Understanding the Peer Effects of Non-Cognitive Ability on Academic Outcomes

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Abstract

By exploiting the random assignment of students to classes within high schools and newly available datasets in China, I find positive peer effects of non-cognitive ability on academic outcomes using linear-in-mean model. Specifically, I find positive peer effects of persistence on Math test scores, but not on Chinese and English test scores in the first wave. Moreover, I find enduring positive impacts of peer persistence on Math for students at 8th grade in the follow-up wave, which implies sustainable peer effects of persistence. I also find high-persistence students benefit from persistent peers in achieving higher math test scores but no salient evidence for low-persistence students. Two potential mechanisms are examined in this study: time allocation and peer grouping. While I do not find evidence on the mechanism that students spend more time on homework, I find evidence that students spend less time watching tv and playing video games as potential channels. Additionally, I find evidence on peer grouping mechanism for positive peer effects: mainly on grouping with good peers but no evidence on not grouping with bad peers.

Keywords: peer effects, socio-emotional skills, human capital
JEL Code: I21, I24, J24

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1 Introduction

The impacts of non-cognitive abilities on both educational attainment and labor market outcomes have been well documented in the economics literature (Heckman, Stixrud and Urzua, 2006; Borghans et al., 2008; Alan, Boneva and Ertac, 2019; Lindqvist and Vestman, 2011; Heckman and Rubinstein, 2001). While the importance of non-cognitive skills is well known to economists, evidence related to the impacts of non-cognitive through social interaction is scarce. In the setting of the classroom of the economics of education literature, peer effects are considered as one of the important social interactions. Therefore, in this study, I examine the peer effects of non-cognitive ability on academic outcomes and its potential channels, by exploiting the random assignment of students to classes within middle schools and newly available datasets in China.

Random assignment of newly enrolled students to the classroom at the beginning of 7th grade becomes more widespread in China's middle schools as it is recommended by the Ministry of Education for the purpose of students' equal and fair opportunities when they are in their nine-year compulsory education (from grade one to nine). Two random assignment strategies are mainly used in those middle schools, purely random assignment and balanced assignment rule, to ensure each classroom within the school will be balanced in term of students' test scores, gender, and other dimensions. Random assignment of students to classroom within schools provides an exogenous peer composition in the classroom, thus making us able to examine the peer effects of non-cognitive ability on academic outcomes.

The data used in this study are from wave 1 (2013-2014) and wave 2 (2014-2015) of the China Education Panel Survey (CEPS), which provides large-scale, nationally representative, longitudinal survey datasets. In wave 1, CEPS surveys 19,487 students at the 7th and 9th grade from 112 schools in the 2013-2014 academic year, and also survey information from their parents, teachers, and principals. In wave 2, CEPS keep tracking those students, as students at 7th grade go to 8th grade and students at 9th grade go to senior high school. In wave 2, however, only the data related to students at 7th grade in wave 1 is publicly available so far.

I use the linear-in-mean model to identify the peer effects in this study, which is the commonly used model in the peer effects literature (Sacerdote, 2011). For causal inference in the peer effects literature, three main problems need to be addressed, according to Manski (1993) and other studies: i) selection problem; ii) reflection problem; and iii) omitted variables problem. First, I address the selection problem by exploiting the random assignment of students to classes within schools at the beginning of 7th grade. Next, for addressing the reflection problem, I use students' prior information of non-cognitive ability when they were at 6th grade. Last, I include students' time-invariant variables in the linear-in-mean equation, which include age, gender, minority, hukou status, migrant status, an indicator for whether from one child family, whether attended kindergarten, age attending primary school, and fathers and mothers years of schooling.

In this study, I find positive peer effects of persistence, but not of other non-cognitive abilities: self-confidence, learning ability, respond quickly and openness; ii) For students at 7th grade in wave 1, I find positive peer effects on standardized Math test scores, but no significant peer effects on Chinese and English test scores; iii) For students in wave 2, when they become students at 8th grade, I find sustainable positive peer effects and that magnitudes become slightly smaller, which implies enduring impacts of peer persistence. Next, I examine the heterogeneity of peer effects. I find that high-persistence students benefit from persistent peers in achieving higher academic outcomes. However, no robust evidence is found suggesting that low and middle- persistence students benefit from having persistent peers. Interesting, I also find consistent evidence that students with low level of self-reported self-confidence, respond quickly and learning ability benefit from their peers

leave-me-out-mean on achieving higher academic outcomes (mainly on Math test score).

Two potential channels are tested in this study: students' time allocation and peer grouping. For the time allocation channel: While I do not find evidence on the impacts of peer effects on spending more time on homework, either assigned by teachers school, or by parents or tutoring school. However, I find evidence on peer effects on spending less time on both watching TV and playing video games. For the peer grouping channel: I find evidence to support the peer grouping mechanism for positive peer effects of non-cognitive ability, mainly on grouping with "good" peers (who are either study hard or have the expectation on going to college) and no evidence on not grouping with "bad" peers.

This paper extends the existing literature on documenting the peer effects of non-cognitive ability on educational performance, as established by Golsteyn, Non and Zölitz (2019). Using random assignment of college students to university sections in Switzerland, Golsteyn, Non and Zölitz (2019) find that students perform better in the presence of more persistent peers and this impact is enduring in subsequent periods, which are consistent with results found in this study. However, there are several differences between my study and Golsteyn, Non and Zölitz (2019)'s. First, for the academic outcomes, I look for test scores for each main subject in China: Chinese, Math, and English, instead of just GPA (as in Golsteyn, Non and Zölitz (2019)), which allows me to look at the impacts on academic outcomes more specifically; Second, due to the detailed survey information contained in CEPS, I am able to test two potential channels of impacts of peer personality: time allocation and peer grouping. While I do not find evidence on the mechanism that students spend more time on homework, I do find evidence that students spend less time watching tv and playing video games as potential channels. In addition, I find evidence on the impacts of peer personality through grouping with good peers and not evidence on not grouping with bad peers. Last, to my best knowledge, this study contributes the first evidence of impacts of peer personality in the high school setting, and also provide the first evidence of peer effects of personality from developing countries.

The rest of the paper is organized as follows. Section 2 provides background information on student-classroom random assignment within the high schools in China. Section 3 and 4 introduce the data and identification strategy, respectively. Section 5 presents the main empirical findings and heterogeneity. Section 6 discusses two potential channels of main findings, while section 7 concludes the paper.

2 Randomization Background

Middle schools in China use various methods to assign their students into classrooms. As mentioned by Gong, Lu and Song (2018), random assignment of students to the classroom at the beginning of 7th grade becomes more widespread in China as it is recommended by the Ministry of Education for the purpose of students' equal and fair opportunities when they are in their nine-year compulsory education (from grade one to nine). As shown in this study, 74% of middle schools Wave 1 of CEPS was using random assignment policy for their student-class assignment process.

Two random assignment strategies are commonly used in those middle schools in China: i) purely random assignment, and ii) "balanced assignment" rule. The former includes an example that assigns students to classroom randomly using the computer program which incorporates with students' demographic, classroom and other information to finish the randomization process (Gong, Lu and Song, 2018). The latter, "balanced assignment" rule, refers to the process of evenly assigning students into the classroom in term of their test scores at the end of 6th grade or the beginning of 7th grade. For example, we assume there is a middle school with 5 classes and 200 students at 7th grade. Based on those 200 students' test scores in exams at the end of 6th grade or test scores in diagnostic tests at the beginning of 7th grade, the school will rank those students from 1 to 200. First, starting with the top 5 students, the school will assign student with rank 1 to the Class 1, rank 2 student to the Class 2, rank 3 student to the Class 3, and all the way to the student with rank 5 to the Class 5. Next, student with rank 6 will be assigned to the Class 5, rank 7 student will be in Class 4, and all the way back to assigning rank 10 student to the Class 1. The school will keep continuing the above process until all the students are assigned in the classroom. Besides the above example, the "balanced assignment" rule also refers to other similar processes for the purpose of balancing test scores in each classroom. Two examples of using "balanced assignment" rule for the random assignment process in China's middle school can be found in Carman and Zhang (2012) and Feng and Li (2016).

