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The Spillover Effects of Parental Verbal Conflict on Classmates' Cognitive and Noncognitive Outcomes

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Abstract:

This study shows that children exposed to Interparental Verbal Conflict (IPVC) exert negative spillovers on their peers. Our first identification strategy uses within-school, across-classroom variation in peer's IPVC in schools that randomly assign students into classrooms. Our second strategy uses within-student, year-to-year changes in peer's IPVC to control for peer's pre-existing characteristics. Both results suggest that being randomly assigned to classes where more classmates experience IPVC reduces mental wellbeing, lowers social engagement, diminishes self-confidence, and increases the likelihood of problem behaviors. Effects operate by damaging relationships between classmates. There is no evidence of impacts on test scores or teacher behavior.

JEL Codes: I21, J12, J13, D91

Keywords: peer effects; interparental conflict, non-cognitive skills, classroom environment

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Abbreviations: CEPS, China Education Panel Study; IPVC, Interparental Verbal Conflict; SD, standard deviation.

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1. Introduction

Interparental *verbal* conflict (IPVC) is a pervasive global issue across wealth and education distributions. There is ample evidence that exposure to IPVC is associated with negative outcomes for children: poor mental health, poor academic achievement, and increased antisocial behavior.[1] In contrast to the abundant evidence about the negative effects of parental conflict on their own children, little is known about whether the negative effects of IPVC spill over to the children's peers, such as their classmates or friends. This study aims to fill this gap.

We find that being assigned to classes where more classmates experience IPVC in their family environments reduces mental wellbeing, self-confidence, and social engagement, and increases the likelihood of problem behaviors. Effects on test scores are minimal and not statistically significant.

There is a relatively well-developed literature on the externalities associated with peer's parental characteristics. Researchers have found that "disruptive" peers, characterized by, for example, being exposed to domestic violence (Carrell & Hoekstra, 2010; Carrell et al., 2018), and having an alcoholic father (Zhao & Zhao, 2021) have profound negative impacts on other students in the same classes or schools. Our study is distinguished from this set of studies on two key dimensions. First, the richness of the survey data we analyze allows us to assess effects on both cognitive and noncognitive outcomes; many previous peer spillover studies using administrative data could not directly measure impacts on socio-emotional skills. This is especially important given the increasing evidence that personality traits and "soft skills" causally impact later life outcomes (Almlund et al., 2011; Borghans et al., 2016). And, second, we consider a peer parental characteristic that is relatively common compared to domestic violence and alcoholism – about one in ten students experience IPVC in a given year in our study sample – and varies somewhat from year-to-year – about one in ten students also change their reports of IPVC across the two years of our study. Although there remains a relatively high degree of persistence in IPVC, both the higher frequency and more transitory nature of the shock distinguish its effect from rarer and arguably less malleable peer characteristics such as exposure to domestic violence and parent alcoholism that are likely correlated with peers' other socioeconomic factors.

We adopt two empirical approaches, both of which yield similar findings. First, we exploit idiosyncratic variation in the proportion of students with IPVC across classrooms in the same school

[1] See Davies et al. (2002), El-Sheikh et al. (2001), Emery (1982), Ghazarian & Buehler (2010), Ghazarian & Buehler (2010) for example.

generated by random assignment to classes. To ensure that we are not capturing effects related to underlying classmates' socioeconomic factors that may be correlated with classmates' parental conflict, we include a detailed set of classmates' family characteristics in our model. Our second empirical strategy uses the panel structure of the CEPS, following students and their classmates from grade seven to grade eight (where they were kept in the same classrooms), and identifies effects using within-student year-to-year changes in classmates' reports of IPVC. This strategy enables us to include student fixed effects, as well as control for constant classroom-level characteristics, such as peer composition along the dimensions of gender, baseline ability, and pre-existing family characteristics. To the best of our knowledge, this is the first study in the literature that is able to use within-student, across-time variation to identify the spillover effect of a parental characteristic in randomly assigned classrooms.

The salient effects in our study are on students' noncognitive outcomes. Noncognitive or socio-emotional skills are increasingly recognized as key determinants of future success for students. Recent studies have found that short-term peer effects on test scores in schools are relatively small and cannot fully explain the large long-term impacts on subsequent labor market outcomes (Carrell & Hoekstra, 2010; Carrell et al., 2018). This highlights the importance of uncovering the direct impact of disruptive peers on noncognitive skills, a relatively undeveloped area of research. Noncognitive skills are largely shaped during adolescence (Heckman, Stixrud, & Urzua, 2006; Cunha & Heckman, 2007; Borghans et al., 2008; Heckman & Kautz, 2013; Brunello & Schlotter, 2011), so, given the setting of our study is middle schools, the peer spillovers we find are likely to have long-lasting effects.

We also find suggestive evidence that students' home environments can help offset some of the negative effects from exposure to disruptive peers. Children of parents who actively encourage their children to talk about their worries or the events happening in school are less affected by classmates' IPVC, as are children of parents who report valuing school discipline.

This paper further contributes to the literature by probing the mechanisms through which these potentially disruptive peers affect their classmates. As suggested in the "bad apple" literature, the externality could typically operate by (1) affecting teachers' preferences and behaviors; and (2) damaging the classroom environment by affecting classmate or student-teacher interactions and relationships.

We examine these possible channels. (1) To assess whether effects operate through teachers, we consider impacts on teacher time use, teaching methods, and job satisfaction. The proportion of students with IPVC does not affect any of these outcomes, suggesting that the mechanism is unlikely to operate through teacher behavior. (2) We then explore the impact on the classroom environment. Students who have more classmates with IPVC are less likely to feel that their classroom has a good atmosphere, and they are more likely to report dislike of their classmates. These findings indicate that the negative effects on noncognitive outcomes may come about through poor student relationships within the classroom. Finally, students with IPVC do not cause other students to be late, skip class, or make them unable to concentrate.

Our study uses nationally representative survey data from middle schools in China, the China Education Panel Study (CEPS). One important advantage in using the CEPS is that it collects information on schools' classroom assignment policies. We focus on schools that randomly assign students into classes upon entry to middle school at grade seven and with no further reassignments in subsequent grades, that is, schools in which students remain in the same classes throughout middle school. This is about 70 percent of the schools in the survey.

IPVC in this paper is measured by the survey question: "Do your parents often fight verbally?" In most of the existing literature, interparental conflict is measured by either surveying the parents about their relationship with each other or surveying the children about how they perceive interparental relations. Although both measures prove to be strongly correlated with each other, the measures that use children's perception are shown to be more closely related to the children's own mental and behavioral outcomes (Grych & Fincham, 1990; Fosco & Grych, 2010; Nikolas et al., 2013). However, measurement error in perceived parental conflict is possible. We test the extent to which measurement error could bias the results following a method that is similar to the one employed by Feld and Zölitz (2017), finding that estimation results are robust to relatively large degrees of classical measurement error or systematic over- or under-reporting of IPVC.

This paper contributes to extensive literature on peer composition effects. These studies have considered the impacts of peer gender (Hoxby, 2000; Lavy & Schlosser, 2011; Black, Devereux, & Salvanes, 2013; Hill, 2015; Gong, Lu & Song, 2019), peer ability (Duflo, Dupas, & Kremer, 2011; Lavy, Silva, & Weinhardt, 2012; Lavy, Paserman, & Schlosser, 2012; Xu, Zhang, & Zhou, 2020; Huang & Zhu, 2020), peer migration status (Gould, Lavy, & Paserman, 2009), presence of behavioral or mental difficulties among peers (Horoi & Ost, 2015; Aizer, 2008), male peer with female-sounding names

(Figlio, 2007), peer's drug or alcohol use (Gaviria & Raphael, 2001), smoking (Krauth, 2005; Krauth, 2007; Kooreman, 2007), and peers with divorced or convicted criminal parents (Kristoffersen, Krægpøth, and Simonsen, 2015). Many of these papers use within-school, across-cohort variation in peer composition to identify effects, relying on the assumption that parents do not select the timing of school entry based on expected cohort characteristics.[2] In contrast, we use a quasi-experimental setting—random class assignment— comparing students exposed to different levels of classmates with IPVC, as well as within-student, across-time variation, to identify effects. The latter approach has the advantage of fully controlling for peers' pre-existing characteristics given classroom composition is fixed in our setting.

2. Brief Overview of Schooling in China

In China's education system, students begin middle school in grade seven, after six years of primary education at an elementary school. Middle school ends in grade nine, which is the last year of compulsory education in China. There are three core subjects in middle school: Chinese (reading, writing, and analysis), mathematics, and English. The core subjects have standardized tests that are typically administered at the same time for all schools in a community.

