Table 1. Analytic sample summary statistics

|  |  |  |  |
| --- | --- | --- | --- |
| Key Variables | Chinese Sample | English Sample | Math Sample |
| N = 4,882 | N = 5,010 | N = 4,995 |
| ***Predictor Variables*** |  |  |  |
| Education (years) | 15.94 (0.71) | 15.87 (0.77) | 15.88 (0.79) |
| Graduate degree | 2.54% | 2.38% | 2.62% |
| Education major | 95.78% | 86.79% | 93.61% |
| Experience (years) | 16 (8) | 17 (9) | 17 (8) |
| ***Outcome Variables*** |  |  |  |
| Score | 0.00 (0.99) | 0.01 (0.99) | 0.00 (0.99) |
| Self-concept | 0.00 (0.99) | 0.00 (0.99) | 0.00 (0.99) |

Notes: Cells report mean and standard deviation for continuous variables and percentage of each category for categorical variables.

Table 2. Covariates balance check: regressions of student baseline covariate variables on predictor variable in three subjects

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Chinese Sample | | English Sample | | Math Sample | |
|  | Education (years) | Experience (years) | Education (years) | Experience (years) | Education (years) | Experience (years) |
|  | | | | | | |
| Baseline Chinese | 0.016 | 0.090 | -0.015 | -0.017 | -0.039 | -0.102 |
|  | (0.025) | (0.226) | (0.023) | (0.186) | (0.023) | (0.239) |
| Baseline English | -0.019 | 0.249 | 0.054 | -0.090 | 0.052 | 0.117 |
|  | (0.028) | (0.325) | (0.029) | (0.236) | (0.027) | (0.283) |
| Baseline math | 0.036 | -0.280 | -0.038 | 0.169 | 0.003 | -0.048 |
|  | (0.021) | (0.290) | (0.027) | (0.208) | (0.023) | (0.249) |
| Baseline cognitive | -0.016 | -0.025 | 0.020 | 0.270 | -0.002 | -0.074 |
|  | (0.021) | (0.306) | (0.028) | (0.209) | (0.015) | (0.296) |
| Female student | -0.015 | 0.081 | -0.017 | 0.246 | -0.017 | 0.099 |
|  | (0.013) | (0.137) | (0.015) | (0.125) | (0.014) | (0.173) |
| Age | 0.013 | -0.480 | -0.011 | 0.094 | 0.016 | -0.140 |
|  | (0.013) | (0.286) | (0.025) | (0.151) | (0.018) | (0.231) |
| Only child | -0.013 | 0.048 | -0.004 | -0.302 | -0.025 | 0.171 |
|  | (0.019) | (0.181) | (0.012) | (0.169) | (0.014) | (0.211) |
| Rural residency | 0.016 | 0.292\* | 0.006 | -0.266 | -0.031 | -0.091 |
|  | (0.021) | (0.145) | (0.013) | (0.179) | (0.019) | (0.227) |
| Migrant worker family | -0.016 | 0.340 | 0.019 | -0.128 | 0.024 | -0.229 |
|  | (0.027) | (0.184) | (0.021) | (0.191) | (0.018) | (0.268) |
| Mother education (years) | 0.002 | -0.011 | -0.003 | -0.019 | -0.002 | 0.042 |
|  | (0.004) | (0.032) | (0.003) | (0.028) | (0.003) | (0.042) |
| Father education (years) | 0.004 | 0.061 | -0.002 | 0.009 | -0.001 | -0.014 |
|  | (0.003) | (0.033) | (0.002) | (0.023) | (0.002) | (0.033) |
| Family income | -0.006 | 0.022 | 0.011 | 0.153 | 0.059\* | -0.518\* |
|  | (0.021) | (0.272) | (0.022) | (0.149) | (0.023) | (0.234) |
|  | | | | | | |
| School FE | Yes | Yes | Yes | Yes | Yes | Yes |
| School clustered SE | Yes | Yes | Yes | Yes | Yes | Yes |
| *F*-Statistics | 0.853  (*df* = 12; 61) | 1.731  (*df* = 12; 61) | 1.01  (*df* = 12; 62) | 1.791  (*df* = 12; 62) | 1.141  (*df* = 12; 62) | 1.347  (*df* = 12; 62) |
| Observations | 4,882 | 4,882 | 5,010 | 5,010 | 4,995 | 4,995 |
| *R*2 | 0.616 | 0.551 | 0.651 | 0.762 | 0.623 | 0.539 |

