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Abstract

I study whether peer-family health composition affects adolescent risk environments, school relationships, and mental health. Using nationally representative data from the China Education Panel Survey, I exploit quasi-random variation in the share of a student's middle school classmates whose parents report that they never smoke and never drink. A one-standard-deviation increase in exposure to classmates from non-smoking and non-drinking family environments reduces the likelihood that the homeroom teacher reports smoking or drinking among students in the class by 8.2 percentage points. This estimate is concentrated among classmates whose mothers never smoke and never drink. The same peer composition measure is also associated with fewer mental health problems, with larger effects for girls, and with stronger classroom integration, school attachment, and relationships with classmates and teachers. These results suggest that parental health behaviors may generate spillovers beyond the household by shaping the classroom environments in which adolescents form relationships, norms, and behavioral risks.

Keywords: peer effects; intergenerational spillovers; risky behavior; parental health behavior; mental health;

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1 Introduction

Adolescent smoking, drinking, and other risky behaviors are shaped not only by individual and family characteristics, but also by the social environments in which adolescents form habits, norms, and beliefs. A large literature shows that peers influence youth substance use and risky behavior, including alcohol consumption, smoking, drug use, and other forms of adolescent risk-taking (Card & Giuliano, 2013; Clark & Loh'eac, 2007; Eisenberg, Golberstein, & Whitlock, 2014; Gaviria & Raphael, 2001; Kremer & Levy, 2008; Lundborg, 2006; Nakajima, 2007). This linkage is important because adolescent smoking, drinking, and related risky behaviors are associated with substance-use progression, changes in decision-making, and later mental health and neuropsychiatric outcomes (Kandel, 1975; Nasrallah et al., 2011; Nasrallah, Yang, & Bernstein, 2009; Prochaska & Benowitz, 2019; Taffe et al., 2010; Teague & Nestler, 2022). These behaviors may also affect school engagement and academic performance, making peer health environments relevant for later human capital formation (Card & Giuliano, 2013; Eisenberg et al., 2014; Kremer & Levy, 2008). A central empirical challenge is that families sort across schools and neighborhoods, while adolescents select into friendship networks, making it difficult to separate peer influence from shared background characteristics and endogenous social ties (Fletcher, 2010, 2012; Fletcher & Ross, 2018; Norton, Lindrooth, & Ennett, 1998; Powell, Tauras, & Ross, 2005).

In this paper, I study whether peers' family health environments affect adolescent behavior and well-being. I focus on one common dimension of the family health environment: whether peers' parents smoke or drink. The closest existing evidence is correlational and shows that friends' parents are associated with adolescent substance use through social networks (Cleveland, Feinberg, Bontempo, & Greenberg, 2012; Ragan, Osgood, & Feinberg, 2014; Shakya, Christakis, & Fowler, 2012). I build on this work by asking whether exposure to peers from non-smoking and non-drinking family environments shapes classroom risk environments and student well-being in a setting with quasi-random peer composition. I show that exposure to a greater share of these peers reduces teacher-reported smoking and drink-

ing in the classroom, improves students' school relationships, and is associated with fewer mental health problems. These results suggest that parental health behaviors can spill over beyond the household by shaping the peer environments adolescents encounter at school.

My research design exploits quasi-random variation in peer composition across Chinese middle schools. I use data from the China Education Panel Survey (CEPS), a nationally representative survey of middle school students, parents, teachers, and schools. The richness of the CEPS allows me to link parental health behaviors to students' classroom peer environments and to measure outcomes from multiple respondents. I study variation in the proportion of a student's classmates whose parents report that they never smoke and never drink. In my data, roughly 49 percent of students' parents report that they never smoke and never drink, with substantial variation within schools across classrooms. This variation allows me to compare students in the same school and grade who are exposed to different shares of peers from non-smoking and non-drinking family environments. I estimate the reduced-form effects of this exposure on risky-behavior environments, school relationships, and adolescent mental health. I measure risky behavior environment using the homeroom teacher's report of whether students in the class smoke or drink.

This paper has three main findings. First, exposure to a greater share of classroom peers whose parents never smoke and never drink reduces teacher-reported smoking and drinking in the class. A one-standard-deviation increase in this exposure, equal to roughly 14 percentage points, reduces the likelihood that the homeroom teacher reports smoking or drinking among students in the class by 8.2 percentage points. The estimate is concentrated in maternal NSD exposure: a one-standard-deviation increase in the share of classmates whose mothers never smoke and never drink reduces the same classroom outcome by 6.0 percentage points, while the estimate for paternal NSD exposure is small and statistically insignificant.

Second, I find that exposure to peers whose parents never smoke and never drink reduces students' mental health problems. A one-standard-deviation increase in this exposure

reduces the mental health problem index by about 0.05 standard deviations. The effect is again concentrated among peers whose mothers never smoke and never drink, while exposure to peers whose fathers never smoke and never drink has little effect. These mental health effects are larger for girls, with the reduction of about 0.08–0.09 standard deviations.

Third, I provide evidence on a potential mechanism. Exposure to peers whose parents never smoke and never drink improves students’ social and relational environment at school, increasing classroom integration, school attachment, and relationships with classmates and teachers. These patterns are consistent with a framework in which healthier family behaviors spill over to adolescents partly by improving the peer, classroom, and teacher relationships through which students experience school (Chen, Lin, & Wang, 2026; Gong, Lu, & Song, 2021; Lavy & Sand, 2019; Orben, Tomova, & Blakemore, 2020).

First, to my knowledge, this paper provides the first quasi-experimental evidence that parental smoking and drinking behaviors generate spillovers beyond the household through classroom peer exposure, exploiting quasi-random variation in classroom peer composition. This question is difficult to study because parental health behaviors are not randomly assigned, and directly manipulating parents’ smoking or drinking would be neither feasible nor ethical. The closest existing evidence shows that friends’ parents can shape adolescent substance use through social networks (Cleveland et al., 2012; Ragan et al., 2014; Shakya et al., 2012). However, because friendship networks and parental behaviors are observational, these estimates may reflect unobserved family background, neighborhood conditions, or endogenous friendship formation. I address these concerns by exploiting quasi-random variation in classroom composition within schools and grades. I measure classroom risky-behavior using the homeroom teacher’s report of whether students in the class smoke or drink, which reduces concerns that the estimates are driven by social desirability bias or underreporting in student self-reports.

Second, the paper links two literatures that are usually studied separately: peer effects and intergenerational transmission. A large peer-effects literature shows that adolescents

are affected by classmates', roommates', and friends' own smoking, drinking, drug use, and other risky behaviors (Card & Giuliano, 2013; Clark & Loh'eac, 2007; Eisenberg et al., 2014; Gaviria & Raphael, 2001; Kremer & Levy, 2008; Lundborg, 2006; Nakajima, 2007). I study a different channel: whether the parental health behaviors embedded in a classroom's family composition shape the school environments adolescents experience. The estimates therefore capture a reduced-form spillover from peer-family health environments to classroom risk environments and student well-being, rather than a direct parent-child effect or a standard individual peer effect among adolescents.

Third, the paper broadens the study of adolescent health spillovers beyond smoking and drinking by examining mental health and the school relationships through which adolescents experience their daily environment. This extension is important because adolescence is a period in which mental health is especially sensitive to social environments, peer relationships, and school belonging (Collins et al., 2011; Kessler et al., 2007; Orben et al., 2020). I show that exposure to a greater share of classmates whose parents never smoke and never drink reduces teacher-reported smoking and drinking in the class, is associated with fewer mental health problems, and improves students' classroom integration, school attachment, relationships with classmates, and interactions with teachers. These patterns suggest that parental health behaviors may create social externalities beyond the household by shaping the classroom and relational environments through which adolescents experience school.

2 Background

This section describes the institutional setting, data, and construction of the peer parent NSD measure. I first explain why Chinese middle schools provide a useful setting for studying adolescent risky behavior and peer-environment spillovers. I then describe the CEPS data, the estimation sample, and the main outcome measures. Finally, I define parent NSD and the corresponding leave-one-out peer parent NSD measure that forms the key explanatory

variable in the analysis.

2.1 Setting

This paper studies peer-environment spillovers in Chinese middle schools. This setting has four features that make it useful for examining whether peers' family health environments affect adolescent behavior and well-being. The first feature is that smoking and drinking among middle school students are both sensitive and policy-relevant behaviors. Chinese law prohibits the sale of tobacco and alcohol to minors, and school rules instruct primary and secondary school students not to smoke or drink (Ministry of Education of the People's Republic of China, 2015, 2020). These institutional restrictions mean that student smoking and drinking are not ordinary consumption choices. They are behaviors that violate legal protections for minors and school behavioral expectations, making them useful outcomes for studying whether peer family environments shape adolescent risk-taking.

The second feature is the developmental stage captured by middle school. Middle school is a stage in which adolescents spend more time with peers, become more responsive to social acceptance, and begin to form health behaviors and school attachments that may persist into later life. This timing is especially relevant for smoking and drinking because early substance use is associated with later substance-use progression, changes in decision-making, and mental health risks (Kandel, 1975; Nasrallah et al., 2011, 2009; Teague & Nestler, 2022). This stage therefore provides a useful setting for studying whether exposure to healthier peer family environments affects students before risky behaviors become established.

The third feature is the central role of the homeroom teacher in Chinese middle schools. Each classroom cohort is assigned a homeroom teacher, or *banzhuren*, who is typically also one of the class's subject teachers and has sustained contact with students both inside and outside the classroom, through regular instruction, study periods, and class (Ministry of Education of the People's Republic of China, 2009). The homeroom teacher is formally responsible for classroom management, student discipline, and routine communication with

students and parents. This role makes the homeroom teacher a central observer of student behavior and classroom relationships, which helps motivate the teacher-reported risky-behavior outcome and the relationship measures used in the analysis.