Students are typically assigned to elementary and middle schools based on where they live.[3] Once school assignments are completed, classroom assignments are made at the beginning of the seventh grade. In recent years, China's Ministry of Education has generally promoted equal educational opportunities for all children; as a result, most middle schools assign students to their grade seven classes randomly. In the first wave of CEPS data, 83% of schools reported using that practice for the 2013 entry cohort. Depending on school policies, some schools reassign students in the eighth or ninth grades; otherwise, the same class assignment is maintained through a student's middle school education.

The classroom is a key peer unit among middle school students. Students in a given class take most of their subjects in the same classroom. Each student's personal storage space is usually built under

[2] Gong et al. (2018), Xu et al. (2020) and Huang & Zhu (2020) use within-school across-classroom variation.

[3] To show residency, students are usually required to present a resident card (*Hukou*) upon registration at schools. In addition to Hukous, many schools also require parents to present proof of local housing through either home ownership documentation or rental agreements.

the student's desk inside that classroom. Students' social events and extracurricular activities are generally organized at the classroom level and overseen by each class's homeroom teacher.[4]

3. Data and Variables

3.1. The China Education Panel Study

Our data are from the Chinese Education Panel Study (CEPS), a nationally representative school-based study of middle school students in mainland China. The CEPS applied a four-stage sampling design and randomly selected 112 schools from 28 representative counties to participate.[5]

The CEPS has two waves. The first wave surveyed students who were in grade seven or grade nine in the 2013-2014 academic year. The second wave followed the grade seven students to grade eight, while students who were in grade nine in the first wave were not followed because they had graduated from middle school.

The CEPS has several distinctive features. First, once a class was selected into the CEPS sample, all students in the class were surveyed. Second, all those students' parents completed the CEPS parent survey. These features allow us to obtain a full picture of both the characteristics of all peers in a class and their families. In addition to the student and parent surveys, the CEPS incorporated teacher and school principal surveys, providing detailed information about the school environment.

3.2. Key Variables

The measure of IPVC is based on a survey question in the CEPS: "Do your parents often fight verbally?"[6] Students answer "yes" or "no." It captures parental conflict as perceived by the child. As discussed in the introduction, this has an advantage over parent-reported conflict or conflict measured by other entities such as social workers in that it portrays the child's experience of their family

[4] Each class has a homeroom teacher who has primary responsibility for overseeing not only students' academic activities but also their behavior and discipline at school. Homeroom teachers are responsible for arranging classroom seating, communicating with parents, and organizing various kinds of classroom activities. The homeroom teacher is called *ban zhu ren lao shi* in Chinese, which is sometimes translated as "head teacher."

[5] Counties are stratified based on their populations' average education level and mobility, with probability proportional to size (PPS).

[6] The same questions also appear on the Children's Perception of Interparental Conflict Scale (CIPC), which is widely used to measure interparental conflict in North America (Grych, 1992).

environment. In the sample, 9.8% of students report IPVC. Figure 1 presents the distribution of the proportion of students with IPVC in a class. The class-level variable has a mean of 0.101 and a standard deviation (SD) of 0.063.

[Place Figure 1 approximately here]

The CEPS provides measures of both test scores and noncognitive outcomes. Students' official test scores in all three core subjects—Chinese, mathematics, and English—were obtained from schools' administration offices. We normalize the raw test scores to be z-scores (mean=0, SD=1).

Four questions in the CEPS are related to a student's mental health. Students are asked the frequencies with which they felt the following ways during the previous seven days: (1) sad, (2) not happy, (3) that life is not joyful, and (4) depressed. The answers range from 1 (never) to 5 (always). We use principal component analysis (PCA) on the four questions to generate an overall assessment of a student's mental wellbeing, which we call the mental distress score; the higher the score, the less happy the student.

Student confidence is measured using a survey question that asks whether the student feels confident about his or her future, with answers ranging from 1 (not confident at all) to 4 (very confident).

We use three survey questions to measure students' level of social engagement. Students are asked whether they (1) take part in activities organized by school or class (school activities), (2) feel bored at school, and (3) go to museums, zoos, or science parks with classmates or by themselves (out-of-school activities). Answers are given on a five-point scale from 1 (never) to 5 (always). A social engagement score is generated using PCA on the three questions, a higher score indicating more social engagement.

Measures of students' problem behaviors are drawn from survey questions that ask students to rate the frequencies of the following four behaviors over the past year from 1 (never) to 5 (always): (1) fighting, (2) bullying small children, (3) easily getting angry, and (4) cursing. Like the previous categories, we generate a problem behavior score using PCA. Note that behavioral questions were only included in the 2014 wave of the CEPS, so the sample size is smaller for this set of questions.

3.3. Descriptive Statistics

Table 1 reports summary statistics separately for students who report IPVC and students who do not report IPVC. The sample is restricted to schools that randomly assign students into classes at grade 7 and have no further reassignment in subsequent grades (see detailed explanation in the next section). Students with IPVC have lower test scores, are less happy, are more likely to present problem behaviors, and are less likely to display social engagement. These statistics reveal a negative correlation between exposure to IPVC and children's cognitive and noncognitive outcomes, and are consistent with them being considered "disruptive peers". Children with IPVC are also slightly older, more likely to be male, and more likely to belong to a minority ethnic group, and their parents have lower education compared to the children without IPVC.

[Place Table 1 approximately here]

Figure 2 presents the first descriptive evidence of the spillover effect: how students who do *not* have IPVC could be affected by their classmates with IPVC. We divide the classes into three equal groups based on the proportion of students in the class with IPVC: low, medium, and high. Figure 2 suggests that the high group—students who were randomly assigned to classes where more classmates had IPVC—were more likely to present mental distress and problem behaviors, less likely to engage in school activities, and more likely to have low self-confidence. In contrast, the low group—students randomly assigned to classes where fewer classmates had IPVC—show opposite signs over virtually all outcome variables. A similar tendency can be seen in test scores, although the differences are less significant than with noncognitive outcomes.

[Place Figure 2 approximately here]

4. Empirical Methodology

4.1. Random Class Assignment

The CEPS obtained each school's classroom assignment policies. To address potential nonrandom sorting into classrooms, the analysis is restricted to schools where principals report that (1) they randomly assigned students to classes at the beginning of grade seven and (2) no reassignments were made in grades eight or nine. As noted previously, this is a considerable majority of the schools in the

CEPS. The final sample includes 437 classes across 78 schools over the two years (two waves of the CEPS).

The presence of random classroom assignment in these schools has been verified by a series of recent papers (Gong et al., 2019, Hill and Zhou, 2021; Huang and Zhu 2020; Wang et al., 2018; Xu et al., 2020; Zhou and Wang, 2021). Nonetheless, we conduct a series of balance tests to confirm that class assignment is random in our particular sample. These tests are reported in Table 2. In Column 1, we regress the key variable of interest, the proportion of students with IPVC in a class, on all individual pre-determined characteristics listed in Table 1, Panel B. In Column 2, we add classroom and teacher characteristics. Column 3 only uses the first CEPS wave to avoid double-counting students followed in the second wave of the study. Columns 4 and 5 again apply the full sample but use indicators for being in the top 1% or 10% in the distribution of class-level parental conflict as the dependent variable. This is to explore balance throughout the distribution of classmate exposure to IPVC.

[Place Table 2 approximately here]

Most of the regressors in the table are not statistically significant, and the hypotheses that all coefficients are jointly equal to zero cannot be rejected in any of the specifications. There is no evidence of individual, class, or teacher characteristics being systematically related to the proportion of classmates with IPVC.

4.2. Estimation Framework

We use two approaches in the empirical analysis. First, we pool the two waves of the CEPS and treat the data as a repeated cross-section. This maximizes the sample size as both grade seven and grade nine students from the first wave can be included in the analysis. Second, we exploit the longitudinal component of the data in a panel analysis. This approach allows for the inclusion of student fixed effects to fully control for fixed student characteristics that may affect both IPVC and student outcomes, but at the cost of a smaller sample as grade nine students are not followed in the second wave, so are excluded.

4.2.1. Cross-Sectional Analysis

The following regression model is used to estimate the impact of having classmates with IPVC on students' cognitive and noncognitive outcomes

$$Y_{icgs} = \alpha Proportion_Students_with_IPVC_{cgs} + \beta X_{icgs} + \gamma W_{cgs} + \delta_g + \mu_s + \epsilon_{icgs} \quad \text{(Eq. 1)}$$

where Y_{icgs} is the outcome variable of student *i* in class *c*, grade *g*, and school *s*. The analysis is performed on students without IPVC in their own family environments to avoid conflating any effects of a student's own exposure to IPVC and mean classmate's exposure to IPVC.[7] The key variable of interest, $Proportion_Students_with_IPVC_{cgs}$, is calculated by dividing the number of students with IPVC in class *c* by the total number of students in the class. X_{icgs} is the set of student controls listed in Table 1. W_{cgs} includes a set of class-level controls: class size, proportion of females in the class, a set of teacher characteristics (age, gender, education, experience, and tenure status), and a set of mean classmates' family background characteristics (father's and mother's education, wealth level, and income assistance status).