For samples from the CEPS's first wave used in this study, I choose schools with random assignment policy following similar criteria used by Gong, Lu and Song (2018) [1]. Schools in the first wave that assign students to classrooms randomly should meet the following two conditions: (i) the school principal reports that standards used for arranging new students into classrooms are random assignment; and (ii) all head teachers in the seventh grade report that students are not assigned by test scores.[2] Using this criterion of choosing schools with random assignment policy, and only focusing on 7th-grade students in wave 1, I find that 74% of the schools in the 2013-2014 CEPS database assign classrooms randomly, translating into a sample of 6,301 students across 137 classrooms and 83 schools. See Table 1 for statistical description and the balancing tests of random assignment can be found in Table 2 and Table 3.

For schools in the follow-up wave, some of those schools will reassign their students to different class with or without using random assignment policy, when their students move from 7th grade to 8th grade. Since the information of how those schools reassign their students is not available, I exclude all the schools in the second wave with reassignment policy. I select schools in the second wave that meet the following two conditions: (i) the school principal reports that there was no reassignment of students to classrooms at the beginning of the eighth grade; and (ii) there is 'w2clsra" indicator in the second wave to

[1] The random assignment strategy was firstly used in Hu (2015) and is also used in several peer effects studies (Eble and Hu, 2018, 2017; Hu, 2018)

[2] Compared to the conditions used in this study, Gong, Lu and Song (2018) have one more condition in their study's criteria: after students have been assigned to classrooms at the beginning of the seventh grade, there is not a rearrangement of their classes for grades 8 and 9. However, in this study I only focus on students from the seventh grade in the first wave of CEPS, instead of students from both seventh and ninth grade, so I do not need to meet this condition in my criteria.

identify which whether there was reassignment at the beginning of the eighth grade, provided by the CEPS program. Thus I keep those schools where the indicator showing that there were not any reassignment in the second wave.[3] Therefore, I further exclude 13 schools that were in the first wave to track the long-term impacts of peer effects of non-cognitive ability. Eventually, after excluding those schools with reassignment policy, the final sample used as the follow-up observation ends up with a sample of 5,277 students across 117 classrooms and 70 schools.

3 Data

The data used in this study are from wave 1 (2013-2014) and wave 2 (2014-2015) of the China Education Panel Survey. CEPS, held by the National Survey Research Center at the Renmin University of China, which provides large-scale, nationally representative, longitudinal survey datasets.

In wave 1, CEPS surveys 19,487 students at the 7th and 9th grade from 112 schools in the 2013-2014 academic year, and also survey information from their parents, teachers, and principals. In wave 2, CEPS keep tracking those students, as students at 7th grade go to 8th grade and students at 9th grade go to senior high school. In wave 2, however, only the data related to students at 7th grade in wave 1 is publicly available so far.

Using the criteria mentioned in section 2 of choosing schools with random assignment policy, and only focusing on 7th-grade students in wave 1. The final sample is with 6,301 students across 137 classrooms and 83 schools in wave 1, and with 5,225 students across 115 classrooms and 69 schools in the follow-up wave. See Table 1 for statistical description.

3.1 Measurement

Non-cognitive Ability: Seven questions related to non-cognitive abilities are measured in the CEPS2013-14 dataset for students at 6th grade, which consists of: 1) three measurements on persistence: persistence on attending school, persistence on finishing disliked homework, persistence on finishing challenging homework; 2) four measurements on non-cognitive abilities: self-confidence, respond quickly, learning ability and openness.[4] Detailed information of those non-cognitive ability measurements can be found in Table A of the Appendix.

Dependent Outcomes: Academic outcomes are consist of midterm test scores for Chinese, Math, and English for students at 7th grade in the first wave and at 8th grade in the follow-up wave. All students' test scores are provided from the school administration surveyed by the CEPS. Standardized test score for all three subjects, with mean 70 and standard deviation 10, are organized and provided by the CEPS directly.

[3] According the information provided by the CEPS wave 2's codebook, there are 20 schools in wave 2 were reassigning their students at the beginning of the eighth grade, which is indicated by a variable "w2clsra". While schools' information on reassignment is almost identical under those two conditions, there is one school where the principal reports they did reassign students at the eighth grade but "w2clsra" indicates there was not. I drop that school as well in the second wave.

[4] I aim to use the measurements of students' non-cognitive ability at 6th grade to address the reflection problem (Manski, 1993). The issue here is that, the questions of non-cognitive abilities at 6th grade was asked at the survey when the students are at 7th grade. Therefore, one might think about the measurement errors issue. In other words, those non-cognitive abilities measurement may be a function of students' states at 7th grade. I address this issue by testing the relationship between students' non-cognitive ability and its peer means. As shown in Table B of the Appendix, I find there are negative relationships for two non-cognitive ability: respond quickly and openness. However, those findings will not affect our conclusion on positive peer effects, which are based on other non-cognitive ability, i.e., positive peer effects of persistence and learning ability.

Channels: Time Allocation and Peer Grouping
CEPS provides rich information on testing the potential channels of positive peer effects found in this study. Two of those potential channels are student's time allocation and peer grouping. The former can be treated as the **direct** channel of peer effects, as those outcomes will directly affect students' academic outcomes, if there are any peer effects. The latter can be treated as **indirect** channel, as students can improve their academic outcomes without putting any additional efforts.

Time Allocation variables include: 1) Student's time spending on homework assigned by their teachers at school last weekday, weekend and week; 2)Student's time spending on homework assigned by their parents or tutoring school last weekday, weekend and week; 3)Student's time spending on watching TV last weekday, weekend and week; and 4)Student's time spending on playing video games last weekday, weekend and week.

Peer Grouping are consist of a series of survey questions on "How many of your best friends mentioned above fit in the following descriptions": 1) Doing well in academic performance; 2) Studying hard; 3) Expecting to go to college; 4) Skipping classes; 5) Criticized or punished for violating school rules; 6) Always fighting with others; 7) Smoking or drinking alcohol; 8) Always going to net bars or paling video arcade; 9) Being or having been in a relationship.

4 Identification Strategy

4.1 Balancing Tests

$$\overline{NC}_{-i,j,k} = \beta_0 + \beta_1 X_{i,j,k} + \delta_k + \epsilon_i \tag{1}$$

Where $\overline{NC}_{-i,j,k}$ is the leave-me-out-mean of each peers' non-cognitive ability in class j school k, $X_{i,j,k}$ is student's time-invariant variables, which include age, gender, minority, hukou status, migrant status, indicator for whether from one child family, whether attended kindergarten, age attending primary school, and fathers and mothers years of schooling. δ_k is the school fixed effects, and ϵ_i is the error term. Standard errors are clustered at school level to allow correlation across students within each school.

The results of the balancing test can be found in Table 2 and 3. While Table 2 is the results of the balancing test with school fixed effects, Table 3 shows the results of the balancing test without fixed effects. We can see that, conditional on which school to attend, student' time-invariant variables are generally not good predictors for her peer mean of non-cognitive ability at 7th grade, which implies good balancing for student-class random assignment.

4.2 Linear-in-Mean Model

$$Y_{i,j,k} = \beta_0 + \beta_1 NC_{i,j,k} + \beta_2 \overline{NC}_{-i,j,k} + \beta_3 X_{i,j,k} + \delta_k + \epsilon_i \tag{2}$$

Where $Y_{i,j,k}$ are student's academic outcomes for Chinese, Math, and English test scores at 7th grade and 8th. $NC_{i,j,k}$ is student i's non-cognitive ability when she was at a 6th-grade student, and now as a 7th-grade student, in class j, school k. $\overline{NC}_{-i,j,k}$ is the leave-me-out-mean of each peers' non-cognitive ability in class j, school k, $X_{i,j,k}$ is student's time-invariant variables, which include age, gender, minority, hukou status, migrant status, indicator for whether from one child family, whether attended kindergarten, age attending primary school, and fathers and mothers years of schooling. δ_k is the school fixed effects, and ϵ_i is the error term. Standard errors are clustered at school level.