The fourth feature is quasi-random classroom assignment within schools. Students are typically assigned to middle schools by local educational authorities, and many schools assign students to classrooms at the beginning of middle school using random or even assignment rules. Prior work using the China Education Panel Survey has exploited this institutional feature to study quasi-experiments in Chinese middle schools (Chen et al., 2026; Eble & Hu, 2020, 2022; Gong, Lu, & Song, 2018; Gong et al., 2021). I use variation in classroom composition among schools that report random classroom assignment. This within-school-grade comparison helps address the concern that classroom composition reflects sorting by academic ability, family background, or parental preferences.

2.2 Data

This paper uses the first wave of the China Education Panel Survey (CEPS), collected during the 2013–2014 academic year. The CEPS is a nationally representative survey of Chinese middle school students that collects linked information from students, parents, homeroom teachers, subject teachers, and school administrators. The survey follows students in randomly selected seventh- and ninth-grade classrooms within sampled schools. I restrict the estimation sample to schools and grades with random classroom assignment. These restrictions leave an estimation sample of 9,361 students in 215 classrooms across 86 schools (Eble & Hu, 2020, 2022; Gong et al., 2018, 2021).

I study three sets of outcomes. The first outcome is classroom risky behavior. Rather than relying on students’ own reports of sensitive behaviors, I use the homeroom teacher’s report of how many students in the class have a habit of smoking or drinking. The original response categories are “none,” “a few,” “many,” and “a great number.” I code this measure as an indicator equal to one if the teacher reports at least a few students with a smoking

or drinking habit, and zero if the teacher reports none. This measure captures the teacher-observed presence of risky behavior in the classroom, rather than an individual student’s own smoking or drinking behavior, and reduces concerns that the outcome is driven by underreporting in student surveys.

The second set of outcomes measures mental health. The CEPS asks students how often they feel blue, unhappy, that life is meaningless, unable to enjoy life, or sad. I use these five emotional-distress items to construct two standardized mental-health indices: the item mean and the first principal component. Higher values correspond to more severe mental-health problems. I standardize both indices within school and grade so that the estimates compare students facing different classroom peer environments within the same broader school-grade setting.

The third set of outcomes captures students’ social and relational experiences at school. These measures include students’ reports of classroom atmosphere, relationships with classmates, participation in school activities, school attachment, ease of getting along with others, and desire to transfer schools. I also use measures of students’ relationships with teachers, including whether they like their homeroom teacher and whether they report receiving praise from teachers. These outcomes are measured on ordinal survey scales and provide evidence on whether healthier peer family environments affect the social relationships through which students experience school.

2.3 Measure of peer parents’ behavior

The key explanatory variable is the share of peers whose parents report that they never smoke and never drink. The CEPS parent questionnaire asks respondents how often they smoke and drink. I code a student’s parent as coming from a non-smoking and non-drinking family health environment if the parent reports “never” for both behaviors. I refer to this family-health measure as parent NSD, and to the corresponding leave-one-out classroom peer share as peer parent NSD. For each student, peer parent NSD is the share of classmates, excluding

Table 1: Descriptive Statistics by Parent Smoking and Drinking Status

	Full sample	Parent NSD	Parent SD	Difference
<i>Panel A. Student and family characteristics</i>				
Mother's years of schooling	9.875 (3.709)	10.436 (3.462)	9.577 (3.835)	0.859 [0.000]
Father's years of schooling	10.614 (3.278)	10.772 (3.274)	10.664 (3.292)	0.108 [0.140]
Age	13.231 (1.198)	13.109 (1.142)	13.304 (1.236)	-0.195 [0.000]
Ethnic minority (1 = Yes)	0.117 (0.322)	0.085 (0.279)	0.139 (0.346)	-0.054 [0.000]
Only child (1 = Yes)	0.468 (0.499)	0.506 (0.500)	0.468 (0.499)	0.037 [0.001]
Agricultural hukou (1 = Yes)	0.481 (0.500)	0.457 (0.498)	0.479 (0.500)	-0.022 [0.053]
Ever attended kindergarten (1 = Yes)	0.809 (0.393)	0.824 (0.381)	0.806 (0.396)	0.018 [0.036]
Household economic status	2.850 (0.586)	2.897 (0.543)	2.826 (0.593)	0.071 [0.000]
Female (1 = Yes)	0.480 (0.500)	0.515 (0.500)	0.462 (0.499)	0.054 [0.000]
Ever repeated grade (1 = Yes)	0.144 (0.351)	0.112 (0.315)	0.152 (0.359)	-0.040 [0.000]
<i>Panel B. Mental health outcomes</i>				
Poor mental health index, PCA	-0.000 (0.993)	-0.053 (0.978)	0.024 (0.979)	-0.077 [0.000]
Poor mental health index, mean	-0.000 (0.993)	-0.052 (0.979)	0.023 (0.977)	-0.075 [0.001]
Feeling blue	2.219 (0.983)	2.147 (0.969)	2.264 (0.975)	-0.118 [0.000]
Depressed	1.956 (1.045)	1.880 (1.022)	1.988 (1.043)	-0.109 [0.000]
Unhappy	2.268 (1.039)	2.183 (1.017)	2.311 (1.038)	-0.128 [0.000]
Not enjoying life	1.736 (1.067)	1.664 (1.021)	1.769 (1.082)	-0.105 [0.000]
Sad	2.024 (1.024)	1.946 (1.001)	2.062 (1.024)	-0.116 [0.000]
Observations	9,361	3,982	4,100	8,082

Note: This table reports means, with standard deviations in parentheses, for students in the estimation sample. The full sample includes all students in the estimation sample. The Parent NSD and Parent SD columns are restricted to students with non-missing parental smoking and drinking reports, so their totals do not sum to the full sample. Parent NSD equals one if the student's parent reports that they never smoke and never drink. Parent SD includes students whose parent reports smoking or drinking. The difference column reports the difference in means between Parent NSD and Parent SD, with p-values in brackets. Mental health indices are standardized so that higher values indicate more severe mental health problems. Agricultural hukou refers to rural household registration status.

the student’s own household, whose parents report that they never smoke and never drink. I use the “never” category because it is the most conservative measure of a healthier family behavioral environment. Although these reports are collected after classroom assignment, the “never” response refers to behaviors that parents report never having engaged in. I therefore treat parent NSD as predetermined with respect to the student’s classroom peer exposure. I construct analogous peer shares separately for fathers and mothers.

In my data, peer parent NSD ranges from 0.083 to 0.857, with a mean of 0.490 and a standard deviation of 0.137. Thus, a one-standard-deviation increase corresponds to roughly a 14 percentage point increase in the share of peers whose parents never smoke and never drink. Once standardized, the variable ranges from -2.96 to 2.68 standard deviations. Appendix Figures A.1–A.3 describe the variation in this measure. Figure A.1 shows that the classroom-level share of parent NSD is centered around 49 percent but varies substantially across classrooms. Figures A.2 and A.3 show that there is also substantial variation across paired classrooms within the same school and grade. This within-school-grade variation is the identifying variation in my empirical design and allows me to compare students facing different classroom peer environments within the same school-grade setting.

3 Estimation Strategy

This section describes the empirical strategy used to estimate the effect of peer parent NSD. I first describe the classroom assignment restrictions that generate identifying variation and present balance tests for the key peer exposure measure. I then introduce the estimating equation, define the coefficient of interest.

3.1 Random Classroom Assignment

The empirical strategy uses variation in classroom peer composition within Chinese middle schools. I restrict the sample to schools and grades with plausibly random classroom

assignment. A school-grade cell enters the estimation sample only if principals report that students were randomly assigned to classrooms at school entry and that classrooms were not reorganized afterward. I also require homeroom teachers within the same grade to report that students are not systematically grouped by prior performance or ability.

Under these restrictions, identification comes from differences across classrooms within the same school and grade in the share of peers whose parents never smoke and never drink. The identifying comparison is therefore between students who attend the same school, are in the same grade, and face the same broad institutional environment, but who are exposed to different classroom peer family-health environments. This design follows prior work using the CEPS to study classroom peer effects under plausibly random classroom assignment (Chen et al., 2026; Eble & Hu, 2022; Gong et al., 2021). More broadly, the empirical strategy builds on an economics literature that uses plausibly exogenous variation in peer environments to study peer effects in education and youth behavior. Early work uses roommate, classroom, and school-level variation to estimate peer effects (Ammermueller & Pischke, 2009; Hoxby, 2000; Sacerdote, 2001), while subsequent work studies peer networks, classroom composition, tracking, and peer traits as determinants of students' academic, behavioral, and noncognitive outcomes (Bifulco, Fletcher, & Ross, 2011; Black, Devereux, & Salvanes, 2013; Calv'o-Armengol, Patacchini, & Zenou, 2009; De Giorgi, Pellizzari, & Redaelli, 2010; Duflo, Dupas, & Kremer, 2011; Golsteyn, Non, & Z"olitz, 2021; Lavy & Schlosser, 2011). My design is related to this literature, but the peer exposure differs: I study a family behavior that enters the classroom peer environment through classmates' households, rather than only classmates' own characteristics or behaviors.

The key identifying assumption is that, conditional on school-by-grade fixed effects and predetermined student and family controls, peer parent NSD is unrelated to unobserved determinants of risk-behavior environments, school relationships, and mental health. This assumption would be violated if students were sorted into classrooms based on traits correlated with both their classmates' parental smoking and drinking behaviors and their own

outcomes. The random-assignment restrictions help address this concern. I further assess the plausibility of the design by testing whether peer parent NSD predicts predetermined student and family characteristics. The balance results in Table 2 show little systematic association between peer parent NSD and these baseline characteristics, consistent with the view that within-school-grade variation in peer parent NSD is plausibly exogenous.