Notes: \*\*\* *p* < 0.001; \*\* *p* < 0.01; \* *p* < 0.05. Cells report coefficients and associated standard errors in parentheses. Each column reports results of a separate OLS regression where one of the predictor variables (teacher education and experience measured in years) is regressed on baseline student score measures and characteristics. All models control for school fixed effects and cluster standard errors at school level.

Table 3. Causal effect estimates of advisor-advisee relationship on teacher-student relationship

|  |
| --- |
|  |
|  | Teacher-Student Relationship | | | | | | | | |
|  | Chinese | | | English | | | Math | | |
| Advisor-advisee relationship | 0.202\*\* | 0.213\*\* | 0.224\*\* | 0.130 | 0.150\* | 0.200\*\* | 0.037 | 0.005 | 0.001 |
| (0.072) | (0.067) | (0.078) | (0.072) | (0.061) | (0.072) | (0.079) | (0.066) | (0.072) |
|  | | | | | | | | | |
| Student Covariates | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Teacher Covariates | No | Yes | Yes | No | Yes | Yes | No | Yes | Yes |
| Student Covariates | No | No | Yes | No | No | Yes | No | No | Yes |
| School FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Clustered SE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| First-stage *F* | 7.859 | 10.147 | 8.305 | 3.259 | 5.996 | 7.779 | 0.222 | 0.005 | 0 |
| Observations | 5,055 | 5,055 | 5,055 | 5,080 | 5,080 | 5,080 | 5,105 | 5,105 | 5,105 |
| *R*2 | 0.019 | 0.021 | 0.025 | 0.038 | 0.041 | 0.045 | 0.009 | 0.019 | 0.020 |

Notes: \*\*\* *p* < 0.001; \*\* *p* < 0.01; \* *p* < 0.05. Cells report coefficients and associated standard errors in parentheses. Each column reports results of a separate OLS regression where the predictor variable, teacher-student relationship is regressed on the exogenous instrumental variable, advisor-advisee relationship indicator. All models control for school fixed effects and cluster standard errors at school level. Note that for each model, the first-stage *F* statistic is the square of the *t*-statistic of the instrument’s coefficient.

**Appendix A. Data Description**

The China Education Panel Survey (CEPS) started in school year 2013-2014 and employed a stratified, four-step random sampling procedure to draw a random sample of middle schools, teachers, and students from the nation. First, they randomly selected 28 school districts/counties with probability proportional to size (PPS) from three stratified sample frames, specifically, 15 from 2,870 districts/counties (frame 1) in the nation, 3 from 31 districts/counties in Shanghai area (frame 2), and 10 from 120 migrant labor concentrated districts/counties (frame 3). Second, within each district/county, they randomly selected four schools from all schools serving 7th and/or 9th grades with PPS. Third, within each school, they randomly selected two homerooms from 7th grade and another two from 9th grade. Fourth, within each homeroom, they included all students and administered separate surveys to students, parents, homeroom advisory teachers, classroom teachers for three core subjects (math, Chinese, and English), and school administrators.

Using this procedure, the CEPS team surveyed 10,279 7th grade and 9,568 9th grade students in school year 2013-14 and successfully followed up with 9,449 of the original 7th graders (follow-up rate 91.9%) along with 471 new students in school year 2014-15. Detailed numbers of students by wave and frame are visualized in the following bar chat. Note that the 9,449 students with two-wave data (the first three bars) will be the focus of my dissertation, see more discussion in the text.