4.3 Heterogeneity

$$\begin{aligned} Y_{i,j,k} = \beta_0 + \sum_{level=1}^{4} \alpha^{level} NC_{i,j,k}^{level} + \sum_{level=1}^{4} \gamma^{level} NC_{i,j,k}^{level} * \overline{NC}_{-i,j,k} \\ + \psi \overline{NC}_{-i,j,k} + \lambda X_{i,j,k} + \delta_k + \epsilon_i \end{aligned} \tag{3}$$

Where $Y_{i,j,k}$ are student's academic outcomes for Chinese, Math, and English test scores at 7th grade. $NC_{i,j,k}^{level}$ is the dummy group measuring student i's non-cognitive ability level when she was at 6th grade with level $\in [1, 4]$, as each non-cognitive ability is measured by integer from 1 to 4. γ^{level} is parameter of interest that reflects the heterogeneity of peer effects, as it is indicated by interaction term $NC_{i,j,k}^{level} * \overline{NC}_{-i,j,k}$. $X_{i,j,k}$ is student's time-invariant variables, δ_k is the school fixed effects, and ϵ_i is the error term. Standard errors are clustered at school level.

4.4 Channels

$$Channel_{i,j,k} = \beta_0 + \beta_1 NC_{i,j,k} + \beta_2 \overline{NC}_{-i,j,k} + \beta_3 X_{i,j,k} + \delta_k + \epsilon_i \tag{4}$$

Where equation (4) is basically the same as equation (2), with the only difference that we test the impacts of peer effects on potential mechanisms, instead of academic outcomes as it was in equation (2). Two potential channels are tested here, where $Channel_{i,j,k}$ are variables measuring time allocation or peer grouping for student i in class j and school k.

5. Findings

5.1 Peer Effects on Academic Outcomes

Table 4, 5 and 6 show the peer effects of non-cognitive ability on students' test scores of Chinese, Math, and English at 7th grade, respectively. Table 7, 8 and 9 show the peer effects of non-cognitive ability on students' test scores of Chinese, Math, and English at 8th grade, respectively.[5] Also, see Figure A in the Appendix for the binned scatter plot showing the relationship between peer non-cognitive ability and academic outcomes.

Main findings of the peer effects on academic outcomes include: i) I find positive peer effects of (two out of the three items of) persistence, but not of other non-cognitive abilities: self-confidence, learning ability, respond quickly and openness. For students at 7th grade in wave 1, I find positive peer effects on standardized Math test scores, but no significant peer effects on Chinese and English test scores. In addition, when students become students at 8th grade in wave 2, I find sustainable positive peer effects and that magnitudes become slightly smaller, which implies enduring impacts of peer persistence.

Compared to the existing evidence from Golsteyn, Non and Zölitz (2019), peer effects of persistence on finishing disliked or challenging homework found in this study are consistent with but relatively larger than their estimates.[6]

5.2 Heterogeneity

See Table 10 for the heterogeneity of peer effects. I find that high-persistence students benefit from persistent peers in achieving higher academic outcomes. However, no robust evidence is found suggesting that low and middle- persistence students benefit from having persistent peers.

Interesting, I also find consistent evidence that students with low level of self-reported self-confidence, respond quickly and learning ability benefit from their peers leave-me-out-mean on achieving higher academic outcomes (mainly on Math test score).

[5] I also provide estimates of peer effects using samples in wave 1 but restricting them to those that will also be in wave 2. See Table C1, C2, and C3 of the Appendix for a detailed comparison of estimates of peer effects on academic outcomes.

[6] One reason could be due to, compared to a standard randomized control trial, I don't have ideal baseline measurement on academic outcomes in this study to control for. Even though I have controlled students' every characteristic before 6th grade that I have, the estimates here are still not precise enough, because of the lack of baseline information. Another reason could be due to the setting in this study is the middle school in developing countries, which is different from higher education setting in the developed county in the case of Golsteyn, Non and Zölitz (2019). One related evidence is that, using the same dataset and random assignment identification strategy, Hu (2018) studies the impacts of migrant peers in the classroom and finds relatively larger estimates compared to estimates found in the developed country.

6. Mechanism

6.1 Time Allocation

Figure 1 shows detailed results this study test on the potential channels related to students' time allocation. I do not find evidence on the impacts of peer effects on spending more time on homework (either assigned by teachers school, or by parents or tutoring school), which are consistent with findings of Golsteyn, Non and Zölitz (2019). However, I find evidence on peer effects on spending less time on both watching TV and playing video games.

6.2 Peer Grouping

Similar to Figure 1, Figure 2 checks the potential channels on peer grouping. Peer effects study used to fail to detect peers grouping due to the lack of peer networking data (Griffith, 2018; Auerbach, 2019). In this study, using the information available in CEPS on students' description for their best friends, I do find the peer grouping mechanism for positive peer effects of non-cognitive ability, mainly on grouping with "good" peers (who are either study hard or have expectation on going to college) and no evidence on not grouping with "bad" peers.

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Table 1: Statistical Description

VARIABLES	N	mean	sd	min	max
Academic outcomes					
z_w2stdchn	6,142	0	1	-7.240	2.847
z_w2stdmat	6,145	0	1	-5.249	7.511
z_w2stdeng	6,139	0	1	-5.576	3.405
z_w1stdchn	4,880	0	1	-7.233	2.516
z_w1stdmat	4,882	0	1	-6.541	3.136
z_w1stdeng	4,872	0	1	-5.521	3.802
Student Characteristics					
age	6,168	13.58	0.740	12	18
minority	6,281	0.107	0.309	0	1
female	6,301	0.475	0.499	0	1
non_migrant	6,255	0.771	0.420	0	1
hukou_agr	6,301	0.506	0.500	0	1
one_child	6,220	0.464	0.499	0	1
kindergarten	6,250	0.814	0.389	0	1
age_primary	6,236	6.530	1.073	0	9
edu_schooling_mo	6,287	9.637	3.546	0	18
edu_schooling_fa	6,287	10.38	3.209	0	18
Non-cognitive Ability					
pers_sch	6,098	3.348	0.858	1	4
pers_hw	6,068	3.399	0.791	1	4
pers_effort	6,063	3.499	0.758	1	4
self_confidence	6,025	3.145	0.806	1	4
respond_quick	6,023	3.040	0.794	1	4
learn_ability	5,964	3.029	0.815	1	4
openness	6,034	3.508	0.777	1	4
Peer non-cognitive ability					
peer_pers_sch	6,098	3.242	0.234	2.521	3.938
peer_pers_hw	6,068	3.278	0.261	2.326	3.889
peer_pers_effort	6,063	3.370	0.249	2.535	3.969
peer_confidence	6,025	3.012	0.295	2.216	3.938
peer_respond_quick	6,023	2.911	0.293	2.027	3.582
peer_learn_ability	5,964	2.873	0.304	2	3.531
peer_openness	6,034	3.362	0.197	2.784	3.878

Source. CEPS2013-14(Wave 1) and 2014-15(Wave 2).

Table 1: Statistical Description (Cont.)