Table 2: Test for Randomization

	(1)	(2)
Mother's years of schooling	0.0470*** (0.00760)	0.00165 (0.00170)
Father's years of schooling	0.00680 (0.00740)	0.00347* (0.00177)
Age	-0.153*** (0.0449)	0.000306 (0.00487)
Ethnic minority (1 = Yes)	-0.649*** (0.146)	0.0262 (0.0247)
Only child (1 = Yes)	0.120** (0.0538)	-0.00340 (0.00976)
Agricultural hukou (1 = Yes)	0.0937 (0.0574)	-0.0311** (0.0157)
Ever attended kindergarten (1 = Yes)	0.0975** (0.0427)	0.0222 (0.0169)
Household economic status	0.0923** (0.0406)	0.00861 (0.0127)
Female (1 = Yes)	0.0545** (0.0220)	-0.00392 (0.00573)
Ever repeated grade (1 = Yes)	-0.167** (0.0741)	-0.0127 (0.0165)
Number of observations	8,530	8,530
School-by-grade fixed effects		X
Joint test F-statistic	11.90	1.257
Joint test p-value	0.000	0.256

Note: This table presents a balancing test which tests whether predetermined student and family characteristics jointly predict the peer parent NSD measure. The dependent variable is standardized peer parent NSD, defined as the leave-one-out classroom share of peers whose parents report that they never smoke and never drink. Column 1 excludes fixed effects. Column 2 adds school-by-grade fixed effects. Standard errors clustered at the classroom level are reported in parentheses. The joint test reports the F-statistic and p-value from a test that the listed covariates are jointly equal to zero. The indicator variables are coded as 0 = No and 1 = Yes.

3.2 Estimation Framework

I estimate the reduced-form effect of exposure to classmates from non-smoking and non-drinking family environments using the following specification:

$$Y_{icgs} = \beta_0 + \beta \text{PeerParentNSD}_{-i,cgs} + S'_{icgs}\theta + T'_{cgs}\lambda + P'_{-i,cgs}\pi + \delta_{gs} + \varepsilon_{icgs}.$$

where i indexes students, c classrooms, g grades, and s schools. The dependent variable Y_{icgs} denotes one of three sets of outcomes: teacher-reported classroom risky-behavior problems, student mental health problems, and student school relationships. $\text{PeerParentNSD}_{-i,cgs}$ denotes the leave-one-out classroom share of classmates whose parents report that they never smoke and never drink. S_{icgs} includes predetermined student and family controls. T_{cgs} includes homeroom teacher characteristics. $P_{-i,cgs}$ includes leave-one-out classroom peer composition controls. The fixed effect δ_{gs} denotes school-by-grade fixed effects, so identification comes from comparing students in different classrooms within the same school and grade. The error term is denoted by ε_{icgs} . Standard errors are clustered at the classroom level.

The main coefficient of interest is β . It captures the reduced-form effect of a one-standard-deviation increase in exposure to classmates from non-smoking and non-drinking family environments, conditional on school-by-grade fixed effects and the control set. In the main specifications, I use the standardized peer parent NSD measure, so the estimates can be interpreted as the effect of increasing peer parent NSD by one standard deviation, or roughly 14 percentage points. I also estimate analogous specifications separately for peer father NSD and peer mother NSD to examine whether the estimates are driven more by fathers' or mothers' smoking and drinking behaviors.

Student and family controls include parental education, student age, minority status, only-child status, agricultural hukou status, preschool attendance, household income, gender, and repeated-grade status. Agricultural hukou refers to China's household-registration

category that distinguishes agricultural from non-agricultural registration. Teacher controls include the homeroom teacher’s gender, age, teaching experience, and pedagogical major. I include these controls because the risky-behavior outcome is reported by the homeroom teacher, and observable teacher characteristics may affect how teachers observe or report smoking and drinking in the classroom. In specifications with peer composition controls, $P_{-i,cgs}$ denotes leave-one-out peer composition controls. These controls help assess whether β captures exposure to peer parent NSD rather than other observable dimensions of classroom composition. Because the identifying comparison is within school and grade, all specifications absorb common school-grade factors, including school resources, grade-level rules, and broader institutional environments shared by students in the same school-grade cell.

4 Main results

This section presents the main estimates. I first examine whether exposure to peers whose parents never smoke and never drink reduces risky-behavior environments and then study mental health problems. Across both sets of outcomes, I report estimates for peer parent NSD and then decompose the exposure measure into father- and mother-specific components.

4.1 Risky-behavior environments

I first estimate whether exposure to peers whose parents never smoke and never drink affects risky-behavior environments. I estimate this relationship separately for peer parent NSD, peer father NSD, and peer mother NSD to examine whether the association differs across parental measures. The outcome is based on the homeroom teacher’s report of how many students in the class have a habit of smoking or drinking. This teacher-reported measure is useful because adolescent smoking and drinking are sensitive behaviors and may be underreported in student self-reports (Dolcini, Adler, & Ginsberg, 1996; Patrick et al., 1994).

Table 3 reports the main results. Column 1 shows that exposure to peers whose parents

never smoke and never drink reduces teacher-reported classroom smoking or drinking problems. A one-standard-deviation increase in peer parent NSD, equal to roughly 14 percentage points, reduces the likelihood that the homeroom teacher reports smoking or drinking among students in the class by 8.2 percentage points. This estimate is large relative to the outcome and suggests that peer family health environments are predictive of risky-behavior environments even within the same school and grade.

Table 3: Effects of Peer Parent NSD on Risky-Behavior Environments

	Teacher-reported classroom smoking or drinking problems		
	(1) Parent	(2) Father	(3) Mother
Peer parent NSD	-0.0824** (0.0359)	0.0103 (0.0382)	-0.0602** (0.0260)
Observations	8,275	8,274	8,275
R-squared	0.735	0.729	0.735

Note: This table reports estimates of the effect of exposure to peer parent NSD on teacher-reported classroom smoking or drinking problems. The dependent variable is an indicator equal to one if the homeroom teacher reports that at least a few students in the class have a habit of smoking or drinking. Columns 1–3 use the standardized leave-one-out share of peers whose parent, father, or mother never smokes and never drinks, respectively. All specifications include school-by-grade fixed effects, student and family controls, and homeroom teacher controls. Standard errors clustered at the classroom level are reported in parentheses.

Columns 2 and 3 separate the measure by fathers and mothers. The father-specific estimate is small and close to zero. In contrast, the mother-specific estimate is negative and similar in magnitude to the parent measure: a one-standard-deviation increase in exposure to peers whose mothers never smoke and never drink reduces teacher-reported classroom smoking or drinking problems by 6.0 percentage points. This pattern suggests that the overall risky-behavior result is concentrated among peers whose mothers never smoke and never drink. This mother-specific pattern is consistent with two related strands of evidence. First, social-network evidence shows that friends’ mothers’ parenting styles are associated with adolescents’ alcohol abuse, binge drinking, smoking, and marijuana use (Shakya et al., 2012). Second, evidence on maternal substance use shows that mothers’ drinking behavior predicts their children’s later alcohol use and alcohol-related problems (Baer, Sampson, Barr, Connor,

& Streissguth, 2003). These studies suggest that mothers may be especially important in the formation of adolescent substance-use environments, although my data do not allow me to distinguish the specific household or peer mechanisms behind the mother-specific estimate.

Figure 1 provides a visual analogue to these estimates. The figure plots binned relationships between residualized teacher-reported classroom smoking or drinking problems and residualized peer NSD measures after removing school-by-grade fixed effects. Panel A shows a negative relationship for the parent measure. Panel B shows little relationship for the father measure. Panel C shows a negative relationship for the mother measure. The figure therefore mirrors the pattern in Table 3: exposure to peers from never smoke and never drink parental environments is associated with lower teacher-reported classroom risky-behavior problems, and this relationship is concentrated in the mother-specific measure.

4.2 Mental Health

I next study whether exposure to peers whose parents never smoke and never drink affects students' mental health. Prior work shows that both family and peer environments shape adolescent risky behavior: parental smoking predicts adolescent smoking initiation, while peers influence smoking, drinking, drug use, and other risky behaviors (Card & Giuliano, 2013; Eisenberg et al., 2014; Gaviria & Raphael, 2001; Gilman et al., 2009; Kremer & Levy, 2008; Lundborg, 2006; Mays et al., 2014). These behaviors and the social environments in which they occur may also matter for adolescent mental health and school adjustment (Orben et al., 2020). I therefore examine whether peer parent NSD affects mental health problems from students' reports of emotional distress.

Table 4 reports the results. Columns 1–3 use the first principal component of five emotional-distress items as the dependent variable, while columns 4–6 use the item mean. Across both measures, exposure to peers whose parents never smoke and never drink reduces mental health problems. A one-standard-deviation increase in peer parent NSD reduces the poor mental health index by about 0.05 standard deviations. This estimate is similar across