The model also includes school fixed effects μ_s and grade fixed effects δ_g. School fixed effects control for school- or community-level factors that could simultaneously affect the likelihood of IPVC and student outcomes. Local economic conditions leading to parental unemployment, for example, may both generate spousal conflict and result in less family resources for educational inputs such as tutoring. The grade fixed effects control for potential biases introduced by systematic differences across grades.[8] Standard errors are clustered at the school level to allow for potential within-school correlations.

The parameter of interest α measures the effect of having classmates with IPVC on student outcomes. The identification strategy relies on variation in the proportion of students with IPVC across classes in the same school. The variation is generated by within-school random assignment to classes; some classes will simply have more students with IPVC than other classes in the same school.

To verify whether there is sufficient within-school variation to identify α with precision, we compute the within-school across-class standard deviation (SD) of the proportion of students with IPVC.[9] The SD is 0.046 using student-level data and 0.048 using class-level data (Panel A of Table 3). The within-

[7] Angrist (2014) and Guryan et al. (2009) suggest that the mechanical negative correlation between own and average peer characteristics could cause a bias in estimating peer-effects models. A solution to the problem is to break the sample between the students who are potentially affecting their peers and the students who are affected (Angrist, 2014; Angrist and Lang, 2004; Imberman et al., 2012). Therefore, we exclude students with IPVC from our sample.

[8] Such differences could be, for example, older students in higher grades have more difficult tests and are more aware of their family environments, so may be more likely to report IPVC.

[9] Specifically, we regressed *the share of students in the class with IPVC* on school and grade dummies and report the SD of the residual, the within-school component not explained by fixed school and grade characteristics.

school SDs are more than two-thirds of the SDs of the raw data, suggesting relatively substantial within-school variation in exposure to classmates with IPVC.

[Place Table 3 approximately here]

A key assumption underpinning the empirical approach is that exposure to IPVC in a given year is treated as exogenous. In other words, there is no feedback loop in which contemporaneous classroom shocks affect a student's likelihood of experiencing IPVC. These shocks could be related to the characteristics of classmates or teachers. The assumption is similar to Carrell & Hoekstra's (2010) characterization of a student's experiences of domestic violence in their analysis of peer spillovers.

Appendix A summarizes the common sources of spousal conflict discussed in both the broader literature and specifically occurring in China using the Family Survey of the China General Survey 2006. This evidence confirms that it is unlikely that a student's or teacher's actions or characteristics could systematically affect whether a classmate's parents engage in spousal conflict. However, it is possible. For example, parents may argue about how to respond to a teacher's disciplinary actions or their instruction method. If the related teacher actions systematically affect student outcomes, there may be a spurious correlation between the proportion of students in the class with IPVC and student outcomes. To explore this possibility, we examine the correlation between students' parental conflict and a detailed set of teacher characteristics (Appendix Table 1). We do not find any statistically significant correlations, suggesting that, at least for observable characteristics, teachers are not systematically affecting the likelihood of IPVC. Similarly, we do not find evidence that a student's IPVC is correlated with classmates' pre-existing characteristics (Appendix Table 2). Although we cannot test every possible channel through which contemporaneous classroom shocks could affect both IPVC and student outcomes, it would require a very particular pattern of relationships for this to bias the estimates.

4.2.2. Panel Data Analysis

We exploit the panel nature of the data in a second model. The inclusion of student fixed effects in this specification means that within-student variation over time is used to identify the effects of exposure to peers with IPVC.

$$Y_{ict} = \tilde{\alpha} Proportion_Students_with_IPVC_{ct} + \tilde{\gamma} W_{ct} + a_i + \delta_t + \epsilon_{ict}$$

This model is applied to the sample of students who report no IPVC in both survey years, 2013 and 2014, again to avoid any conflation of own and peer effects of IPVC. Y_{ict} is the relevant outcome for student *i* in class *c* in year *t*. In addition to many of the class-level variables included in the first model, individual fixed effects a_i control for observed and unobserved fixed student characteristics.

In the panel data analysis, the sample is restricted to schools that kept students in the same classes over the study period. Students who were transferred in or out over the study period are not included in the panel sample. We calculate our key variable of interest, the proportion of students with IPVC, based on students who are observed in both CEPS 2013 and 2014. Therefore, the student fixed effects also control for constant classroom-level characteristics, such as classroom composition in terms of gender, ability, and the preexisting family background characteristics of this fixed group.

There may be small changes in class demographics across the two years caused by classmates repeating a grade or moving schools, and these changes may not be captured by student fixed effects. The CEPS reports that about 3% of students from the first wave are missing from the second wave, with the most common reason being that they transferred to another school (77%). Appendix Table 3 examines whether the likelihood a student is missing from the second wave is correlated with their IPVC status or class-level IPVC in the first wave. The coefficients on both own exposure to IPVC and proportion of classmates with IPVC are not statistically significant; the joint hypothesis that all coefficients on IPVC status and other classroom characteristics are equal to zero cannot be rejected. This provides evidence that attrition is unlikely to bias results in our setting.

The panel data analysis relies on variation in the proportion of students within a class whose exposure to IPVC changes across the two years. Year-to-year variation in parental conflict among peers may be generated by events such as income shocks or extramarital affairs. We examine the extent of within-class variation over time in the proportion of students with IPVC in Table 3, Panels B and C. The within-class, over-time SD of the proportion of classmates with IPVC is almost one-third of its mean (Panel B), suggesting considerable variation in exposure to peer IPVC over the two years. In Panel C, it is shown that about 9.9% of students report their IPVC status changed across the two years: 4.9% of students report having parental conflict in the first year but do not report it in the second year, while 5.0% of students report the opposite.

5. Estimation Results

5.1. Own Effect of Parental Conflict

We first estimate the impact of students' own IPVC before analyzing the externalities associated with classmates' IPVC. Comparing the size of the own effect with the size of the spillover effect helps us assess the salience of the externality. We use an individual fixed-effect model to estimate the effect of own exposure to IPVC, identifying the effect by comparing outcomes for students whose IPVC status changes between grades seven and eight.

The results presented in Table 4 suggest that own parental conflict is associated with an increased likelihood of mental distress and increased problem behaviors. For example, exposing a child to IPVC causes their mental distress score to increase by 0.432***, which is about one-quarter of the SD (=0.432/1.644). However, there are no statistically significant associations between own IPVC and level of social engagement or test scores. Note that problem behaviors are only surveyed in the 2014 wave of the CEPS, so the corresponding set of estimates are identified using across-student and not within-student variation in exposure to IPVC.

[Place Table 4 approximately here]

5.2. Spillover Effect of Parental Conflict

The causal effects of having peers with IPVC are reported in Table 5. Students assigned to classes where more classmates report IPVC are more likely to present mental distress (Panel A), are less likely to engage in social activities (Panel B), have less self-confidence (Panel B), and are more likely to present problem behaviors (Panel C). However, no effects are found on test scores (Panel D).[10]

[Place Table 5 approximately here]

To assess the magnitude of these effects, consider feeling sad—an outcome of mental distress—as an example (Column 1 of Panel A). Given that the SD of the proportion of students with IPVC is 0.06 (Table 3), the point estimate of 0.595** suggests that a one-SD increase in the proportion of classmates with IPVC increases the sadness of each student in the class without own IPVC by 3.5%

[10] The estimation results in Table 5 using our full model specification (Eq. 1) are very similar to results in Appendix Table 4 that exclude observed classmate characteristics, such as classmates' parental education and family wealth. The fact that observed classmate characteristics do not affect the findings suggests the same may be true of unobserved classmate characteristics.

(=0.06×0.595/1.013) of an SD. In other words, adding one student with IPVC to a class of 50—about the average class size in the sample—increases the sadness of each student in the class by 0.012 points (=0.595×1/50) on a 5-point scale. The size of the externality is about one-tenth of the association between own IPVC and sadness reported in Table 4 .

The magnitudes of the effects on other non-cognitive outcomes are similar. A one-SD increase in classmates with IPVC reduces a student's social engagement score by 5% of a SD, reduces their confidence level by 3.6% of a SD, and increases their problem behavior score by 7.8% of a SD. A couple's conflict is also associated with an increase in problem behavior score of own children by 0.469, and causes the score of every classmate of own children to increase by 0.035 (=1.768/50).

