in terms of mental health and school satisfaction than their high school counterparts. Alternatively, there are some differences between the school environments of middle schools and high schools, which may affect students' responsiveness to being exposed to a higher share of female peers, such as cohort size, racial composition, and exposure to female teachers.[24] Note that these differences are not problematic for the estimation of our main results, as we include grade fixed effects that absorb these time-invariant differences.

5.3 Heterogeneity by socioeconomic status

We next examine heterogeneous effects by socioeconomic status (SES). Given that low-SES students are more likely to experience class disruptions and violence (Lavy & Schlosser, 2011), we evaluate whether low-SES students be receive disproportionally larger benefits from exposure to a higher share of female peers. We classify as high- or low-SES based on family income under three alternative schemes. In the first, students are designated as low-SES if their family income falls below the median and high-SES if it is above the median. In the second, students in the bottom income tertile are considered low-SES and those in the top tertile are considered high-SES. In the third, low-SES corresponds to the bottom income quartile and high-SES to the top quartile.

Figure 6 presents estimates of the effects of the share of female peers in a cohort on boys' mental health and school satisfaction. Results are reported separately for low-SES boys (left panels) and high-SES boys (right panels). The first coefficient in each panel reproduces the baseline specification without SES stratification for reference. Our results indicate that the positive effects of a higher share of girls in a cohort on mental health and school satisfaction for boys that we found in Table 3 are driven by low-SES boys.

For girls, we do not observe meaningful heterogeneity by SES. As shown in Figure 7, exposure to a higher share of female peers reduces CES-D scores for both low- and

[24] Authors' calculations indicate that cohort size in middle schools (174) is smaller than the cohort size in high schools (281) in the data. Additionally, calculations indicate that 55% of middle school students are white, relative to 49% of high school students.

high-SES girls and decreases the probability of being classified as depressed, although the latter effects are generally not statistically significant. Consistent with the aggregate results in Table 3, we find no evidence that peer gender composition affects girls' school satisfaction. Our findings are consistent with previous literature that finds that low-SES students experience the largest benefits from exposure to a higher share of female peers since low-SES students are those who are likely to experience higher levels of class disruptions and violence and may be in particular need of additional teacher attention (Lavy & Schlosser, 2011). Our findings indicate that low-SES students, particularly boys, benefit from a higher exposure to female peers.

5.4 Heterogeneity by household composition

We next examine heterogeneity by household composition, focusing on parental and sibling presence. Table 7 first considers parental composition. On one hand, children from single-parent households may be more exposed to at-risk peers, and therefore exposure to a higher share of female peers may have the highest returns on their mental health. On the other hand, children from two-parent households may have an environment conducive to building friendships, and may benefit more from exposure to a higher share of female peers. We evaluate whether parental composition affects the returns to being expose to a higher share of female peers. Columns 1 and 2 compare the effects of a higher share of female peers for students living with two or more parents versus those with one or fewer.[25] The benefits of a higher share of female peers for mental health and school satisfaction are concentrated among students in two-parent households, with weaker effects observed for those in single-parent households. Columns 3 and 4 compare outcomes by maternal presence, while columns 5 and 6 do the same for paternal presence. In both cases, the benefits of a higher share of female peers are stronger in households with a mother or father present than in those without. Overall, these results suggest that students in households with greater parental presence are more sensitive to peer gender composition in terms of mental health and well-being

Second, Table 8 examines whether the effects of peer gender composition vary with the presence and gender composition of siblings in the household. On one hand, respondents with sisters may be more comfortable with interactions with female peers and therefore experience a higher return to exposure to female peers. On the other hand, respondents with only brothers may be the ones who benefit the most from spending school time with a higher share of female peers. We evaluate whether the effect of exposure to female

[25]Nearly all students with two or more parents report exactly two; cases with three or more are extremely rare.

peers varies depending on the gender composition of siblings. Columns 1 and 2 compare respondents with any siblings to those without, columns 3 and 4 compare respondents with brothers to those without, and columns 5 and 6 compare respondents with sisters to those without. In general, we find that the effects of peer gender composition are less sensitive to sibling composition than to parental composition in the household.

5.5 Heterogeneity by own race

A remaining question is whether exposure to a larger share of female peers has stronger implications for mental health when those peers are of the student's own race. To investigate this, we estimate a variant of Equation 1 in which we replace the overall share of girls in the cohort with two separate measures: (a) the share of the cohort composed of girls of the student's own race, and (b) the share composed of girls of other races. Formally, we replace $\beta_1 ShareFem_{i,s,g}$ with $\beta_{11} ShareFemOwnRace_{i,s,g}$ and $\beta_{12} ShareFemNotOwnRace_{i,s,g}$, and report estimates of β_{11} and β_{12} in Table 9.

Panel A of Table 9 indicates that the effect of exposure to female peers both of one's own race and of other races improves mental health, as measured by CES-D scores. For girls, we find that a 5 percentage point increase in the share of same-race girls in a cohort improves mental health by 2.48% and a 5 percentage point increase in the share of different-race girls improves mental health by 2.12%. For boys, we find that a 5 percentage point increase in the share of same-race girls in a cohort improves mental health by 1.70% and a 5 percentage point increase in the share of different-race girls improves mental health by 1.03%, but these results are not statistically significant for either same-race or different-race female share.

These findings suggest that while a higher share of female peers of any race is beneficial, these benefits may be especially pronounced among same-race peers. These conclusions are also qualitatively reflected in Panels B and C, which look at the effects of same-race and different-race girls on clinical depression classification and school satisfaction, respectively.

6 Mechanisms

The next step is to investigate the potential pathways through which exposure to a higher share of female peers improves mental health and school satisfaction. While we cannot pinpoint the exact pathways through which being exposed to a higher share of female peers affects mental health, we leverage the rich set of questions in Add Health

to explore the following variables, which can be determinants of, consequences of, or just move simultaneously with mental health and school satisfaction: grades, feeling cared for, parental relationships, friendships, and self-image.

A higher share of female peers may influence some of these variables by directly changing them (i.e., higher exposure to female peers could improve GPA), or by just changing the compositional characteristics associated with gender composition (i.e., higher exposure to female peers does not improve communication with parents; however, if girls have better communication with their parents than boys, then a higher share of girls in the cohort would lead to being in a cohort where students have better communication with their parents, on average, which could affect outcomes).

Disentangling these mechanisms is empirically challenging. Lavy and Schlosser (2011) address this by separately analyzing survey questions on students' perceptions of their peers (e.g., reported classroom violence), which capture compositional effects, and questions on students' own behavior (e.g., self-reported involvement in violent incidents), which capture behavioral changes.[26] For an intermediate outcome to mediate the relationship between female peer share and boys' school experience via direct behavioral change, exposure to more female peers must significantly affect that outcome. Accordingly, we estimate each regression separately for each outcome to this necessary condition by assessing whether the coefficient is statistically different from zero.

On the other hand, some variables may not change directly in response to a higher share of female peers (e.g., propensity to engage in violence), which would result in a null effect of having a higher share of female peers on each individual's propensity to engage in violence. However, if there is a difference in the baseline propensity between boys and girls, a higher share of female peers may affect the perceived level of violence in the classroom, which in turn could affect mental health and school satisfaction, even without affecting own behavior (Lavy & Schlosser, 2011).[27]

[26] Lavy and Schlosser (2011) find that a higher share of female peers improves boys' and girls' cognitive outcomes, primarily through reduced classroom disruption and violence (lower reported classroom violence), rather than through changes in students' own behavior (unchanged self-reported involvement in violence).

[27] While it is not possible to measure all the relevant mechanisms or to causally attribute the findings to any of these mechanisms, we interpret a significant effect of the share of female peers on any given potential mechanism among boys as suggestive evidence of that variable being a mechanism through which the higher sex ratios leads to a positive school experience and improved mental health among boys.

6.1 Grades

One potential mechanism through which a higher share of female peers may improve school satisfaction and mental health is by enhancing academic performance. Alternatively, better grades may also be the consequence of improved mental health and school satisfaction. If exposure to more female peers raises test scores, students may subsequently have a more positive school experience, which in turn leads to more school satisfaction and better mental health. Add Health provides self-reported grades in four subjects: English, Math, Social Studies, and Science. We also use to these measures to construct a measure of overall GPA by assigning 4 points for an A, 3 for a B, 2 for a C, and 1 for a D.

Results for our analysis are shown in Figure 8, and point estimates are also displayed in Table A6.[28] We find that increasing exposure to female peers by 5 percentage points significantly increases the likelihood of girls receiving an A or B in Math by 3.2% an in Science by 2.1%. These findings suggest that a higher share of girls in a cohort may improve mental health for girls through better academic performance, although it is possible that girls have better academic performance through a higher share of female peers as a result of improved mental health.

Interestingly, increasing exposure to female peers by 5 percentage points decreases the likelihood of receiving an A or B in math for boys by 2.1%. Given that girls are more likely than boys to receive an A or B in every subject (see baseline probabilities in Table A6), this suggets exposure to a higher share of female peers may improve boys' academic environment even though their grades do not improve, which could mechanically contribute to higher levels of school satisfaction and improved mental health.[29]

6.2 Caring environment

Next, we look at whether peer gender composition affects students' perceptions of how much those around them care for them. Figure 9 suggests that being exposed to a higher share of girls leads to boys being more likely to report feeling cared for by teachers, friends and family, although not all results are statistically significant. In particular, being exposed to a higher share of female peers leads to a statistically significant increase in the probability that boys report feeling well understood and receiving attention from family members. Among girls, the coefficients are also positive but statistical significance

[28]For all mechanisms, we present main results as figures, with coefficient estimates, mean values, and percent changes displayed in Table A6.

[29]We do not find significant effects on overall GPA for either boys or girls, although we are only able to compute GPA for the subsample of students who reported a valid grade for each of the four subjects

on estimates is limited to teachers caring about students. In the following subsections, we further examine specific dimensions of students' relationships with parents and peers.

6.3 Parental support

Socialization, networking, and peer interactions tend to occur primarily within gender groups (Bailey, Johnston, Kuchler, Kumar, & Stroebel, 2025; Cullen & Perez-Truglia, 2023). Consequently, a higher share of female peers may reduce boys' opportunities for same-gender friendships and socialization. This could potentially lead to stronger relationships with parents if familial relationships serve as substitutes for friendships. Alternatively, this could also lead to weaker relationships with parents if familial relationships are complements to friendships. Additionally, if girls tend to foster a more socially engaging and less disruptive environment, such cross-gender friendships may indirectly strengthen boys' relationships with their parents.

Overall, we find suggestive evidence that exposureto a higher share of female peers strengthens parental relationships, but these findings are not statistically significant for the most part (Figure 10).

6.4 Friendships

We next look at the effects of a higher share of female peers on friendships using the subsample of respondents who were asked to list up to five male and five female friends. It is important to be aware of two caveats of the friendship analysis. First, we restrict the analysis to the subsample (34% of respondents) who are asked to list up to five male and five female friends, and exclude the rest of the respondents who are only asked to list one male friend and one female friend. Second, we use the respondents' reported number of friends, independent of whether these reported friends also listed the respondents as their friends.

With those caveats in mind, Figure 11 indicates that a higher share of girls in a cohort leads to boys listing a higher number of friends, and this effect is driven by listing more school friends, both male and female. This is an especially interesting finding given that research indicates socialization is more likely to occur within gender (Bailey et al., 2025; Cullen & Perez-Truglia, 2023). In contrast, we observe the opposite pattern among girls: Exposure to a higher share of female peers decreases the number of school friends of both genders for boys and girls. We cannot conclude that boys indeed have more friends and girls have fewer friends, as this could be driven by boys perceiving a less combative school environment or more caring interactions as having more friends.

In addition to asking questions about the number of friends a student has, Add Health asks respondents about the nature of their friendship interactions. Specifically, respondents are asked about whether they spent time at a given friend's house in the past week, if they hung out in the past week or the past weekend, if they talked about problems, and if they talked on the phone. Figure 12 shows results looking at engagement with male friends. We find that when there is a higher share of girls in a cohort, boys are significantly more likely to spend time with male friends, while girls are less likely to spend time with male friends and also less likely to talk with them about problems or on the phone. In contrast, Figure 13 indicates a higher share of girls in a cohort does not affect the time that boys or girls spend interacting with female friends. Again, this should be interpreted with caution, as a less combative school environment may translate into boys perceiving that they have more school friends and also that they are closer to such friends.

