Discussion Papers In Economics And Business

Long-Term Consequences of Group Work
in Japanese Public Elementary Schools

Kohei Kubota, Takahiro Ito, and Fumio Ohtake

Discussion Paper 19-11

August 2019

Graduate School of Economics
Osaka University, Toyonaka, Osaka 560-0043, JAPAN

Long-Term Consequences of Group Work in Japanese Public Elementary Schools[*]

Kohei Kubota[†], Takahiro Ito[‡], and Fumio Ohtake[§]

Abstract

Using original web survey data, this study investigates the long-term consequences of the experience of group work, which is a common teaching practice. We examined the convention in the context of Japanese public elementary schools, which are considered to be less susceptible to self-selection bias, in order to improve on the research conditions of previous studies. The regression results show that the experience of group work is negatively associated with annual income and financial assets. Furthermore, we find that the experience of group work does not relate to well-being and life satisfaction and that those who experienced group work attach higher satisfaction to human relationships and less satisfaction to household economic status. From the insignificant association between group work and well-being/whole life satisfaction, it may be interpreted that the positive association with satisfaction related to human relationships offsets the negative association with satisfaction regarding one's present economic status. We also show that experience of group work is negatively associated with cognitive skills but is positively associated with altruistic and positive reciprocal behavior.

JEL classification D83, I21, I31, Z13

Keywords: Teaching practice, Annual income, Well-being, Cognitive skills, Non-cognitive skills

[*] We thank Ryuichi Tanaka and numerous participants at the Kansai Labor Economics Workshop for their helpful comments. This study was supported by the Grant-in-Aid for Scientific Research A (Grant No. 26245041) and the Grant-in-Aid for Young Scientists B (Grant No. 15K17069) from the Japan Society for the Promotion of Science and the Joint Usage/Research Center at ISER/Osaka University.

[†] Corresponding author: Faculty of Commerce, Chuo University, 742-1 Higashinakano, Hachioji-shi, Tokyo, 192-0393, Japan.

[‡] Graduate School of International Cooperation Studies, Kobe University, 2–1 Rokkodai-cho, Nada-ku, Kobe, 657-8501, Japan.

[§] Graduate School of Economics, Osaka University, 1-7 Machikaneyama, Toyonaka, Osaka, 560-0043, Japan.

1. Introduction

New technology and automation have changed the content of jobs and the skills required in the workplace (see Autor, 2015; Frey and Osborne, 2017). Education in schools plays an important role in adjusting to this rapid change in society, because cognitive and non-cognitive skills are fundamental for learning. Active learning, which is believed to promote non-cognitive skills, is receiving tremendous attention. In fact, the Third Basic Plan for the Promotion of Education[1], established by the Japanese government in 2018, highlights both the need for an improvement in students' non-cognitive skills to accommodate the recent and future advances in artificial intelligence and robotics and the importance of active learning in promoting subjective and interactive education in place of cramming education. This statement is consistent with discussions in economics. For example, Autor (2015) noted that "the interplay between machine and human comparative advantage allows computers to substitute for workers in performing routine, codifiable tasks while amplifying the comparative advantage of workers in supplying problem-solving skills, adaptability, and creativity." Problem-solving skills, adaptability, and creativity are considered non-cognitive skills. However, it is not obvious whether active learning is an effective practice in promoting students' non-cognitive skills. Furthermore, to the best of our knowledge, there is no existing study seeking to determine the association between active learning and long-term outcomes.

Teaching practices and educational content are key instruments in school education. Student outcomes are not only associated with educational content but also with teaching practices, such as the lecture method and group work. Studies on group

[1] The Basic Education Promotion Plan is a plan formulated by the Japanese government to realize the philosophy contained in the Basic Education Law and to promote educational policy.

work are ongoing in the fields of education and economics. In education research, many studies focus on the correlation between group work and the attitudes or non-cognitive skills of students.[2] On the other hand, in economics research, many studies have devoted attention to the causal impacts of group work on cognitive skills such as test scores.

This study investigates the long-term consequences of group work. The long-term outcomes in which we are interested are annual income, financial assets, well-being, and satisfaction. Well-being and satisfaction are better measurements in terms of representing the comprehensive present life conditions of individuals.[3] Education in schools is one of the influential factors in developing the cognitive and non-cognitive skills of students. In addition, these skills are associated with labor market outcomes (Heckman et al., 2006; Lindqvist and Vestman, 2011; Deming, 2013). In this sense, school education has a lifelong impact. However, few studies seek to understand the effects of group work after graduation. We also explore channels related to the effects of group work. Furthermore, in keeping with previous papers and studies, we investigate the effects of group work on cognitive and non-cognitive skills.

In this study, we used original web survey data collected in 2015. This data includes several questionnaires about long-term outcomes and teaching practices. The survey data has the advantage of evaluating the long-term consequences of group work. Conversely, the survey data has some disadvantages. Questionnaires about teaching practices are retrospective and questionnaires about cognitive and non-cognitive skills are

[2] The survey literature in education are, for example, Springer, et al. (1999), Prince (2004), and Seidel and Shavelson (2007).

[3] Well-being refers to happiness in this study. Our survey asks the respondents about their level of satisfaction with several aspects of life. The concept of well-being is close to whole life satisfaction. The results from regression are similar between them. The definitions of the two terms, along with the phrasing used in the questionnaire, are provided in Appendix A.

self-evaluated. Thus, the use of responses from retrospective and self-reported questionnaires is always confronted with measurement errors. Although we recognize these disadvantages, our focus is to evaluate the long-term consequences of group work, which has not yet been addressed in the literature.

The endogeneity of teaching practices is a common empirical issue in estimating the causal impacts of education in schools, because in many countries people can choose a school for their child to attend. Most of the existing literature seeking the causality of group work employs individual fixed-effect models or school fixed-effect models to account for unobservable factors that could potentially associate with group work and its outcomes (Schwerdt and Wuppermann, 2011; Van Klaveren, 2011; Algan et al., 2013; Bietenbeck, 2014). This study uses Japanese educational conventions to mitigate this concern. As we will explain in section 3, Japanese public elementary schools are less susceptible to self-selection than previous studies have suggested.

Our primary findings are as follows: First, we endeavored to uncover the association between the experience of group work and its long-term outcomes. The results show that respondents who experienced group work earn 8.9% less annual income for males and 13.5% less annual income for females. Additionally, such respondents have 14.4% fewer financial assets. Further investigation into the effects of group work on annual income indicate that the association between group work and annual income comes from educational attainments, years of employment, and one's choice to remain in their hometown. Regression results for well-being and satisfaction indicate that the experience of group work does not relate to well-being and life satisfaction and that those who experienced group work attach higher satisfaction to human relationships and less satisfaction to household economic status. Next, we estimated the association between

group work and cognitive and non-cognitive skills. We used a subjective grade evaluation at the age of 15 to measure cognitive skills. The results show that those who experienced group work are more likely to have earned lower grades on average. We further investigated the distributional associations of experiencing group work and found that the negative association is larger in the lower-grade group and insignificant in the higher-grade group. Turning to the results for non-cognitive skills, we found that those who experienced group work are more likely to exhibit altruistic and reciprocal behavior. The results obtained by dividing the sample according to grades earned show that the associations between group work and altruism and reciprocity are higher in the lower-grade subsample than in the higher-grade subsample.

The rest of the paper is organized as follows. Section 2 reviews the previous literature on group work, and section 3 presents the empirical framework. Here, we provide our empirical specifications and explain the Japanese public elementary school system. Section 4 introduces the data, and section 5 reports the estimation results. Section 6 concludes this paper.

2. Previous Literature

Active learning has substituted for lecture-style learning, and has received increasing attention in recent years (Prince, 2004). It is difficult to define active learning because it includes learning through cooperation, collaboration, problem-solving, and so forth. Group work in classroom settings can be seen as one type of active learning because it is a teaching practice that also utilizes cooperative learning, collaborative learning, and problem-based learning.

Estimating the causal impact of group work is not straightforward because of various confounding factors. Self-selection into a school that conducts an attractive teaching practice could create a bias related to the estimated impact of the teaching practice. To resolve this issue, previous literature has employed a fixed-effect model utilizing the variation between subjects within students. Schwerdt and Wuppermann (2011) estimated the impacts of teaching practices on student test scores using the 2003 wave of the Trends in International Mathematics and Science Study (TIMSS) for students in the U.S. in their second year of secondary education. The results showed that a 10% shift from problem-solving to lecture-style presentation resulted in an increase in student achievement of about 1% from the standard deviation. Van Klaveren (2011) also estimated the effects of lecture-style teaching on test scores, obtaining information from the 2003 wave of the TIMSS for students in the Netherlands. In contrast to Schwerdt and Wuppermann (2011), Van Klaveren (2011) found no relationship between the proportion of time that teachers spend on lecture-style teaching and student test results. These studies indicate that group work has no positive effect on student test scores, and the impacts of a given teaching style differ from country to country. To determine why this is so, it is necessary to accumulate empirical evidence from various countries.