Compared with the size of the effect resulting from peers' other family characteristics, the effect size of peer IPVC found in this paper is moderate. Carrell and Hoekstra (2010), using U.S. data, find that a one-SD increase in the proportion of peers with domestic violence, a severe form of parental conflict, causes test scores of other students in the class to fall by 2.5% of a SD and the number of disciplinary infractions committed in school to increase by 0.093, or about 5% of a SD. Note that the "disciplinary infractions" used in Carrell and Hoekstra (2010) are described as "incidents that are very serious or require intervention from the principal," which could be more aggressive behavior than a score generated from self-reported frequency of how easily one gets angry or fights. Similarly, Zhao and Zhao (2021) find that adding one more student with an alcoholic father to a class causes the average test score of the other students to fall by 1.6% of a SD.

In addition to the outcomes discussed above, the CEPS provides other outcome variables of potential interest: being late for class, skipping class, copying other's homework or cheating on an exam, being able to concentrate, frequency of watching movies or sports, smoking or drinking, and three variables measuring students' health outcomes: BMI, self-reported health status, and hospitalization in the past year. However, we found no externalities associated with peer IPVC on these outcomes (see Appendix Table 5).

5.3. Panel Data Analyses

Table 6 reports estimation results using individual fixed effects. The findings are all aligned with those in Table 5, although the parameter of interest on school activities becomes marginally insignificant.

The robustness of the results to the inclusion of student fixed effects suggests that fixed characteristics of parents (such as underlying communication or problem-solving skills likely associated with parental conflict) are not the cause of the negative externalities we document. In other words, students are affected by time-varying shocks in their peers' homes. The contemporaneous nature of the peer effect we document distinguishes it from several other peer externalities estimated in the literature.

[Place Table 6 approximately here]

Generally, although the differences are not statistically significant, the magnitudes of the coefficients in the panel data analysis are larger than in the cross-sectional analysis, particularly for the mental distress score.[11] In other words, the within-student effects of exposure to classmates' IPVC are larger than the across-student effects. One speculative interpretation is that parental conflict could have more severe effects on the affected children in the short run compared to families with more constant conflict over time. This would be in line with findings in the literature suggesting that, in the long run, children develop skills to adapt to their own interparental conflicts and overcome their negative effects (Harold & Murch, 2005).

5.4. Robustness Checks

5.4.1. Measurement Error

Students may perceive and report IPVC with error. We examine to what extent measurement error could bias the results using procedures that are similar to Feld and Zölitz (2017). First, we randomly select a specified share of students into an "error" sample (e.g., 1% or 5% of the original sample). Then, we randomly assign IPVC status to students in this error sample, maintaining the mean level of IPVC in the original sample to ensure that the introduced measurement zero has a mean of zero. We call the new sample (the combination of the error sample and the remaining original sample) the error-included sample. Using this error-included sample, we re-generate our key variable of interest, the proportion of classmates with IPVC,[12] and then re-estimate the main model. We repeat this procedure 500 times to generate a simulated distribution of the key parameter, the effect of the proportion of

[11] The *p*-value of an equality text that examines the difference in the coefficient of mental distress index between cross-section analysis (Table 5, panel A) and panel analysis (Table 6, panel A) is 0.25.

[12] Note that although the mean of IPVC in the error-included sample is the same as the original sample, the proportion of students with IPVC in a given class could be different in the error-included sample compared to the original sample.

classmates with IPVC on the respective outcome. The extent to which this distribution excludes null effects provides information about the robustness of the finding to the specified level of measurement error.

The above experiment introduces mean-zero (classical) measurement error into the sample. We also investigate whether our estimates are robust to systematic overreporting or underreporting of IPVC. The approach is similar. For the test of sensitivity to systematic overreporting, rather than constructing an error sample randomly, only students who report having no IPVC are eligible for selection into the error sample, and then we assign the students in the error sample to have IPVC. The remaining procedure is the same: we obtain estimates of the key parameter for 500 measurement error "draws" and generate a simulated distribution. The same experiment is also carried out for underreporting. For this test, only students who report IPVC are eligible for inclusion in the error sample before the IPVC status of students in the error sample are reversed.

We consider four outcome variables in our investigation of sensitivity to measurement error: the mental distress score, the social engagement score, the confidence level, and the problem behavior score. We report the mean and 95% CI of our estimates in Figure 3. The simulation results indicate that the negative externalities associated with IPVC persist in the presence of an additional 5% of classical measurement error in student reporting of IPVC, as well as introducing a similar level of systematic overreporting or underreporting of IPVC.[13] The simulation using the panel model shows similar results (Appendix Figure 1).

[Place Figure 3 approximately here]

5.4.2. Additional Robustness Checks on Random Classroom Assignment

Recall that the analysis is restricted to middle schools where principals report that classroom assignment is random in grade seven and where there is no reassignment in grades eight or nine. In this subsection, we probe whether unreported classroom reassignment may be affecting our findings. First, we perform the analysis on grade seven students only, reducing any possibility of reassignment in later grades affecting our findings. The parameters of interest are identified using across-student

[13] For example, assume the original sample has 10,000 observations, our results are robust if 500 observations' IPVC status are randomly assigned (while keep the mean of IPVC changed), or 500 observations are assigned to overreport their IPVC status, or 500 observations are assigned to underreport their IPVC status.

variation with this restriction. Table 7, Panel A, reports the results, showing the negative spillovers remain precisely estimated and are of a similar magnitude in this subsample.

[Place Table 7 approximately here]

Second, we restrict the sample to schools where principals disagree that "Parents request assignment of their children to specific teachers' classes" (Table 7, Panel B). Note that this question only asks whether parents requested a specific assignment, not that the principal granted any such requests. Therefore, principals were able to answer honestly without being concerned about violating government policies. The estimation results in both panels remain essentially unchanged.

Third, we repeat the balance test reported in Table 2, but using data from schools where principals report using *nonrandom* classroom assignment (schools excluded from the sample.) This test is simply to explore whether the original balance test has the potential to detect nonrandom assignment to classes. Appendix Table 6 indicates there is imbalance in this sample: the joint hypotheses that all coefficients are equal to zero can be rejected (the *p*-value of the *F*-statistic=0.005). We interpret this as evidence that the balance test has the potential to find some forms of nonrandom class assignment, but, notably, does not.

Finally, we estimate whether peer parental conflict impacts predetermined student or parent characteristics, such as father's or mother's education. This could only occur if there were selection into peer groups. The results from these falsification tests are reported in Table 7, Panel C. All estimates are insignificant.

The robustness tests using individual fixed effects models are reported in Appendix Table 7. All results are consistent with the cross-sectional analysis.

5.4.3. Other Robustness Checks

One concern regarding our identification strategy is that a family's IPVC may be correlated with that family's financial distress, and it could be that financial distress is causing the externality rather than the IPVC. To address this concern, we add the following four mean classmates' family characteristics to our regression model: father's and mother's employment status and whether father and mother have skilled occupations.[14] Note that classmates' family wealth and whether the household is on

[14] Skilled occupation is a dummy variable indicating whether an individual is a government official or management personnel or has a skilled occupation such as engineer, doctor, lawyer, or technician.

income assistance are already included in the baseline controls. Appendix Table 8 shows that our estimation results are essentially unchanged.

Using the same CEPS data set, Zhao and Zhao (2021) find that having an alcoholic father negatively affect peers' academic outcomes. One concern with our study is that our results could be driven by the father's alcoholism, since this may be correlated with IPVC.[15] To address this concern, we re-estimate our main results in Table 5 and Table 6 controlling for the proportion of peers with an alcoholic father. Appendix Table 9 shows that our results are robust. The size of the coefficient remains essentially unchanged, suggesting that parental conflict generates externalities regardless of the presence of parental alcoholism.

Our panel data analysis includes students that are observed in both CEPS 2013 and 2014. There may be concerns about how the characteristics of students who transferred in or out of the classroom during the study period affect our estimates.[16] To address this issue, we further control for the following variables in our panel estimation: the proportion of students who transferred in or out, the average IPVC status of those transferred in or out, and the average years of education of the father and mother of those students who transferred in or out. The estimation results reported in Appendix Table 10 are essentially unchanged compared with our original estimates.

Many students in the cross-sectional sample are not included in the panel sample: grade 9 students who were not followed in the second wave and some grade 7 students who dropped out of the sample. This makes comparisons across the two samples difficult. To address this concern, we re-estimate the cross-sectional sample by restricting the sample to students who are used in the panel sample. We find our results are essentially unchanged (Appendix Table 11).

6. Potential Mechanisms

[15] The correlation between father's alcoholism and IPVC is 0.25 in our sample.