Overall, results indicate that a higher share of girls in a cohort leads to boys reporting they have more school friendships and such friendships to be closer. Girls, on the other hand, report a decrease in the number of friendships and a decrease in closeness to male friends that is not substituted with greater closeness to female friends.

6.5 Self-image

Finally, we explore whether peer gender composition affects self-image. A priori, it is unclear whether being exposed to a higher share of female peers would improve or worsen self-image. On one hand, being exposed to a higher share of female peers may worsen romantic relationship bargaining power among girls Arcidiacono et al. (2016), which in turn may have detrimental implications for self-esteem. On the other hand, to the extent that girls are more likely to experience self-image instability and lower self-esteem than boys (Simmons & Rosenberg, 1975), being exposed to more girls may raise awareness of self-image issues, which in turn would have positive implications for self-esteem.

Results in Figure 14 indicate that exposure to a higher share of female peers leads to girls being more likely to report that they are the right weight and less likely to report that they are overweight. These results are robust to controlling for BMI. We also find that girls are less likely to report that they are trying to lose weight and more likely to report that they are trying to maintain weight. In contrast, we do not find that peer gender composition has any effect on self-image for boys

7 Conclusion

This paper provides new evidence on how variation in peer gender composition across school cohorts influences adolescents' mental health and school satisfaction. Exploiting idiosyncratic differences in sex ratios within schools, we show that exposure to a higher share of female peers significantly improves mental health outcomes for both boys and girls, though the magnitudes and suggestive mechanisms differ by gender. For boys, the benefits appear concentrated among those at risk of marginal depression, whereas for girls the improvements are more widespread. These findings contribute to a growing literature on the role of peer environments in shaping adolescent development, extending it to the domain of mental health. More broadly, our results highlight the importance of social context in understanding disparities in mental health and suggest that seemingly small differences in school composition can have lasting consequences.

We find that a 5 percentage point increase in the share of female peers decreases the propensity to meet the clinical threshold for depression by 10.0% for boys. Our findings in a US setting contrast with those of Getik and Meier (2022), which finds that a 5 percentage point increase in the share of female peers in Sweden increases mental health diagnoses by 1.35%. A notable difference between the studies is that our study focuses on self-reported measures of experiences with depressive symptoms, while Getik and Meier (2022) focuses on formal mental health diagnoses. Formal diagnoses embed a combination of mental health outcomes and willingness to seek mental healthcare, which may be affected by willingness to seek help. Our studies are complementary to each other, and the differences in findings could be a reflection of institutional differences across countries or a reflection of the effect of peer gender composition of healthcare seeking behavior for mental health issues.

Future research should continue to explore the channels through which peer environments affect mental health, as well as the longer-term implications for educational attainment and adult well-being.

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Tables and figures

Table 1: Summary statistics

	Boys	Girls
Panel A: Independent variable		
Share of girls in cohort	0.50	0.51
Panel B: Dependent variables		
CES-D mental health index	10.03	11.87
CES-D depression indicator	0.06	0.09
School satisfaction index	14.55	14.74
Panel C: Control variables		
Individual controls		
Male	1.00	0.00
Age	15.50	15.34
Race		
White	0.65	0.65
Black	0.15	0.15
Asian	0.04	0.03
Hispanic	0.12	0.12
Other race	0.05	0.05
US-born	0.94	0.93
Cohort controls		
Cohort size	211.84	213.21
Cohort age	14.82	14.83
Cohort racial composition		
White share	0.58	0.58
Black share	0.14	0.14
Asian share	0.03	0.03
Hispanic share	0.14	0.14
Other race share	0.11	0.11
Cohort US-born share	0.93	0.93
N	8,516	8,925

Notes: Observations are at the student level and means for the dependent and independent variables are reported.

Table 2: Balance tests

	(1) All, Above	(2) All, Contemp	(3) Boys, Above	(4) Boys, Contemp	(5) Girls, Above	(6) Girls, Contemp
Panel A: Balance tests on key individual covariates						
Male	0.0660	-0.0859				
	(0.1418)	(0.1448)				
White	0.0709	-0.0462	0.0986	0.0052	0.0571	-0.1191
	(0.1178)	(0.0777)	(0.1289)	(0.0760)	(0.1907)	(0.1249)
Black	0.0086	0.0323	-0.1368	-0.0031	0.1642	0.0532
	(0.0614)	(0.0348)	(0.0829)	(0.0527)	(0.0993)	(0.0625)
Asian	0.0130	-0.0118	0.0153	-0.0385	0.0162	0.0159
	(0.0278)	(0.0289)	(0.0451)	(0.0520)	(0.0390)	(0.0341)
Hispanic	-0.0768	0.0999	0.0483	0.1162	-0.2389*	0.0927
	(0.0829)	(0.0635)	(0.0908)	(0.0809)	(0.1207)	(0.0977)
Other race	-0.0158	-0.0742*	-0.0255	-0.0797	0.0013	-0.0428
	(0.0472)	(0.0378)	(0.0776)	(0.0550)	(0.0847)	(0.0604)
Age	0.1542	-0.1710	-0.1412	-0.0245	0.3865	-0.0808
	(0.2643)	(0.2044)	(0.3352)	(0.2283)	(0.3157)	(0.3241)
U.S.-born	-0.0583	-0.0250	-0.1258	0.0080	0.0026	-0.0511
	(0.0666)	(0.0420)	(0.0760)	(0.0618)	(0.0856)	(0.0601)
Panel B: Sorting tests on additional variables						
Cohort size	12.7663	-26.8857	13.4470	-35.1944	9.6582	-19.7072
	(38.5208)	(38.8480)	(37.4021)	(38.4901)	(40.4036)	(40.4642)
Total family income	9.6865	-9.9017	0.1883	-8.4962	21.0200	-15.9189
	(16.2816)	(8.3372)	(17.6134)	(10.8133)	(25.5516)	(11.9099)
Share older	-0.0294	-0.0895	-0.0309	-0.0924	-0.0111	-0.0893
	(0.1812)	(0.1263)	(0.1841)	(0.1265)	(0.1773)	(0.1303)
Share older male	-0.0981	-0.1824	-0.1096	-0.1576	-0.0688	-0.2020
	(0.2211)	(0.1237)	(0.2258)	(0.1308)	(0.2096)	(0.1231)
Share older female	-0.0453	0.1763	-0.0306	0.1674	-0.0459	0.1787
	(0.1871)	(0.1577)	(0.1907)	(0.1588)	(0.1873)	(0.1606)
Cohort age	-0.2317	-0.1339	-0.2607	-0.1174	-0.1746	-0.1475
	(0.2898)	(0.1761)	(0.3025)	(0.1839)	(0.2778)	(0.1752)
Cohort size	12.7663	-26.8857	13.4470	-35.1944	9.6582	-19.7072
	(38.5208)	(38.8480)	(37.4021)	(38.4901)	(40.4036)	(40.4642)
Has sibling in household	-0.1102	-0.0872	-0.3146*	0.2073	0.1134	-0.2909*
	(0.1056)	(0.1024)	(0.1818)	(0.1260)	(0.1703)	(0.1623)
Has father in household	-0.1706	-0.0657	-0.0900	0.1282	-0.2600	-0.1741
	(0.1286)	(0.0972)	(0.1915)	(0.1233)	(0.1722)	(0.1360)
School FEs	X	X	X	X	X	X
Grade FEs	X	X	X	X	X	X

Notes: Each cell corresponds to a separate regression, with the outcome variable corresponding to the row label. The independent variable in column 1 is the share of girls in the cohort above, and the independent variable in column 2 is the share of girls in the contemporaneous cohort. Standard errors are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.10.

Table 3: The effects of cohort gender ratios on mental health and well-being

	Boys		Girls	
	(1)	(2)	(3)	(4)
Panel A: CES-D mental health index				
Share of girls in cohort	-2.9563	-3.1272	-5.6290**	-5.8474**
	(2.2299)	(2.2519)	(2.6169)	(2.4056)
Mean	10.3885	10.3885	12.3157	12.3157
Percent change	-0.0142	-0.0151	-0.0229	-0.0237
Panel B: CES-D depression indicator				
Share of girls in cohort	-0.1249*	-0.1333*	-0.0342	-0.0414
	(0.0669)	(0.0719)	(0.0789)	(0.0824)
Mean	0.0670	0.0670	0.0965	0.0965
Percent change	-0.0932	-0.0995	-0.0178	-0.0216
Panel C: School satisfaction index				
Share of girls in cohort	-2.8732**	-2.8601**	-1.2299	-0.9866
	(1.3827)	(1.3106)	(1.5566)	(1.5567)
Mean	14.6186	14.6186	14.8145	14.8145
Percent change	-0.0098	-0.0098	-0.0042	-0.0033
N	8,516	8,516	8,925	8,925
School FEs	X	X	X	X
Grade FEs	X	X	X	X
Individual controls	X	X	X	X
Cohort controls		X		X

Notes: The outcome variable in Panel A is the student's CES-D score, the outcome variable in Panel B is an indicator variable that takes a value of one if a student's CES-D score meets the clinical threshold for depression and zero otherwise, and the outcome variable in Panel C is the student's school well-being score. Standard errors are clustered at the school level. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share. *** p<0.01, ** p<0.05, * p<0.10.

Table 4: The effects of cohort gender ratios on mental health and well-being: robustness to excluding outlier observations

	Boys		Girls	
	All	Excl. extreme 1%	All	Excl. extreme 1%
	(1)	(2)	(3)	(4)
Panel A: CES-D mental health index				
Share of girls in cohort	-3.1272	-2.0983	-5.8474**	-6.3429**
	(2.2519)	(2.8280)	(2.4056)	(3.1051)
Mean	10.3885	10.3882	12.3157	12.3341
Percent change	-0.0151	-0.0101	-0.0237	-0.0257
Panel B: CES-D depression indicator				
Share of girls in cohort	-0.1333*	-0.1737**	-0.0414	-0.0825
	(0.0719)	(0.0839)	(0.0824)	(0.0987)
Mean	0.0670	0.0671	0.0965	0.0962
Percent change	-0.0995	-0.1296	-0.0216	-0.0430
Panel C: School satisfaction index				
Share of girls in cohort	-2.8601**	-1.9140	-0.9866	-0.6145
	(1.3106)	(1.5111)	(1.5567)	(1.7317)
Mean	14.6186	14.6072	14.8145	14.8269
Percent change	-0.0098	-0.0066	-0.0033	-0.0021
N	8,516	8,348	8,925	8,764
School FEs	X	X	X	X
Grade FEs	X	X	X	X
Full individual/cohort controls	X	X	X	X

Notes: The outcome variable in Panel A is the student's CES-D score, the outcome variable in Panel B is an indicator variable that takes a value of one if a student's CES-D score meets the clinical threshold for depression and zero otherwise, and the outcome variable in Panel C is the student's school well-being score.. Standard errors are clustered at the school level. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share. *** p<0.01, ** p<0.05, * p<0.10.