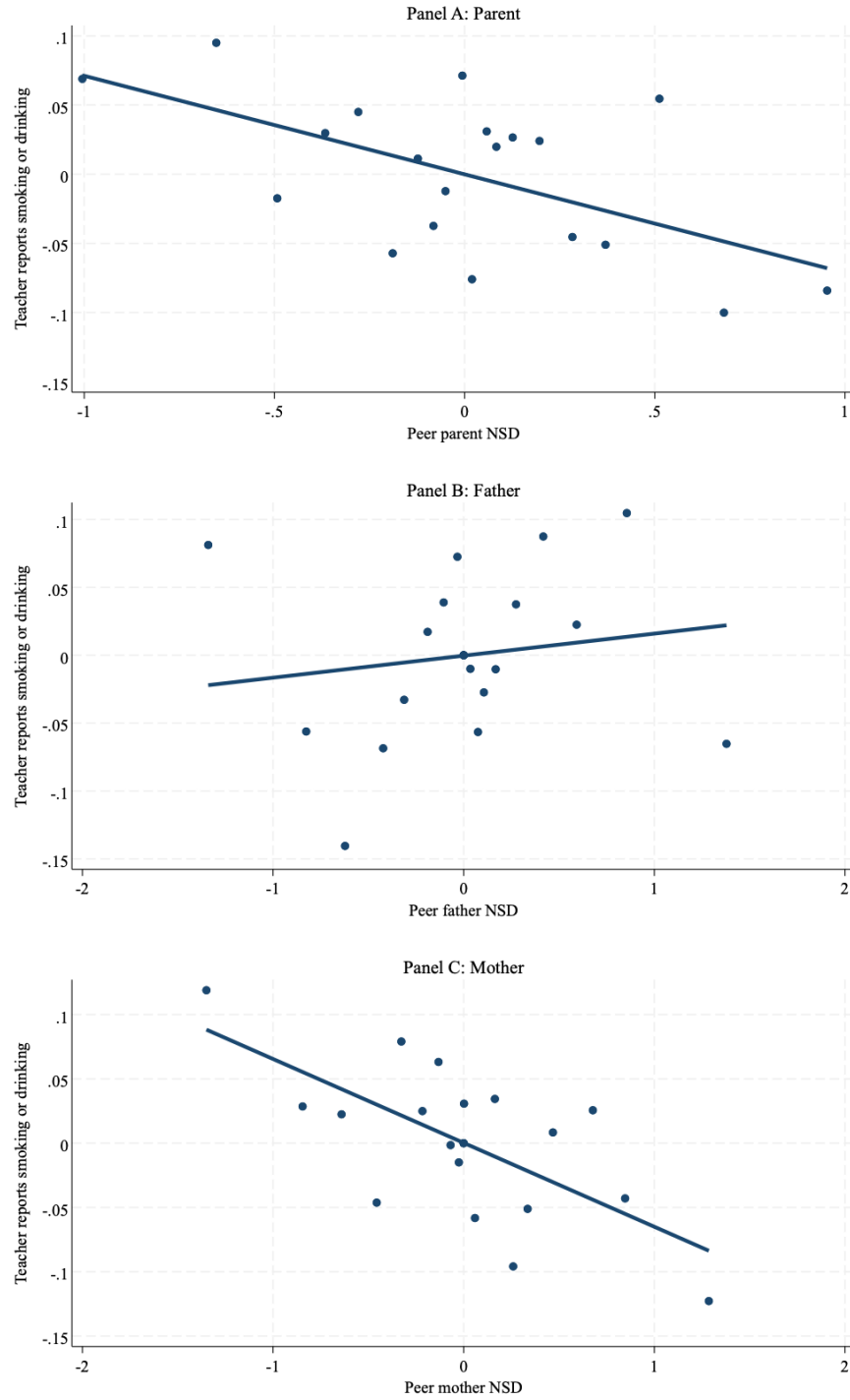


Figure 1: Binned Relationships Between Peer Parent NSD and Risky-Behavior Environments

Note: This figure plots binned relationships between teacher-reported classroom risky-behavior problems and peer NSD measures after removing school-by-grade fixed effects from both variables. Panel A uses peer parent NSD, Panel B uses peer father NSD, and Panel C uses peer mother NSD. The dependent variable is an indicator equal to one if the homeroom teacher reports that at least a few students in the class have a habit of smoking or drinking.

the PCA and mean indices.

Table 4: Effects of Peer Parent NSD on Student Mental Health

	Poor mental health index, PCA			Poor mental health index, mean		
	(1) Parent	(2) Father	(3) Mother	(4) Parent	(5) Father	(6) Mother
Peer NSD	-0.0497** (0.0245)	-0.00813 (0.0176)	-0.0494*** (0.0164)	-0.0500** (0.0245)	-0.00526 (0.0175)	-0.0483*** (0.0165)
Observations	8,030	8,029	8,030	8,147	8,146	8,147
R-squared	0.014	0.013	0.014	0.014	0.014	0.014

Note: This table reports estimates of the effect of exposure to peer parent NSD on student mental health. The dependent variables are standardized mental-health problem. Columns 1–3 use the first principal component of the five items, and columns 4–6 use their item mean. Higher values indicate more severe mental health problems. Columns labeled Parent, Father, and Mother use the standardized leave-one-out share of peers whose parent, father, or mother never smokes or drinks, respectively. All specifications include school-by-grade fixed effects, student and family controls, and homeroom teacher controls. Standard errors clustered at the classroom level are reported in parentheses.

As in the risky-behavior results, the effect is concentrated in the mother-specific measure. The father-specific estimates are close to zero in both mental health specifications. In contrast, a one-standard-deviation increase in peer mother NSD reduces mental health problems by about 0.05 standard deviations using either the PCA or mean index. This pattern suggests that the mental-health result is not driven equally by fathers’ and mothers’ smoking and drinking behaviors. As above, I interpret the mother-specific estimates as a decomposition of the peer family-health measure, rather than direct evidence on the household mechanism through which maternal behavior affects students.

Figure 2 provides a visual analogue to Table 4, plotting binned relationships after removing school-by-grade fixed effects. The parent and mother panels show clear negative relationships, while the father panels are noisier and become statistically indistinguishable from zero with the full controls. Overall, the figure suggests that the negative mental-health relationship is most consistent for the parent and mother NSD measures.

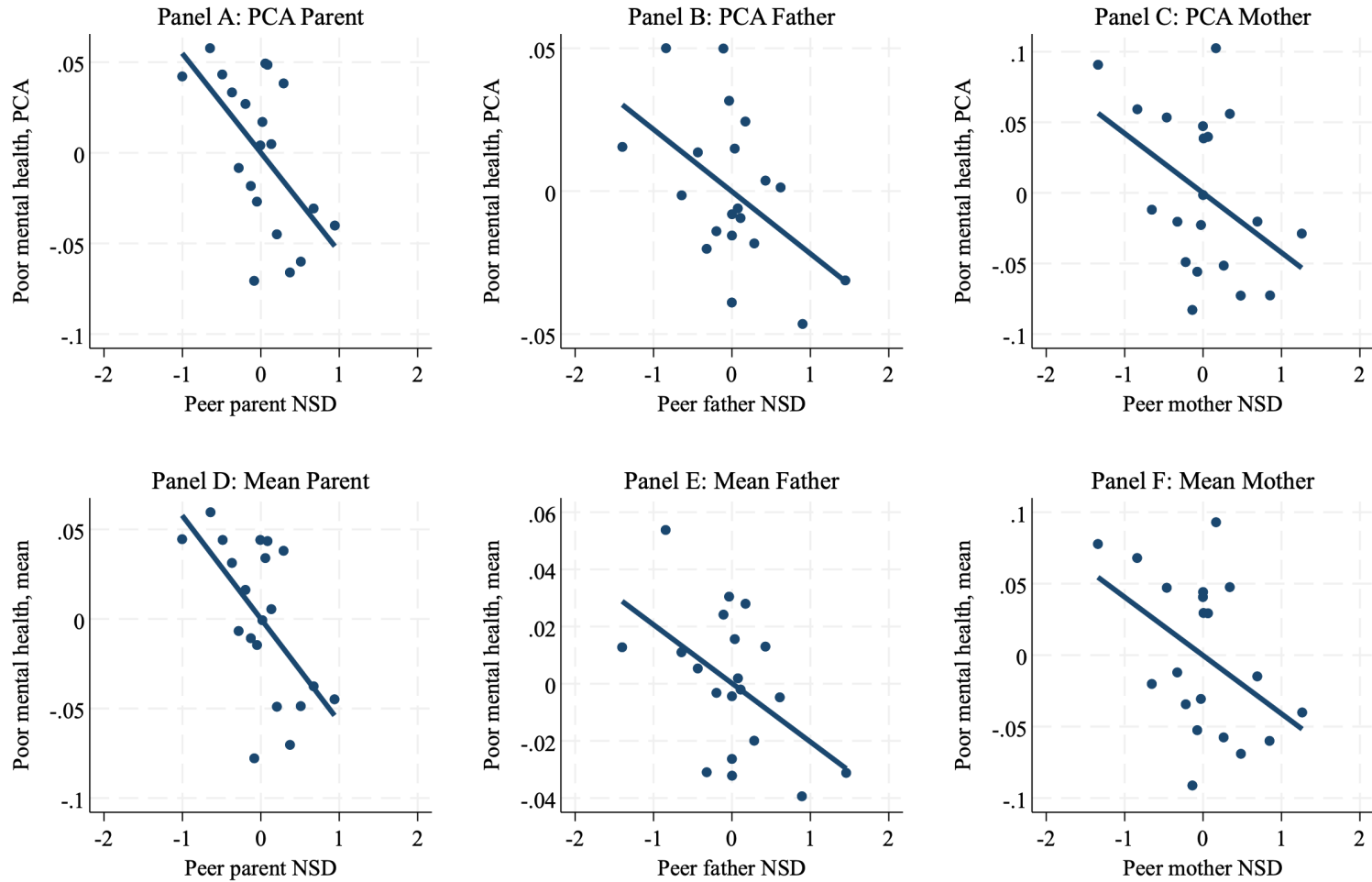


Figure 2: Binned Relationships Between Peer Parent NSD and Student Mental Health

Note: This figure plots binned relationships between student mental health problems and peer NSD measures after removing school-by-grade fixed effects from both variables. Panels A–C use the standardized poor mental health index based on the first principal component of the five emotional-distress items. Panels D–F use the standardized poor mental health index based on the item mean. Panels A and D use peer parent NSD, Panels B and E use peer father NSD, and Panels C and F use peer mother NSD. Higher values of the dependent variables indicate more severe mental health problems. The figure is intended as a visual analogue to the within-school-grade variation and does not residualize the full set of covariates used in the regression tables.

5 Mechanism

The estimates above show that exposure to peers whose parents never smoke and never drink reduces teacher-reported classroom risky-behavior problems and students’ mental health problems. In this section, I explore potential channels through which this peer family environment may affect students. I focus on two channels that are central to adolescents’ daily school experience: the classroom social environment and teacher-student interaction. These channels are motivated by evidence that peer networks, school belonging, and adult support matter for adolescent behavior and mental health (Chen et al., 2026; Cleveland et al., 2012; Gong et al., 2021; Lavy & Sand, 2019; Orben et al., 2020; Ragan et al., 2014; Shakya et al., 2012).