[16] Dropping classrooms with composition changes is a potential alternative approach to addressing this issue. However, although in each classroom, on average, only one student transferred in and/or out over the two years of the study period, only about 30% of the classrooms have exactly the same composition over the study period; dropping 70% of the data is too costly in terms of precision.

The externalities associated with peer parental conflict could operate through a number of potential channels. We consider the effects of classmates' IPVC on two candidate mechanisms: (1) teacher behavior and preferences, and (2) the classroom environment.

We consider three broad categories of teacher-related mechanisms: teacher time use, instruction methods, and job satisfaction. The CEPS includes a rich teacher survey that asks teachers several questions about each of these categories. To evaluate potential impacts on teacher time use, we use time spent communicating with students, time spent preparing lectures, time spent delivering lecturing, time spent marking, and total teaching time (the sum of the previous four). To evaluate potential effects on teaching methods, we consider whether teachers report using a variety of inputs in their classroom instruction: lectures, group discussion, student-teacher interactions, multimedia equipment, the internet, personal teaching websites, domestic textbooks, foreign textbooks, self-written materials, and reference books. Finally, teachers report a set of indicators related to their job satisfaction: willing to be homeroom teacher again, feeling tired of being a teacher, willing to be a teacher again, willing to be a middle school teacher again, and overall job satisfaction.

Despite this large list of teacher-related variables, no consistent effect on teacher outcomes could be detected; the only statistically significant impact of the proportion of classmates with IPVC was on teachers' use of reference books, and this was at the 10% level (Appendix Table 12). Classmate exposure to IPVC does not appear to systematically affect teacher behavior or preferences.

Turning to potential effects on the classroom environment, we consider several questions from the student survey of the CEPS in which students are asked about interactions with their peers. We find that students with more classmates experiencing IPVC are less likely to report "Like classmates," "Classmates are nice to me," "The class I belong to has a good atmosphere," and "I feel close to the people in school" (Table 8). We find consistent evidence that higher shares of classmates with parental conflict are associated with worse classroom atmospheres. Rather than disruptive peers directly affecting their teachers, they are affecting their peers. These negative effects are consistent with the lower levels of their own mental wellbeing reported earlier.

[Place Table 8 approximately here]

Finally, note that some learning processes are not negatively affected by their troubled peers: the effect on students' ability to concentrate or how often they are late or skip class are not statistically significant (Appendix Table 5). Interpreting these findings alongside the absence of effects on teacher behavior

and preferences, it is less surprising that the effects on test scores are minimal and not statistically significant.

7. Heterogeneity and Potential Mitigating Factors

Are some students more affected by disruptive classmates than others? In particular, are there student characteristics that may mitigate the negative externalities associated with peers with IPVC? To answer these questions, we investigate heterogeneity in the effects of peer parental conflict by family characteristics of the affected students.

We explore whether the spillover effects on children's mental wellbeing depend on whether parents frequently talk with and spend time with their children. The variable "Parents frequently talk with children" is generated from survey questions asking parents whether they actively initiate conversation with their children on the following topics: (1) things happening at school, (2) relationships with friends, (3) relationships with teachers, and (4) worries and troubles.[17] Parents are asked to rate their answers on a three-point scale from 1 (never) to 3 (always) for each topic.

We sum the answers over all topics and generate a dummy variable indicating whether the summed score is above the median. We interact the dummy variable with the proportion of students in the class with IPVC, and include the interaction as additional regressors in the model.

Table 9, Columns 1 to 4, show that the coefficient on the proportion of students with IPVC – the effect for students whose parents do not exhibit the associated behaviors – is slightly larger than in Table 5, although the difference is not statistically significant. However, the interaction terms have the opposite sign, are statistically significant at the 1% level, and largely cancel out the level effect. In other words, the children of parents who communicate and invest in family time do not experience the negative spillovers associated with classmate IPVC. In contrast to these results, we do not find evidence that the externality depends on mother's education (the second panel of Table 9), suggesting the heterogeneity we find above is more likely to be driven by parents' approach towards children instead of characteristics more generally related to parental cognitive skills.

[Place Table 9 approximately here]

[17] In addition to the four topics, children's mental status is also asked in CEPS 2013. Unfortunately, the topic is not asked in CEPS 2014. We therefore cannot include it in our analysis.

The above heterogeneity analyses suggest that parental involvement in the form of active communication may mitigate the negative externalities associated with disruptive peers. Although these findings are only suggestive – the associated parental behaviors are potentially endogenous to children's own noncognitive outcomes – they indicate that parents may have an important role in equipping their children to deal with negative influences in the classroom environment.

8. Conclusion

Students experiencing conflict at home are known to exhibit disruptive behaviors in the classroom. Building on a literature that documents negative externalities exerted by students experiencing persistent home conflict that is both rare and extreme – domestic violence - we find evidence that more common and potentially time-varying home challenges can also negatively affect students' classmates. In particular, we document negative spillovers in the classroom from peer interparental verbal conflict on noncognitive and socio-emotional skills, such as social engagement and confidence, as well as on problem behaviors. There is no effect on test scores. The effect appears to operate through reductions in the quality of the classroom atmosphere and relationships among classmates rather than through changes in teacher inputs, which we interpret as consistent with the negative effect on noncognitive skills without a corresponding decline in test scores. Finally, we also find that students of higher quality parents—parents who are more communicative and invest more time in their children—are less affected by negative classmate influences. This is some of the first evidence that parents may be able to insulate their children directly or indirectly from negative peers, and, although beyond the scope of the analysis in this paper, suggests a policy instrument: programs that develop and enhance parenting skills may be an effective mitigation strategy for negative peer effects.

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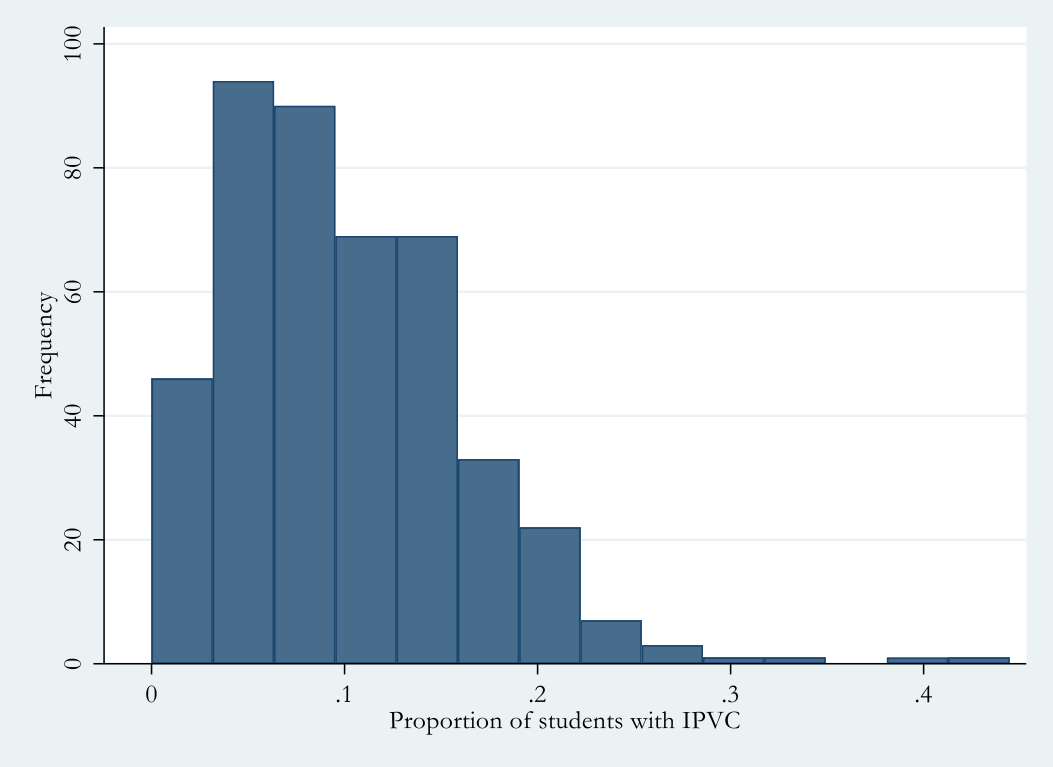
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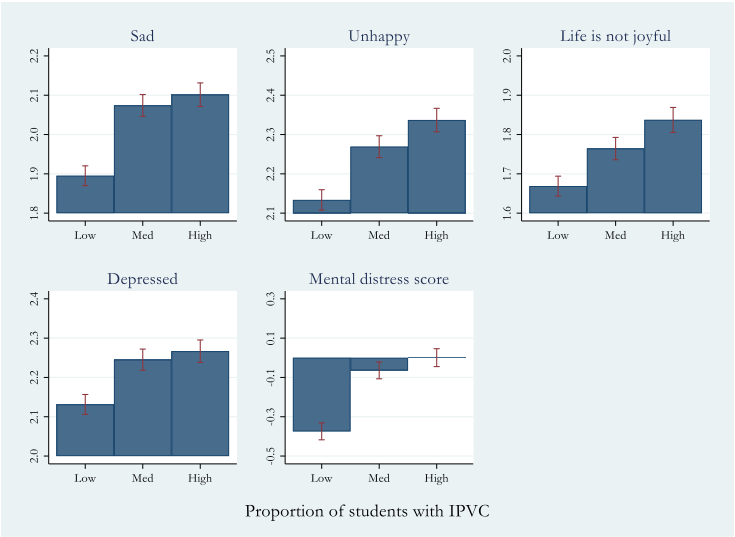
Figure 1. Distribution of the main variable of interest: proportion of students with parental conflict in a classroom