Table 5: Cohort size heterogeneity in the effects of cohort gender ratios on mental health and well-being

	Boys	Girls
	(1)	(2)
Panel A: CES-D mental health index		
Share of girls in cohort×Quartile 1	-3.0493	-5.5412**
	(2.2748)	(2.3712)
Share of girls in cohort×Quartile 2	-2.6873	-6.1459**
	(2.4632)	(2.4933)
Share of girls in cohort×Quartile 3	-3.4967	-7.0327**
	(2.5824)	(2.7603)
Share of girls in cohort×Quartile 4	-1.8480	-6.9394**
	(2.9260)	(3.2033)
Mean	10.3885	12.3157
Percent change Quartile 1	-0.0147	-0.0225
Percent change Quartile 2	-0.0129	-0.0250
Percent change Quartile 3	-0.0168	-0.0286
Percent change Quartile 4	-0.0089	-0.0282
Panel B: CES-D depression index		
Share of girls in cohort×Quartile 1	-0.1231*	-0.0361
	(0.0722)	(0.0826)
Share of girls in cohort×Quartile 2	-0.1417*	-0.0579
	(0.0764)	(0.0842)
Share of girls in cohort×Quartile 3	-0.1828**	-0.0646
	(0.0899)	(0.0920)
Share of girls in cohort×Quartile 4	-0.1212	-0.1006
	(0.1087)	(0.1124)
Mean	0.0670	0.0965
Percent change Quartile 1	-0.0919	-0.0188
Percent change Quartile 2	-0.1057	-0.0302
Percent change Quartile 3	-0.1364	-0.0336
Percent change Quartile 4	-0.0904	-0.0524
Panel C: School satisfaction index		
Share of girls in cohort×Quartile 1	-2.9022**	-0.6100
	(1.2969)	(1.6010)
Share of girls in cohort×Quartile 2	-2.6940*	-1.3634
	(1.3753)	(1.6094)
Share of girls in cohort×Quartile 3	-2.4606	-2.4310
	(1.4998)	(1.7309)
Share of girls in cohort×Quartile 4	-0.9754	-2.1912

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Table 5 – continued from previous page

	Boys (1)	Girls (2)
	(1.8222)	(2.0887)
Mean	14.6186	14.8145
Percent change Quartile 1	-0.0099	-0.0021
Percent change Quartile 2	-0.0092	-0.0046
Percent change Quartile 3	-0.0084	-0.0082
Percent change Quartile 4	-0.0033	-0.0074
N	8,516	8,925
School FEs	X	X
Grade FEs	X	X
Full individual/cohort controls	X	X

Notes: The outcome variable in Panel A is the student's CES-D score, the outcome variable in Panel B is an indicator variable that takes a value of one if a student's CES-D score meets the clinical threshold for depression and zero otherwise, and the outcome variable in Panel C is the student's school well-being score.. The average cohort size is 254 with a median of 210. The cutoffs for each quartile are 130 (Q1), 210 (Q2), and 351 (Q3). The mean and variance of female peer share for each quartile of cohort size is: First quartile: Mean female share=0.5067 (SD=0.0817). Second quartile: Mean female share=0.4948 (SD=0.0537). Third quartile: Mean female share=0.5054 (SD=0.0378). Fourth quartile: Mean female share=0.4995 (SD=0.0362). Standard errors are clustered at the school level. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share. *** p<0.01, ** p<0.05, * p<0.10.

Table 6: Grade level heterogeneity in the effects of cohort gender ratios on mental health and well-being

	Boys (1)	Girls (2)
Panel A: CES-D mental health index		
Share of girls×middle school	-5.5510**	-8.6826**
	(2.6610)	(3.6028)
Share of girls×high school	-1.5712	-4.1986
	(3.1076)	(2.9773)
Mean	10.3885	12.3157
Percent change (middle school)	-0.0267	-0.0352
Percent change (high school)	-0.0076	-0.0170
Panel B: CES-D depression indicator		
Share of girls×middle school	-0.1550	-0.0288
	(0.0986)	(0.1351)
Share of girls×high school	-0.1194	-0.0488
	(0.0917)	(0.0886)
Mean	0.0670	0.0965
Percent change (middle school)	-0.1157	-0.0150
Percent change (high school)	-0.0891	-0.0254
Panel C: School satisfaction index		
Share of girls×middle school	-6.9338***	-1.3235
	(1.9090)	(3.1046)
Share of girls×high school	-0.2451	-0.7906
	(1.3404)	(1.4605)
Mean	14.6186	14.8145
Percent change (middle school)	-0.0237	-0.0045
Percent change (high school)	-0.0008	-0.0027
N	8,516	8,925
School FEs	X	X
Grade FEs	X	X
Full individual/cohort controls	X	X

Notes: The outcome variable in Panel A is the student's CES-D score, the outcome variable in Panel B is an indicator variable that takes a value of one if a student's CES-D score meets the clinical threshold for depression and zero otherwise, and the outcome variable in Panel C is the student's school well-being score.. Standard errors are clustered at the school level. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share. *** p<0.01, ** p<0.05, * p<0.10.

Table 7: The effects of peer gender ratios: heterogeneity by adult household composition

	Boys (1)	Girls (2)	Boys (3)	Girls (4)	Boys (5)	Girls (6)
Panel A: CES-D mental health index						
Share of girls×2+ parents present	-3.7928*	-6.9009***				
	(2.2367)	(2.4268)				
Share of girls× <2 parents	-1.1580	-4.5995*				
	(2.2075)	(2.4402)				
Share of girls×Mom present			-3.0773	-6.1652**		
			(2.2315)	(2.4089)		
Share of girls×No mom			0.3982	-2.8867		
			(2.3210)	(2.5374)		
Share of girls×Dad present					-3.5738	-6.6993***
					(2.2533)	(2.4290)
Share of girls×No dad					-1.6884	-4.7935*
					(2.2195)	(2.4247)
Mean	10.3885	12.3157	10.3885	12.3157	10.3885	12.3157
Percent change (present)	-0.0183	-0.0280	-0.0148	-0.0250	-0.0172	-0.0272
Percent change (not present)	-0.0056	-0.0187	0.0019	-0.0117	-0.0081	-0.0195
Panel B: CES-D depression indicator						
Share of girls×2+ parents present	-0.1470**	-0.0678				
	(0.0729)	(0.0823)				
Share of girls× <2 parents	-0.0929	-0.0102				
	(0.0719)	(0.0843)				
Share of girls×Mom present			-0.1319*	-0.0531		
			(0.0716)	(0.0814)		
Share of girls×No mom			-0.0344	0.0670		
			(0.0762)	(0.0913)		
Share of girls×Dad present					-0.1421*	-0.0617
					(0.0726)	(0.0835)
Share of girls×No dad					-0.1051	-0.0164
					(0.0719)	(0.0837)
Mean	0.0670	0.0965	0.0670	0.0965	0.0670	0.0965
Percent change (present)	-0.1097	-0.0353	-0.0984	-0.0277	-0.1060	-0.0321
Percent change (not present)	-0.0693	-0.0053	-0.0257	0.0349	-0.0784	-0.0085
Panel C: School satisfaction index						
Share of girls×2+ parents present	-3.2477**	-1.4798				
	(1.2990)	(1.5666)				
Share of girls× <2 parents	-1.7136	-0.4023				
	(1.3250)	(1.5615)				
Share of girls×Mom present			-2.8415**	-1.1150		
			(1.2948)	(1.5723)		
Share of girls×No mom			-1.5419	0.2102		
			(1.3540)	(1.5789)		
Share of girls×Dad present					-3.1087**	-1.4486
					(1.3105)	(1.5494)
Share of girls×No dad					-2.0594	-0.4150
					(1.3474)	(1.5443)
Mean	14.6186	14.8145	14.6186	14.8145	14.6186	14.8145
Percent change (present)	-0.0111	-0.0050	-0.0097	-0.0038	-0.0106	-0.0049
Percent change (not present)	-0.0059	-0.0014	-0.0053	0.0007	-0.0070	-0.0014
N	8,516	8,925	8,516	8,925	8,516	8,925
School FEs	X	X	X	X	X	X
Grade FEs	X	X	X	X	X	X
Full individual/cohort controls	X	X	X	X	X	X

Notes: The outcome variable in Panel A is the student's CES-D score, the outcome variable in Panel B is an indicator variable that takes a value of one if a student's CES-D score meets the clinical threshold for depression and zero otherwise, and the outcome variable in Panel C is the student's school well-being score. Standard errors are clustered at the school level. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share. *** p<0.01, ** p<0.05, * p<0.10.

Table 8: The effects of peer gender ratios: heterogeneity by sibling status

	Boys (1)	Girls (2)	Boys (3)	Girls (4)	Boys (5)	Girls (6)
Panel A: CES-D mental health index						
Share of girls×Has siblings	-3.1991	-6.3309***				
	(2.2465)	(2.4167)				
Share of girls×No siblings	-2.6667	-5.2676**				
	(2.3145)	(2.4382)				
Share of girls×Has brothers			-3.2586	-6.1940**		
			(2.2253)	(2.3941)		
Share of girls×No brothers			-2.8423	-5.6024**		
			(2.3534)	(2.4226)		
Share of girls×Has sister					-2.9265	-5.5793**
					(2.2962)	(2.4023)
Share of girls×No Sister					-3.3319	-6.0068**
					(2.2381)	(2.4184)
Mean	10.3885	12.3157	10.3885	12.3157	10.3885	12.3157
Percent change (has)	-0.0154	-0.0257	-0.0157	-0.0251	-0.0141	-0.0227
Percent change (no)	-0.0128	-0.0214	-0.0137	-0.0227	-0.0160	-0.0244
Panel B: CES-D depression indicator						
Share of girls×Has siblings	-0.1384*	-0.0720				
	(0.0715)	(0.0821)				
Share of girls×No siblings	-0.1009	-0.0048				
	(0.0755)	(0.0863)				
Share of girls×Has brother			-0.1442**	-0.0611		
			(0.0710)	(0.0821)		
Share of girls×No brother			-0.1098	-0.0275		
			(0.0755)	(0.0836)		
Share of girls×Has sister					-0.1332*	-0.0559
					(0.0727)	(0.0817)
Share of girls×No sister					-0.1335*	-0.0328
					(0.0718)	(0.0836)
Mean	0.0670	0.0965	0.0670	0.0965	0.0670	0.0965
Percent change (has)	-0.1033	-0.0375	-0.1076	-0.0318	-0.0994	-0.0291
Percent change (no)	-0.0753	-0.0025	-0.0819	-0.0143	-0.0996	-0.0171
Panel C: School satisfaction index						
Share of girls×Has siblings	-2.9575**	-1.5922				
	(1.3199)	(1.5490)				
Share of girls×No siblings	-2.2370*	-0.2603				
	(1.3315)	(1.5059)				
Share of girls×Has brother			-3.1043**	-1.4049		
			(1.3234)	(1.5778)		
Share of girls×No brother		-2.3308*	-0.6908			
			(1.3177)	(1.5343)		
Share of girls×Has sister					-2.8038**	-1.3164
					(1.3333)	(1.5572)
Share of girls×No sister					-2.9176**	-0.7905
					(1.3030)	(1.5485)
Mean	14.6186	14.8145	14.6186	14.8145	14.6186	14.8145
Percent change (has)	-0.0101	-0.0054	-0.0106	-0.0047	-0.0096	-0.0044
Percent change (no)	-0.0077	-0.0009	-0.0080	-0.0023	-0.0100	-0.0027
N	8516	8925	8516	8925	8516	8925
School FEs	X	X	X	X	X	X
Grade FEs	X	X	X	X	X	X
Full individual/cohort controls	X	X	X	X	X	X

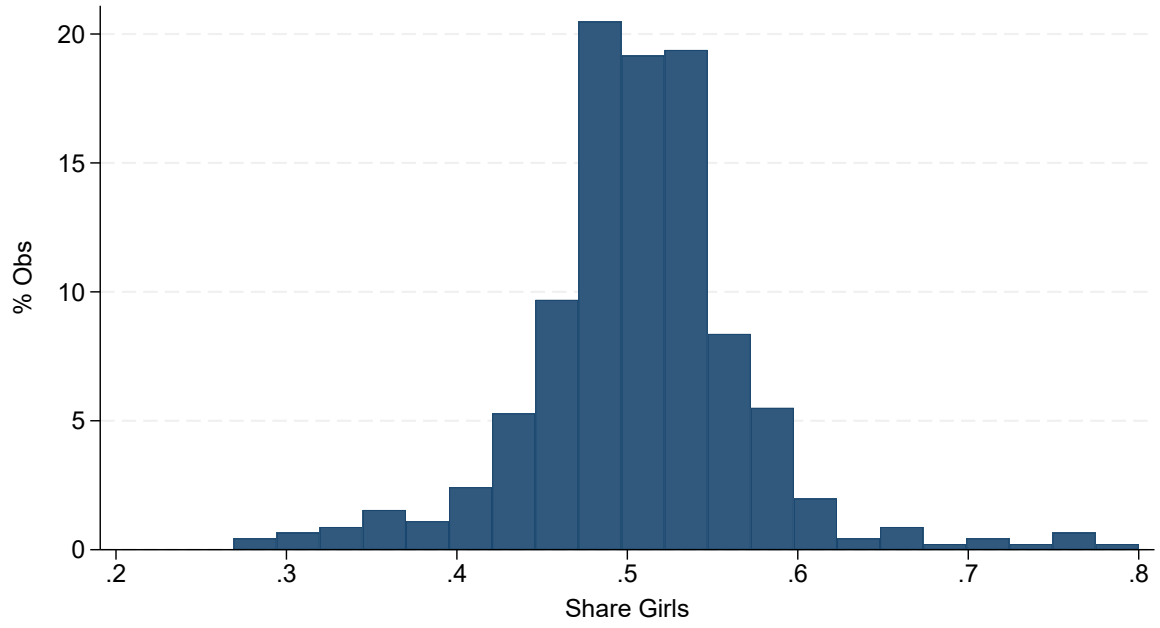
Notes: The outcome variable in Panel A is the student's CES-D score, the outcome variable in Panel B is an indicator variable that takes a value of one if a student's CES-D score meets the clinical threshold for depression and zero otherwise, and the outcome variable in Panel C is the student's school well-being score. Standard errors are clustered at the school level. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share. *** p<0.01, ** p<0.05, * p<0.10.