VARIABLES	N	mean	sd	min	max
Time Allocation					
time_homework_weekday	6,012	2.396	2.334	0	24
time_homework_weekend	6,021	2.875	2.369	0	24
time_homework_week	5,951	5.262	4.016	0	48
time_tutoring_hw_weekday	6,117	0.708	1.481	0	24
time_tutoring_hw_weekend	6,100	0.898	1.523	0	24
time_hw_tutoring_week	6,057	1.592	2.635	0	48
time_watching_tv_weekday	6,067	1.070	1.931	0	24
time_watching_tv_weekend	6,051	1.813	2.157	0	24
time_watching_tv_week	5,982	2.863	3.479	0	41.97
time_game_weekday	6,098	0.704	1.654	0	24
time_game_weekend	6,065	1.452	2.342	0	24
time_game_week	6,018	2.145	3.544	0	48
Peer Grouping					
peer_excellent_grade	6,179	0.463	0.499	0	1
peer_work_hard	6,177	0.494	0.500	0	1
peer_college_expetation	6,152	0.705	0.456	0	1
peer_truancy	6,155	0.0135	0.115	0	1
peer_discipline_action	6,165	0.0178	0.132	0	1
peer_fight	6,171	0.0165	0.128	0	1
peer_drink_smoke	6,175	0.0154	0.123	0	1
peer_game_bar	6,177	0.0233	0.151	0	1
peer_love	6,171	0.0251	0.156	0	1

Source. CEPS2013-14(Wave 1) and 2014-15(Wave 2).

Table 2: Balancing Tests

	Dependent variable: Peers' Non-Cognitive Abilities						
	(1) Persist	(2) Persist	(3) Persist	(4) Confidence	(5) Respond	(6) Learning	(7) Openness
age	0.004	−0.003	−0.002	−0.001	−0.001	−0.002	0.000
	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
female	0.004	−0.000	−0.001	0.002	0.006*	0.006	0.000
	(0.005)	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)
minority	0.018*	0.021**	0.014*	0.010	0.007	0.015	0.014*
	(0.010)	(0.009)	(0.008)	(0.009)	(0.007)	(0.012)	(0.008)
agriculture hukou	−0.004	−0.007	−0.011	−0.007	−0.009	−0.010	−0.004
	(0.008)	(0.010)	(0.008)	(0.009)	(0.007)	(0.011)	(0.006)
Non Migrant	0.006	0.003	−0.003	0.002	−0.001	0.002	0.006
	(0.007)	(0.007)	(0.005)	(0.009)	(0.006)	(0.007)	(0.005)
Single Child Family	0.007	0.006	0.006	0.003	0.002	0.008	0.002
	(0.007)	(0.007)	(0.008)	(0.007)	(0.005)	(0.007)	(0.005)
kindergarten	0.002	0.011	0.008	−0.000	0.008	0.010	0.005
	(0.010)	(0.009)	(0.008)	(0.011)	(0.007)	(0.010)	(0.007)
age atteding primary school	−0.000	0.000	0.001	0.000	0.002	−0.001	0.001
	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
mother's education	−0.002**	−0.001	−0.000	−0.001	−0.001	−0.000	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
father's education	0.001	0.000	0.001	0.001	0.001	0.000	0.001**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
School fixed effects	yes	yes	yes	yes	yes	yes	yes
Adjusted R-squared	0.590	0.711	0.719	0.763	0.855	0.841	0.624
F-Statistic	2.05	1.32	1.21	1.07	2.18	1.15	1.20
Observations	5,748	5,724	5,718	5,685	5,681	5,628	5,693

Note. All regressions include control variables: age, gender, minority, hukou status, migrant status, whether from one child family, whether attended kindergarten, age attending primary school, father's and mother's years of schooling, and school fixed effects, and standard errors are clustered at school level. Standard errors in brackets, *** p<0.01, ** p< 0.05, * p<0.1.

Source. CEPS2013-14.

Table 3: Balancing Tests (Without School Fixed Effects)

	Dependent variable: Peers' Non-Cognitive Abilities						
	(1) Persist	(2) Persist	(3) Persist	(4) Confidence	(5) Respond	(6) Learning	(7) Openness
age	−0.025***	−0.027***	−0.033***	−0.043***	−0.051***	−0.059***	−0.030***
	(0.009)	(0.009)	(0.007)	(0.011)	(0.012)	(0.013)	(0.007)
female	0.011	0.001	0.002	0.010	0.016**	0.017*	−0.004
	(0.007)	(0.007)	(0.006)	(0.006)	(0.007)	(0.009)	(0.005)
minority	−0.053	−0.106**	−0.121**	−0.118**	−0.166**	−0.165**	−0.064*
	(0.043)	(0.052)	(0.047)	(0.048)	(0.065)	(0.069)	(0.037)
agriculture hukou	0.003	0.056**	0.027	0.008	−0.032	−0.034	−0.005
	(0.021)	(0.023)	(0.022)	(0.025)	(0.025)	(0.024)	(0.018)
Non Migrant	0.044*	0.113***	0.091***	0.076**	−0.003	0.005	−0.004
	(0.023)	(0.031)	(0.027)	(0.036)	(0.029)	(0.039)	(0.019)
Single Child Family	0.042**	0.014	0.043**	0.070***	0.093***	0.101***	0.017
	(0.017)	(0.021)	(0.020)	(0.022)	(0.021)	(0.022)	(0.013)
kindergarten	0.009	−0.006	0.006	0.009	0.031**	0.026*	0.012
	(0.015)	(0.017)	(0.017)	(0.019)	(0.015)	(0.014)	(0.010)
age atteding primary school	0.021**	0.020*	0.022**	0.026**	0.025***	0.024**	0.011*
	(0.008)	(0.010)	(0.009)	(0.012)	(0.009)	(0.009)	(0.006)
mother's education	0.001	0.003	0.006**	0.009***	0.014***	0.014***	0.003**
	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
father's education	−0.004	−0.006**	−0.003	−0.001	0.006**	0.006**	0.002
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
School fixed effects	no	no	no	no	no	no	no
Adjusted R-squared	0.041	0.071	0.093	0.105	0.232	0.243	0.053
F-Statistic	2.16	2.97	4.97	4.10	6.22	7.23	2.99
Observations	5,748	5,724	5,718	5,685	5,681	5,628	5,693

Note. All regressions include control variables: age, gender, minority, hukou status, migrant status, whether from one child family, whether attended kindergarten, age attending primary school, father's and mother's years of schooling, and school fixed effects, and standard errors are clustered at school level. Standard errors in brackets, *** p<0.01, ** p< 0.05, * p<0.1.

Source. CEPS2013-14.

Table 4: Peer Effects on Chinese Test Scores at 7th Grade

	Dependent variable: Standardized Chinese Test Score						
	(1) Chinese	(2) Chinese	(3) Chinese	(4) Chinese	(5) Chinese	(6) Chinese	(7) Chinese
peer_pers_sch	0.085						
	(0.148)						
peer_pers_hw		0.302					
		(0.237)					
peer_pers_effort			0.323				
			(0.239)				
peer_confidence				0.033			
				(0.151)			
peer_respond_quick					0.181		
					(0.340)		
peer_learn_ability						0.290	
						(0.268)	
peer_openness							0.311
							(0.224)
School fixed effects	yes	yes	yes	yes	yes	yes	yes
Control variables	yes	yes	yes	yes	yes	yes	yes
Adjusted R-squared	0.116	0.118	0.122	0.109	0.112	0.124	0.110
Observations	5,611	5,588	5,581	5,550	5,546	5,495	5,557

Note. All regressions include control variables: age, gender, minority, hukou status, migrant status, whether from one child family, whether attended kindergarten, age attending primary school, father's and mother's years of schooling, and school fixed effects, and standard errors are clustered at school level. Standard errors in brackets, *** p<0.01, ** p< 0.05, * p<0.1.

Source. CEPS2013-14.

Table 5: Peer Effects on Math Test Scores at 7th Grade

	Dependent variable: Standardized Math Test Score						
	(1) Math	(2) Math	(3) Math	(4) Math	(5) Math	(6) Math	(7) Math
peer_pers_sch	0.229						
	(0.158)						
peer_pers_hw		0.489**					
		(0.208)					
peer_pers_effort			0.514***				
			(0.184)				
peer_confidence				0.234			
				(0.166)			
peer_respond_quick					0.320		
					(0.287)		
peer_learn_ability						0.317	
						(0.255)	
peer_openness							0.359
							(0.222)
School fixed effects	yes	yes	yes	yes	yes	yes	yes
Control variables	yes	yes	yes	yes	yes	yes	yes
Adjusted R-squared	0.030	0.036	0.039	0.022	0.028	0.055	0.023
Observations	5,614	5,591	5,584	5,553	5,549	5,498	5,560

Note. All regressions include control variables: age, gender, minority, hukou status, migrant status, whether from one child family, whether attended kindergarten, age attending primary school, father's and mother's years of schooling, and school fixed effects, and standard errors are clustered at school level. Standard errors in brackets, *** p<0.01, ** p< 0.05, * p<0.1.