The above studies focused on test scores as a proxy for cognitive skills reflecting student outcomes. Test scores can measure one aspect of cognitive skills. Bietenbeck (2014) estimated the effects of teaching styles on cognitive skills as measured by self-reported questionnaires. He also utilized the fixed-effect model and the 2007 wave of the TIMSS for students in the U.S., showing that different teaching practices promote different cognitive skills in students. In particular, lecture-style teaching fosters factual knowledge and competency in routine problem-solving skills. In contrast, group work

promotes reasoning skills. The results of Bietenbeck (2014) suggest that an evaluation of teaching practices depends on the outcome of the given practice.

In contrast to cognitive skills, Algan et al. (2013) focused on non-cognitive skills as the student outcome. They employed a fixed-effect model that uses the variation between students within schools to identify the effects of teaching styles on beliefs about cooperation among students. They found that group work was associated with pro-social beliefs, while lecture-style teaching was associated with the opposite.

The previous literature that we surveyed estimated the effects of teaching practices on outcomes that were measured at a time when the teaching practice was conducted. To the best of our knowledge, there are no studies focusing on the long-term consequences of teaching practices. The evaluation of teaching styles differs by country and outcomes. Furthermore, the effects of teaching styles could differ according to the length of time that is being evaluated, namely, short-term or long-term. One contribution of this study is the estimation of the long-term effects of group work using annual income, financial wealth, well-being, and satisfaction as long-term outcomes. We also investigate the association between group work and cognitive and non-cognitive skills. Our analysis has an advantage over previous literature, particularly in our investigation into the association between group work and cognitive and non-cognitive skills and how they differ according to the distribution of cognitive skills.

3. Empirical Framework

3.1.Empirical Specification

We estimated the association between the experience of group work (GW_i) and respondent outcomes ($Outcome_i$) based on the following equation:

$$(1) \qquad Outcome_i = \alpha + \beta GW_i + \boldsymbol{X_i}\boldsymbol{\gamma} + \varepsilon_i$$

where i indexes individuals, $\boldsymbol{X_i}$ is the vector of controls that were determined before experiencing group work, and ε_i is an unobserved component affecting $Outcome_i$; we assumed that $E[\varepsilon_i] = 0$, and α, β, and $\boldsymbol{\gamma}$ are the parameters to be estimated. $Outcome_i$ are long-term outcomes (annual income, amount of financial assets, well-being, and satisfaction), cognitive skills (academic achievement at the age of 15), and non-cognitive skills (social preferences such as altruism, reciprocity, and beliefs about trust and cooperation).[4]

$\boldsymbol{X_i}$ includes individual characteristics (birth cohort dummies, birth month dummies, gender dummy, dummy for "do not remember"), family characteristics (parents' education dummies, dummies for the number of books at home, dummies for living with grandparents at the age of 12, and dummies for the number of siblings at the age of 15), school characteristics (dummies for class size), community characteristics (city/ward/county dummies at the age of 12), and teacher characteristics. We used the responses to the following three statements to capture teaching quality: (1) There was classroom disorder; (2) The teacher intervened when bullying occurred; and (3) The teacher did not use corporal punishment. The descriptive statistics of $\boldsymbol{X_i}$ are provided in Table A of Appendix B.

[4] The wordings for the questions we used is presented in Appendix A.

Note that differences in regional and generational tendencies are controlled by community and birth cohort fixed effects. Since our regression controls for birth year and birth month, the effect of instructional time is implicitly controlled. Therefore, as discussed in section 2, the negative (positive) association between group work and academic outcomes can be interpreted as the positive (negative) association between lecture-style teaching and academic outcomes.

Our empirical model accounts for omitted variable bias. The omitted variable violates the conditional mean independent assumption, $E[\varepsilon_i \mid WG_i] = E[\varepsilon_i]$, which is required to estimate the causal effects of group work. The potential omitted variables in our empirical model can be divided into individual-, school-, and teacher-level variables. First, we discuss the omitted variables at the individual level. The bias caused by self-selection into schools can be seen as an individual omitted variable issue. For example, parents who are enthusiastic about education select high-quality schools and we observe that their children obtain high test scores. In this case, we cannot identify the effects of education provided by a particular school on a child's test score because his/her parents, who were enthusiastic about education, provided him/her with a high-quality education. As we will explain in the next section, self-selection is considered to be less serious in our sample.

The bias caused by using retrospective questionnaires can also be seen in the following type of individual-level omitted variable: the case of individual memory. Let us consider the case that people with good memories are more likely to not only remember the teaching practice that was used in elementary school but also achieve good grades and earn higher salaries later in life. In this case, the effects of group work on annual income should exhibit an upward bias because the unobservable individual memory positively

correlates to both the experience of group work and annual income. To resolve this concern, we added the dummy variable of "do not remember" to our empirical model. Nonetheless, it should be noted that controlling for "do not remember" does not guarantee a causal relationship because a retrospective response could still correlate to unobserved individual characteristics.

Next, we consider the school-level omitted variable. Tanaka and Ishizaki (2017) estimated the effects of teaching styles on student test scores. They employed a school fixed-effect model and used Japanese micro-data. Their results showed that the coefficients of teaching practices on test scores that used the model without a school fixed effect are similar to those obtained using the school fixed-effect model. This suggests that school-level unobservable variables do not correlate to teaching practices and test scores, and therefore the school-level omitted variable bias is not considered to be subversive to this study.

Finally, we discuss the teacher-level omitted variable. If a high-quality teacher selects the group work teaching practice and it correlates to student outcomes, then we cannot identify the effects of group work on student outcomes. Algan et al. (2013) also discussed the teacher-level omitted variable bias and noted the difficulty in identifying the causal effects of group work. While they admitted the difficulty, they showed that the teacher-level omitted variable bias is not as impactful as previously thought. If a high-quality teacher selects the group work method, then group work should positively correlate to both cognitive and non-cognitive skills because of the skill of the teacher. Algan et al. examined whether group work positively associates with reading test scores and showed that it does not significantly associate with those particular test scores. Our

empirical model includes proxy variables for teacher quality, which we explained above in order to temper the impact of the teacher-level omitted variable.

3.2.Japanese Public Elementary School System

The educational contents of Japanese public schools are essentially stipulated in the School Curriculum Guidelines of the Ministry of Education, Culture, Sports, Science, and Technology. The contents stipulate the subjects, content, textbooks, and instructional time, among other elements. Therefore, it is believed that most Japanese people think that the same *educational content* is provided at every public elementary school. However, *teaching practices* are not stipulated in the School Curriculum Guidelines, and, in such a circumstance, teaching practices could differ from school to school (and from teacher to teacher).[5]

The public elementary school in which a child is enrolled in Japan depends on their place of residence. However, people are less likely to move in order to select specific public elementary schools. There are at least four reasons for this: First, as previously mentioned, all public elementary schools provide uniform educational content because of the School Curriculum Guidelines, which naturally leads residents to think that the same teaching practices and the same lessons are conducted at every public elementary school. Second, the parents of those targeted in our survey could not access information regarding each school's quality. It was difficult for parents to know which public school provides high-quality education in terms of academic achievement because school-level test scores

[5] For example, an article by Mainichi Newspaper published on February 14, 2017 reports that "Despite past guidelines focused mainly on the contents of each subject, new guidelines emphasize that 'What kind of qualities and skills should we foster' through learning subjects and the goals are described in detail." This is an indication that past guidelines did not prescribe teaching methods.
https://mainichi.jp/articles/20170215/k00/00m/040/130000c

were not made available to the public before 2014. Third, an alternative to public elementary schools is scarcely available for the majority of Japanese people, with the exception of those living in big cities. The ratio of public elementary schools (= number of public elementary schools/number of all elementary schools) was 99.3% in 1955 and 98.5% in 2015. The ratio of students at public elementary schools (= number of students at public elementary schools/number of all students at elementary schools) was 99.3% in 1955 and 98.3% in 2015. While both ratios have somewhat declined, almost all Japanese students attend public elementary schools. Finally, it is common for parents who are enthusiastic about education to utilize a supplementary private school or a private teacher instead of moving to select a specific public elementary school for their child.