Table 9: Racial heterogeneity in effects of own-race cohort gender ratios on mental health and well-being

	Boys (1)	Girls (2)
Panel A: School satisfaction index		
Share of cohort same race girls	-3.5337	-6.1053**
	(2.2698)	(2.4715)
Share of cohort different race girls	-2.1426	-5.2336**
	(2.5286)	(2.5409)
Mean	10.3885	12.3157
Percent change same race	-0.0170	-0.0248
Percent change different race	-0.0103	-0.0212
Panel B: CES-D depression indicator		
Share of cohort same race girls	-0.1455*	-0.0416
	(0.0736)	(0.0859)
Share of cohort different race girls	-0.1039	-0.0409
	(0.0773)	(0.0853)
Mean	0.0670	0.0965
Percent change same race	-0.1086	-0.0217
Percent change different race	-0.0775	-0.0213
Panel C: School satisfaction index		
Share of cohort same race girls	-3.3710**	-1.3694
	(1.3279)	(1.5452)
Share of cohort different race girls	-1.6230	-0.0755
	(1.3589)	(1.5724)
Mean	14.6186	14.8145
Percent change same race	-0.0115	-0.0046
Percent change different race	-0.0056	-0.0003
N	8,516	8,925
School FEs	X	X
Grade FEs	X	X
Full individual/cohort controls	X	X

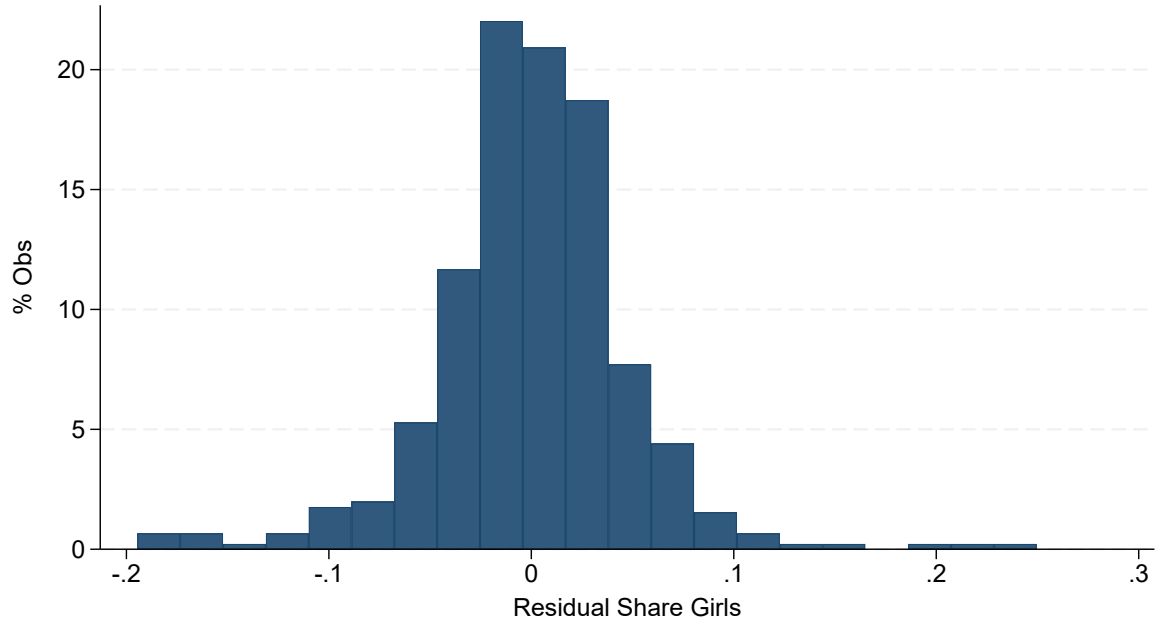
Notes: The outcome variable in Panel A is the student's CES-D score, the outcome variable in Panel B is an indicator variable that takes a value of one if a student's CES-D score meets the clinical threshold for depression and zero otherwise, and the outcome variable in Panel C is the student's school well-being score. Standard errors are clustered at the school level. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share. *** p<0.01, ** p<0.05, * p<0.10.

Figure 1: Distribution of share of girls in cohort



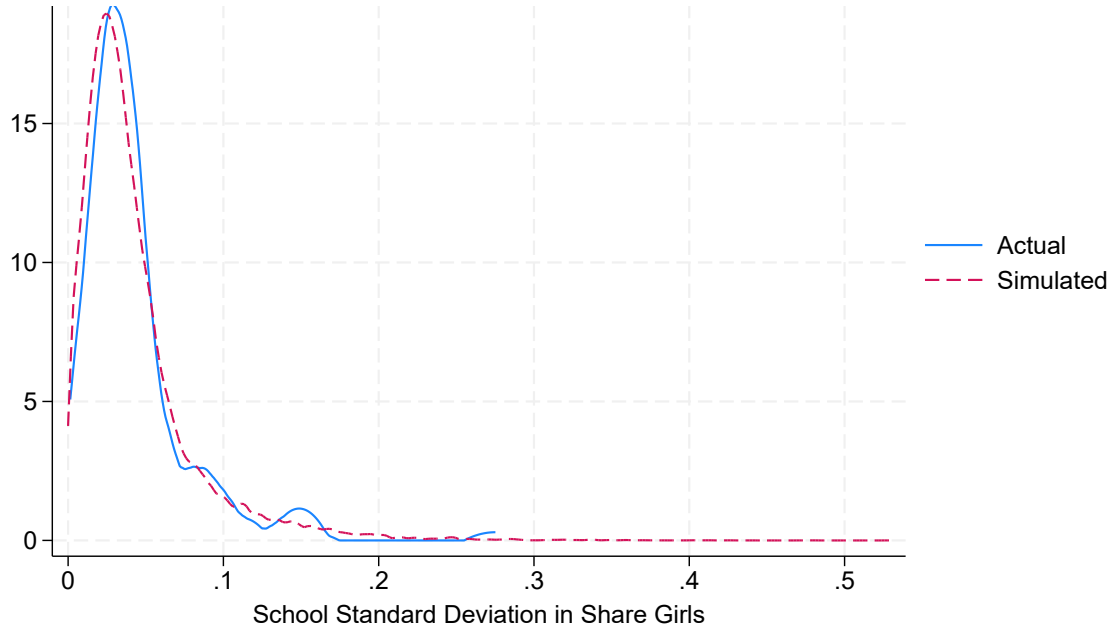
Notes: The histogram depicts the distribution in the share of girls in a cohort for all cohorts in the sample.

Figure 2: Within-school variation in share of girls in cohort



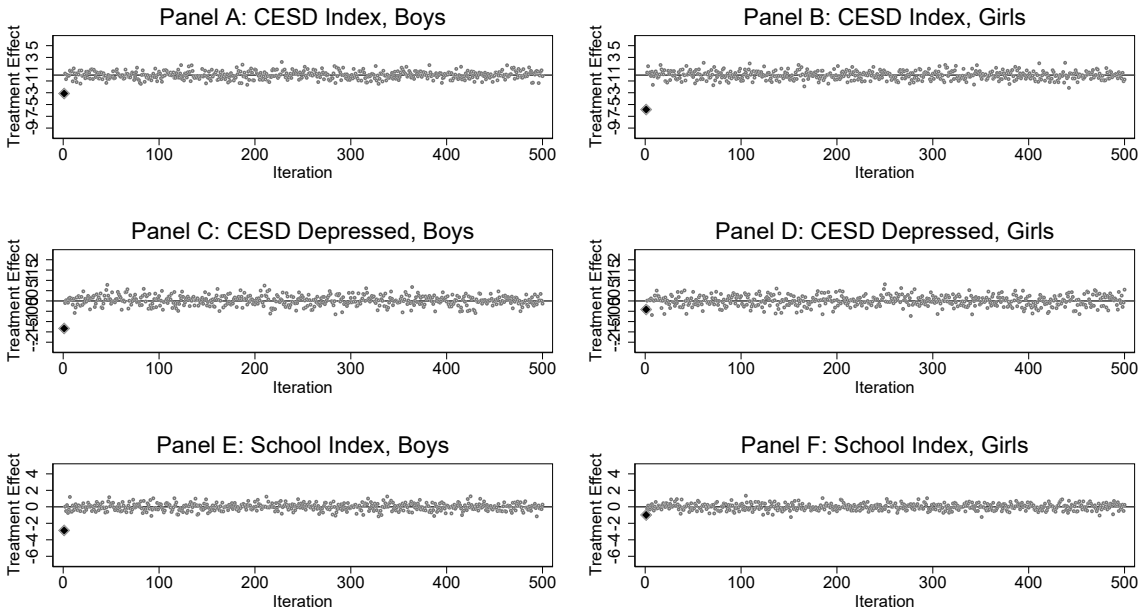
Notes: The histogram depicts the distribution in the residual share of girls in a cohort for all cohorts in the sample. To calculate the residual share, we demean the share of girls in a cohort by taking the difference between the share of girls in a cohort and the share of girls in the school.

Figure 3: Distribution of Actual and Simulated Within School Standard Deviation in the Share of Girls



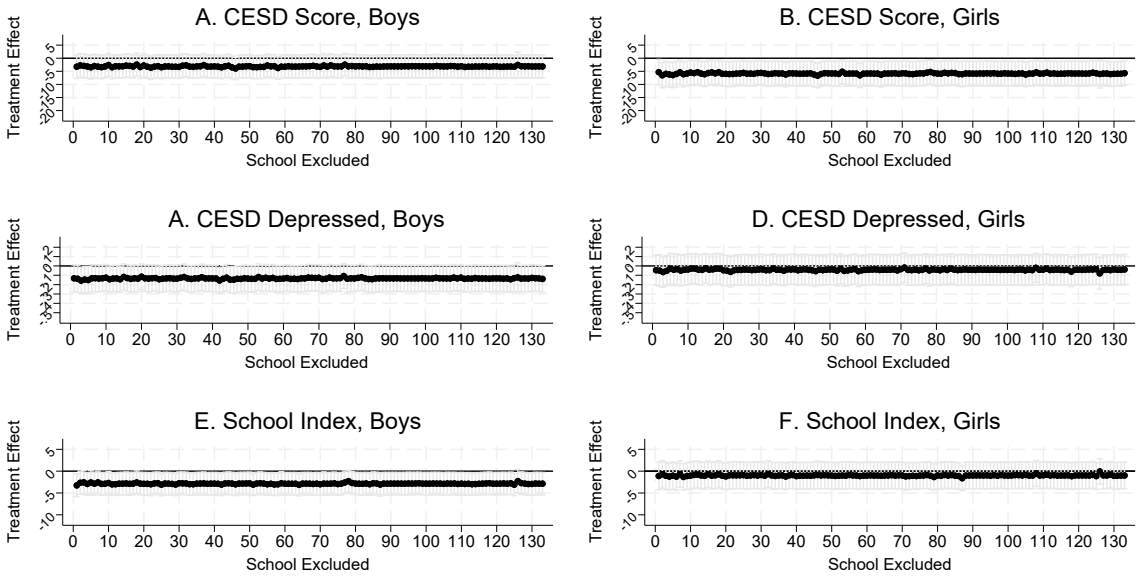
Notes: In the figure, the solid line shows the observed standard deviation in the share of girls for each school in the sample. The dashed line shows the simulated standard deviations in the share of girls for each school using a Monte Carlo simulation.