Source. CEPS2013-14.

Table 6: Peer Effects on English Test Scores at 7th Grade

	Dependent variable: standardized English Test Score						
	(1) English	(2) English	(3) English	(4) English	(5) English	(6) English	(7) English
peer_pers_sch	0.194						
	(0.164)						
peer_pers_hw		0.322					
		(0.231)					
peer_pers_effort			0.396*				
			(0.204)				
peer_confidence				0.182			
				(0.158)			
peer_respond_quick					0.351		
					(0.287)		
peer_learn_ability						0.353	
						(0.259)	
peer_openness							0.145
							(0.228)
School fixed effects	yes	yes	yes	yes	yes	yes	yes
Control variables	yes	yes	yes	yes	yes	yes	yes
Adjusted R-squared	0.116	0.119	0.123	0.109	0.114	0.133	0.108
Observations	5,610	5,587	5,580	5,549	5,545	5,494	5,556

Note. All regressions include control variables: age, gender, minority, hukou status, migrant status, whether from one child family, whether attended kindergarten, age attending primary school, father's and mother's years of schooling, and school fixed effects, and standard errors are clustered at school level. Standard errors in brackets, *** p<0.01, ** p< 0.05, * p<0.1.

Source. CEPS2013-14.

Table 7: Peer Effects on Chinese Test Scores at 8th Grade

	Dependent variable: Wave2: Standardized Chinese Test Score						
	(1) Chinese	(2) Chinese	(3) Chinese	(4) Chinese	(5) Chinese	(6) Chinese	(7) Chinese
peer_pers_sch	0.168						
	(0.161)						
peer_pers_hw		0.298					
		(0.217)					
peer_pers_effort			0.294				
			(0.199)				
peer_confidence				0.010			
				(0.155)			
peer_respond_quick					0.192		
					(0.292)		
peer_learn_ability						0.213	
						(0.290)	
peer_openness							0.175
							(0.216)
School fixed effects	yes	yes	yes	yes	yes	yes	yes
Control variables	yes	yes	yes	yes	yes	yes	yes
Adjusted R-squared	0.121	0.122	0.127	0.115	0.116	0.134	0.114
Observations	4,445	4,436	4,424	4,404	4,394	4,366	4,403

Note. All regressions include control variables: age, gender, minority, hukou status, migrant status, whether from one child family, whether attended kindergarten, age attending primary school, father's and mother's years of schooling, and school fixed effects, and standard errors are clustered at school level. Standard errors in brackets, *** p<0.01, ** p< 0.05, * p<0.1.

Source. CEPS2013-14(Wave 1) and 2014-15(Wave 2).

Table 8: Peer Effects on Math Test Scores at 8th Grade

	Dependent variable: Wave2: Standardized Math Test Score						
	(1) Math	(2) Math	(3) Math	(4) Math	(5) Math	(6) Math	(7) Math
peer_pers_sch	0.166						
	(0.192)						
peer_pers_hw		0.538*					
		(0.273)					
peer_pers_effort			0.473**				
			(0.228)				
peer_confidence				0.097			
				(0.209)			
peer_respond_quick					0.268		
					(0.340)		
peer_learn_ability						0.595**	
						(0.280)	
peer_openness							0.381
							(0.278)
School fixed effects	yes	yes	yes	yes	yes	yes	yes
Control variables	yes	yes	yes	yes	yes	yes	yes
Adjusted R-squared	0.029	0.038	0.043	0.023	0.029	0.060	0.026
Observations	4,447	4,438	4,426	4,406	4,396	4,368	4,405

Note. All regressions include control variables: age, gender, minority, hukou status, migrant status, whether from one child family, whether attended kindergarten, age attending primary school, father's and mother's years of schooling, and school fixed effects, and standard errors are clustered at school level. Standard errors in brackets, *** p<0.01, ** p< 0.05, * p<0.1.

Source. CEPS2013-14(Wave 1) and 2014-15(Wave 2).

Table 9: Peer Effects on English Test Scores at 8th Grade

	Dependent variable: Wave2: Standardized English Test Score						
	(1) English	(2) English	(3) English	(4) English	(5) English	(6) English	(7) English
peer_pers_sch	0.188						
	(0.195)						
peer_pers_hw		0.425					
		(0.305)					
peer_pers_effort			0.364				
			(0.276)				
peer_confidence				0.179			
				(0.174)			
peer_respond_quick					0.342		
					(0.351)		
peer_learn_ability						0.477	
						(0.343)	
peer_openness							0.240
							(0.281)
School fixed effects	yes	yes	yes	yes	yes	yes	yes
Control variables	yes	yes	yes	yes	yes	yes	yes
Adjusted R-squared	-0.005	0.004	0.011	-0.012	-0.011	0.018	-0.013
Observations	4,711	4,701	4,688	4,666	4,657	4,626	4,663

Note. All regressions include control variables: age, gender, minority, hukou status, migrant status, whether from one child family, whether attended kindergarten, age attending primary school, father's and mother's years of schooling, and school fixed effects, and standard errors are clustered at school level. Standard errors in brackets, *** p<0.01, ** p< 0.05, * p<0.1.

Source. CEPS2013-14(Wave 1) and 2014-15(Wave 2).

Table 10: The Heterogeneity of Peer Effects

	Chinese (1)	Math (2)	English (3)
Persistence on attending school			
pers_sch1 * Peer peer_sch	0.081	0.359	0.005
	(0.257)	(0.339)	(0.281)
pers_sch2 * Peer peer_sch	-0.225	0.030	0.128
	(0.271)	(0.257)	(0.224)
pers_sch3 * Peer peer_sch	-0.022	0.225	0.096
	(0.198)	(0.174)	(0.198)
pers_sch4 * Peer peer_sch	0.168	0.250	0.264
	(0.140)	(0.168)	(0.170)
Persistence on finishing disliked homework			
pers_hw1 * Peer peer_hw	0.254	0.523	0.210
	(0.438)	(0.359)	(0.362)
pers_hw2 * Peer peer_hw	0.144	0.467	0.243
	(0.286)	(0.315)	(0.290)
pers_hw3 * Peer peer_hw	0.270	0.382	0.256
	(0.284)	(0.235)	(0.258)
pers_hw4 * Peer peer_hw	0.336	0.537**	0.363
	(0.228)	(0.205)	(0.235)
Persistence on finishing challenging homework			
pers_effort1 * Peer peer_effort	0.202	0.579*	0.280
	(0.358)	(0.313)	(0.293)
pers_effort2 * Peer peer_effort	-0.192	0.043	-0.166
	(0.298)	(0.351)	(0.342)
pers_effort3 * Peer peer_effort	0.328	0.481**	0.446*
	(0.292)	(0.228)	(0.238)
pers_effort4 * Peer peer_effort	0.351	0.546***	0.412*
	(0.231)	(0.179)	(0.205)
School FE	yes	yes	yes
Control Variables	yes	yes	yes

Note. All columns are estimated with ordinary least squares regressions that include dummy variable group of respective own non-cognitive ability, peer mean, and their four interaction terms, as well as control variables: age, gender, minority, hukou status, migrant status, whether from one child family, whether attended kindergarten, age attending primary school, father's and mother's years of schooling, and school fixed effects, and standard errors are clustered at school level. Standard errors in brackets, *** p<0.01, ** p< 0.05, * p<0.1.

Source. CEPS2013-14.