Chart, bar chart

Description automatically generated

**Appendix B. National Education Policies in China**

B1. Compulsory Education Law (2006)

The Compulsory Education Law1 was amended and adopted at the 22nd Session of the 10th National People's Congress Standing Committee and issued as No. 52 Order of the President on June 29, 2006. Relevant to my research, the law highlighted that all school-age children and adolescents shall have equal right and the obligation to receive a 9-year compulsory education (Article 4) at the schools near their residency (Article 12). They shall go to school without taking any examination (Article 12). The county level governments and education departments shall promote the balanced development among schools and narrow down school quality gaps (Article 22). No education government may create key schools and non-key schools and no school may create key classes and non-key classes (Article 22). No school may expel students based on school management rules (Article 27). Legal liabilities are attached to the violations of these articles.

B2. Regulations of Advisory Teachers by Ministry of Education (2009)

The Ministry of Education issued the Regulations of Advisory Teachers2 on August 12, 2009. Relevant to my research, the regulation specified advisory teacher’s core responsibilities as moral education, student discipline, student development, and mentoring. The regulation emphasized that every homeroom in the country shall have an advisory teacher and the position is half-time equivalent. A homeroom’s advisory teacher should teach the homeroom and should be ethical, psychologically healthy, caring, dedicated, and having strong communication ability and managerial skills.

1. See <http://www.lawinfochina.com/Display.aspx?lib=law&Cgid=77520> for a translation of the Law.

2. No translation of this document was found on the internet. The Chinese version is here <http://www.moe.gov.cn/srcsite/A06/s3325/200908/t20090812_81878.html>.

**Appendix C. Additional Tables and Figures**

Table C1. Comparing schools included and excluded from the main analyses on important school characteristics

|  |  |  |  |
| --- | --- | --- | --- |
| School Characteristics | Included | Excluded | *p*-value |
| N = 63 | N = 49 |
| School district sampling frame |  |  | 0.069 |
| Sample frame 1 | 46.03% | 63.27% |  |
| Sample frame 2 | 15.87% | 4.08% |  |
| Sample frame 3 | 38.10% | 32.65% |  |
| School district location |  |  | 0.03 |
| East China | 68.25% | 51.02% |  |
| Middle China | 9.52% | 28.57% |  |
| West China | 22.22% | 20.41% |  |
| School district administrative level |  |  | 0.018 |
| Municipality | 28.57% | 12.24% |  |
| Urban area of provincial capital cities | 20.63% | 14.29% |  |
| Urban area of prefecture-level cities | 20.63% | 14.29% |  |
| County or county-level city | 30.16% | 59.18% |  |
| District population average education (years) | 9.88 (1.44) | 9.27 (1.34) | 0.024 |
| School location |  |  | 0.9 |
| Center of the city/town | 41.27% | 32.65% |  |
| Outskirts of the city/town | 11.11% | 10.20% |  |
| Rural-urban fringe zone of the city/town | 14.29% | 16.33% |  |
| Towns outside of the city/town | 15.87% | 20.41% |  |
| Rural areas | 17.46% | 20.41% |  |
| Proportion of rural residency students |  |  | 0.003 |
| Lower than 25% | 33.33% | 8.16% |  |
| 25% to 60% | 30.16% | 22.45% |  |
| 60% to 80% | 15.87% | 30.61% |  |
| Higher than 80% | 20.63% | 38.78% |  |
| Proportion of the local students |  |  | 0.009 |
| Lower than 50% | 4.76% | 14.29% |  |
| 50% to 70% | 26.98% | 12.24% |  |
| 70% to 90% | 34.92% | 18.37% |  |
| higher than 90% | 33.33% | 55.10% |  |
| Number of substitute teachers | 1.38 (3.77) | 4.27 (17.86) | 0.5 |
| Unknown | 3 | 4 |  |
| Average homeroom size | 48 (9) | 52 (8) | 0.011 |

Notes: Cells report mean and standard deviation for continuous variables and percentage of each category for categorical variables. The *p*-statistic was obtained from a) Wilcoxon rank sum test for district population average education, number of substitute teachers, and average homeroom size, and b) Pearson’s Chi-squared test for all other characteristics.