Figure 4: Randomization inference



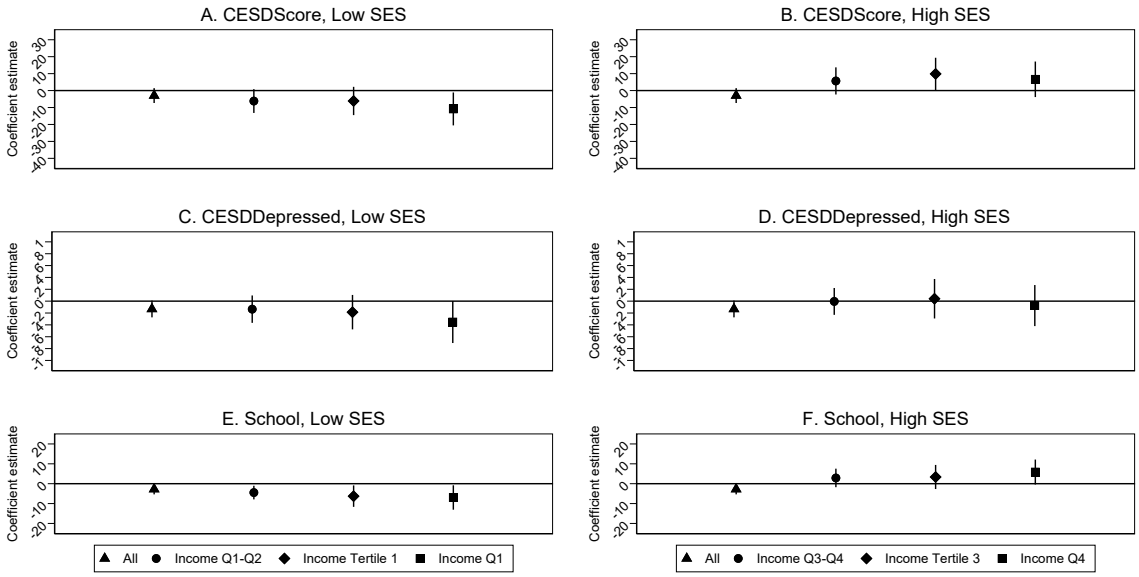
Notes: The outcome variables in Panel A and B are the student's CES-D score, the outcome variables in Panels C and D are an indicator variable that takes a value of one if a student's CES-D score meets the clinical threshold for depression and zero otherwise, and the outcome variables in Panel E and F are the student's school well-being score. The figure displays coefficient estimates of the share of female peers, using randomly-assigned placebo peers, for 500 iterations. The bolded point estimate in each panel represents the estimated coefficient using actual peer composition. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share.

Figure 5: Leave-one-out analysis



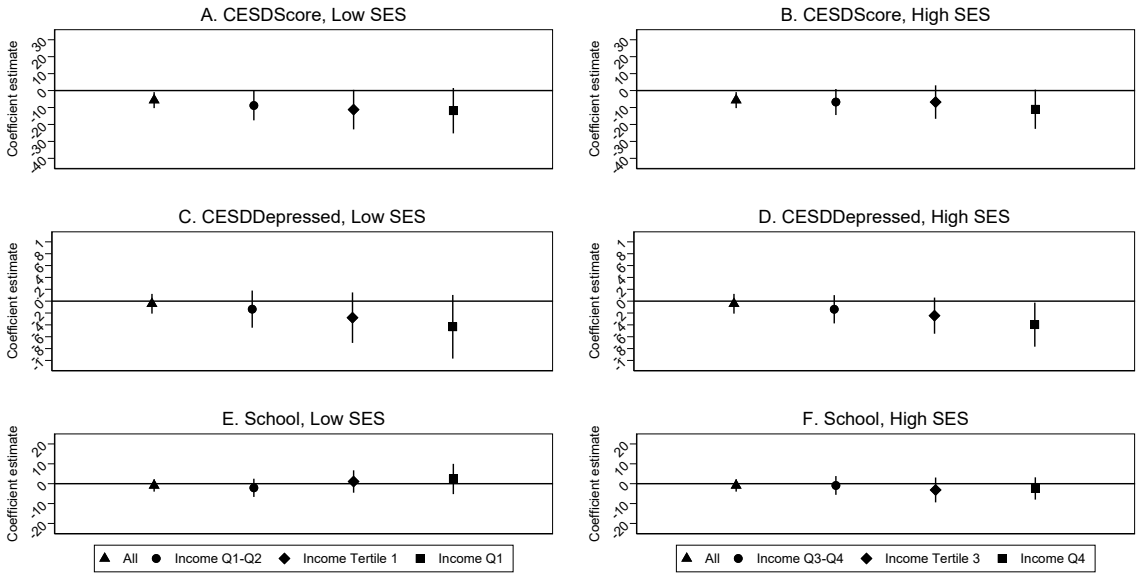
Notes: The outcome variables in Panel A and B are the student's CES-D score, the outcome variables in Panels C and D are an indicator variable that takes a value of one if a student's CES-D score meets the clinical threshold for depression and zero otherwise, and the outcome variables in Panel E and F are the student's school well-being score. The figure displays coefficient estimates of the share of female peers, dropping one school at a time, for each school in the sample. Standard errors are clustered at the school level, and 95% confidence intervals are shown. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share.

Figure 6: Heterogeneity by socioeconomic status: Boys



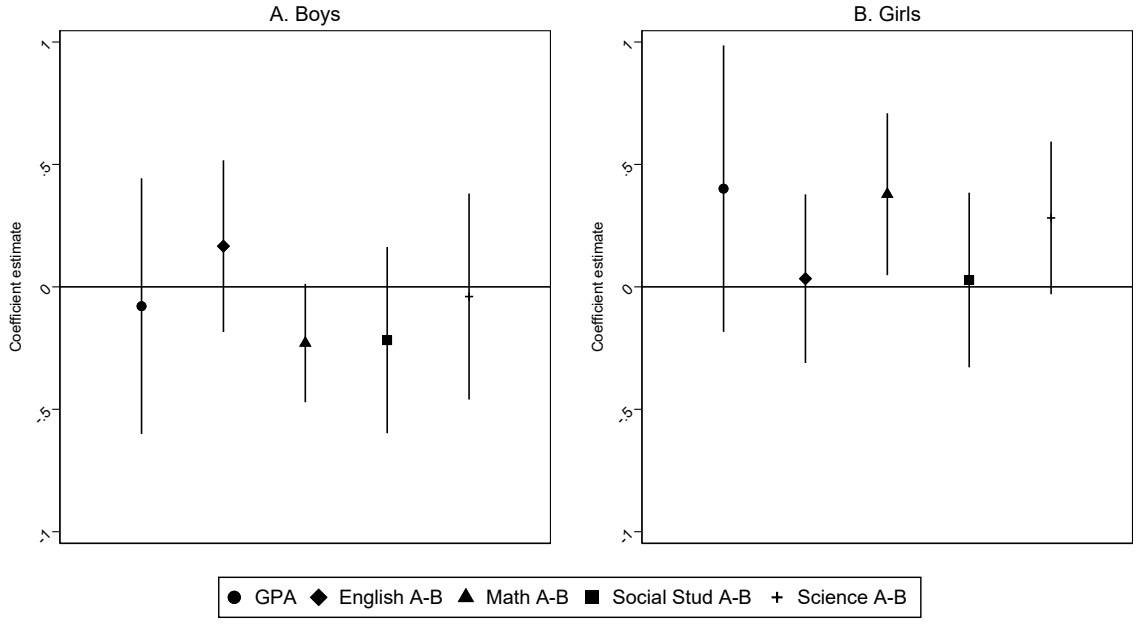
Notes: The outcome variables in Panel A and B are the student's CES-D score, the outcome variables in Panels C and D are an indicator variable that takes a value of one if a student's CES-D score meets the clinical threshold for depression and zero otherwise, and the outcome variables in Panel E and F are the student's school well-being score. The figure displays coefficient estimates of the share of female peers. Standard errors are clustered at the school level, and 95% confidence intervals are shown. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share.

Figure 7: Heterogeneity by socioeconomic status: Girls



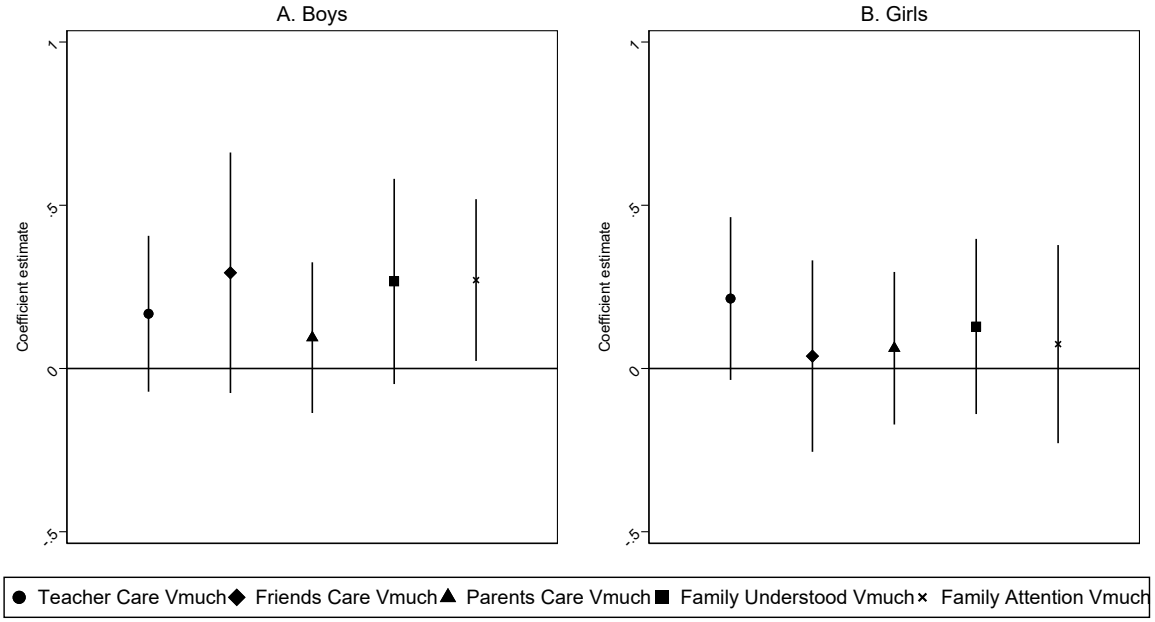
Notes: The outcome variable in Panel A and B are the student's CES-D score, the outcome variable in Panels C and D are an indicator variable that takes a value of one if a student's CES-D score meets the clinical threshold for depression and zero otherwise, and the outcome variable in Panel E and F are the student's school well-being score. The figure displays coefficient estimates of the share of female peers. Standard errors are clustered at the school level, and 95% confidence intervals are shown. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share.

Figure 8: Mechanism analysis: Grades



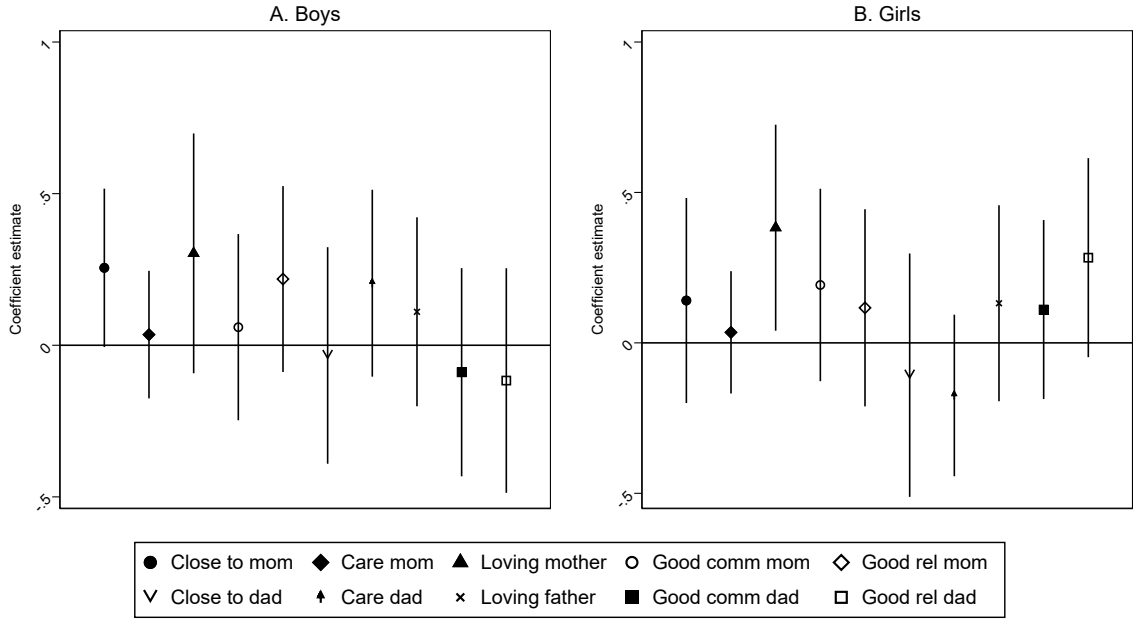
Notes: The figure displays coefficient estimates of the share of female peers on various outcomes, as described in the legend. Standard errors are clustered at the school level, and 95% confidence intervals are shown. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share.