5.1 Classroom Social Environment

A first possible mechanism is that peers from non-smoking and non-drinking family environments improve the social environment of the classroom. Students may experience a more supportive peer group, stronger school attachment, and fewer incentives to engage in risky behavior when more of their classmates come from healthier family behavioral environments. To investigate this channel, I use students’ reports of classroom atmosphere, classmates’ friendliness, participation in school activities, whether they have close people at school, ease of getting along with others, and desire to transfer schools. These measures capture whether students experience school as socially integrated or alienating.

Table 5 reports the results. The estimates support this channel. A one-standard-deviation increase in peer parent NSD improves perceived classroom atmosphere by 0.126 standard deviations. It also increases classmates’ friendliness, participation in school activities, having close people at school, and ease of getting along with others, with estimates ranging from 0.056 to 0.091 standard deviations. Consistent with stronger school attachment, the same exposure reduces students’ desire to transfer schools by 0.064 standard deviations. Overall,

these results suggest that exposure to peers whose parents never smoke and never drink is associated with a more positive and integrated classroom environment.

Table 5: Effects of Peer Parent NSD on School Social Environment

	(1) Class atmosphere	(2) Classmates friendly	(3) School activities	(4) Close people	(5) Easy get along	(6) Transfer school
Peer parent NSD	0.126*** (0.0279)	0.0564*** (0.0179)	0.0450** (0.0220)	0.0889*** (0.0196)	0.0906*** (0.0159)	-0.0640** (0.0306)
Observations	8,211	8,220	8,217	8,165	8,226	8,234
R-squared	0.147	0.079	0.155	0.115	0.065	0.119

Note: This table reports estimates of the effect of exposure to peer parent NSD on students' social environment at school. The dependent variables measure students' perceptions of classroom atmosphere, peers' friendliness, participation in school activities, whether they have close people at school, ease of getting along with others, and desire to transfer schools. All specifications include school-by-grade fixed effects, student and family controls, and homeroom teacher controls. Standard errors clustered at the classroom level are reported in parentheses.

5.2 Teacher-Student Interaction

A second possible mechanism is teacher-student interaction. If peer family health environments improve classroom behavior or social climate, teachers may interact more positively with students in those classrooms. These interactions may matter for both risky behavior and mental health because teachers are central adult figures in Chinese middle schools, especially homeroom teachers. To assess this channel, I use three sets of measures. The first set comes from parent reports of whether students like their homeroom teacher. The second set comes from student reports of whether they receive praise from math, Chinese, English, and homeroom teachers. The third set comes from homeroom teacher reports of whether students' parents respect them and whether they are satisfied with their job as homeroom teachers.

Table 6: Effects of Peer Parent NSD on Teacher Relationships

	Parent and Student-reported teacher relationships					Homeroom-teacher reports	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Like HR teacher	Math praise	Chinese praise	English praise	HR praise	Parent respect	HR satisfaction
Peer parent NSD	0.0813*** (0.0258)	0.0370 (0.0244)	0.0721*** (0.0264)	0.0417* (0.0233)	0.0531** (0.0263)	0.250*** (0.0878)	0.232** (0.109)
Observations	7,955	8,238	8,224	8,241	8,208	8,229	8,213
R-squared	0.119	0.154	0.141	0.147	0.119	0.738	0.699

Note: This table reports estimates of the effect of exposure to peer parent NSD on teacher relationships and the teacher-reported relationship environment. Column 1 uses the parent-reported outcome: whether children like their homeroom teacher. Columns 2–5 use student-reported outcomes: whether students report receiving praise from math, Chinese, English, or homeroom teachers. Columns 6–7 use homeroom-teacher-reported outcomes: how many parents of students pay respect to the homeroom teacher and the homeroom teacher’s job satisfaction. All dependent variables are standardized. All specifications include school-by-grade fixed effects, student and family controls, and homeroom teacher controls. Standard errors clustered at the classroom level are reported in parentheses.

Table 6 reports the results. Panel A shows that exposure to peers whose parents never smoke and never drink improves several student-reported measures of teacher-student interaction. A one-standard-deviation increase in peer parent NSD increases the standardized parent-reported measure of liking the homeroom teacher by 0.081 standard deviations. It also increases student-reported praise from Chinese, English, and homeroom teachers by 0.072, 0.042, and 0.053 standard deviations, respectively. The estimate for math teacher praise is positive but smaller. Panel B shows that the same exposure also improves teacher-reported measures of the school relationship environment. A one-standard-deviation increase in peer parent NSD increases homeroom teachers' reports that parents respect them by 0.250 standard deviations and their job satisfaction by 0.232 standard deviations. These patterns suggest that students exposed to healthier peer family environments experience more positive relationships with teachers, and that homeroom teachers themselves report more favorable classroom-related relationships.

Together, the results in Tables 5 and 6 support a framework in which peer family health environments affect adolescents partly by improving the relationships through which students experience school. I interpret these estimates as evidence on potential channels rather than a formal mediation test. The results show that peer parent NSD is associated with stronger classroom integration, greater school attachment, more positive teacher-student interactions, and more favorable teacher-reported relationship environments, all of which are consistent with lower classroom risky-behavior problems and better mental health.

6 Robustness

This section reports two robustness exercises. I first assess whether the main results are sensitive to social desirability bias in parents' reports of smoking and drinking. I then examine whether the estimates are stable after sequentially adding richer controls for classroom peer composition. Together, these checks address two central concerns: measurement error in the

peer parent NSD measure and omitted peer characteristics correlated with that measure.

6.1 Sensitivity to Misreporting in Parental Smoking and Drinking

A central concern in measuring parent NSD is social desirability bias. Parents may under-report smoking or drinking because these behaviors are socially sensitive and because the survey is linked to their child’s school environment. This concern is especially relevant for my design because the key explanatory variable is constructed from parents’ reports that they never smoke and never drink.

I first examine this issue using an internal consistency check between parent and student reports. In the parent questionnaire, some fathers report that they never drink. In the student questionnaire, however, students are also asked whether their father often gets drunk at home. I classify a case as inconsistent if the father reports never drinking while the student reports that the father often gets drunk at home. There are 26 such cases, equal to 3.23 percent of fathers who report never smoking and never drinking. I set these inconsistent father reports to missing when constructing the main parent NSD measure. I also find little evidence that these inconsistent reports are systematically concentrated among observable student or family background characteristics (Appendix Table A.3). This reduces, though does not eliminate, the concern that misreporting is strongly correlated with the determinants of student outcomes.

I then conduct a simulation exercise to assess whether the main results are sensitive to additional one-sided misreporting. In each simulation, I randomly recode 4, 7, or 10 percent of parents who report never smoking and never drinking as not meeting the never-smoking-and-never-drinking criterion, reconstruct the leave-one-out peer parent NSD measure, standardize it, and re-estimate the main risky-behavior and mental-health specifications. I use three recoding rates: 4 percent, 7 percent, and 10 percent. The 4 percent rate is close to the observed inconsistency rate in the father-report check, while the 7 and 10 percent rates impose larger amounts of hypothetical misreporting. I repeat each exercise 1,000 times.

Appendix Figures A.4 and A.5 plot the resulting coefficient distributions.

The results suggest that the main estimates are robust to this form of measurement error. For teacher-reported classroom smoking or drinking problems, the mean coefficient remains negative under all three assumptions: -0.079 under 4 percent recoding, -0.076 under 7 percent recoding, and -0.073 under 10 percent recoding. These estimates are close to the baseline estimate of -0.082. The full coefficient distributions remain below zero over the 5th–95th percentile range. The share of simulations with $p < 0.05$ is 0.718 under 4 percent recoding, 0.597 under 7 percent recoding, and 0.532 under 10 percent recoding.

The mental-health results show a similar pattern. The mean coefficient remains negative at -0.047, -0.046, and -0.044 under 4, 7, and 10 percent recoding, respectively, compared with a baseline estimate of about -0.050. The 5th–95th percentile ranges also remain negative in all three simulations. The share of simulations with $p < 0.05$ is lower than for risky behavior, ranging from 0.491 under 4 percent recoding to 0.419 under 10 percent recoding, but the coefficient distribution remains centered close to the baseline estimate and below zero.

These simulations are not a substitute for observing true parental smoking and drinking. They do, however, show that the main estimates are not driven by a small number of parents who may falsely report never smoking and never drinking. Even under the more conservative 10 percent recoding scenario, the estimated effects on classroom risky-behavior problems and mental health remain negative and similar in magnitude to the baseline results.

6.2 Stability with Additional Peer Controls

A remaining concern is that peer parent NSD may proxy for other dimensions of classroom peer composition. For example, classrooms with more peers whose parents never smoke and never drink may also have peers from more educated, higher-income, or less disadvantaged households, or peers with different cognitive and demographic characteristics. I assess this concern by adding peer composition controls sequentially to the main specifications. This exercise asks whether the estimated effect of peer parent NSD is stable as I control for

increasingly rich measures of the peer environment.

Table 7 reports the results for three outcomes: mental health problems, teacher-reported classroom smoking or drinking problems, and classroom atmosphere. Column 1 reports the baseline specification. Column 2 adds peer socioeconomic controls, including peers' mothers' education, fathers' education, and household income. Column 3 adds peer agricultural hukou. Column 4 adds peer openness. Column 5 adds peer cognitive ability. Column 6 adds the classroom female share. Column 7 additionally controls for the student's own parent NSD and cognitive ability. Across outcomes, the estimated coefficient on peer parent NSD remains stable. For mental health, the coefficient ranges from -0.050 to -0.073 standard deviations. For teacher-reported classroom smoking or drinking problems, the coefficient ranges from -8.2 to -9.4 percentage points. For classroom atmosphere, the coefficient ranges from 0.126 to 0.128 standard deviations.

The stability of these estimates suggests that the main results are not driven by observable peer socioeconomic composition, peer cognitive ability, classroom gender composition, or students' own family health environment and cognitive ability. Column 7 uses a smaller sample because own parent NSD is missing for some students, so I interpret it as an additional robustness check rather than the preferred specification. Overall, the pattern supports the interpretation that peer parent NSD captures a distinct dimension of the classroom peer environment.