Table C2. Comparing teacher-advisors and non-advisor teachers in full CEPS data on important teacher characteristics

|  |  |  |  |
| --- | --- | --- | --- |
| Teacher Characteristics | Teacher-advisor | Non-advisor teacher | *p*-value |
| N = 235 | N = 475 |
| Female teacher | 66.38% | 73.68% | 0.043 |
| Teacher age | 38 (7) | 39 (8) | 0.11 |
| Teaching experience (years) | 15 (8) | 17 (9) | 0.12 |
| Highest education |  |  | 0.6 |
| Associate degree | 12.77% | 12.63% |  |
| Bachelor degree | 84.68% | 83.37% |  |
| Graduate degree | 2.55% | 4.00% |  |
| Professional rank |  |  | 0.8 |
| Novice teacher | 8.09% | 8.00% |  |
| Intermediate teacher | 30.21% | 29.89% |  |
| Advanced teacher | 45.11% | 42.32% |  |
| Senior teacher | 16.60% | 19.79% |  |
| Subject area |  |  | 0.6 |
| Chinese | 36.17% | 32.84% |  |
| English | 30.21% | 33.47% |  |
| Math | 33.62% | 33.68% |  |

Notes: Cells report mean and standard deviation for continuous variables and percentage of each category for categorical variables. The *p*-statistic was obtained from a) Pearson’s Chi-squared test for gender, education, professional rank, and subject area, and b) Wilcoxon rank sum test for teacher age and experience.

## Table C3. Principal Components Analysis (PCA) on classroom TSR (based on full CEPS data)

Panel A. Chinese sample

|  |  |  |  |
| --- | --- | --- | --- |
|  | Chinese classroom TSR | | |
|  | Eigenvalue | Proportion of variance | Cumulative proportion |
| Comp1 | 1.4630 | 0.7130 | 0.7130 |
| Comp2 | 0.7203 | 0.1729 | 0.8860 |
| Comp3 | 0.5848 | 0.1140 | 1.0000 |
|  |  |  |  |
|  | Principal components (eigenvectors) | | |
|  | Comp1 | Comp2 | Comp3 |
| praise | 0.5516 | 0.7931 | -0.2583 |
| question | 0.6029 | -0.1651 | 0.7806 |
| attention | 0.5765 | -0.5863 | -0.5692 |

Panel B. English sample

|  |  |  |  |
| --- | --- | --- | --- |
|  | English classroom TSR | | |
|  | Eigenvalue | Proportion of variance | Cumulative proportion |
| Comp1 | 1.4528 | 0.7036 | 0.7036 |
| Comp2 | 0.7402 | 0.1827 | 0.8862 |
| Comp3 | 0.5842 | 0.1138 | 1.0000 |
|  |  |  |  |
|  | Principal components (eigenvectors) | | |
|  | Comp1 | Comp2 | Comp3 |
| praise | 0.5436 | 0.8109 | -0.2167 |
| question | 0.6063 | -0.2008 | 0.7695 |
| attention | 0.5805 | -0.5496 | -0.6008 |

Panel C. Math sample

|  |  |  |  |
| --- | --- | --- | --- |
|  | Math classroom TSR | | |
|  | Eigenvalue | Proportion of variance | Cumulative proportion |
| Comp1 | 1.4534 | 0.7041 | 0.7041 |
| Comp2 | 0.7383 | 0.1817 | 0.8858 |
| Comp3 | 0.5853 | 0.1142 | 1.0000 |
|  |  |  |  |
|  | Principal components (eigenvectors) | | |
|  | Comp1 | Comp2 | Comp3 |
| praise | 0.5453 | 0.8051 | 0.2335 |
| question | 0.6062 | -0.1863 | -0.7732 |
| attention | 0.5790 | -0.5631 | 0.5897 |

Notes: The survey questions are: “In your Chinese/English/math class, to what extent do you agree (0 = strongly disagree, 1 = somewhat disagree, 2 = somewhat agree, 3 = strongly agree) with the following statements”:

“My teacher always praises me” (praise)

“My teacher always asks me to answer questions” (question)

“My teacher always pays attention to me” (attention)