Research has been conducted on self-selection into Japanese public schools.[6] Although some evidence shows that people self-select in to public school, the cohorts of these studies are different from our sample cohort, which comprises an older cohort than in previous studies. For instance, our youngest respondents were born in 1990 and entered public elementary school in 1996. It was difficult to access the scores school-level tests taken before 1996, as municipalities were only allowed to publish the school-level outcomes of national tests taken after 2014, and the respondents in our sample were born

[6] Asai et al. (2016) showed counter-evidence of self-selection into school. Through the use of the *Employment Structure Survey 2002*, they reported that the proportion of mothers with children under six years of age who indicated that they moved to another locations for child-rearing purposes and for their children's education was only 8.7%. This is the highest percentage reported in existing research, largely because this figure also includes mothers who moved to another location for child-rearing purposes. In addition, as reported in Ito et al. (2015), land values differ significantly from town to town in the Tokyo metropolitan area, but the difference in school zones in a town does not influence land values. This implies that people are less concerned with school zones. On the other hand, there is evidence in support of self-selection into school. Yoshida et al. (2009) showed that the introduction of the school choice program for junior high school in Adachi ward has caused student sorting. This suggests that parents potentially want to select a junior high school. Furthermore, Kuroda (2018) found that test scores in public elementary schools have a positive impact on the cost of rent for family apartment housing in Matsue city.

before 1990. The parents of respondents were therefore unable to access the school-level national test scores.

In summary, the regression results that examine the situation in Japanese public elementary schools and the controlling for observables is considered to suffer less from self-selection bias, and, therefore, our empirical results show an association that is close to causality.

4. Data

4.1.The Survey

To investigate the educational experiences of respondents and the determinants of their preferences and beliefs, we carried out an original survey in February 2015. The survey was conducted online through a Japanese market research company under the authors' direction.[7] To ensure sufficient variation among the past educational experiences of respondents, we employed quota sampling based on age, gender, and prefecture (seven age categories, two genders, and forty-seven regions), and obtained 18,235 survey responses. In the analysis, we used a sampling weight so that our sample's age-gender-prefecture distribution was proportional to the actual age-gender-prefecture distribution in Japan. The actual distribution of the Japanese population was calculated from the *2014 Basic Resident Resister*.

[7] The survey company is MyVoice Communications Inc. It started conducting Internet surveys in 1998 and had more than one million registered survey panelists as of November 2013. It has a rigorous data quality control system that obtains highly reliable data. For instance, all registrants are strictly checked by examining their registration information, and about one-fourth of new registrants are eliminated beforehand because of inconsistent responses or double registrations. In addition, the survey panelists are regularly monitored, and the number of surveys in which one panelist can participate is controlled (average frequency in one year is about 13).

In our empirical analysis, we restricted the sample to graduates of Japanese public elementary schools and Japanese public junior high schools to manage the self-selection issue. Our empirical specifications used resident information at the city/ward/county level at the age of 12. A sample of missing resident information was excluded for analysis. After the restriction, the sample used in the analysis consisted of 15,429 respondents.

4.2.Group Work

We used the following statement to measure individual experiences of group work: "There was a task in which students worked together as a group." The answers for this statement are "Yes," "No," and "Do not remember." The dummy variable for group work takes the value one if respondents chose "Yes" and takes zero if otherwise. We should note that our questionnaire does not assess detailed aspects of the group work reported by respondents, such as the size of the work groups or the frequency and duration with which groups met. Furthermore, as discussed in the section 3.1, bias can arise in the completion of retrospective questionnaires. Therefore, measurement of group work per se could correlate with unobserved factors.

We found that there were regional variations in the distribution of respondents reporting group work, which can be seen in Figure 1. While group work revealed variations in terms of birth cohort and region, our empirical results presented the consequences of group work after eliminating the birth cohort and regional effects, as our regression controlled for birth cohort and city/ward/county level residence at the age of 12.

Table 1 presents the proportions of respondents of a certain age who experienced group work by gender. We found that younger respondents were more likely to have

experienced group work and that the proportion of males who experienced group work was lower than females for all age range. The proportion of males who answered "Yes" is 66.4% and the proportion of females is 73.5%, making for a gender difference of 7.1%.[8] This seems to be an imbalance of treatment. However, the imbalance can be explained by the gender difference in those who answered with "Do not remember." The last column reports the fractions in which the numerators are "Yes" and the denominators are "Yes + No." The proportion of males is 81.6% and that for females it is 88.1%. The gender difference is 6.5%, suggesting that the part of 9.5% gender imbalance between those who experienced group work can be accounted for by the gender difference in those who indicated that they "Do not remember." Furthermore, Table 1 shows that "Do not remember" responses not only differ by gender but also by age. The proportion of males between the ages of 25 to 29 who answered with "Do not remember" is much higher than females of the same age range, while the proportion of males in the age ranges of 35 to 39, 40 to 44, and 50 to 54 are at the same level as the females of those age ranges. Controlling for both gender and age difference further reduces the gender imbalance of group work. This is an indication that a great part of the imbalance between those answered with "Do not remember" is due to differences between both age and gender. Nonetheless, an unexplained gender imbalance remains. We resolved this imbalance of

[8] The result of testing the difference is provided in Column (1) in Table B of Appendix B. The dependent variable in Table B is a dummy variable that takes one if the respondent answers "Yes" and takes zero if he/she answers "No" or "Do not remember." The controls are age dummies and city/ward/county dummies. Column (1) in Table B reports the results of the linear probability model, indicating that males are 6.8% less likely to answer "Yes" than females.

treatment by adding various controls and the dummy of "Do not remember" to our regressions.[9]

4.3.Outcomes

We identified three major outcomes. The first were long-term outcomes: namely, annual income, financial assets, well-being, and satisfaction. The second were cognitive skills measured by means of retrospective answers about academic grades in the third grade of junior high school (eight grade in the American education system). The third were non-cognitive skills measured using self-reported answers about altruism, trust, reciprocity, and cooperation. The descriptive statistics of the outcomes are shown in Table 2.[10]

4.3.1. Long-Term Outcomes

Our long-term outcomes can be divided into present economic status and well-being/satisfaction. Economic status outcomes consist of annual income and financial assets. The analysis for annual income used a sample that was split according to gender, since there are distinct gender differences in the labor market.

We compared economic statuses in our data with those in national representative data to check for consistency. The average male annual income in our data was 5,250 (thousand yen) which is similar to the 5,210 (thousand yen) that was reported as the average male salary by the *Statistical Survey of Actual Status for Salary in the Private*

[9] The primary findings in this study do not change if we exclude the sample of those who are in the age ranges 25–29 and 55–59. The gender difference between those who answered with "Do not remember" is outstanding in these age ranges.

[10] Turning to the control variables, we found that females, younger people, and people who have parents with more years of schooling were more likely to experience group work from the mean comparison between "Yes" and "No."

Sector 2015. The regular employment rate for men according to our data was 86%, while that reported by the *Labor Force Survey 2015* was 77%. One reason for the difference might be that the definition of regular employment rate as used by the *Labor Force Survey* does not include executives, self-employed workers, and family-employed workers while our definition does. The annual income for working males who did not experience group work is 754,000 (yen) higher than for working males who experienced group work. This difference is significant at a level of 1%. Working females who did not experience group work also had a higher annual income, by 275,000 (yen), than their group work-familiar counterparts. This difference was also significant at a level of 1 percent level. As we have shown, one's experience of group work differs by region and cohort. These are non-negligible confounders that bring the different results between simple mean comparison tests and regression with controls for region and cohort variables. We will present regression results in a later section.

The mean amount of financial assets for households of two or more persons in our data was 1,219 (thousand yen). On the basis of the *National Survey of Family Income and Expenditure 2014* (NSFIE), the national representative data showed an amount of 1,565,000 (yen). The mean amount of financial assets for our data was lower than that of the NSFIE. This difference might owe to our data targeting a sample range from the ages of 25 to 59, while the NSFIE did not restrict the sample by age. Thus, the exclusion of older people from the sample who would have more financial assets than younger people might account for the difference between our data and that of the NSFIE. The financial assets for those who did not experience group work is 3,595,000 (yen) higher than for those who experienced group work. This difference is significant at a level of 1%.

The degree of well-being was measured on a scale from 1 to 11 with the following question: “Overall, to what degree are you currently feeling happy? Using a scale from 1–11 where 1 is very unhappy and 11 is very happy, how do you rate your current level of happiness?” We used eight questions about life satisfaction, covering the following aspects: (1) Whole life; (2) Present economic status; (3) Relationship with family; (4) Relationship with spouse; (5) Relationship with friends; (6) Living area; (7) Leisure life; and (8) Work. The answers were measured on a scale of “1. Not satisfied” to “5. Satisfied.” The distributions of satisfaction are provided in Figure 2. The distributions of present economic status and work skewed right more than other satisfactions, indicating that a large portion of respondents were not satisfied with their economic status and work. Table 2 reports that the differences in satisfaction with whole life between those who experienced group work and those who did not are not significant while the differences in satisfaction with present economic status, relationship with family, relationship with spouse, relationship with friends, and work are significant.