7 Heterogeneity of gender differences

I next examine whether the mental-health effects differ by student gender. This is a natural source of heterogeneity because adolescent girls and boys may respond differently to peer environments, school relationships, and social stressors. I estimate the mental-health specifications with an interaction between peer NSD and an indicator for being female. The coefficient on peer NSD gives the association for boys, while the interaction term gives the

Table 7: Robustness to Additional Peer Controls

	(1) Base	(2) +SES	(3) +Hukou	(4) +Open	(5) +Cog.	(6) +Female	(7) +Own
<i>Panel A. Poor mental health index, PCA</i>							
Peer parent NSD	-0.0497** (0.0245)	-0.0582** (0.0241)	-0.0585** (0.0240)	-0.0587** (0.0238)	-0.0602** (0.0238)	-0.0606** (0.0238)	-0.0734*** (0.0254)
Observations	8,030	8,030	8,030	8,030	8,030	8,030	6,997
R-squared	0.014	0.014	0.014	0.014	0.014	0.014	0.021
<i>Panel B. Teacher-reported classroom smoking or drinking problems</i>							
Peer parent NSD	-0.0824** (0.0359)	-0.0784** (0.0327)	-0.0786** (0.0328)	-0.0792** (0.0325)	-0.0803** (0.0323)	-0.0882** (0.0356)	-0.0940** (0.0387)
Observations	8,275	8,275	8,275	8,275	8,275	8,275	7,185
R-squared	0.735	0.744	0.744	0.744	0.744	0.759	0.747
<i>Panel C. Classroom atmosphere</i>							
Peer parent NSD	0.126*** (0.0279)	0.125*** (0.0275)	0.124*** (0.0270)	0.121*** (0.0259)	0.127*** (0.0258)	0.125*** (0.0252)	0.128*** (0.0299)
Observations	8,211	8,211	8,211	8,211	8,211	8,211	7,139
R-squared	0.147	0.148	0.149	0.150	0.151	0.151	0.153
Peer SES		X	X	X	X	X	X
Peer agricultural hukou			X	X	X	X	X
Peer openness				X	X	X	X
Peer cognitive ability					X	X	X
Female share						X	X
Own NSD and ability							X

Note: This table reports the stability of the peer parent NSD coefficient after sequentially adding controls. All specifications include school-by-grade fixed effects, student and family controls, and homeroom teacher controls. Peer SES includes peers' mothers' education, fathers' education, and household income. Column 7 additionally controls for the student's own parent NSD and cognitive ability; its smaller sample reflects missing values in own parent NSD. Standard errors clustered at the classroom level are reported in parentheses.

additional association for girls.

Table 8 reports the results. Columns 1–3 use the PCA mental-health index, and columns 4–6 use the mean index. The results show that the mental-health effect of peer parent NSD is concentrated among girls. For boys, the coefficient on peer parent NSD is small and close to zero: -0.010 using the PCA index and -0.007 using the mean index. The interaction with female is much larger, at -0.083 and -0.088 standard deviations across the two indices. This implies that a one-standard-deviation increase in peer parent NSD reduces mental health problems for girls by roughly 0.09 standard deviations.

Table 8: Gender Differences in the Effects of Peer Parent NSD on Mental Health

	Poor mental health index, PCA			Poor mental health index, mean		
	(1) Parent	(2) Father	(3) Mother	(4) Parent	(5) Father	(6) Mother
Peer NSD	-0.00956 (0.0293)	0.0120 (0.0212)	-0.0414* (0.0221)	-0.00725 (0.0296)	0.0154 (0.0212)	-0.0389* (0.0226)
Peer NSD $\times$ Female	-0.0829*** (0.0293)	-0.0399* (0.0235)	-0.0162 (0.0291)	-0.0878*** (0.0302)	-0.0407* (0.0234)	-0.0188 (0.0301)
Observations	8,030	8,029	8,030	8,147	8,146	8,147
R-squared	0.015	0.013	0.014	0.016	0.014	0.014

Note: This table reports gender differences in the effect of peer NSD on standardized mental-health problem indices. Columns 1–3 use the PCA index, and columns 4–6 use the mean index; higher values indicate more severe mental health problems. The coefficient on Peer NSD gives the association for boys, and the interaction with Female gives the additional association for girls. All specifications include school-by-grade fixed effects, student and family controls, and homeroom teacher controls. Standard errors clustered at the classroom level are reported in parentheses.

The father-specific measure shows a similar gender pattern, though the estimates are smaller. The interaction between peer father NSD and female is about -0.040 standard deviations for both mental-health indices. The mother-specific measure, by contrast, is negative for boys and the interaction with female is small. This pattern suggests that the overall gender difference is most visible in the parent and father measures, while the mother-specific association is more similar across boys and girls.

These results suggest that girls' mental health is more responsive to peers' family health environments than boys' mental health. I interpret this as heterogeneity in the reduced-

form effect rather than evidence on a separate mechanism. The estimates show that the same classroom peer family environment can have different implications for boys and girls, especially for mental-health outcomes.

8 Conclusion

This paper studies whether peer-family health environments shape classroom risk environments, school relationships, and adolescent mental health. I focus on whether classmates' parents report that they never smoke and never drink, a common and policy-relevant dimension of the family health environment. Using quasi-random variation in peer composition across Chinese middle-school classrooms, I find that exposure to classmates from non-smoking and non-drinking family environments reduces teacher-reported smoking and drinking in the classroom, reduces student mental health problems, and improves school relationships, including classroom integration, school attachment, peer relationships, and teacher interactions. These effects are driven primarily by exposure to classmates whose mothers never smoke and never drink, and the mental-health effects are larger for girls. Additional evidence suggests that students exposed to healthier peer-family environments report stronger classroom integration and more positive teacher relationships, consistent with parental health behaviors spilling over across households by shaping the classroom and relational environments students experience at school.

The analysis has two main limitations. First, parental smoking and drinking are measured using survey reports rather than objective measures, so parents may underreport these behaviors in a school-linked survey. I explain this concern in two ways. I first show that internally inconsistent reports are rare and are not strongly predicted by observed student or family characteristics. I then conduct simulation exercises in which I randomly recode a share of parents who report that they never smoke and never drink as reporting smoking or drinking. The estimated effects remain negative and close to the baseline estimates,

suggesting that the main findings are unlikely to be driven entirely by moderate one-sided misreporting.

Second, the teacher-reported smoking and drinking outcome is measured at the classroom level. I therefore interpret this estimate as the reduced-form effect of peer-family health composition on classroom risky-behavior environments, rather than as a direct effect on an individual student's own smoking or drinking. This classroom-level estimate may combine direct composition effects with spillovers among classmates. Relatedly, the mechanism analysis remains incomplete. Peer norms, friendship formation, classroom interactions, teacher responses, and unobserved features of the school environment may all contribute to the estimated effects. The mechanism results should therefore be interpreted as evidence on correlated changes in the school environment, rather than as a decomposition of the channels.

The results have two broader implications. First, they show that adolescent risk environments are shaped not only by students' own families and direct peer interactions, but also by the family health environments peers bring into school. This extends the idea of intergenerational transmission beyond the parent-child link: family behaviors may generate spillovers across households through the peer environment. Second, the findings suggest that the consequences of parental smoking and drinking extend beyond substance use. Exposure to healthier peer family environments also predicts better mental health and more positive school relationships, outcomes that are central to adolescent development and human capital formation.

The evidence also points to an important policy constraint. Schools can regulate student smoking and drinking, but they have limited direct control over parental health behaviors. The findings suggest that interventions aimed at adolescent risky behavior may need to account for the family environments embedded in peer groups. Whether school-based programs or parent engagement can mitigate harmful spillovers associated with parental smoking and drinking remains an important question for future research.

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A Appendix

This appendix provides additional evidence on measurement, balance, and robustness. Appendix Figures A.1–A.3 describe the construction and variation of the peer parent NSD measure. Figure A.1 shows the distribution of classroom-level peer parent NSD, while Figures A.2 and A.3 show that the measure varies substantially across classrooms within the same school and grade. These figures show that the analysis uses meaningful within-school-grade variation rather than relying only on differences across schools.

Appendix Figures A.4 and A.5 assess sensitivity to social desirability bias in parent reports. In these simulations, I randomly recode 4, 7, or 10 percent of parents who report never smoke and never drink as smoking or drinking, reconstruct peer parent NSD, and re-estimate the main risky-behavior and mental-health specifications. The coefficient distributions remain centered below zero, suggesting that the main results are unlikely to be driven by modest misreporting in parent NSD.

Appendix Tables A.1–A.3 provide additional descriptive and balance evidence. Table A.1 reports descriptive statistics for peer composition and homeroom teacher characteristics. Table A.2 tests whether these peer and teacher characteristics predict peer parent NSD; once school-by-grade fixed effects are included, they do not jointly predict the measure. Table A.3 examines inconsistent father reports and shows that these cases are not systematically predicted by observable. Finally, Appendix Tables A.4–A.6 report horse-race specifications that sequentially add richer peer composition controls. Table A.4 shows that the mental-health estimates remain stable when the outcomes are standardized in the full estimation sample. Table A.5 shows similar stability for student-reported classroom atmosphere and homeroom teacher praise. Table A.6 shows that parent-reported liking of the homeroom teacher and homeroom-teacher-reported job satisfaction are also stable after adding these controls. Together, these tables show that the main patterns are not driven by observable peer socioeconomic composition, peer cognitive ability, or classroom gender composition.