Figure 9: Mechanism analysis: Caring environment



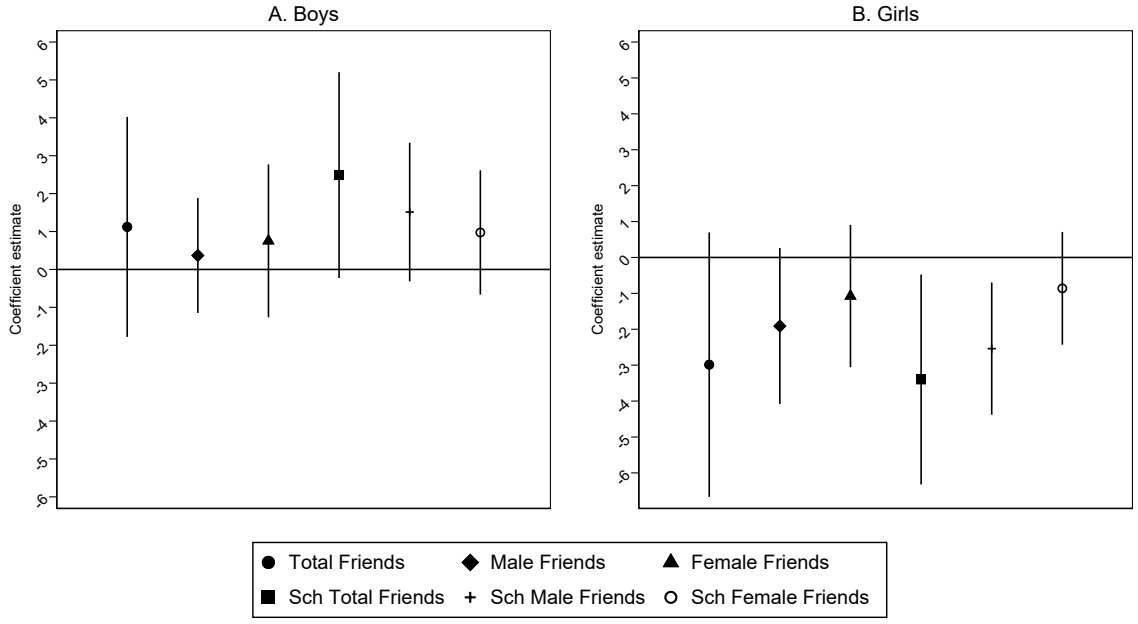
Notes: The figure displays coefficient estimates of the share of female peers on various outcomes, as described in the legend. Standard errors are clustered at the school level, and 95% confidence intervals are shown. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share.

Figure 10: Mechanism analysis: Relationship with parents



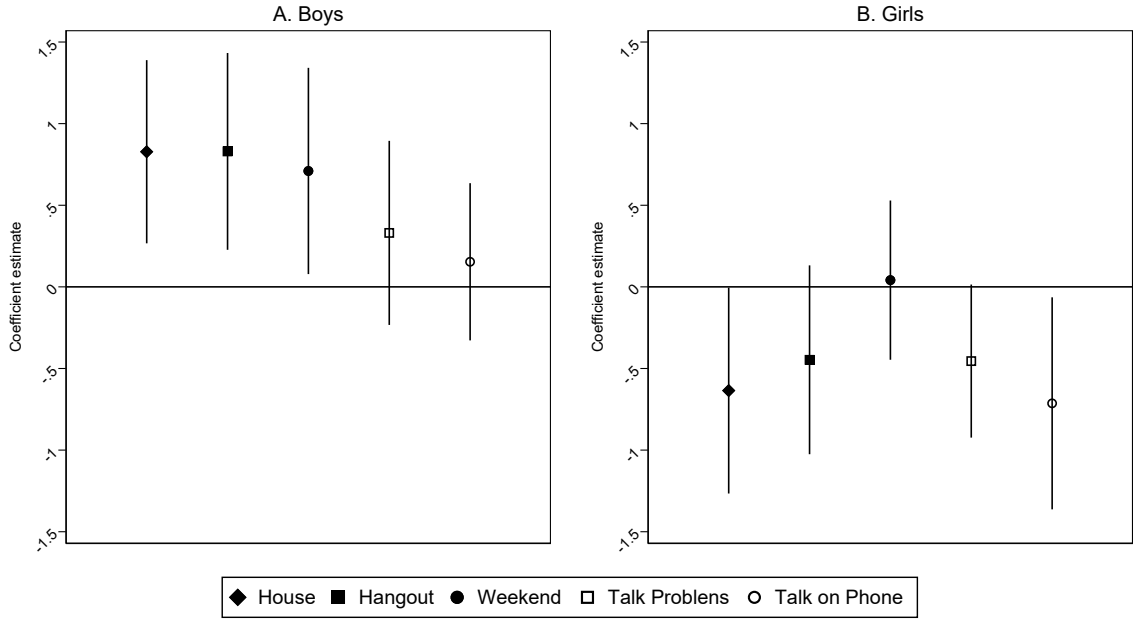
Notes: The figure displays coefficient estimates of the share of female peers on various outcomes, as described in the legend. Standard errors are clustered at the school level, and 95% confidence intervals are shown. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share.

Figure 11: Mechanism analysis: Number of friends



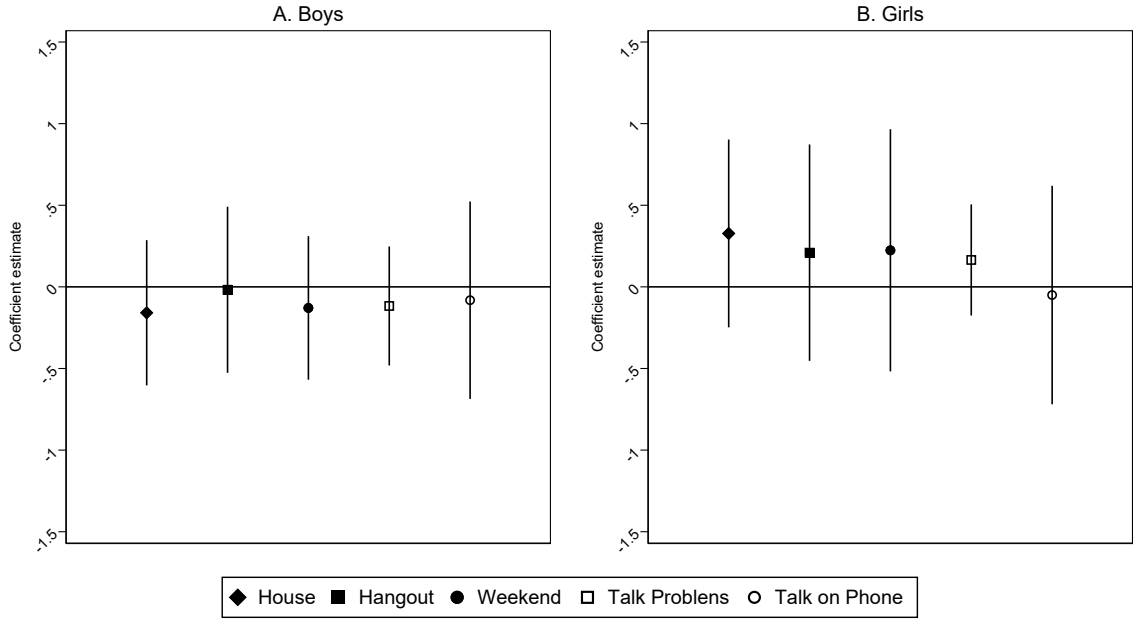
Notes: The figure displays coefficient estimates of the share of female peers on various outcomes, as described in the legend. Standard errors are clustered at the school level, and 95% confidence intervals are shown. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share.

Figure 12: Mechanism analysis: Engagement with Male Friends



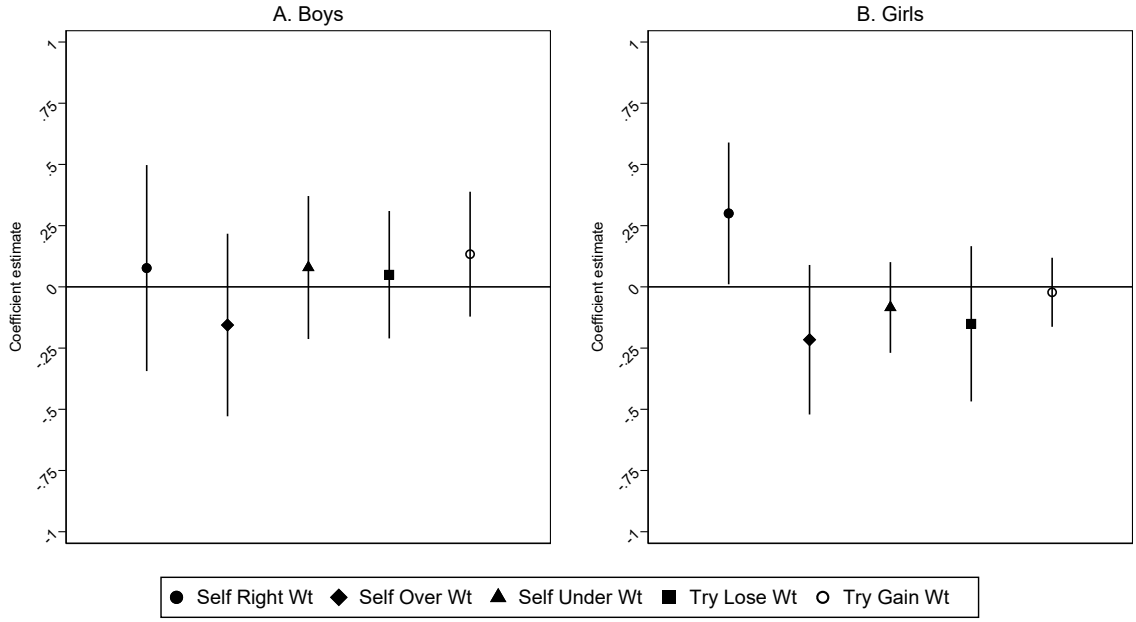
Notes: The figure displays coefficient estimates of the share of female peers on various outcomes, as described in the legend. Standard errors are clustered at the school level, and 95% confidence intervals are shown. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share.

Figure 13: Mechanism analysis: Engagement with Female Friends



Notes: The figure displays coefficient estimates of the share of female peers on various outcomes, as described in the legend. Standard errors are clustered at the school level, and 95% confidence intervals are shown. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share.

Figure 14: Mechanism analysis: Self-Image



Notes: The figure displays coefficient estimates of the share of female peers on various outcomes, as described in the legend. Standard errors are clustered at the school level, and 95% confidence intervals are shown. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share.

A Appendix

Table A1: CES-D score components

1.	You were bothered by things that don't usually bother you
2.	You did feel like eating, your appetite was poor
3.	You felt that you could not shake off the blues, even with help from you family and friends
4.	You felt that you were just as good as other people
5.	You had trouble keeping your mind on what you were doing
6.	You felt depressed
7.	You felt that you were too tired to do things
8.	You felt hopeful about the future
9.	You thought your life had been a failure
10.	You felt fearful
11.	You were happy
12.	You talked less than usual
13	You felt lonely
14.	People were unfriendly to you
15.	You enjoyed life
16.	You felt sad
17.	You felt that people disliked you
18.	It was hard to get started doing things
19.	You felt life was not worth living

Notes: Students are asked how frequently they experienced each listed measure in the past week, and potential answers range between 0 to 3, where 0 corresponds to never or rarely, 1 for sometimes, 2 for a lot of the time, and 3 for most of the time or all of the time. The exception is that measures #4, 8, 11, and 15 are reverse-coded so that a response of 0 corresponds to most or all of the time and 3 corresponds to never or rarely.

Table A2: School well-being score components

1.	You feel close to people at your school
2.	You feel like you are part of your school
3.	Students at your school are prejudiced
4.	You are happy to be at your school
5.	The teachers at your school treat students fairly
6.	You feel safe in your school

Notes: Students are asked the extent to which they agree with each measure of school experience in the most recent school year. The potential answers range between 1 to 5, where 1 corresponds to strongly agree, 2 corresponds to agree, 3 corresponds to neither agree nor disagree, 4 corresponds to disagree and 5 corresponds to strongly disagree. The exception is that measure #3 is reverse-coded so that a lower score of school well-being corresponds to a more positive school experience.