4.3.2. Cognitive Skills

Our measurements for cognitive skills reflected the responses to the retrospective question about academic grades earned in the third grade of junior high school. We asked questions about grades in six areas in the survey: (1) Language; (2) Social studies; (3) Mathematics; (4) Science; (5) English (foreign language); and (6) Average of all subjects. The answers are measured on a scale from “1. In the lower rank,” “2. Rather low,” “3. In the middle,” “4. Rather high,” to “5. In the higher rank.” The distribution of these is shown in Figure 3, indicating that all the variables are skew left. This suggest that the measure seems to have a cognitive bias. This bias is consistent with the above-average

effect (see Svenson, 1981; Dunning et al., 1989), which is one of cognitive bias that leads people to overestimate their positive qualities and underestimate their weaknesses.[11] In addition to these variables, we constructed a new variable that consisted of the average of the five main subjects. We called the composite variable Main5. Table 2 reveals that the academic grades of those who did not experience group work are higher than the grades of those who did experience group work, except in language and English classes.[12]

4.3.3. Non-Cognitive Skills

Our interests in terms of non-cognitive skills were altruism, trust, positive reciprocity, negative reciprocity, and two cooperation variables. These were measured by means of self-reported survey questionnaires. Employing a questionnaire to measure preferences is supported by Falk et al. (2016), who showed that a questionnaire can succeed in predicting the preferences revealed in incentivized choice experiments. The variables are self-reported answers and are measured on a scale of "1. Strongly disagree," "2. Rather disagree," "3. Neither," "4. Rather agree," and "5. Strongly agree." The statement on altruism was as follows: "I feel happy when I do a good deed that I think is for others (such as picking up trash in a park)." We used following statement for trust: "In general, you can trust most people." The distributions of altruism and trust are provided in Figure 4. More than half (55%) of the respondents answered that they agreed with the altruism statement, while 34% of respondents answered that they agreed with the trust statement.

[11] If cognitive bias equalizes the bias for all respondents regarding direction and size, cognitive bias will be of no consequence to OLS regression.

[12] The standard deviation and coefficient of variation are provided in Table C of Appendix B. The table shows that grade inequality in the group of those who experienced group work was larger for all variables. The results imply that conducting group work could widen the inequality of academic achievements.

We used the positive and negative reciprocity variables proposed by Perugini et al. (2003). Positive reciprocity consisted of the averaged answers to the following three questions: “If someone does me a favor, I am prepared to return it”; “I go out of my way to help somebody who has been kind to me before”; and “I am ready to undergo personal costs to help someone who has helped me before.” Negative reciprocity consists of the averaged answers to the following three questions: (1) “If somebody offends me, I will offend him/her back”; (2) “If somebody puts me in a difficult position, I will do the same to him/her”; and (3) “If I suffer a serious wrong, I will take revenge as soon as possible, no matter the cost.”

The statements on cooperation in the questionnaires were as follows: “Working as a group results in greater achievements than working individually (cooperation outcome)” and “I am more satisfied when I achieve a goal by cooperating with others than if I do so only by myself (cooperation satisfaction).” Figure 4 shows the distribution of cooperation variables, revealing that 43% of respondents agreed with the statement on cooperation outcomes and that 46% of respondents agreed with that of cooperation satisfaction. Table 2 shows that people who experience group work are more likely to exhibit altruistic and reciprocal behavior and feel satisfaction with cooperation.

5. Empirical Results

5.1.Long-Term Outcomes

5.1.1. Annual Income and Financial Assets

The estimation results for the basic specification in Equation (1) using annual incomes and financial assets are reported in Table 3. We estimated the model using ordinary least squares (OLS) and adjusted the sampling weight to make our observations proportional

to the overall Japanese population distribution. The numbers in parentheses are Huber-White robust standard errors. The first and second columns of Table 3 provide results using a log of the annual income for men and women, respectively. For men, the coefficient of group work is −0.089 and significant at a 5% level. This means that people who did not experience group work earned 8.9% more than those who did.

For female regression, we employed the control function approach to address the sample selection issue regarding employment decisions.[13] Our exclusion variable was a dummy variable that selected one if the respondent's mother worked at the respondent's age of twelve and zero if otherwise. This variable is considered to correlate with work decisions but not with one's marginal productivity in the labor market. In the first stage, we regress using the working dummy on the exclusion variable, and, in the second stage, we regress log annual income on the group work dummy, controls, maternal work status at age 12, and a third-order polynomial of fitted probability estimated in the first stage.[14] The second column reports that the coefficient of group work is −0.135 and is significant at a 5% level. The negative association between annual income and the experience of group work is larger for women than for men.

The third and fourth columns display results using a log of financial assets for the entire sample, restricting the portion of the sample who were not living with their parents.

[13] The control function approach is surveyed in Wooldridge (2015). Heckman's two-step estimator is the typical approach for dealing with sample selection bias. However, Heckman's two-step estimator, which takes decisions regarding participation in the labor market into account, is often criticized for being sensitive to the functional form assumption. The control function estimator is also a two-step estimator. The first step is a semiparametric estimator of the selection parameters using exclusion variables and the second step utilizes a least squares regression on independent variables and approximating functions of first stage parameters. The difference between Heckman's two-step estimator and the control function estimator lie in the first-stage parameters that are estimated through a distribution-free method rather than by a probit model and in the use of a non-parametric approximation in the second-stage regression rather than the inverse Mills' ratio. The main results do not change if we employ Heckman's two-step estimator.

[14] The main results do not change if we employ the second or forth order polynomial function.

The questionnaire about financial assets inquired into the entire household's financial assets. It is difficult to separate a respondent's financial assets from that of his/her parents if he/she lives with them. Therefore, we reported not only the results for the entire sample but also the results related to the restriction of the portion of the sample who were not living with their parents. The results showed that the amount of financial assets for people who have experienced group work was lower by 14.4% when using the whole sample and was lower by 15.6% when using the sample of people not living with their parents. In summary, the experience of group work in public elementary schools was negatively associated with long-term economic consequences. Next, we briefly analyze and discuss the paths of the effect of group work on economic outcomes.

5.1.2. Why Does the Experience of Group Work Negatively Associate with Annual Income?

The negative association between group work and annual income implies that the experience of group work also associates with various subsequent decisions relating to annual income, such as years of education. The experience of group work could have an impact on a person's schooling as it is connected to academic achievement and, as a result, annual income. We cannot examine all possible paths relating to annual income. To disentangle the mechanism of the negative association between group work and annual income, we estimated equation (2), which included three variables, $\boldsymbol{Z_i}$, related to annual income. $\boldsymbol{Z_i}$ is the vector of the dummies for respondent educational attainments, the number of years working in the present company, and for the choice to remain in one's hometown; one was selected if the place of residence from the ages of 15 to 18 was the same as the place of present residence and zero if otherwise.

(2) $Outcome_i = \alpha_2 + \beta_2 GW_i + \boldsymbol{X_i\gamma_2} + \boldsymbol{Z_i\delta} + \varepsilon_i$

The experience of group work could be associated with income through the variables, $\boldsymbol{Z_i}$. To estimate the extent to which the inclusion of these variables changed the coefficient of group work, β_2, we determined that the factors explained the coefficient of group work based on the estimation results of equation (2).

Table 4 shows the estimation results of Equation (2). Panel A provides the results for men and Panel B reports the results for women. Column (1) in Panel A shows that the coefficient of group work was −0.080, as estimated from equation (1). Column (2) reports that the coefficient of group work was −0.066, representing the estimate when additionally controlling for a respondent's education. Adding the dummy for education lowered the negative association between annual income and the experience of group work by 17.5%, which was accounted for by education. In the same manner, controlling for the number of years at the present company and remaining in one's hometown also lowers the negative association by 31.3% and 18.8%, respectively. Finally, column (5) provides the results for controlling all factors. The coefficient of group work was −0.029, which is statistically insignificant at a level of 10%. These results indicate that the experience of group work associates with educational attainment, the number of years at the present company, and decisions regarding places of residence; these three factors are able to explain 63.8% of the negative association between the experience of group work and annual income.

Next, we turn to the results for women in Panel B. The portion of the coefficient of group work explained by education was 18.2%, which is at the same level as the result

for men. However, the portion of the coefficients of group work explained by the number of years at the present company and the number of years living in one's hometown was 19.5% and 2.6%, respectively. Those magnitudes are smaller than the male results. Nonetheless, the negative associations between the experience of group work and annual income became insignificant after controlling for the three factors for both the male and female results.

The results in Table 4 imply that the experience of group work is associated with years of education, the number of years working at the present company, and decisions related to one's place of residence. To validate our results, we estimated that the models for those dependent variables are the following four variables: the dummy variable for living with one's parents, the public employee dummy, the self-employed dummy, and the company executive dummy. The results are summarized in Table 5.[15] The control variables are the same as those of Table 3. The male results showed that the experience of group work was negatively associated with the number of years working at one's present company and being a public employee, while it was positively associated with remaining in one's hometown, being self-employed, and being a company executive. The female results differ from the male results. For women, the experience of group work was negatively associated with years of schooling.