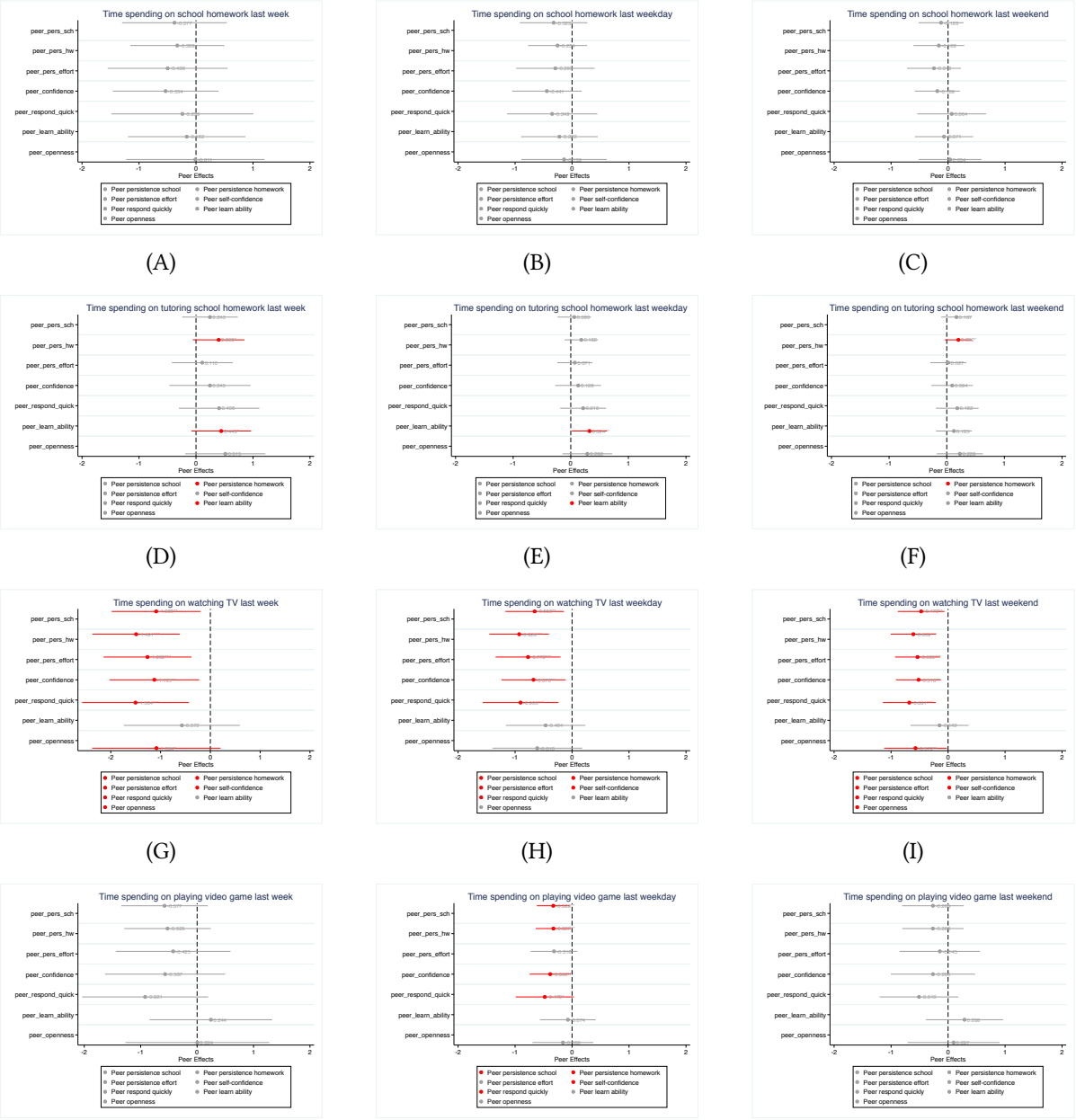
Table 10: The Heterogeneity of Peer Effects (Cont.)

	Chinese	Math	English
	(1)	(2)	(3)
Self-confidence			
Confidence1 * Peer confidence	0.398	0.810***	0.754**
	(0.390)	(0.305)	(0.306)
Confidence2 * Peer confidence	-0.148	0.224	0.061
	(0.215)	(0.234)	(0.230)
Confidence3 * Peer confidence	-0.019	0.201	0.135
	(0.173)	(0.199)	(0.197)
Confidence4 * Peer confidence	0.087	0.370	0.554
	(0.146)	(0.689)	(0.594)
Respond Quickly			
Respond1 * Peer Respond	0.949**	1.003***	0.999*
	(0.409)	(0.326)	(0.324)
Respond2 * Peer Respond	0.101	0.283	0.356
	(0.373)	(0.316)	(0.309)
Respond3 * Peer Respond	0.101	0.237	0.287
	(0.344)	(0.291)	(0.296)
Respond4 * Peer Respond	0.247	0.277	0.264
	(0.337)	(0.284)	(0.286)
Learn ability			
Learn ability1 * Peer learn ability	0.748***	0.792***	0.869***
	(0.322)	(0.297)	(0.319)
Learn ability2 * Peer learn ability	0.151	0.261	0.282
	(0.299)	(0.294)	(0.297)
Learn ability3 * Peer learn ability	0.196	0.222	0.270
	(0.280)	(0.268)	(0.274)
Learn ability4 * Peer learn ability	0.462*	0.431*	0.458*
	(0.268)	(0.254)	(0.245)
Openness			
Openness1 * Peer Openness	0.514	0.681	0.322
	(0.410)	(0.502)	(0.488)
Openness2 * Peer Openness	0.233	0.0726	-0.00439
	(0.320)	(0.308)	(0.308)
Openness3 * Peer Openness	0.0519	0.197	-0.0089
	(0.241)	(0.264)	(0.267)
Openness4 * Peer Openness	0.407*	0.435*	0.211
	(0.236)	(0.221)	(0.229)
School FE	yes	yes	yes
Control Variables	yes	yes	yes

Note. All columns are estimated with ordinary least squares regressions that include dummy variable group of respective own non-cognitive ability, peer mean, and their four interaction terms, as well as control variables: age, gender, minority, hukou status, migrant status, whether from one child family, whether attended kindergarten, age attending primary school, father's and mother's years of schooling, and school fixed effects, and standard errors are clustered at school level. Standard errors in brackets, *** p<0.01, ** p< 0.05, * p<0.1.

Source. CEPS2013-14.