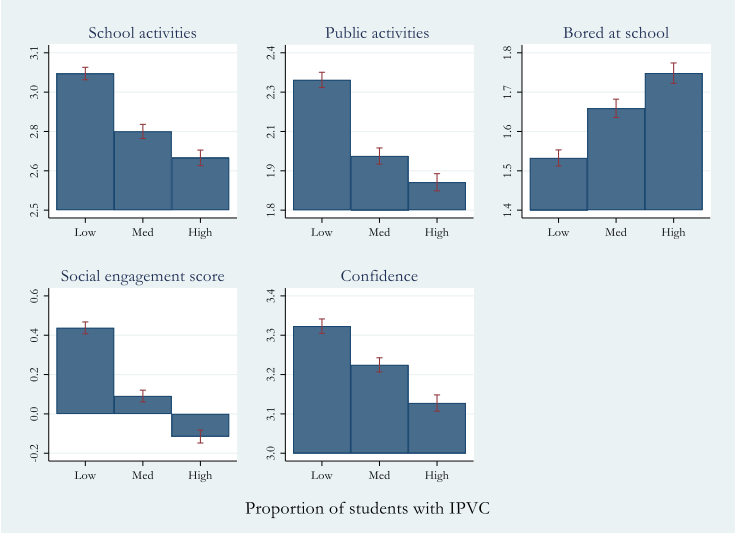
Note: The unit of observation is a class. Sample size: 437.

Figure 2. Correlation between proportion of students with IPVC in a class and outcomes of students without IPVC in randomly assigned classrooms

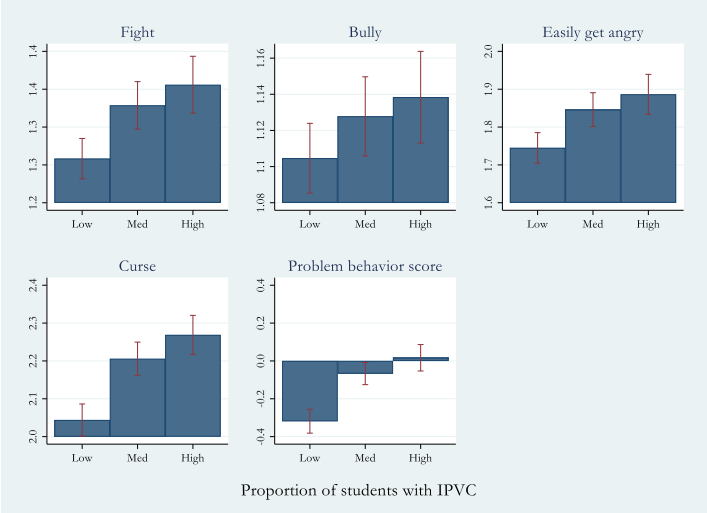
A. Mental distress of students without IPVC



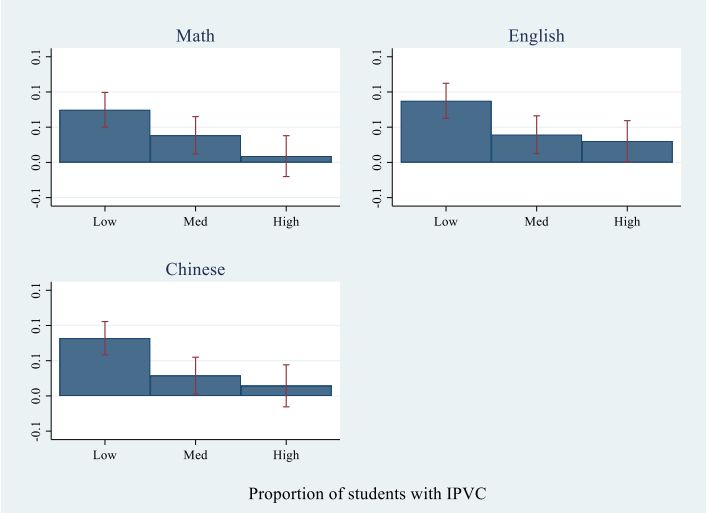
B. Social engagement and confidence of students without IPVC



C. Problem behavior of students without IPVC (CEPS 2014 only)

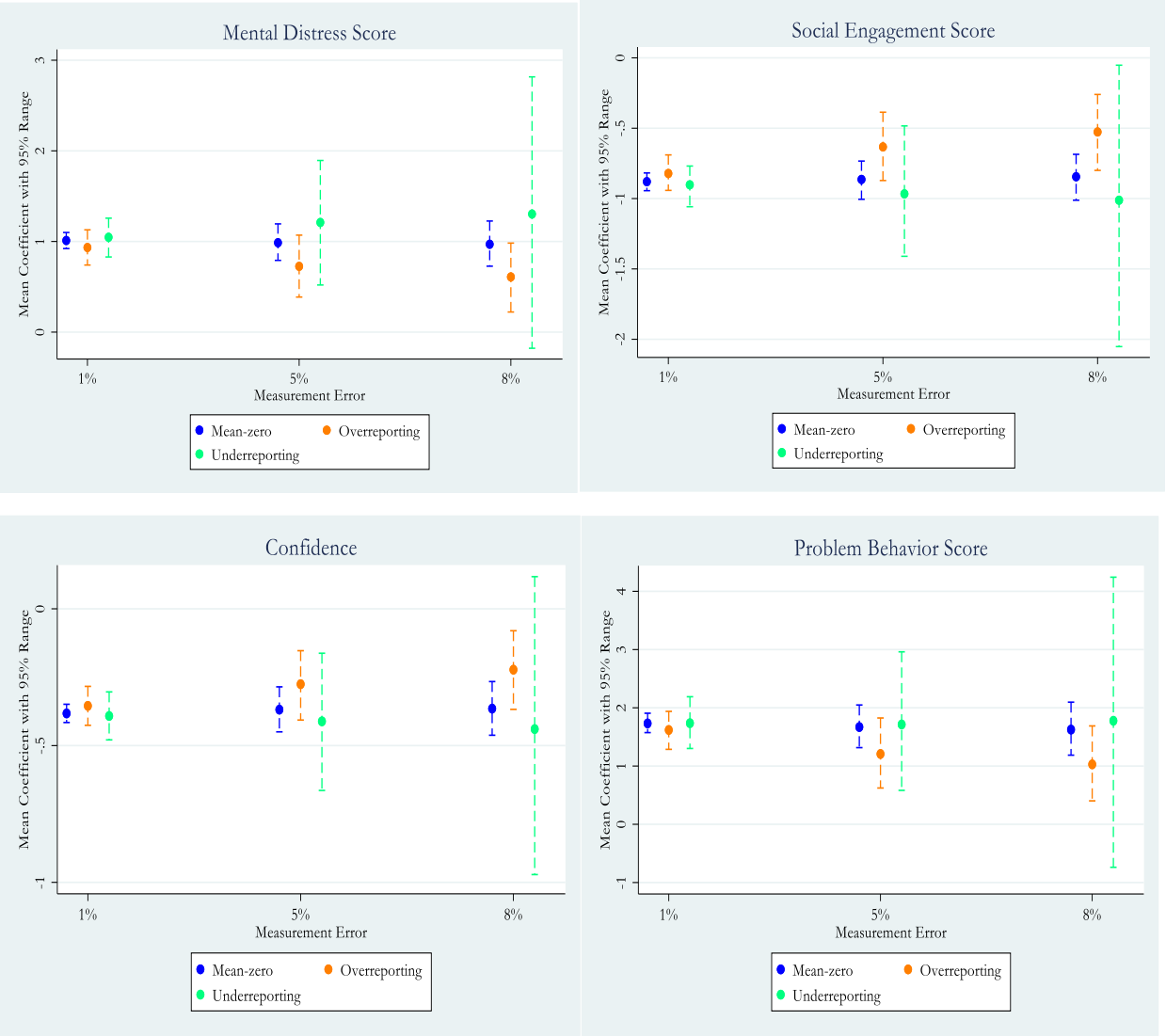


D. Test score of students without IPVC



Note: samples are equally divided into three groups based on the proportion of students with parental conflict in a class: low, medium, or high. Outcomes of students with no own parental conflict are used. Sample size: 15772 in panel A, B and D; 5167 in panel C.