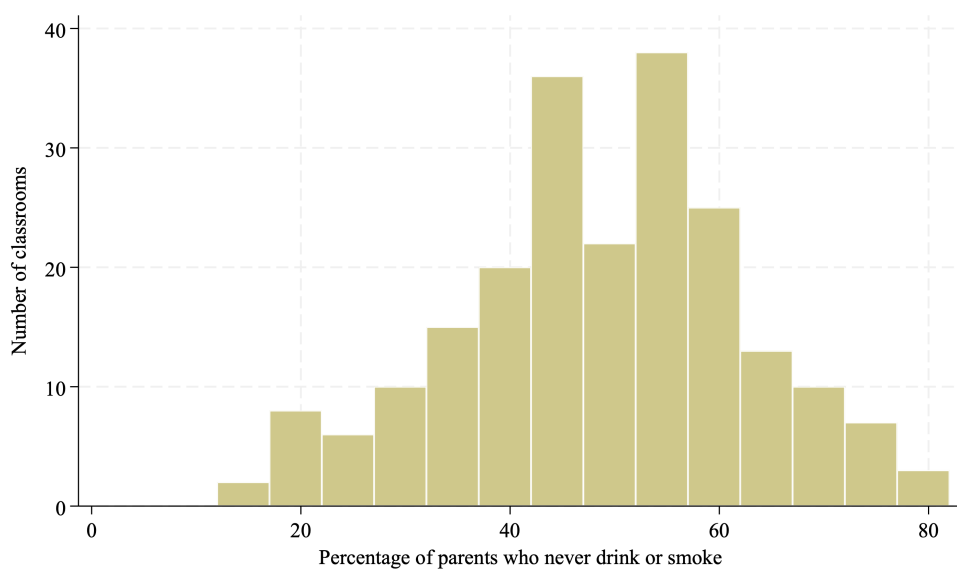


Figure A.1: Distribution of Classroom-Level Peer Parent NSD

Note: This figure shows the distribution of the classroom-level share of parents who report never smoke and never drink. The measure is constructed at the classroom level using parent reports in the estimation sample.

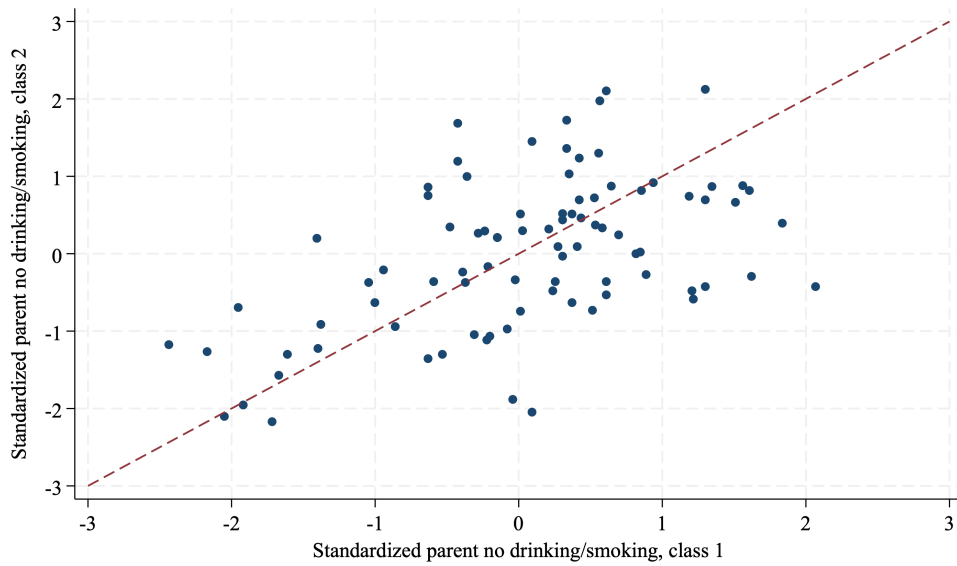


Figure A.2: Within-School-Grade Variation in Peer Parent NSD

Note: This figure plots standardized peer parent NSD for paired classrooms within the same school and grade. Each point represents a pair of classrooms. The dashed 45-degree line indicates equal exposure across the two classrooms. Distance from the line reflects within-school-grade variation in exposure to peers whose parents report that they never smoke and never drink.

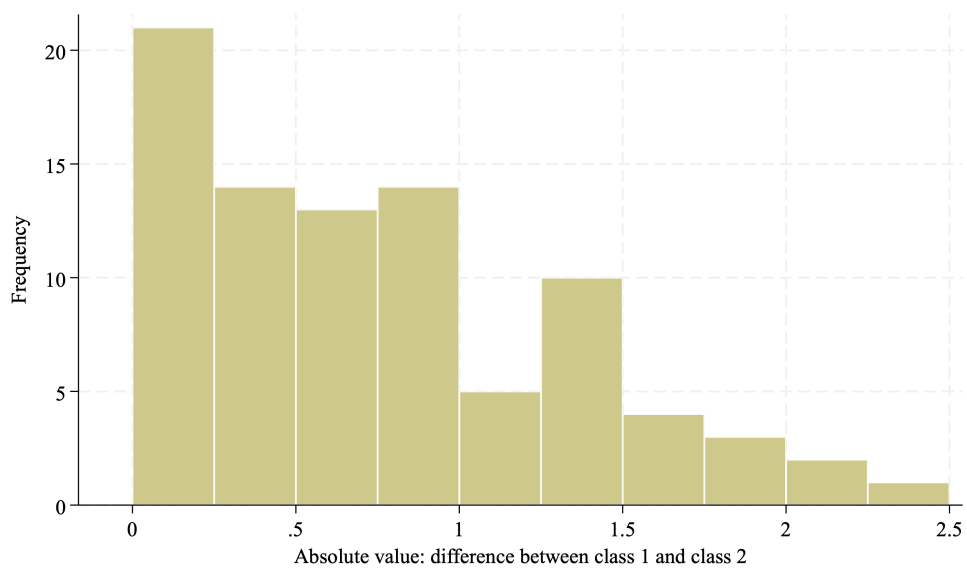


Figure A.3: Absolute Within-Pair Differences in Peer Parent NSD

Note: This figure shows the distribution of the absolute difference in standardized peer parent NSD between paired classrooms within the same school and grade. The figure describes the amount of identifying variation available within school-grade classroom pairs.

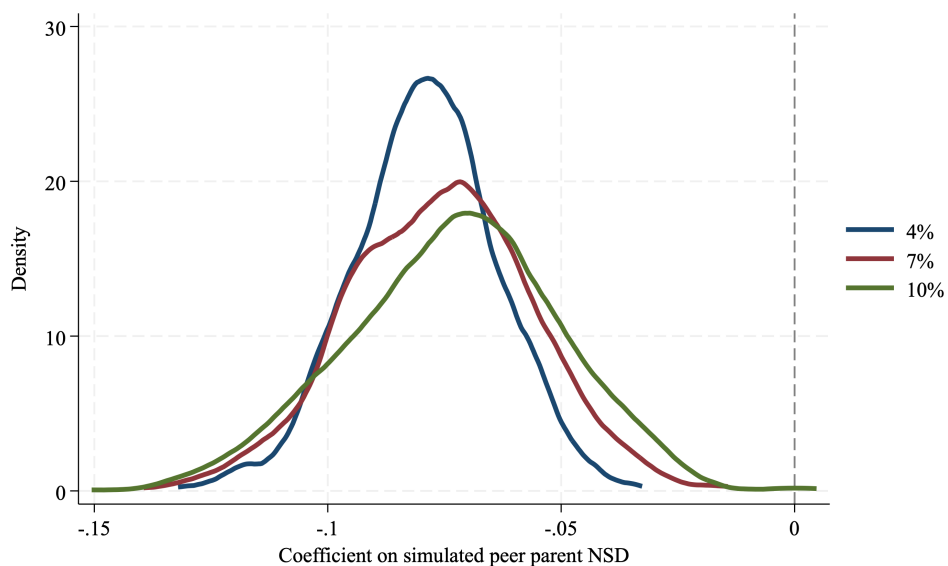


Figure A.4: Simulation Distribution for Risky Behavior Estimates

Note: This figure plots the distribution of estimated coefficients from simulations that randomly recode 4, 7, or 10 percent of parents who report never smoke and never drink as smoking or drinking. In each simulation, I reconstruct the leave-one-out peer parent NSD measure and re-estimate the main risky-behavior specification. The dependent variable is teacher-reported classroom smoking or drinking problems. The dashed vertical line marks zero.

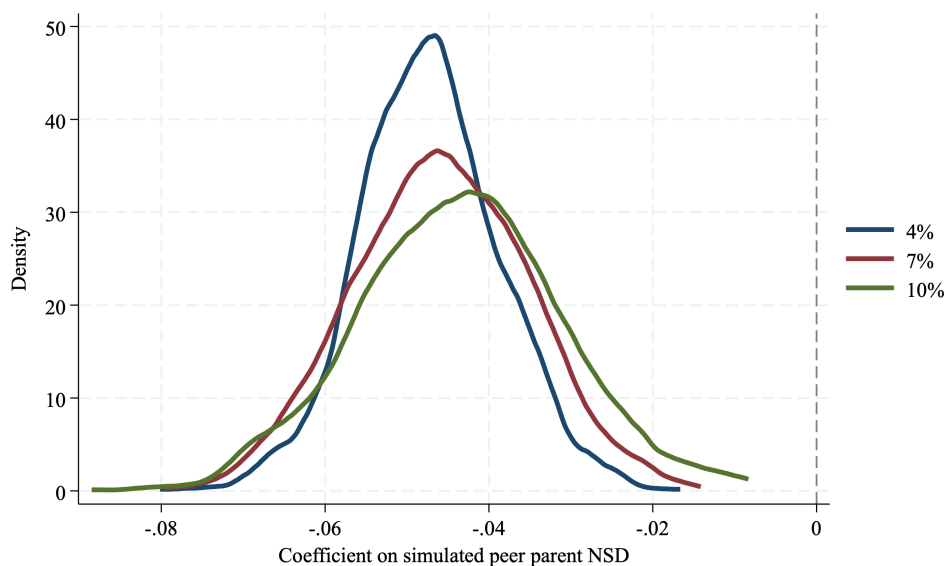


Figure A.5: Simulation Distribution for Mental Health Estimates

Note: This figure plots the distribution of estimated coefficients from simulations that randomly recode 4, 7, or 10 percent of parents who report never smoke and never drink as smoking or drinking. In each simulation, I reconstruct the leave-one-out peer parent NSD measure and re-estimate the main mental-health specification. The dependent variable is the standardized poor mental health index based on the first principal component. The dashed vertical line marks zero.