Men who experience group work might elect to continue living in their hometown and are more likely to work in the public sector of their hometown or succeed the family business from their parents. The shorter duration of working years might represent a change in employment made for the purpose of returning to one's hometown. These are

[15] Table 5 provides results by employing the linear probability models from OLS. These are similar to the results employing the logit or probit model.

consistent with the results in the succeeding subsections, which show that those who experienced group work feel satisfaction in their relationship with family and friends and are more likely to exhibit altruistic and reciprocal behavior. The experience of group work encourages altruistic and reciprocal behavior, and, as the results suggest, those who experience group work might elect to live in their hometown.

We introduce the interpretations of the gender difference in the coefficients of group work on years of schooling. First, the gender difference might reflect the association between the experience of group work and altruistic, family-oriented, or local preferences. Altruistic females are more likely to be nursery teachers, nurses, or care workers. These jobs are favored by altruistic people and do not require college or university degrees. Second, females who have such altruistic, family-oriented, or local preferences might prefer to engage in housework, volunteer activities, or activities for the local community. These activities do not need any of the skills or knowledge that are acquired at college or university. As a result, females who experience group work are less likely to go on to college or university."

5.1.3. Well-Being and Satisfaction

The estimation results using well-being and satisfaction as outcome variables are reported in Table 6.[16] The dependent variables were standardized in the regression analysis. We found that the experience of group work does not statistically associate with well-being and whole life satisfaction. Turning to several aspects of life satisfaction, the experience of group work was negatively correlated with satisfaction in one's present economic

[16] The main results do not change if we estimate the ordered logit model.

status, while it was positively correlated with satisfaction in relationships with one's family and friends. The negative correlation is compatible with the results of the negative association between the experience of group work and economic outcomes. From the insignificant association between group work and well-being/whole life satisfaction, it may be interpreted that the positive association with satisfaction related to human relationships offsets the negative association with satisfaction regarding one's present economic status.

5.2.Cognitive Skills

We found that there was a negative association between group work and years of education, as shown in Table 5. This might be a result of group work lowering cognitive skills. As mentioned in section 2, this interpretation is consistent with the evidence provided in the previous literature that group work does not increase a student's test scores. This evidence implies that group work is negatively associated with years of education through the decline of cognitive skills. This section examines this prediction and provides an analysis related to the association between the experience of group work and cognitive skills.

Our measurements of cognitive skills were derived from the responses provided to the item on the self-reported questionnaire that asked respondents to list their grades for each subject in the third grade of junior high school. We restricted the sample to respondents who attended public elementary schools and public junior high schools.

The estimation results are provided in Table 7.[17] The coefficient of group work on Main5 was −0.076 and significance was at a level of 5%. When examining the results for each subject, we found that associations between the experience of group work and grades differed according to different subjects. We found a statistically significant negative association between the experience of group work and Mathematics, Science, and English, and found an insignificant negative association for Language and Social Studies. It can be interpreted that the association may be strong for subjects where an understanding of the content is required at the elementary school level. The final row in Table 7 also shows the significant negative association between the experience of group work and All.

The results of Table 7 are consistent with previous studies have shown that group work does not have a positive effect on academic achievement. This might be due to the fact that group work sacrifices learning about a broad range of topics for learning deeply about a specific topic, a method that devotes far more time to a single topic than in lecture-style teaching. Indeed, there is evidence showing that lecture-style teaching has positive effects on student academic achievement. This might result from the fact that lecture-style teaching can convey a greater amount of text book content to students. Thus, we speculate that group work teaching has a stronger association with non-cognitive skills while lecture-style teaching is more strongly associated with cognitive skills.

Since instructional time in Japanese public elementary school is restricted by the School Curriculum Guidelines, an increase in group work teaching might correspond to a decrease in lecture-type, one-to-one teaching. Schools and teachers, then, are faced with

[17] While we did not report the coefficients of the dummy for "do not remember," the coefficients are negative and significant for all grades. The dependent variables were standardized in the regression analysis. The main results do not change if we estimate the ordered logit model.

a trade-off between group work teaching and lecture-style teaching. For example, if schools or teachers place a great deal of importance on the cultivation of students' non-cognitive skills, they would select group work teaching while sacrificing their cognitive skills. Conversely, if schools emphasize improvement in academic achievement, they would select lecture-style teaching while sacrificing their non-cognitive skills. In cases wherein the outcome is academic achievement, the negative effects of group work can be seen as being equal to the positive effects of lecture-style teaching. Therefore, under the trade-off situation, it is hard to identify the effects of group work when the instructional time of lecture-style is fixed. In our results in Table 7, the associations between group work and long-run outcomes include the possibility that less lecture-style teaching results in fewer years of education and other long-run outcomes.

Next, we examined whether the association between the experience of group work and grades change according to the distribution of grades. We employed the quantile regression model to assess the distributional association, and the quantiles were 10%, 25%, 50%, 75%, and 90%. Since the variation in grade variables totaled five except for Main5, we estimated the model by the following two steps: In the first step, we obtained the residuals by regressing Likert scale variables on the independent variables in Table 3 without group work and a dummy for "do not remember" by OLS. In the second step, we estimated the quantile regression models by using the dependent variables that were residuals obtained in the first step and by setting the independent variables as group work and a dummy for "do not remember."

The results of the quantile regression are provided in Table 8. We reported only the coefficients of group work and robust standard errors in parentheses. We found that the coefficients of group work in the 10% quantile were the smallest of all quantiles for

all outcomes. The coefficient of group work on Main5 in the 10% quantile was −0.175 and the significance level was at 5%, while the coefficient in the 90% quantile was −0.026 and insignificant. Examining the results using All, the coefficient of group work in the 10% quantile was −0.244 and the significance level was at 1%; the coefficient in the 90% quantile was −0.003 and insignificant. Similar results were obtained for Social Studies, Mathematics, and Science. These results imply that the negative association between the experience of group work and academic achievement is more significant for the students who are ranked lower in the grade, while the negative association is not observed for the students who are ranked the highest. It can be interpreted that unmotivated students underperform in group work. The students with lower grades underperform and, as a result, their grades will continue to deteriorate. At the very least, it can be seen that positive peer effects on academic achievement are not observed in group work.[18] Furthermore, this implies that employing group work could widen the inequality of academic achievements.

5.3.Non-Cognitive Skills

Algan et al. (2013) showed that the experience of group work promotes cooperation among students. We found a positive association between group work and satisfaction with human relationships. These results imply that group work is associated with non-cognitive skills. This section reexamines this relationship.

Our non-cognitive skill measures were altruism, trust, positive reciprocity, negative reciprocity, cooperation outcomes, and cooperation satisfaction. The regression

[18] This can be interpreted as a negative peer effect in classroom. Epple and Romano (2011) and Sacerdote (2011) survey peer effects in education.

results are reported in Table 9.[19] We found that respondents who experienced group work were more likely to be altruistic, positive, and reciprocal. We also found that respondents who experienced group work were more likely to be satisfied with cooperation and, in contrast, the coefficient of the cooperation outcome was not significant. If we regard cooperation outcome as an academic outcome and regard cooperation satisfaction as a satisfaction with human relationships, this contrasting result is consistent with our results: (1) group work negatively associates with grades; and (2) group work positively associates with outcomes relating to human relationships.

We found a negative association between the experience of group work and cognitive skills in the lower-grade group. Does the association between the experience of group work and non-cognitive skills differ according to respondent academic achievements? Table 10 shows how the estimation results are split according to respondent grades (Main5). We split our sample into a quartile subsample using Main5.[20] The positive association between the experience of group work and positive reciprocity was the largest in the lowest quartile subsample. The coefficient of group work on altruism in the below 25 percentile subsample was 0.167, while the coefficient of group work in the above 75 percentile subsample was −0.053. The coefficient of group work on positive reciprocity in the first quartile was 0.324, while that in the fourth quartile was 0.169. Examining the results of cooperation satisfaction, the coefficient of group work in the fourth quartile was positive and significant at 5% level, while that in the first quartile was negative and insignificant. This result implies that higher-grade respondents actively

[19] The dependent variables were standardized in the regression analysis. The main results do not change if we estimate the ordered logit model.

[20] The number of observations for quartile subsample are 6,022 (1st quartile), 2,074 (2nd quartile), 3,959 (3rd quartile), and 3,371 (4th quartile). This is because the distribution of Main5 may have some spikes. The distribution is provided in Figure A of Appendix B.

joined group work and were therefore satisfied with cooperation outcomes. On the other hand, lower-grade respondents might have been more likely to underperform during group work and did not actively join in the work.