Figure 3. Sensitivity to measurement errors, cross-section analysis



Notes: CEPS 2013 and 2014 cross-sectional sample is used, except for "Problem Behavior Score" where only CEPS 2014 sample is used. All regressions control for individual characteristics, classroom characteristics, homeroom teacher characteristics, school and grade fixed effects as in Table 5.

Table 1. Summary statistics

	Students *with* IPVC		Students *without* IPVC	
	Mean	Std. Dev.	Mean	Std. Dev.
A. Outcome variables				
Test scores				
Chinese	-0.068	1.009	0.044	0.981
Math	-0.055	1.023	0.055	0.988
English	-0.057	1.029	0.045	0.971
Mental outcomes				
Sad	2.546	1.185	2.014	1.013
Unhappy	2.786	1.158	2.237	1.024
Life is not joyful	2.328	1.311	1.748	1.037
Depressed	2.692	1.137	2.208	0.988
Mental distress score (PCA)	0.944	1.957	-0.159	1.644
Confident about future	2.947	0.817	3.228	0.702
Social engagement				
School activities	2.59	1.059	2.856	0.989
Feel bored at school	1.935	0.963	1.636	0.85
Out-of-school activities	1.828	1.073	2.088	1.141
Social engagement score (PCA)	-0.324	1.165	0.143	1.144
Problem Behavior (CEPS 2014 only)				
Fight	1.454	0.875	1.308	0.663
Bully	1.206	0.652	1.121	0.464
Curse	2.174	1.202	1.817	0.961
Easily get angry	2.51	1.095	2.159	0.971
Problem behavior score (PCA)	0.425	1.753	-0.119	1.353
B. Individual pre-determined characteristics				
Age	14.086	1.187	13.932	1.213
Female	0.468	0.499	0.482	0.5
One child	0.418	0.493	0.472	0.499
Minority	0.13	0.336	0.103	0.304
Mother's years of education	9.078	3.94	9.695	3.799
Father's years of education	9.882	3.586	10.379	3.529
Skip grade	0.021	0.142	0.014	0.118
Repeat grade	0.155	0.362	0.117	0.321
C. Classroom characteristics:				
Percentage of female	0.469	0.082	0.474	0.082
Class size	48.56	14.421	48.959	14.408
Observations	1671		15772	

Notes: CEPS 2013 and 2014 data are used except for the outcome variables related to *Problem Behavior*, which only use CEPS 2014. Observations of *Problem Behavior* for students with IPVC and students without IPVC is 545 and 5190 respectively.

Table 2. Balance test

	(1)	(2)	(3)	(4)	(5)
	Proportion of students with IPVC			Top 1 percent	Top 10 percent
Age	0.001	0.000	0.001	-0.001	0.008*
	(0.001)	(0.001)	(0.001)	(0.002)	(0.004)
Female	-0.000	0.000	-0.000	-0.000	0.001
	(0.001)	(0.000)	(0.000)	(0.000)	(0.002)
One child	0.001	0.001	0.000	-0.001	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.006)
Minority	0.004	0.003	0.003	0.001	0.017
	(0.002)	(0.002)	(0.003)	(0.002)	(0.020)
Mother's years of education	-0.000	-0.000	-0.000	0.000	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Father's years of education	-0.000	0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Skip grade	0.006*	0.005	0.006	-0.006	0.029
	(0.004)	(0.003)	(0.004)	(0.007)	(0.024)
Repeat grade	0.001	0.000	-0.001	0.003	-0.005
	(0.002)	(0.002)	(0.002)	(0.004)	(0.010)
Percentage of female		-0.019	-0.080	0.066	0.047
		(0.045)	(0.053)	(0.087)	(0.263)
Class size		-0.000	0.000	-0.000	-0.000
		(0.000)	(0.001)	(0.001)	(0.002)
Teacher characteristics					
Female		-0.008	-0.002	-0.004	-0.069*
		(0.006)	(0.007)	(0.014)	(0.041)
Age		-0.000	-0.000	-0.002	-0.001
		(0.001)	(0.000)	(0.002)	(0.003)
Years of education		-0.010	-0.002	-0.024	-0.058
		(0.007)	(0.007)	(0.018)	(0.042)
Years of experience		0.001	0.000	0.002	-0.002
		(0.001)	(0.001)	(0.002)	(0.003)
Years of tenure		-0.000	-0.000	-0.001*	-0.001
		(0.001)	(0.001)	(0.001)	(0.004)
School and grade FE	Yes	Yes	Yes	Yes	Yes
Observations	17,469	17,469	11,713	17,469	17,469
R-squared	0.007	0.024	0.025	0.019	0.031
Test for joint significance:					
F-statistic	1.125	1.070	1.002	0.388	1.043
p-value	0.355	0.398	0.466	0.984	0.424

Notes: CEPS 2013 and 2014 data are used. Variable *Top 1 percent* and *Top 10 percent* are dummies indicating whether the proportion of students with IPVC in the class is equal or above the top 1 or 10 percent of the distribution, respectively. Robust standard errors clustered at the school level are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3. Variation in proportion of students with IPVC in a class

Panel A. Cross-sectional sample: proportion of students with IPVC in a class		
	Student-level data	Class-level data
Mean	0.098	0.101
Std. dev.	0.060	0.063
Within-school across-class SD	0.046	0.049
Observations	17,469	437
Panel B. Panel sample: proportion of students with IPVC in a class		
	Student-level data	Class-level data
Mean	0.09	0.089
Std. dev.	0.059	0.059
Within-class over-time SD	0.028	0.023
Observations	10,828	256
Panel C. Panel sample: distribution of student's IPVC over the two years		
IPVC in 2013	IPVC in 2014	Percentage of students
No	Yes	5.0%
Yes	No	4.9%
Yes	Yes	4.0%
No	No	86.0%

Notes: CEPS 2013 and 2014 data are used.

Table 4. Effects of IPVC on own children

	(1)	(2)	(3)	(4)	(5)
Panel A: Mental distress	Sad	Unhappy	Life is not joyful	Depressed	Mental distress score
Own IPVC	0.161**	0.217***	0.241***	0.269***	0.432***
	(0.066)	(0.055)	(0.060)	(0.058)	(0.092)
Mean of Y	2.043	2.245	1.795	2.223	-0.103
Observations	10,696	10,693	10,670	10,714	10,611
R-squared	0.016	0.012	0.045	0.018	0.030
Panel B: Social engagement and self-confidence	School activities	Feel bored at school	Out-of-school activities	Social engagement score	Confident about future
Own IPVC	-0.020	0.053	-0.054	-0.061	-0.033
	(0.053)	(0.049)	(0.056)	(0.053)	(0.036)
Mean of Y	2.864	2.495	2.154	0.208	3.223
Observations	10,760	10,743	10,662	10,550	10,709
R-squared	0.006	0.031	0.014	0.010	0.066
Panel C: Problem behaviors (CEPS 2014 only)	Fight	Bully	Easily get angry	Curse	Bad behavior score
Own IPVC	0.124***	0.066**	0.332***	0.295***	0.469***
	(0.044)	(0.029)	(0.060)	(0.060)	(0.087)
Mean of Y	1.322	1.129	1.851	2.192	-0.067
Observations	5,395	5,399	5,401	5,403	5,374
R-squared	0.076	0.022	0.016	0.022	0.038
Panel D: Test scores	Math	English	Chinese		
Own IPVC	-0.018	-0.038	0.004		
	(0.029)	(0.026)	(0.035)		
Mean of Y	0.038	0.058	0.042		
Observations	10,827	10,815	10,828		
R-squared	0.018	0.064	0.031		

Notes: CEPS 2013 and 2014 panel sample is used except for Panel C where only CEPS 2014 sample is used. All regressions control for classroom characteristics, homeroom teacher characteristics, individual and grade fixed effects. In Panel C, grade fixed effects are dropped, and individual characteristics are controlled instead of individual fixed effects. Individual characteristics includes all pre-determined characteristics reported in Panel B of Table 1. Classroom characteristic includes all variables reported in Panel C of Table 1 and classmates' father's and mother's education, wealth level, and income assistance status. Homeroom teacher characteristics include female, age education, experience, and tenure. Robust standard errors clustered at the school level are in in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5. Effects of having classmates with IPVC, cross-sectional analysis