Table A3: Nonlinearities in the effects of cohort gender ratios: Quartile analysis

	Boys	Girls
	(1)	(2)
Panel A: CES-D mental health index		
Share of girls (Quartile 1)	-0.4042	-5.0748
	(4.9430)	(4.2178)
Share of girls (Quartile 2)	-1.0719	-4.6426
	(4.4078)	(3.8108)
Share of girls (Quartile 3)	-1.5845	-5.9244*
	(4.0968)	(3.5356)
Share of girls (Quartile 4)	-1.0960	-5.0234
	(3.6939)	(3.2340)
Mean	10.3242	12.2569
Percent change Q1	-0.0055	-0.0222
Percent change Q2	-0.0051	-0.0184
Percent change Q3	-0.0080	-0.0246
Percent change Q4	-0.0055	-0.0222
Panel B: CES-D depression indicator		
Share of girls (Quartile 1)	0.1678	0.0618
	(0.1631)	(0.1732)
Share of girls (Quartile 2)	0.1026	0.0588
	(0.1450)	(0.1511)
Share of girls (Quartile 3)	0.0954	0.0254
	(0.1333)	(0.1425)
Share of girls (Quartile 4)	0.0776	0.0374
	(0.1182)	(0.1294)
Mean	0.0648	0.0954
Percent change Q1	0.0681	0.0240
Percent change Q2	0.0789	0.0294
Percent change Q3	0.0837	0.0137
Percent change Q4	0.0681	0.0240
Panel C: School satisfaction index		
Share of girls (Quartile 1)	-2.7172	0.2048

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Table A3 – continued from previous page

	Boys (1)	Girls (2)
	(2.9416)	(3.5475)
Share of girls (Quartile 2)	-2.8987	0.2370
	(2.6949)	(3.1091)
Share of girls (Quartile 3)	-2.7992	-0.4797
	(2.5063)	(2.9006)
Share of girls (Quartile 4)	-2.7776	-0.0026
	(2.2916)	(2.7217)
Mean	14.5914	14.8007
Percent change Q1	-0.0096	-0.0000
Percent change Q2	-0.0099	0.0008
Percent change Q3	-0.0096	-0.0016
Percent change Q4	-0.0096	-0.0000
N	8,516	8,925
School FEs	X	X
Grade FEs	X	X
Full individual/cohort controls	X	X

Notes: The outcome variable in Panel A is the student's CES-D score, and the outcome variable in Panel B is an indicator variable that takes a value of one if a student's CES-D score meets the clinical threshold for depression and zero otherwise. The thresholds for the quartiles of share of female peers are the following: At 25th percentile is 0.47, at 50th percentile is 0.498, and at 75th percentile is 0.528. Standard errors are clustered at the school level. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table A4: Component analysis: CES-D mental health index

	CES-D index		Rarely experience	
	Boys	Girls	Boys	Girls
	(1)	(2)	(3)	(4)
Bothered by things	-0.2233	-0.2607	0.1072	0.0884
	(0.1964)	(0.2154)	(0.1490)	(0.1458)
Mean	0.4246	0.6136	0.6499	0.5244
Percent change	-0.0263	-0.0212	0.0082	0.0084
Poor appetite	-0.0955	-0.1353	0.0097	0.0805
	(0.2059)	(0.2301)	(0.1527)	(0.1703)
Mean	0.3464	0.5993	0.7184	0.5548
Percent change	-0.0138	-0.0113	0.0007	0.0073
Could not shake off the blues	0.0241	-0.2331	-0.0350	0.1543
	(0.1865)	(0.2210)	(0.1236)	(0.1566)
Mean	0.3149	0.5002	0.7613	0.6383
Percent change	0.0038	-0.0233	-0.0023	0.0121
Felt as good as others (reverse-coded)	-0.3043	-0.7407**	0.0343	-0.1453
	(0.3074)	(0.3602)	(0.1023)	(0.0909)
Mean	1.0415	1.2092	0.1106	0.1255
Percent change	-0.0146	-0.0306	0.0155	-0.0581
Trouble focusing	-0.3743	-0.8789***	0.0282	0.5364***
	(0.2560)	(0.2879)	(0.1594)	(0.1958)
Mean	0.8069	0.8472	0.3973	0.3839
Percent change	-0.0232	-0.0519	0.0036	0.0698
Depressed	-0.1378	-0.3269	-0.0493	0.2918*
	(0.2188)	(0.2135)	(0.1502)	(0.1527)
Mean	0.4271	0.6422	0.6617	0.5343
Percent change	-0.0161	-0.0255	-0.0037	0.0273
Too tired	0.0977	-0.0339	-0.2279	0.1701
	(0.2962)	(0.2393)	(0.1660)	(0.1630)
Mean	0.6964	0.7972	0.4311	0.3904
Percent change	0.0070	-0.0021	-0.0264	0.0218
Hopeful for future (reverse-coded)	0.2429	-0.3141	0.0902	0.0156
	(0.3742)	(0.3052)	(0.1069)	(0.1095)
Mean	1.1955	1.2018	0.1201	0.1113
Percent change	0.0102	-0.0131	0.0376	0.0070
Felt life was failure	0.0182	-0.1352	-0.0133	0.1507
	(0.1720)	(0.1651)	(0.1164)	(0.1379)
Mean	0.1934	0.2542	0.8466	0.8086
Percent change	0.0047	-0.0266	-0.0008	0.0093
Fearful	-0.1215	-0.1257	0.1083	0.1409
	(0.2168)	(0.1789)	(0.1798)	(0.1545)
Mean	0.2818	0.3742	0.7492	0.6843
Percent change	-0.0215	-0.0168	0.0072	0.0103
Happy (reverse-coded)	-0.0844	-0.2634	-0.0384	0.0097
	(0.2463)	(0.2604)	(0.0569)	(0.0386)

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Table A4 – continued from previous page

	CES-D index		Rarely experience	
	Boys	Girls	Boys	Girls
	(1)	(2)	(3)	(4)
Mean	0.9069	0.9040	0.0283	0.0299
Percent change	-0.0047	-0.0146	-0.0686	0.0162
Talked less	-0.4988**	-0.4317*	0.2241	0.2079
	(0.1950)	(0.2379)	(0.1504)	(0.1641)
Mean	0.6174	0.5542	0.5156	0.5744
Percent change	-0.0404	-0.0390	0.0217	0.0181
Lonely	-0.3152	-0.4635**	0.1172	0.3234**
	(0.2065)	(0.2190)	(0.1524)	(0.1518)
Mean	0.3901	0.5530	0.6885	0.5751
Percent change	-0.0404	-0.0419	0.0085	0.0281
Felt people unfriendly	0.0035	0.2385	-0.0531	-0.1445
	(0.2426)	(0.1919)	(0.1643)	(0.1392)
Mean	0.4016	0.4060	0.6542	0.6621
Percent change	0.0004	0.0294	-0.0041	-0.0109
Enjoyed life (reverse-coded)	-0.1972	-0.6391**	-0.0940	-0.0104
	(0.2405)	(0.2823)	(0.0590)	(0.0538)
Mean	0.7334	0.8651	0.0396	0.0430
Percent change	-0.0135	-0.0369	-0.1175	-0.0121
Sad	-0.2726	-0.4190*	0.1058	0.2625
	(0.2025)	(0.2380)	(0.1675)	(0.1668)
Mean	0.4765	0.6960	0.5771	0.4349
Percent change	-0.0286	-0.0301	0.0092	0.0302
Felt people disliked you	-0.4721**	-0.1062	0.2164	0.0311
	(0.2032)	(0.2172)	(0.1413)	(0.1667)
Mean	0.3847	0.4493	0.6690	0.6324
Percent change	-0.0613	-0.0118	0.0162	0.0025
Hard to get started	-0.2864	-0.1806	0.0650	0.0830
	(0.2441)	(0.2218)	(0.1735)	(0.1606)
Mean	0.6172	0.6478	0.4795	0.4693
Percent change	-0.0232	-0.0139	0.0068	0.0088
Life not worth living	-0.1303	-0.3979***	0.1054	0.2407**
	(0.1166)	(0.1488)	(0.0948)	(0.1032)
Mean	0.1323	0.2010	0.8998	0.8528
Percent change	-0.0494	-0.0990	0.0059	0.0141
N	8,516	8,925	8,516	8,925
School FEs	X	X	X	X
Grade FEs	X	X	X	X
Full individual/cohort controls	X	X	X	X

Notes: Each cell represents an estimate from a separate regression. The independent variable is share of girls in the cohort, and the outcome variable is denoted in the row title. Standard errors are clustered at the school level. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share. *** p<0.01, ** p<0.05, * p<0.10.

Table A5: Component analysis: School satisfaction index

	School index		Agree or strongly agree with statement	
	Boys	Girls	Boys	Girls
	(1)	(2)	(3)	(4)
Felt close to people at school	-0.6913**	0.1022	0.2783*	0.0136
	(0.3195)	(0.2689)	(0.1415)	(0.1618)
Mean	2.2862	2.3268	0.1961	0.2029
Percent change	-0.0151	0.0022	0.0710	0.0033
Felt part of schoolt	-0.4789	0.0464	0.4315***	0.0393
	(0.3121)	(0.3078)	(0.1354)	(0.1966)
Mean	2.1983	2.1740	0.2503	0.2586
Percent change	-0.0109	0.0011	0.0863	0.0076
Peers at school are prejudiced (reverse-coded)	0.1998	-0.2225	0.0658	0.0121
	(0.3713)	(0.4013)	(0.1150)	(0.0887)
Mean	3.1165	3.1343	0.1021	0.0958
Percent change	0.0032	-0.0035	0.0323	0.0063
Happy to be at school	-0.8600*	-0.0893	0.3595**	0.0882
	(0.4832)	(0.4664)	(0.1589)	(0.1735)
Mean	2.2708	2.3395	0.2563	0.2377
Percent change	-0.0189	-0.0019	0.0702	0.0185
Teachers treat student fairly	-0.5477	-0.6825	0.2253*	0.2336*
	(0.3461)	(0.5326)	(0.1339)	(0.1379)
Mean	2.4811	2.5611	0.1643	0.1495
Percent change	-0.0110	-0.0133	0.0687	0.0779
Felt safe at school	-0.4821	-0.1408	0.1731	-0.0378
	(0.2982)	(0.3118)	(0.1384)	(0.1461)
Mean	2.2657	2.2789	0.2366	0.2218
Percent change	-0.0106	-0.0031	0.0365	-0.0085
N	8,516	8,925	8,516	8,925
School FEs	X	X	X	X
Grade FEs	X	X	X	X
Full individual/cohort controls	X	X	X	X

Each cell represents an estimate from a separate regression. The independent variable is share of girls in the cohort, and the outcome variable is denoted in the row title. Standard errors are clustered at the school level. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share. *** p<0.01, ** p<0.05, * p<0.10.