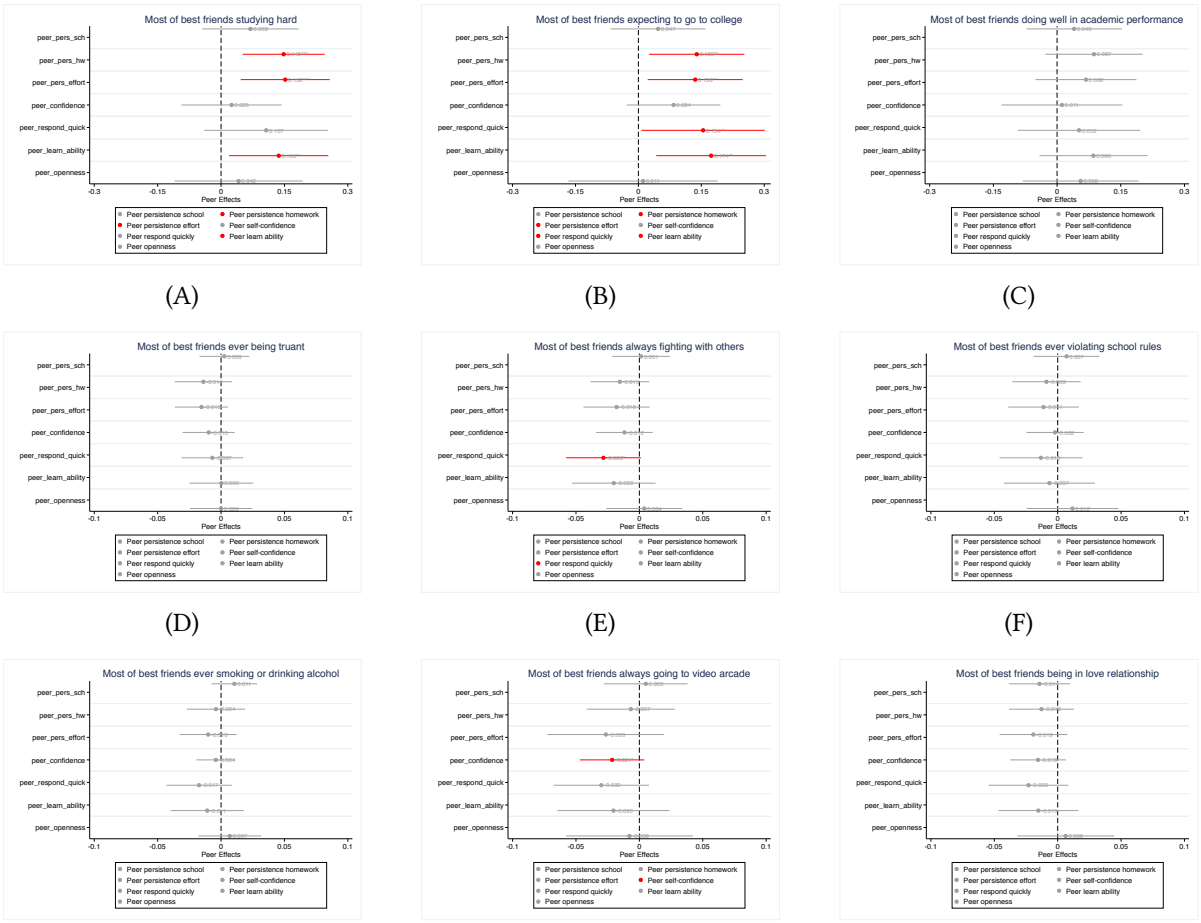
Figure 1: Channel of Peer Personality on Academic Outcomes I: Time Allocation



Note. Each subfigure examines one channel for each non-cognitive ability on students' **time allocation**. While subfigure (A), (B), and (C) looks for the "Time spending on homework assigned by school", subfigure (D), (E), and (F) looks for the "Time spending on homework assigned by tutoring school". Similarly, subfigure (G), (H), and (I) looks for the "Time spending on watching TV homework", subfigure (J), (K), and (L) looks for the "Time spending on playing video game". Each OLS regression includes control variables, school fixed effects, and standard errors are clustered at school level. *** p<0.01, ** p< 0.05, * p<0.1.

Source. CEPS2013-14.

Figure 2: Channel of Peer Personality on Academic Outcomes II: Peer Grouping



(A) (B) (C)

(D) (E) (F)

(G) (H) (I)

Note. Each subfigure examines one channel for each non-cognitive ability students' **peer grouping**. While subfigure (A), (B), and (C) looks for grouping with "good" peers, subfigure (D), (E), (F), (G), (H), and (I) looks for grouping with "bad" peers. Each OLS regression includes control variables, school fixed effects, and standard errors are clustered at school level. *** p<0.01, ** p< 0.05, * p<0.1.

Source. CEPS2013-14.

Appendix to: "Understanding the Peer Effects of Non-Cognitive Ability on Academic Outcomes"

Jian Zou

March 2019

Table A: Measurement of Students' Non-Cognitivge Ability

Non-Cognitive Ability	Definition	Measurement
Persistence on attending school	I would try my best to go to school even if I was not feeling very well or I had other reasons to stay at home.	All questions are measured on a scale of 1-4.
Persistence on finishing disliked homework	I would try my best to finish even the homework I dislike.	1 for strongly disagree
Persistence on finishing challenging homework	I would try my best to finish my homework, even if it would take me quite a long time.	2 for somewhat disagree
Self-Confidence	I was able to express myself clearly.	3 for somewhat agree
Response Quickly	I was able to give quick responses.	4 for strongly agree
Learn Ability	I was a fast learner.	
Openness	I was a curious about new stuff.	

Note. These questions ask students at 7th grade about their perception when they were students at 6th grade, by asking them "How much do you agree with each of the following statements about your experiences in GRADE 6? "

Source. CFPS2013-14.

Table B: The Relationship Between Non-Cognitive Ability and its Peer Mean

	Persistence school (1)	Persistence homework I (2)	Persistence homework II (3)	Self-Confidence (4)	Respond Quickly (5)	Learn Ability (6)	Openness (7)
Peer persistence on attending school	0.0069						
	(0.153)						
Peer persistence on finishing disliked homework		-0.119					
		(0.164)					
Peer persistence on finishing challenging homework			-0.131				
			(0.197)				
Peer self-confidence				0.0241			
				(0.174)			
Peer response quickly					-0.542**		
					(0.206)		
Peer learn ability						-0.337	
						(0.208)	
Peer openness							-0.337**
							(0.178)
School FE	yes	yes	yes	yes	yes	yes	yes
Control Variables	no	no	no	no	no	no	no
R-squared	0.036	0.056	0.053	0.076	0.095	0.085	0.025
Observations	6,098	6,068	6,063	6,025	6,023	5,964	6,034

Note. This table is based on separate ordinary least squares regressions with student's non-cognitive ability on peer's non-cognitive ability with school fixed effects for each non-cognitive ability, clustered school level. Dependent variable in first three columns: (1) is "persistence on attending school", (2) is "persistence on finishing disliked homework", and (3) is "persistence on finishing challenging homework". Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Source. CFPS2013-14.

Table C1: The Impacts of Peer's Non-Cognitive Ability on Chinese Test Scores

Panel A Chinese Test Scores	Wave 1			Wave 2		
	(1)	(2)	(3)	(4)	(5)	(6)
Peer persistence on attending school	-0.013 (0.066)	0.134 (0.159)	0.161 (0.155)	-0.006 (0.064)	0.144 (0.159)	0.168 (0.161)
Peer persistence on finishing disliked homework	0.023 (0.093)	0.395 (0.289)	0.405 (0.289)	-0.033 (0.073)	0.282 (0.223)	0.298 (0.217)
Peer persistence on finishing challenging homework	-0.001 (0.101)	0.324 (0.284)	0.346 (0.273)	-0.030 (0.081)	0.264 (0.215)	0.294 (0.199)
Peer self-confidence	0.039 (0.042)	0.088 (0.156)	0.065 (0.162)	0.064 (0.040)	0.011 (0.150)	0.010 (0.155)
Peer response quickly	0.031 (0.064)	0.235 (0.374)	0.180 (0.379)	-0.029 (0.051)	0.217 (0.295)	0.192 (0.292)
Peer learn ability	0.081 (0.057)	0.406 (0.354)	0.429 (0.345)	-0.131*** (0.047)	0.158 (0.301)	0.213 (0.290)
Peer openness	0.064 (0.099)	0.301 (0.256)	0.279 (0.263)	0.021 (0.082)	0.173 (0.239)	0.175 (0.216)
School FE	no	yes	yes	no	yes	yes
Control Variables	no	no	yes	no	no	yes

Note. This table is based on separate ordinary least squares regressions with Chinese test scores on peer means and personal trait for each personal trait, clustered school level. Regressions in column (1) and (4) are without school fixed effects and control variables; regressions in column (2) and (5) are with school fixed effects but without control variables, while regressions in column (3) and (6) are with both school fixed effects and control variables. Control variables includes age, gender, minority, hukou status, migrant status, whether from one child family, whether attended kindergarten, age attending primary school, fathers and mothers years of schoolings. Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Source. CFPS2013-14(Wave 1) and 2014-15(Wave 2).