	(1)	(2)	(3)	(4)	(5)
Panel A: Mental distress	Sad	Unhappy	Life is not joyful	Depressed	Mental distress score
Proportion of students with IPVC	0.595**	0.663**	0.908***	0.250	1.125**
	(0.285)	(0.256)	(0.293)	(0.282)	(0.473)
Mean of Y	2.014	2.237	1.748	2.208	1.772
Observations	15,552	15,547	15,507	15,573	15,432
R-squared	0.010	0.012	0.016	0.015	0.015
Panel B: Social engagement and self-confidence	School activities	Feel bored at school	Out-of-school activities	Social engagement score	Confident about future
Proportion of students with IPVC	-0.646**	0.789***	-0.456*	-1.100***	-0.433***
	(0.306)	(0.234)	(0.254)	(0.337)	(0.163)
Mean of Y	2.856	2.472	2.088	0.156	3.227
Observations	15,646	15,433	15,457	15,272	15622
R-squared	0.012	0.021	0.024	0.030	0.029
Panel C: Problem behaviors (CEPS 2014 only)	Fight	Bully	Easily get angry	Curse	Problem behavior score
Proportion of students with IPVC	0.827**	0.535	0.766**	0.594	1.768**
	(0.395)	(0.327)	(0.375)	(0.483)	(0.799)
Mean of Y	1.308	1.121	1.817	2.159	-0.119
Observations	5,190	5,194	5,195	5,197	5,167
R-squared	0.076	0.023	0.005	0.015	0.031
Panel D: Test scores	Math	English	Chinese		
Proportion of students with IPVC	-0.089	0.055	0.191		
	(0.435)	(0.460)	(0.423)		
Mean of Y	0.044	0.055	0.045		
Observations	15,761	15,753	15,772		
R-squared	0.045	0.123	0.109		

Notes: CEPS 2013 and 2014 cross-sectional sample is used, except for Panel C where only CEPS 2014 sample is used. All regressions control for individual characteristics, classroom characteristics, homeroom teacher characteristics, school and grade fixed effects. In Panel C, grade fixed effects are dropped. Individual characteristics includes all pre-determined characteristics reported in Panel B of Table 1. Classroom characteristic includes all variables reported in Panel C of Table 1 and classmates' father's and mother's education, wealth level, and income assistance status. Homeroom teacher characteristics include female, age education, experience, and tenure. Robust standard errors clustered at the school level are in in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 6. Effects of having classmates with IPVC, panel data analysis

	(1)	(2)	(3)	(4)	(5)
Panel A: Mental distress	Sad	Unhappy	Life is not joyful	Depressed	Mental distress score
Proportion of students with IPVC	1.415**	1.422***	1.443***	0.736	2.335**
	(0.560)	(0.534)	(0.522)	(0.552)	(0.941)
Individual FE	Yes	Yes	Yes	Yes	Yes
Observations	9,206	9,202	9,184	9,222	9,134
R-squared	0.012	0.010	0.017	0.015	0.015
Panel B: Social engagement and self-confidence	School activities	Feel bored at school	Out-of-school activities	Social engagement score	Confident about future
Proportion of students with IPVC	-0.603	1.034**	-1.714***	-1.924***	-0.666**
	(0.550)	(0.451)	(0.573)	(0.606)	(0.271)
Individual FE	Yes	Yes	Yes	Yes	Yes
Observations	9,260	9,252	9,181	9,087	9,226
R-squared	0.005	0.021	0.013	0.013	0.032
Panel C: Test scores	Math	English	Chinese		
Proportion of students with IPVC	-0.147	-0.108	0.105		
	(1.100)	(1.139)	(1.295)		
Individual FE	Yes	Yes	Yes		
Observations	0.019	0.065	0.025		
R-squared	4,660	4,660	4,660		

Notes: CEPS 2013 and 2014 panel sample is used. All regressions control for classroom characteristics, homeroom teacher characteristics, individual and grade fixed effects. Classroom characteristic includes all variables reported in Panel C of Table 1 and classmates' father's and mother's education, wealth level, and income assistance status. Homeroom teacher characteristics include female, age education, experience, and tenure. Robust standard errors clustered at the school level are in in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 7. Robustness checks

	(1) Mental distress score	(2) School engagement score	(3) Confident about future	(4) Problem behavior score (CEPS 2014 only)
Panel A. 7th grade students only				
Proportion of students with IPVC	1.214*	-1.129*	-0.856***	
	(0.699)	(0.604)	(0.320)	
Observations	5,552	5,484	5,685	
R-squared	0.014	0.025	0.024	
Panel B. Parents do not request special assignment				
Proportion of students with IPVC	1.200**	-1.269***	-0.528***	1.637*
	(0.515)	(0.365)	(0.174)	(0.862)
Observations	12,713	12,587	12,847	4,272
R-squared	0.014	0.029	0.030	0.031
Panel C. Falsification test: effects on pre-existing outcomes				
	Father's education	Mother's education	One child	Minority
Proportion of students with IPVC	0.254	-0.013	0.051	0.053
	(0.263)	(0.238)	(0.068)	(0.051)
Observations	15,772	15,772	15,772	15,772
R-squared	0.323	0.334	0.057	0.004

Notes: Panel A uses CEPS 2013 sample and only grade 7 students are included in the sample. Panel B and C uses CEPS 2013 and 2014 cross-sectional sample. Panel B restricts the sample to schools where principal disagree that "Parents request assignment of their children to specific teachers' classes". Dependent variables of Panel A and B are reported in the first row of the table; dependent variables of Panel C are reported in the first row of Panel C. All regressions control for individual characteristics, classroom characteristics, homeroom teacher characteristics, school and grade fixed effects. Individual characteristics includes all pre-determined characteristics reported in Panel B of Table 1. Panel C does not control for individual characteristics which are used as dependent variables. Classroom characteristic includes all variables reported in Panel C of Table 1 and classmates' father's and mother's education, wealth level, and income assistance status. Homeroom teacher characteristics include female, age education, experience, and tenure. Robust standard errors clustered at the school level are in in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 8. Classroom environment

	(1)	(2)	(3)	(4)	(5)	(6)
	Like classmates	Classmates are nice to me	Classroom has good atmosphere	Feel close to the people in the school	Hope to transfer to another school	Like homeroom teacher
Proportion of students with IPVC	-0.275**	-0.398**	-0.753**	-0.530**	0.232	-0.304
	(0.124)	(0.175)	(0.332)	(0.257)	(0.218)	(0.269)
Observations	15,139	15,660	15,634	15,567	15,678	15,209
R-squared	0.011	0.012	0.022	0.013	0.010	0.031

Notes: CEPS 2013 and 2014 data is used. All regressions control for individual characteristics, classroom characteristics, homeroom teacher characteristics, school and grade fixed effects. Individual characteristics includes all pre-determined characteristics reported in Panel B of Table 1. Classroom characteristic includes all variables reported in Panel C of Table 1 and classmates' father's and mother's education, wealth level, and income assistance status. Homeroom teacher characteristics include female, age education, experience, and tenure. Robust standard errors clustered at the school level are in in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 9. Heterogeneity

	(1) Mental distress score	(2) School engagement score	(3) Confident about future	(4) Problem behavior score (CEPS 2014 only)
Proportion of students with IPVC	1.850***	-1.969***	-0.965***	2.196***
	(0.471)	(0.354)	(0.180)	(0.744)
Proportion of students with IPVC	-1.370***	1.704***	0.997***	-1.077**
× Parents frequently talk with children	(0.248)	(0.199)	(0.134)	(0.426)
Proportion of students with IPVC	1.405*	-1.055*	-0.809**	2.084
	(0.782)	(0.558)	(0.369)	(1.442)
Proportion of students with IPVC	-0.029	-0.005	0.039	-0.035
× Mother's education	(0.073)	(0.051)	(0.033)	(0.123)
Observations	14830	14680	15007	5059

Notes: CEPS 2013 and 2014 data is used. All regressions control for individual characteristics, classroom characteristics, homeroom teacher characteristics, school and grade fixed effects. Individual characteristics includes all pre-determined characteristics reported in Panel B of Table 1. Classroom characteristic includes all variables reported in Panel C of Table 1 and classmates' father's and mother's education, wealth level, and income assistance status. Homeroom teacher characteristics include female, age education, experience, and tenure. Robust standard errors clustered at the school level are in in parentheses. *** p<0.01, ** p<0.05, * p<0.1.