Table A6: The effects of cohort gender ratios: mechanisms analysis

	Boys (1)	Girls (2)
Academic performance		
GPA	-0.0788	0.4012
	(0.2639)	(0.2956)
Mean	2.6701	2.8951
Percent change	-0.0015	0.0069
English A/B	0.1664	0.0335
	(0.1772)	(0.1740)
Mean	0.5607	0.7205
Percent change	0.0148	0.0023
Math A/B	-0.2295*	0.3784**
	(0.1222)	(0.1671)
Mean	0.5366	0.5805
Percent change	-0.0214	0.0326
Social Studies A/B	-0.2176	0.0280
	(0.1921)	(0.1802)
Mean	0.6025	0.6868
Percent change	-0.0181	0.0020
Science A/B	-0.0396	0.2816*
	(0.2125)	(0.1576)
Mean	0.5693	0.6588
Percent change	-0.0035	0.0214
Perceptions of care		
Teachers care very much	0.1677	0.2143*
	(0.1206)	(0.1260)
Mean	0.1696	0.1794
Percent change	0.0493	0.0599
Friends care very much	0.2932	0.0379
	(0.1861)	(0.1482)
Mean	0.3482	0.5056
Percent change	0.0421	0.0037
Parents care very much	0.0945	0.0620
	(0.1166)	(0.1180)
Mean	0.8394	0.8513
Percent change	0.0056	0.0036
Family understood very much	0.2667*	0.1287
	(0.1588)	(0.1356)
Mean	0.2308	0.1793
Percent change	0.0577	0.0359
Family very much paid attention	0.2709**	0.0746
	(0.1252)	(0.1533)
Mean	0.2997	0.2926
Percent change	0.0452	0.0127
Relationship with parents		
Close to mom	0.2553*	0.1408
	(0.1320)	(0.1721)
Mean	0.7107	0.6425
Percent change	0.0180	0.0109
Caring mom	0.0351	0.0350

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Table A6 – continued from previous page

	Boys (1)	Girls (2)
	(0.1063)	(0.1027)
Mean	0.9000	0.8877
Percent change	0.0020	0.0020
Loving mom	0.3030	0.3828**
	(0.1998)	(0.1730)
Mean	0.5163	0.4926
Percent change	0.0294	0.0388
Good communication with mom	0.0596	0.1925
	(0.1551)	(0.1616)
Mean	0.3977	0.3601
Percent change	0.0075	0.0267
Good relationship with mom	0.2184	0.1165
	(0.1549)	(0.1656)
Mean	0.5110	0.4685
Percent change	0.0214	0.0124
Close to dad	-0.0336	-0.1073
	(0.1804)	(0.2044)
Mean	0.5936	0.4713
Percent change	-0.0028	-0.0114
Caring dad	0.2046	-0.1748
	(0.1557)	(0.1356)
Mean	0.8182	0.8188
Percent change	0.0125	-0.0107
Loving dad	0.1104	0.1317
	(0.1574)	(0.1645)
Mean	0.3786	0.4005
Percent change	0.0146	0.0165
Good communication with dad	-0.0890	0.1108
	(0.1734)	(0.1503)
Mean	0.3532	0.3009
Percent change	-0.0126	0.0184
Good relationship with dad	-0.1164	0.2832*
	(0.1871)	(0.1671)
Mean	0.4163	0.3660
Percent change	-0.0140	0.0387
Number of friends		
Total number of friends	1.1222	-2.9859
	(1.4651)	(1.8594)
Mean	5.8822	6.1664
Percent change	0.0095	-0.0242
Number of male friends	0.3684	-1.9103*
	(0.7652)	(1.0974)
Mean	3.4682	2.8086
Percent change	0.0053	-0.0340
Number of female friends	0.7538	-1.0756
	(1.0185)	(1.0002)
Mean	2.4139	3.3578
Percent change	0.0156	-0.0160
Number of school friends	2.4894*	-3.3986**
	(1.3704)	(1.4765)

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Table A6 – continued from previous page

	Boys (1)	Girls (2)
Mean	3.8723	3.8887
Percent change	0.0321	-0.0437
Number of male school friends	1.5142	-2.5382***
	(0.9242)	(0.9295)
Mean	2.3084	1.5110
Percent change	0.0328	-0.0840
Number of female school friends	0.9751	-0.8604
	(0.8279)	(0.7929)
Mean	1.5639	2.3777
Percent change	0.0312	-0.0181
Engagement with male school friends (any)		
Going over to house	0.8279***	-0.6353**
	(0.2833)	(0.3185)
Mean	0.5833	0.2307
Percent change	0.0710	-0.1375
Hanging out	0.8300***	-0.4467
	(0.3043)	(0.2921)
Mean	0.6342	0.3479
Percent change	0.0655	-0.0642
See over the weekend	0.7100**	0.0413
	(0.3189)	(0.2463)
Mean	0.5577	0.3057
Percent change	0.0636	0.0067
Talk about problems	0.3306	-0.4546*
	(0.2847)	(0.2367)
Mean	0.4064	0.3839
Percent change	0.0407	-0.0592
Talk on phone	0.1537	-0.7135**
	(0.2432)	(0.3280)
Mean	0.6441	0.4398
Percent change	0.0119	-0.0811
Engagement with female school friends (any)		
Going over to house	-0.1587	0.3274
	(0.2246)	(0.2905)
Mean	0.2859	0.5478
Percent change	-0.0277	0.0299
Hanging out	-0.0178	0.2096
	(0.2569)	(0.3347)
Mean	0.3641	0.6150
Percent change	-0.0024	0.0170
See over the weekend	-0.1290	0.2239
	(0.2220)	(0.3746)
Mean	0.3255	0.5492
Percent change	-0.0198	0.0204
Talk about problems	-0.1169	0.1650
	(0.1841)	(0.1719)
Mean	0.3152	0.6550
Percent change	-0.0186	0.0126
Talk on phone	-0.0816	-0.0500

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Table A6 – continued from previous page

	Boys (1)	Girls (2)
	(0.3053)	(0.3380)
Mean	0.4614	0.7520
Percent change	2783	2588
Self-image		
Right weight	0.0768	0.3001**
	(0.2126)	(0.1462)
Mean	0.5497	0.4765
Percent change	0.0070	0.0315
Overweight	-0.1558	-0.2158
	(0.1884)	(0.1543)
Mean	0.2250	0.4060
Percent change	-0.0346	-0.0266
Underweight	0.0790	-0.0842
	(0.1475)	(0.0936)
Mean	0.2253	0.1175
Percent change	0.0176	-0.0357
Trying to lose weight	0.0496	-0.1508
	(0.1314)	(0.1602)
Mean	0.2086	0.4768
Percent change	0.0119	-0.0158
Trying to gain weight	0.1336	-0.0221
	(0.1288)	(0.0712)
Mean	0.3181	0.0794
Percent change	0.0210	-0.0140

Each cell represents an estimate from a separate regression. The independent variable is the share of girls in the cohort, and the outcome variable is denoted in the row title. Standard errors are clustered at the school level. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share. *** p<0.01, ** p<0.05, * p<0.10.

Table A7: Balance tests by grade level

	All	Middle School	High School
	(1)	(2)	(3)
Male	-0.0859	0.3546*	-0.2027
	(0.1448)	(0.1780)	(0.1730)
White	-0.0462	-0.0968	-0.0101
	(0.0777)	(0.0970)	(0.1193)
Black	0.0323	0.0025	0.0340
	(0.0348)	(0.0537)	(0.0495)
Asian	-0.0118	-0.0391	-0.0014
	(0.0289)	(0.0545)	(0.0314)
Hispanic	0.0999	0.1259	0.0948
	(0.0635)	(0.0770)	(0.0968)
Other race	-0.0742*	0.0074	-0.1174**
	(0.0378)	(0.0387)	(0.0570)
Age	-0.1710	0.4759	-0.5008**
	(0.2044)	(0.2906)	(0.2181)
U.S.-born	-0.0250	-0.0670	-0.0080
	(0.0420)	(0.0604)	(0.0616)
School FEs	X	X	X
Grade FEs	X	X	X

Notes: Each cell corresponds to a separate regression, with the outcome variable corresponding to the row label. The independent variable is the share of girls in the student's cohort. For the regression with the outcome "male," we implement the correction developed in Guryan et al. (2009) to address bias due to the fact that an individual cannot be their own peer, generating a correlation between own characteristic and peer composition in that characteristic. Standard errors are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.10.

Table A8: Balance tests by income level

	All (1)	Low Income (2)	High Income (3)
Male	-0.0891	-0.0748	-0.1456
	(0.1470)	(0.1929)	(0.1925)
White	-0.0441	-0.1559	0.0933
	(0.0793)	(0.1565)	(0.1286)
Black	0.0318	0.0283	-0.0060
	(0.0347)	(0.0849)	(0.0482)
Asian	-0.0117	-0.0529	0.0229
	(0.0291)	(0.0480)	(0.0329)
Hispanic	0.0905	0.2773**	-0.0417
	(0.0637)	(0.1181)	(0.0952)
Other race	-0.0665*	-0.0968	-0.0685
	(0.0392)	(0.0762)	(0.0598)
Age	-0.1677	-0.1015	-0.2167
	(0.2052)	(0.3129)	(0.2511)
U.S.-born	-0.0234	-0.0978	0.0079
	(0.0429)	(0.0686)	(0.0688)
School FEs	X	X	X
Grade FEs	X	X	X

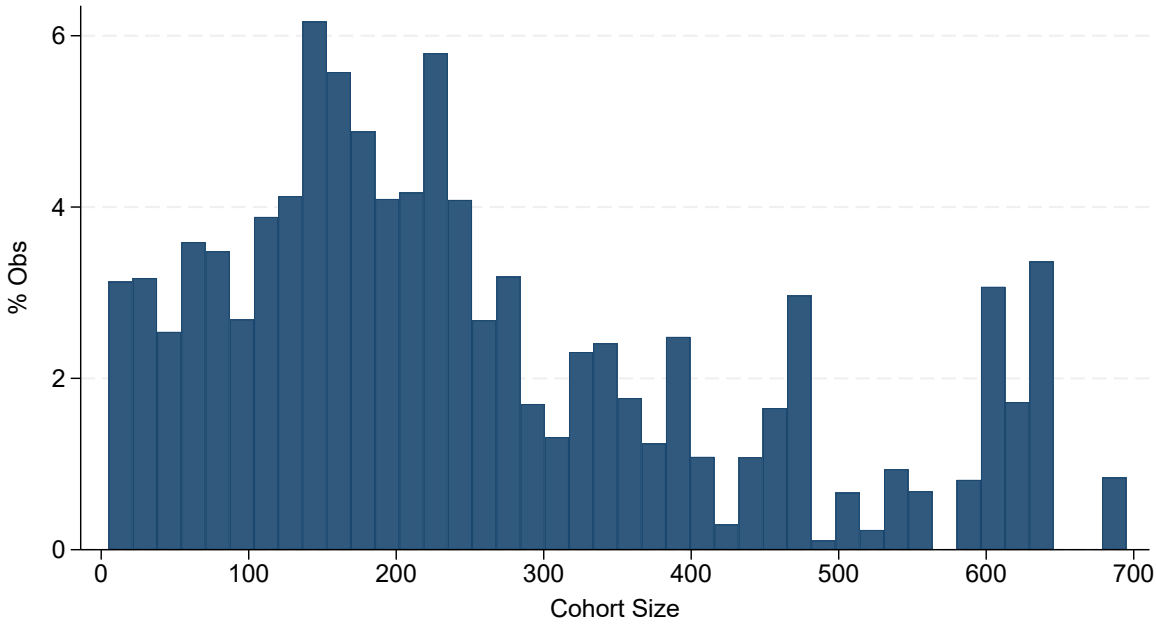
Notes: Each cell corresponds to a separate regression, with the outcome variable corresponding to the row label. The independent variable is the share of girls in the student's cohort. We define high-income individuals as those in the top income tertile and low-income individuals as those in the bottom income tertile. For the regression with the outcome "male," we implement the correction developed in Guryan et al. (2009) to address bias due to the fact that an individual cannot be their own peer, generating a correlation between own characteristic and peer composition in that characteristic. Standard errors are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.10.

Table A9: The effects of cohort gender ratios on mental health and well-being with extended controls

	Boys		Girls	
	(1)	(2)	(3)	(4)
Panel A: CES-D mental health index				
Share of girls in cohort	-3.1272	-5.6744	-5.8474**	-4.1999
	(2.2519)	(3.4702)	(2.4056)	(3.1523)
Mean	10.3242	10.3242	12.2569	12.2569
Percent change	-0.0151	-0.0275	-0.0239	-0.0171
Panel B: CES-D depression indicator				
Share of girls in cohort	-0.1333*	-0.2238**	-0.0414	0.0488
	(0.0719)	(0.0954)	(0.0824)	(0.1106)
Mean	0.0648	0.0648	0.0954	0.0954
Percent change	-0.1025	-0.1722	-0.0218	0.0257
Panel C: School satisfaction index				
Share of girls in cohort	-2.8601**	-3.1410*	-0.9866	-0.6646
	(1.3106)	(1.7608)	(1.5567)	(1.9579)
Mean	14.5914	14.5914	14.8007	14.8007
Percent change	-0.0098	-0.0108	-0.0033	-0.0022
N	8,516	4,201	8,925	4,650
School FEs	X	X	X	X
Grade FEs	X	X	X	X
Individual controls	X	X	X	X
Cohort controls	X	X	X	X
Extended controls		X		X

Notes: The outcome variable in Panel A is the student's CES-D score, the outcome variable in Panel B is an indicator variable that takes a value of one if a student's CES-D score meets the clinical threshold for depression and zero otherwise, and the outcome variable in Panel C is the student's school well-being score. Standard errors are clustered at the school level. Individual-level controls include variables categorical variables for age, race/ethnicity, whether a student is US-born, birth month, and interview month. Cohort-level controls include variables for cohort size, mean cohort age, cohort race/ethnicity shares and cohort US-born share. Extended controls include variables for total family income and parental education. p<0.01, ** p<0.05, * p<0.10.

Figure A1: Cohort size distribution



Notes: The histogram depicts the distribution of cohort sizes in the sample.