6. Conclusion

This article studies the long-term consequences of experiencing group work at public elementary schools. To the best of our knowledge, this is the first study to employ long-term outcomes such as annual income, financial assets, well-being, and satisfaction in evaluating the association of group work. The regression results showed that the experience of group work has pros and cons. The positive aspect of group work is its cultivation of altruistic and reciprocal behavior. On the other hand, its negative aspect is the negative association between the experience of group work and long-term economic outcomes such as annual income and financial assets.

We mention some reasons for caution in using our results and some challenges for future research. First, our results did not present a causal relationship between group work experience and student outcomes. The assumption of no-self-selection into public elementary school cannot be tested by data. Identifying rigorous causality is a task for future research. Second, this article did not seek the mechanism of association between group work and student outcomes. Why does group work negatively associate with cognitive ability? One interpretation is that group work teaching crowds out lecture-type teaching that significantly improves students' cognitive abilities. Negative peer effects, which result from interactions between students, can also be interpreted. Previous papers have discussed the importance of peer effects in education, but a straightforward

attribution of impact on the part of peer effects cannot be made because of the self-selection and reflection problem as discussed in Manski (1993). Interactions with unmotivated students could have a negative impact on other students. It will be worthwhile to clarify the mechanism of negative associations between group work and cognitive skills in future research. Finally, our study did not tend to the content and implementation time of group work. In reality, these differ according to school, teacher, grade, and subject. Further research is required to clarify the conditions for the effective implementation of group work.

References

Algan, Y., Cahuc, P., Shleifer, A. 2013. Teaching practices and social capital. American Economic Journal: Applied Economics 5(3), 189-210.

Asai, Y., Kambayashi, R., Yamaguchi, S. 2016. Crowding-out effect of subsidized childcare. SSRN.

Autor, D. 2015. Why are there still so many jobs? The history and future of workplace automation. Journal of Economic Perspectives 29(3), 3-30.

Bietenbeck, J. 2014. Teaching practices and cognitive skills. Labour Economics 30, 143-153.

Deming, D.J. 2017. The growing importance of social skills in the labor market. The Quarterly Journal of Economics 132(4), 1593-1640.

Dunning, D., Meyerowitz, J.A., Holzberg, A.D. (1989). Ambiguity and self-evaluation: The role of idiosyncratic trait definitions in self-serving assessments of ability. Journal of Personality and Social Psychology 57(6), 1082.

Epple, D., Romano, R. E. 2011. Peer effects in education: A survey of the theory and evidence. In Handbook of social economics (Vol. 1, pp. 1053-1163). North-Holland.

Falk, A., Becker, A., Dohmen, T., Huffman, D., Sunde, U. 2016. The preference survey module: A validated instrument for measuring risk, time, and social preferences. IZA Discussion Paper 9674.

Frey, C.B., Osborne, M.A. 2017. The future of employment: How susceptible are jobs to computerisation? Technological forecasting and social change 114, 254-280.

Heckman, J.J., Stixrud, J., Urzua, S. 2006. The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. Journal of Labor Economics 24(3), 411-482.

Ito, T., Kubota, K., Ohtake, F. 2015. The Hidden Curriculum and Social Preferences. Institute of Social and Economic Research Discussion Papers, 954, 1-59.

Kuroda, Y., 2018. The effect of school quality on housing rents: Evidence from Matsue city in Japan. Journal of the Japanese and International Economies, 50, 16-25.

Lindqvist, E., Vestman, R. 2011. The labor market returns to cognitive and noncognitive ability: Evidence from the Swedish enlistment. American Economic Journal: Applied Economics 3(1), 101-28.

Manski, C. F. 1993. Identification of endogenous social effects: The reflection problem. The Review of Economic Studies, 60(3), 531-542.

Prince, M. 2004. Does active learning work? A review of the research. Journal of Engineering Education 93(3), 223-231.

Perugini, M., Gallucci, M., Presaghi, F., Ercolani, A. P. 2003. The personal norm of reciprocity. European Journal of Personality, 17(4), 251-283.

Sacerdote, B. 2011. Peer effects in education: How might they work, how big are they and how much do we know thus far? In Handbook of the Economics of Education (Vol. 3, pp. 249-277). Elsevier.

Schwerdt, G., Wuppermann, A.C. 2011. Is traditional teaching really all that bad? A within-student between-subject approach. Economics of Education Review 30(2), 365-379.

Seidel, T., Shavelson, R.J. 2007. Teaching effectiveness research in the past decade: The role of theory and research design in disentangling meta-analysis results. Review of Educational Research 77(4), 454-499.

Springer, L., Stanne, M.E., Donovan, S.S. 1999. Effects of small-group learning on undergraduates in science, mathematics, engineering, and technology: A meta-analysis. Review of Educational Research 69(1), 21-51.

Svenson, O. 1981. Are we all less risky and more skillful than our fellow drivers? Acta Psychologica, 47(2), 143-148.

Tanaka, R., Ishizaki, K. 2017. Do teaching practices matter for students' academic achievement? A case of linguistic activity. RIETI Discussion Paper Series 17-E-108.

Van Klaveren, C. 2011. Lecturing style teaching and student performance. Economics of Education Review 30(4), 729-739.

Wooldridge, J.M. 2015. Control function methods in applied econometrics. Journal of Human Resources 50(2), 420-445.

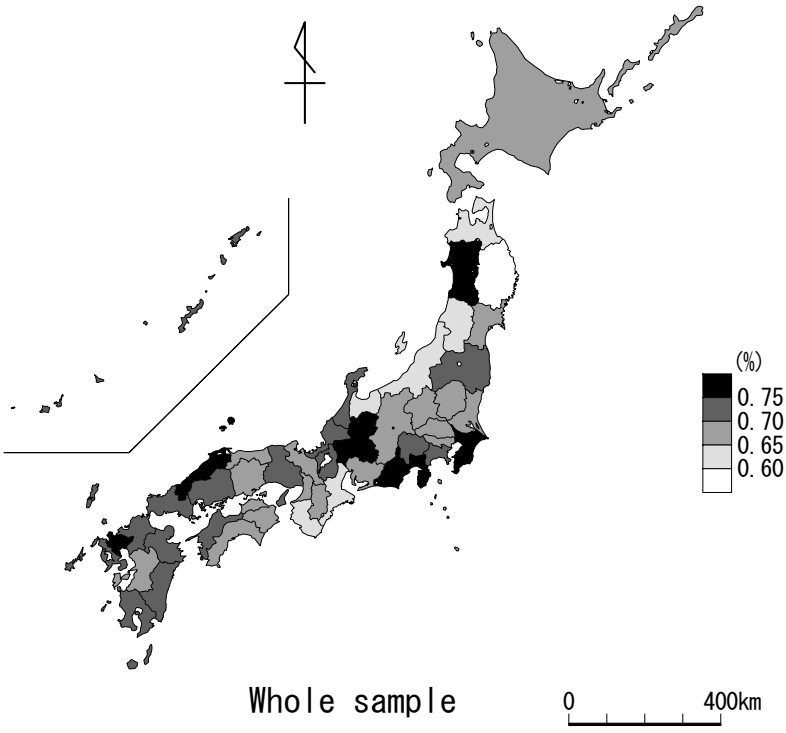

Figure 1. Regional Distribution of Those Who Experienced Group Work

Note: The figures in Figure 1 show the proportions of those who answered “Yes” to the following statement, “There was a task in which students worked together as a group.”

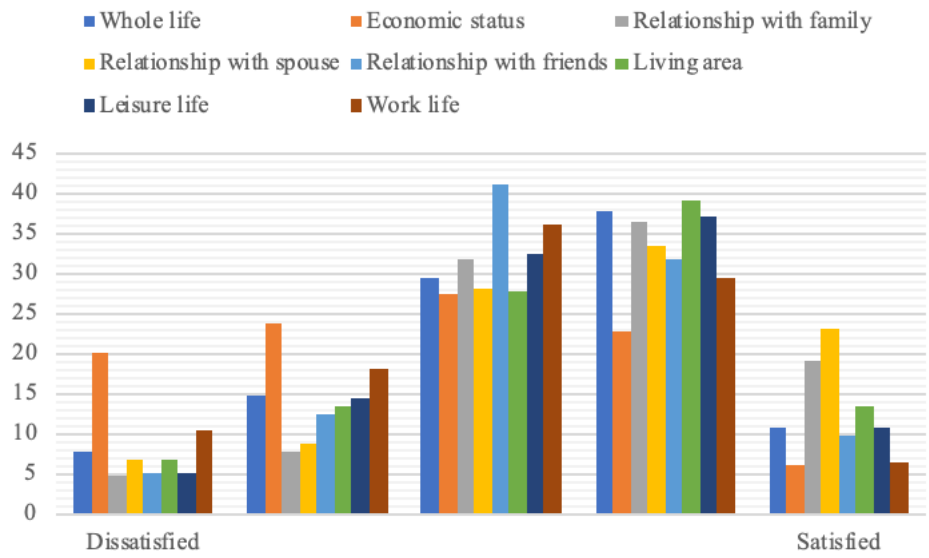

Figure 2. Distribution of Satisfaction

Note: These measurements of life satisfaction reflect the responses provided to the following question, as applied to various aspects of life: “How satisfied are you with each of the following?”: (1) Whole life; (2) Present economic status; (3) Relationship with family; (4) Relationship with spouse; (5) Relationship with friends; (6) Living area; (7) Leisure life; and (8) Work. The answers were measured on a scale of “1. Not satisfied” to “5. Satisfied.”