Table A.1: Descriptive Statistics for Peer and Homeroom Teacher Characteristics

	Full sample	Parent NSD	Parent SD	Difference
Peer cognitive ability	0.042 (0.538)	0.115 (0.503)	0.020 (0.545)	0.095 [0.000]
Peer female share	0.480 (0.086)	0.485 (0.080)	0.476 (0.091)	0.009 [0.000]
Female homeroom teacher (1 = Yes)	0.685 (0.464)	0.722 (0.448)	0.661 (0.473)	0.061 [0.000]
Age of homeroom teacher	36.963 (7.106)	37.036 (6.886)	37.077 (7.296)	-0.042 [0.792]
Teaching experience	14.900 (7.851)	15.093 (7.601)	14.995 (8.015)	0.097 [0.582]
Homeroom teacher pedagogical major	0.938 (0.241)	0.946 (0.226)	0.940 (0.238)	0.006 [0.244]
Observations	9,361	3,982	4,100	8,082

Note: This table reports means, with standard deviations in parentheses, for peer and homeroom teacher characteristics. Parent NSD equals one if the student's parent reports never smoke and never drink. Parent SD includes students whose parent reports smoking or drinking. The difference column reports the difference in means between Parent NSD and Parent SD, with p-values in brackets.

Table A.2: Balance Test for Peer and Homeroom Teacher Characteristics

	(1) No FE	(2) School-by-grade FE
Peer cognitive ability	0.307*** (0.0828)	-0.0650 (0.115)
Peer female share	0.109 (0.0687)	0.0517 (0.0616)
Female homeroom teacher (1 = Yes)	0.453*** (0.155)	0.236* (0.129)
Age of homeroom teacher	-0.0308 (0.0406)	-0.0276 (0.0324)
Teaching experience	0.0186 (0.0370)	0.0179 (0.0315)
Homeroom teacher pedagogical major (1=YES)	0.295 (0.231)	-0.0232 (0.214)
Observations	9,101	9,101
R-squared	0.204	0.817
Joint F-test	7.172	1.319
Joint p-value	0.000	0.250

Note: This table tests whether peer and homeroom teacher characteristics predict standardized peer parent NSD. The dependent variable is standardized peer parent NSD. Column 1 excludes fixed effects, while Column 2 includes school-by-grade fixed effects. Standard errors clustered at the classroom level are reported in parentheses. The joint test reports the F-statistic and p-value from a test that the listed covariates are jointly equal to zero.

Table A.3: Balance Test for Inconsistent Father Reports

	(1) No FE	(2) School-by-grade FE
Mother's years of schooling	0.000419 (0.000509)	0.000107 (0.000574)
Father's years of schooling	-0.00115** (0.000551)	-0.00137** (0.000607)
Age	0.00132 (0.00102)	-0.000292 (0.00198)
Ethnic minority (1 = Yes)	-0.00545* (0.00304)	-0.00130 (0.00207)
Only child (1 = Yes)	0.000135 (0.00389)	0.00126 (0.00507)
Agricultural hukou (1 = Yes)	0.00429 (0.00332)	0.00511 (0.00362)
Ever attended kindergarten (1 = Yes)	0.00195 (0.00322)	0.00112 (0.00331)
Household economic status	-0.00186 (0.00308)	-0.00167 (0.00316)
Female (1 = Yes)	-0.00234 (0.00258)	-0.00293 (0.00269)
Ever repeated grade (1 = Yes)	-0.00925*** (0.00319)	-0.00756** (0.00341)
Observations	3,622	3,622
R-squared	0.0045	0.0336
Joint F-test	1.61	1.34
Joint p-value	0.107	0.211

Note: This table tests whether predetermined student and family characteristics predict inconsistent father reports. The dependent variable equals one if the biological father reports never drinking while the student reports that the father often gets drunk at home. Column 1 excludes fixed effects, while Column 2 includes school-by-grade fixed effects. Standard errors clustered at the classroom level are reported in parentheses. The joint test reports the F-statistic and p-value from a test that the listed covariates are jointly equal to zero. The inconsistent cases are not concentrated in a small number of classrooms: among 215 classrooms, 190 have no inconsistent father reports, 24 have one, and only one has two.

Table A.4: Robustness of Full-Sample-Standardized Mental Health Estimates

	(1) Base	(2) +SES	(3) +Hukou	(4) +Open	(5) +Cog.	(6) +Female	(7) +Own
<i>Panel A. Poor mental health index, PCA</i>							
Peer parent NSD	-0.0449* (0.0238)	-0.0551** (0.0228)	-0.0555** (0.0227)	-0.0555** (0.0226)	-0.0573** (0.0226)	-0.0574** (0.0227)	-0.0705*** (0.0243)
Observations	8,030	8,030	8,030	8,030	8,030	8,030	6,997
R-squared	0.075	0.076	0.076	0.076	0.076	0.076	0.085
<i>Panel B. Poor mental health index, mean</i>							
Peer parent NSD	-0.0449* (0.0237)	-0.0535** (0.0228)	-0.0539** (0.0227)	-0.0538** (0.0226)	-0.0557** (0.0225)	-0.0555** (0.0227)	-0.0698*** (0.0241)
Observations	8,147	8,147	8,147	8,147	8,147	8,147	7,096
R-squared	0.076	0.076	0.077	0.077	0.077	0.077	0.085
Peer SES		X	X	X	X	X	X
Peer agricultural hukou			X	X	X	X	X
Peer openness				X	X	X	X
Peer cognitive ability					X	X	X
Female share						X	X
NSD and ability							X

Note: This table reports the stability of the peer parent NSD coefficient after sequentially adding controls. The dependent variables are mental-health problem indices standardized in the full estimation sample. All specifications include school-by-grade fixed effects, student and family controls, and home-room teacher controls. Peer SES includes peers' mothers' education, fathers' education, and household income. Column 7 additionally controls for the student's own parent NSD and cognitive ability; its smaller sample reflects missing values in own parent NSD. Standard errors clustered at the classroom level are reported in parentheses.

Table A.5: Robustness of Student-Reported School Relationship Estimates

	(1) Base	(2) +SES	(3) +Hukou	(4) +Open	(5) +Cog.	(6) +Female	(7) +Own
<i>Panel A. Classroom atmosphere</i>							
Peer parent NSD	0.126*** (0.0279)	0.125*** (0.0275)	0.124*** (0.0270)	0.121*** (0.0259)	0.127*** (0.0258)	0.125*** (0.0252)	0.128*** (0.0299)
Observations	8,211	8,211	8,211	8,211	8,211	8,211	7,139
R-squared	0.147	0.148	0.149	0.150	0.151	0.151	0.153
<i>Panel B. Homeroom teacher praise</i>							
Peer parent NSD	0.0531** (0.0263)	0.0607** (0.0264)	0.0615** (0.0256)	0.0597** (0.0240)	0.0571** (0.0247)	0.0589** (0.0238)	0.0594** (0.0261)
Observations	8,208	8,208	8,208	8,208	8,208	8,208	7,133
R-squared	0.119	0.119	0.120	0.120	0.120	0.120	0.129
Peer SES		X	X	X	X	X	X
Peer agricultural hukou			X	X	X	X	X
Peer openness				X	X	X	X
Peer cognitive ability					X	X	X
Female share						X	X
NSD and ability							X

Note: This table reports the stability of student-reported school relationship estimates after sequentially adding controls. The dependent variables are standardized classroom atmosphere and homeroom teacher praise. All specifications include school-by-grade fixed effects, student and family controls, and homeroom teacher controls. Peer SES includes peers' mothers' education, fathers' education, and household income. Column 7 additionally controls for the student's own parent NSD and cognitive ability; its smaller sample reflects missing values in own parent NSD. Standard errors clustered at the classroom level are reported in parentheses.

Table A.6: Robustness of Parent- and Homeroom-Teacher-Reported Relationship Estimates

	(1) Base	(2) +SES	(3) +Hukou	(4) +Open	(5) +Cog.	(6) +Female	(7) +Own
<i>Panel A. Parent-reported liking of homeroom teacher</i>							
Peer parent NSD	0.0813*** (0.0258)	0.0813*** (0.0265)	0.0809*** (0.0265)	0.0781*** (0.0257)	0.0794*** (0.0245)	0.0807*** (0.0241)	0.0582** (0.0263)
Observations	7,955	7,955	7,955	7,955	7,955	7,955	7,134
R-squared	0.119	0.121	0.121	0.122	0.122	0.122	0.125
<i>Panel B. Homeroom teacher job satisfaction</i>							
Peer parent NSD	0.232** (0.109)	0.249** (0.107)	0.251** (0.106)	0.252** (0.100)	0.240** (0.0980)	0.255** (0.101)	0.242** (0.105)
Observations	8,213	8,213	8,213	8,213	8,213	8,213	7,153
R-squared	0.699	0.705	0.706	0.716	0.718	0.728	0.723
Peer SES		X	X	X	X	X	X
Peer agricultural hukou			X	X	X	X	X
Peer openness				X	X	X	X
Peer cognitive ability					X	X	X
Female share						X	X
NSD and ability							X

Note: This table reports the stability of parent- and homeroom-teacher-reported relationship estimates after sequentially adding controls. Panel A uses parents' reports of whether students like their homeroom teacher. Panel B uses homeroom teachers' job satisfaction. All specifications include school-by-grade fixed effects, student and family controls, and homeroom teacher controls. Peer SES includes peers' mothers' education, fathers' education, and household income. Column 7 additionally controls for the student's own parent NSD and cognitive ability; its smaller sample reflects missing values in own parent NSD. Standard errors clustered at the classroom level are reported in parentheses.