Table C2: The Impacts of Peer's Non-Cognitive Ability on Math Test Scores

Panel B Math Test Scores	Wave 1			Wave 2		
	(1)	(2)	(3)	(4)	(5)	(6)
Peer persistence on attending school	0.055 (0.067)	0.287* (0.160)	0.315* (0.169)	0.005 (0.074)	0.142 (0.181)	0.166 (0.192)
Peer persistence on finishing disliked homework	0.071 (0.077)	0.549** (0.212)	0.563** (0.214)	0.052 (0.091)	0.528* (0.274)	0.538* (0.273)
Peer persistence on finishing challenging homework	0.057 (0.085)	0.482*** (0.201)	0.496** (0.196)	0.053 (0.095)	0.473* (0.242)	0.473** (0.228)
Peer self-confidence	0.031 (0.045)	0.240 (0.161)	0.243 (0.169)	0.004 (0.053)	0.087 (0.204)	0.097 (0.209)
Peer response quickly	-0.055 (0.055)	0.272 (0.298)	0.242 (0.309)	-0.038 (0.061)	0.285 (0.345)	0.268 (0.340)
Peer learn ability	0.131*** (0.048)	0.367 (0.267)	0.385 (0.267)	-0.110** (0.055)	0.530* (0.290)	0.595** (0.280)
Peer openness	0.130 (0.085)	0.433** (0.216)	0.436* (0.227)	0.128 (0.096)	0.379 (0.264)	0.381 (0.278)
School FE	no	yes	yes	no	yes	yes
Control Variables	no	no	yes	no	no	yes

Note. This table is based on separate ordinary least squares regressions with Math test scores on peer means and personal trait for each personal trait, clustered school level. Regressions in column (1) and (4) are without school fixed effects and control variables; regressions in column (2) and (5) are with school fixed effects but without control variables, while regressions in column (3) and (6) are with both school fixed effects and control variables. Control variables includes age, gender, minority, hukou status, migrant status, whether from one child family, whether attended kindergarten, age attending primary school, fathers and mothers years of schoolings. Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Source. CFPS2013-14(Wave 1) and 2014-15(Wave 2).

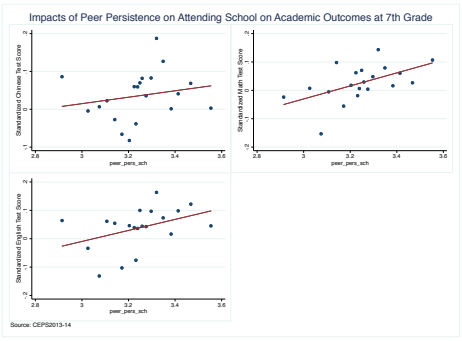
Table C3: The Impacts of Peer's Non-Cognitive Ability on English Test Scores

Panel C English Test Scores	Wave 1			Wave 2		
	(1)	(2)	(3)	(4)	(5)	(6)
Peer persistence on attending school	0.046 (0.070)	0.283 (0.171)	0.319* (0.179)	0.026 (0.076)	0.188 (0.195)	0.178 (0.207)
Peer persistence on finishing disliked homework	0.009 (0.086)	0.410 (0.262)	0.419* (0.250)	0.019 (0.096)	0.425 (0.305)	0.413 (0.301)
Peer persistence on finishing challenging homework	0.023 (0.093)	0.412* (0.231)	0.419* (0.217)	0.010 (0.101)	0.364 (0.276)	0.369 (0.301)
Peer self-confidence	-0.013 (0.046)	0.207 (0.165)	0.216 (0.160)	0.003 (0.046)	0.179 (0.174)	0.164 (0.182)
Peer response quickly	-0.019 (0.059)	0.347 (0.315)	0.336 (0.304)	0.006 (0.061)	0.342 (0.351)	0.310 (0.346)
Peer learn ability	0.102* (0.055)	0.474 (0.303)	0.496* (0.283)	-0.093 (0.058)	0.477 (0.343)	0.488 (0.334)
Peer openness	0.033 (0.095)	0.197 (0.257)	0.198 (0.252)	0.073 (0.099)	0.240 (0.281)	0.213 (0.289)
School FE	no	yes	yes	no	yes	yes
Control Variables	no	no	yes	no	no	yes

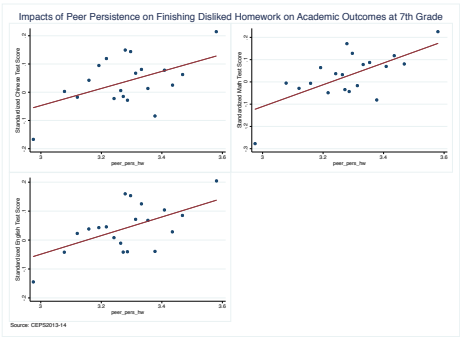
Note. This table is based on separate ordinary least squares regressions with English test scores on peer means and personal trait for each personal trait, clustered school level. Regressions in column (1) and (4) are without school fixed effects and control variables; regressions in column (2) and (5) are with school fixed effects but without control variables, while regressions in column (3) and (6) are with both school fixed effects and control variables. Control variables includes age, gender, minority, hukou status, migrant status, whether from one child family, whether attended kindergarten, age attending primary school, fathers and mothers years of schoolings. Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Source. CFPS2013-14(Wave 1) and 2014-15(Wave 2).

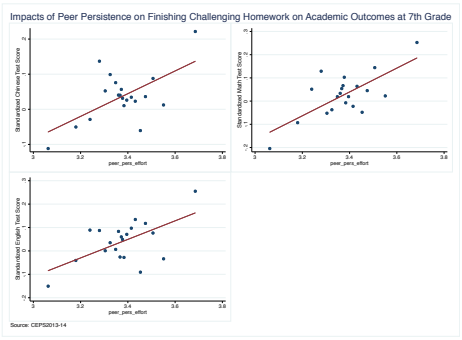
Figure A: Peer Personality and Student's Academic Outcomes



(A) Peer Persistence on Attending School



(B) Peer Persistence on Finishing Disliked Homework

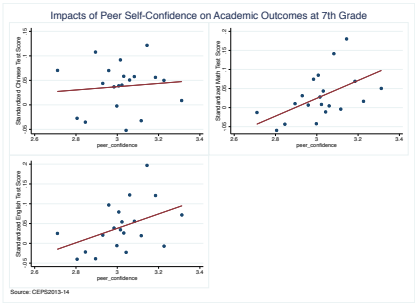


(C) Peer Persistence on Finishing Challenging Homework

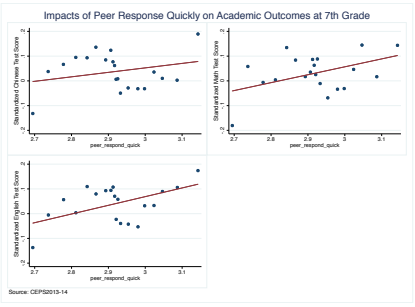
Note. All regressions include student's own respective personality, and control variables: age, gender, minority, hukou status, migrant status, whether from one child family, whether attended kindergarten, age attending primary school, father's and mother's years of schooling, and school fixed effects.

Source. CEPS2013-14.

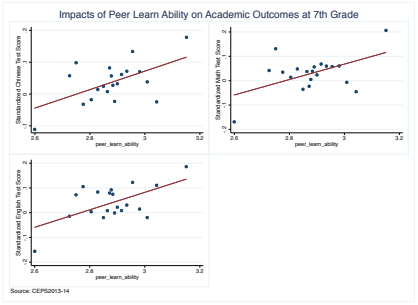
Figure A: Peer Personality and Student's Academic Outcomes (Cont.)



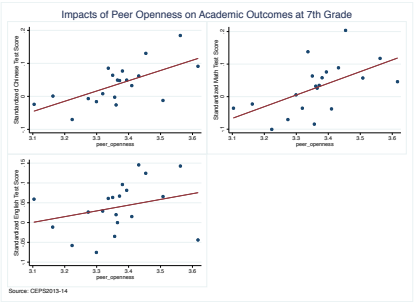
(A) Peer Self-Confidence



(B) Peer Response Quickly



(C) Peer Learn Ability



(D) Peer Openness

Note. All regressions include student's own respective personality, and control variables: age, gender, minority, hukou status, migrant status, whether from one child family, whether attended kindergarten, age attending primary school, father's and mother's years of schooling, and school fixed effects.

Source. CEPS2013-14.