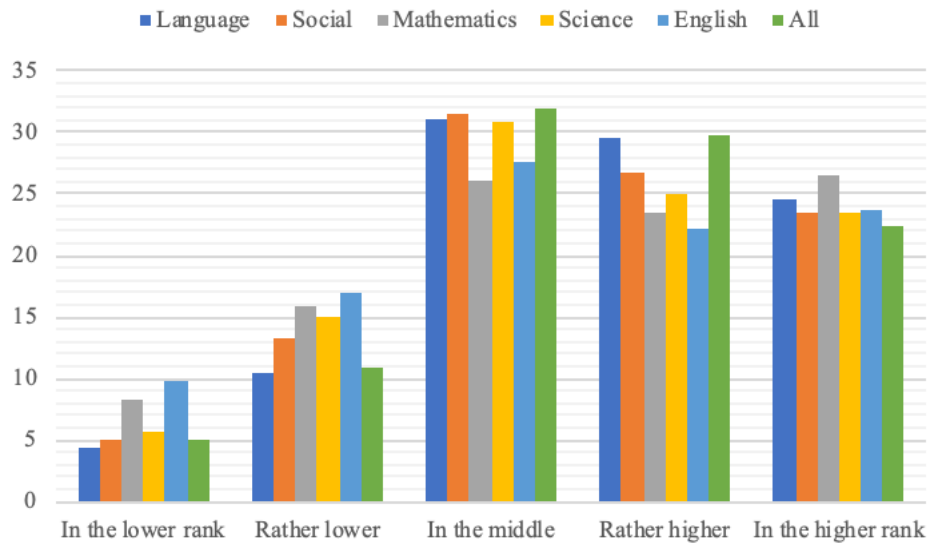

Figure 3. Distribution of Academic Achievement in the Third Grade of Junior High School

Note: These measurements of cognitive skills reflect the responses provided to a retrospective question about academic grades earned in the third grade of junior high school. The subjects are (1) Language; (2) Social studies; (3) Mathematics; (4) Science; (5) English; and (6) Average of all subjects. The answers were measured according to the following scale: “1. In the lower rank,” “2. Rather low,” “3. In the middle,” “4. Rather high,” and “5. In the higher rank.”

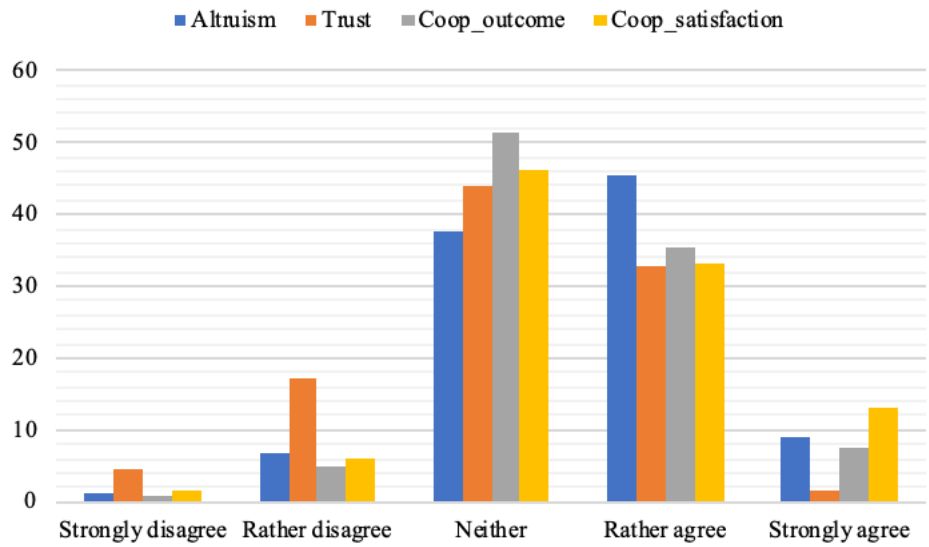

Figure 4. Distribution of Non-Cognitive Skills

Note: These measurements of non-cognitive skills reflect the responses provided to the following statements: 1) Altruism is: "I feel happy when I do a good deed that I think is beneficial for others (such as picking up trash in a park)"; 2) Trust is: "In general, you can trust most people"; 3) Coop_outcome is: "Working as a group results in greater achievements than working individually"; 4) Coop_satisfaction is: "I am more satisfied when I achieve a goal by cooperating with others than if I do so only by myself." The answers were measured according to the following scale: "1. Strongly disagree," "2. Rather disagree," "3. Neither," "4. Rather agree," and "5. Strongly agree."

Table 1. Distribution of Group Work by Birth Year

		Group work			
Birth year	Obs.	Yes	No	Do not remember	Yes/(Yes + No)
Panel A. Male					
−1959	1,166	0.574	0.194	0.232	0.747
1960−64	1,171	0.667	0.147	0.186	0.819
1965−69	1,209	0.639	0.173	0.188	0.787
1970−74	1,202	0.641	0.148	0.211	0.813
1975−79	1,156	0.671	0.154	0.175	0.814
1980−84	1,112	0.739	0.112	0.148	0.868
1985−	463	0.743	0.102	0.154	0.879
Total	7,479	0.664	0.149	0.187	0.816
Panel B. Female					
−1959	1,101	0.660	0.152	0.188	0.813
1960−64	1,224	0.696	0.121	0.182	0.852
1965−69	1,282	0.721	0.110	0.169	0.867
1970−74	1,241	0.693	0.096	0.211	0.878
1975−79	1,249	0.721	0.103	0.176	0.875
1980−84	1,163	0.814	0.067	0.120	0.924
1985−	687	0.890	0.031	0.079	0.966
Total	7,947	0.735	0.099	0.166	0.881

Table 2. Descriptive Statistics of Outcomes

	Obs.	Mean	Group work				
			Yes	No	Do not remember	Yes − No	
Sample of working people							
Male							
Annual income (ten thousand yen)	6,552	525.0	511.8	587.2	521.6	−75.4	[11.01]***
Years of schooling	7,285	14.74	14.71	14.92	14.69	−0.21	[0.079]***
Years working for present company	6,459	13.89	13.26	15.58	14.83	−2.32	[0.370]***
Remaining in hometown	7,479	0.49	0.50	0.46	0.49	0.03	[0.017]*
Public employee dummy	6,459	0.10	0.09	0.15	0.10	−0.06	[0.011]***
Self-employed dummy	6,459	0.11	0.12	0.09	0.10	0.02	[0.011]**
Company executive dummy	6,459	0.04	0.05	0.03	0.03	0.02	[0.008]**
Female							
Annual income (ten thousand yen)	5,243	241.7	239.7	267.2	234.4	−27.5	[10.09]***
Years of schooling	7,761	13.86	13.86	14.05	13.76	−0.19	[0.077]**
Years working for present company	4,862	8.51	8.41	9.27	8.48	−0.85	[0.376]**
Remaining in hometown	7,947	0.56	0.56	0.57	0.57	−0.01	[0.019]
Public employee dummy	4,862	0.06	0.06	0.07	0.06	0.00	[0.012]
Self-employed dummy	4,862	0.13	0.12	0.12	0.16	0.00	[0.015]
Company executive dummy	4,862	0.02	0.02	0.02	0.01	0.00	[0.007]
Whole sample							
Financial assets (ten thousand yen)							
Whole sample	9,704	1,219	1186.2	1545.7	1093.9	-359.5	[64.46]***
Two or more persons in household	8,154	1,266	1227.6	1590.2	1162.6	-362.6	[70.83]***
Not living with parents	7,661	1,127	1084.9	1453.9	1036.4	-369.0	[66.31]***
Well-being and Satisfaction							
Well-being	15,426	7.33	7.40	7.36	7.06	0.04	[0.050]
Satisfaction with							
Whole life	15,426	3.29	3.31	3.33	3.20	-0.02	[0.027]
Present economic status	15,426	2.73	2.71	2.85	2.75	-0.14	[0.030]***
Relationship with family	14,494	3.58	3.62	3.53	3.47	0.09	[0.026]***
Relationship with spouse	11,101	3.58	3.63	3.46	3.45	0.17	[0.032]***
Relationship with friends	15,426	3.30	3.33	3.27	3.18	0.06	[0.024]**
Living area	15,426	3.45	3.48	3.45	3.36	0.02	[0.027]
Leisure life	15,426	3.37	3.39	3.36	3.30	0.03	[0.025]
Work	13,378	3.03	3.03	3.08	2.98	-0.05	[0.028]*

Table 2. Descriptive Statistics of Outcomes (continued)

			Group work				
	Obs.	Mean	Yes	No	Do not remember	Yes − No	
Whole sample							
Cognitive skills							
Language	15,426	3.61	3.65	3.62	3.44	0.03	[0.027]
Social studies	15,426	3.43	3.44	3.59	3.31	−0.16	[0.031]***
Mathematics	15,426	3.46	3.46	3.61	3.33	−0.15	[0.029]***
Science	15,426	3.52	3.54	3.60	3.38	−0.06	[0.029]**
English (foreign language)	15,426	3.35	3.38	3.42	3.22	−0.04	[0.032]
Main5	15,426	17.38	17.48	17.85	16.68	−0.37	[0.124]***
All	15,426	3.54	3.55	3.65	3.41	−0.09	[0.028]***
Non-cognitive skills							
Altruism	15,426	3.52	3.56	3.43	3.40	0.13	[0.020]***
Trust	15,426	3.07	3.08	3.08	3.03	0.00	[0.021]
Positive reciprocity	15,426	3.78	3.84	3.71	3.62	0.13	[0.014]***
Negative reciprocity	15,426	2.69	2.68	2.69	2.71	0.00	[0.020]
Cooperation outcome	15,426	3.42	3.44	3.45	3.34	−0.01	[0.019]
Cooperation satisfaction	15,426	3.48	3.51	3.42	3.39	0.09	[0.022]***

Note: Standard errors of the test of mean difference between “Yes" and " No” are reported in bracket. ***, **, and * indicate statistical significance at levels of 1%, 5%, and 10% respectively.

Table 3. Annual Income and Financial Assets

Dependent variable	Log of annual income		Log of financial assets	
	Male	Female	Whole	Not living with parents
	(1)	(2)	(3)	(4)
Group work	−0.089**	−0.135**	−0.144***	−0.157**
	[0.040]	[0.066]	[0.055]	[0.061]
Number of observations	6,552	5,243	9,704	7,661
Adjusted R-squared	0.165	0.114	0.165	0.195

Note: For columns (1), (3), and (4), the estimates are calculated by OLS with other controls. Column (2) is calculated by the control function approach. The exclusion variable is a dummy variable that selects one if the respondent's mother worked at the respondent's age of twelve and zero if otherwise. The control variables are individual characteristics (birth cohort dummies, birth month dummies, dummy for "do not remember"), family characteristics (parents' education dummies, dummies for number of books at home, dummies for living with grandparents at the age of 12, and dummies for number of siblings at the age of 15), school characteristics (dummies for class size), community characteristics (city/ward/county dummies at the age of 12), and teacher characteristics (dummies for classroom disorder, bullying interventions, and corporal punishment). We include the gender dummy in columns (3) and (4). We adjust the sampling weight to ensure that our observations are proportional to the overall Japanese population distribution. Numbers in brackets are Huber-White robust standard errors. ***, **, and * indicate statistical significance at levels of 1%, 5%, and 10% respectively.

Table 4. Why Does the Experience of Group Work Negatively Associate with Annual Income?

	(1)	(2)	(3)	(4)	(5)
Panel A. Male					
Group work	−0.080**	−0.066*	−0.055*	−0.065*	−0.029
	[0.037]	[0.035]	[0.033]	[0.037]	[0.031]
Dummies for education		✓			✓
Dummies for years working for present company			✓		✓
Dummy for remaining in hometown				✓	✓
Fraction of the coefficient of GW explained		17.5%	31.3%	18.8%	63.8%
Number of observations	5,895	5,895	5,895	5,895	5,895
Adjusted R-squared	0.174	0.221	0.291	0.193	0.351
Panel B. Female					
Group work	−0.154**	−0.126*	−0.124*	−0.150**	−0.098
	[0.070]	[0.070]	[0.066]	[0.070]	[0.066]
Dummies for education		✓			✓
Dummies for years working for present company			✓		✓
Dummy for remaining in hometown				✓	✓
Fraction of the coefficient of GW explained		18.2%	19.5%	2.6%	37.0%
Number of observations	4,282	4,282	4,282	4,282	4,282
Adjusted R-squared	0.137	0.160	0.275	0.140	0.294

Note: Dependent variables are logs of annual income in each column. Panel A is calculated by OLS with other controls. Panel B is calculated by the control function approach with other controls. The control variables are individual characteristics (birth cohort dummies, birth month dummies, dummy for "do not remember"), family characteristics (parents' education dummies, dummies for number of books at home, dummies for living with grandparents at the age of 12, and dummies for number of siblings at the age of 15), school characteristics (dummies for class size), community characteristics (city/ward/county dummies at the age of 12), and teacher characteristics (dummies for classroom disorder, bullying interventions, and corporal punishment). We adjust the sampling weight to ensure that our observations are proportional to the overall Japanese population distribution. Numbers in brackets are Huber-White robust standard errors. ***, **, and * indicate statistical significance at levels of 1%, 5%, and 10% respectively.

Table 5. Other Outcomes Related to Annual Income

Dependent variables	Coefficient	Robust S.E.	Num. obs.	Adj-R2	Mean
Panel A. Male					
Years of schooling	−0.191	[0.129]	5,821	0.219	14.71
Years working for present job	−1.082	[0.467]**	5,895	0.375	14.68
Dummy for remaining in hometown	0.077	[0.027]***	5,895	0.160	0.44
Public employee dummy	−0.070	[0.017]***	5,895	0.086	0.14
Self-employed dummy	0.051	[0.015]***	5,895	0.102	0.11
Company executive dummy	0.020	[0.009]**	5,895	0.068	0.05
Panel B. Female					
Years of schooling	−0.480	[0.136]***	4,222	0.299	13.84
Years working for present job	−0.531	[0.585]	4,282	0.211	9.09
Dummy for remaining in hometown	−0.046	[0.039]	4,282	0.183	0.58
Public employee dummy	−0.026	[0.016]	4,282	0.114	0.08
Self-employed dummy	0.034	[0.026]	4,282	0.120	0.12
Company executive dummy	0.000	[0.009]	4,282	0.026	0.02

Note: The table reports the estimates from separate regressions in each outcome. Panel A is calculated by OLS with other controls. Panel B is calculated by the control function approach with other controls except for years of schooling. The control variables are individual characteristics (birth cohort dummies, birth month dummies, dummy for "do not remember"), family characteristics (parents' education dummies, dummies for number of books at home, dummies for living with grandparents at the age of 12, and dummies for number of siblings at the age of 15), school characteristics (dummies for class size), community characteristics (city/ward/county dummies at the age of 12), and teacher characteristics (dummies for classroom disorder, bullying interventions, and corporal punishment). We adjust the sampling weight to ensure that out our observations are proportional to the overall Japanese population distribution. Numbers in brackets are Huber-White robust standard errors. ***, **, and * indicate statistical significance at levels of 1%, 5%, and 10% respectively.

Table 6. Well-being and Satisfaction

Dependent variables	Coefficient	Robust S.E.	Num. obs.	Adj-R2
Well-being	−0.017	[0.035]	15,426	0.106
Satisfaction with				
Whole life	−0.049	[0.035]	15,426	0.084
Present economic status	−0.120	[0.036]***	15,426	0.072
Relationship with family	0.071	[0.036]**	14,494	0.074
Relationship with spouse	0.128	[0.041]***	11,101	0.096
Relationship with friends	0.032	[0.035]	15,426	0.087
Living area	0.019	[0.034]	15,426	0.072
Leisure life	0.015	[0.034]	15,426	0.067
Work	−0.042	[0.039]	13,378	0.064

Note: The table reports OLS estimates from separate regressions of well-being or satisfaction on group work. The control variables are individual characteristics (birth cohort dummies, birth month dummies, gender dummy, dummy for "do not remember"), family characteristics (parents' education dummies, dummies for number of books at home, dummies for living with grandparents at the age of 12, and dummies for number of siblings at the age of 15), school characteristics (dummies for class size), community characteristics (city/ward/county dummies at the age of 12), and teacher characteristics (dummies for classroom disorder, bullying interventions, and corporal punishment). We include the gender dummy in columns (3) and (4). We adjust the sampling weight to ensure that out our observations are proportional to the overall Japanese population distribution. Numbers in brackets are Huber-White robust standard errors. ***, **, and * indicate statistical significance at levels of 1%, 5%, and 10% respectively.

Table 7. Subjective Academic Achievement in Junior High School

Dependent variables	Coefficient	Robust S.E.	Num. obs.	Adj-R2
Main5	−0.076	[0.031]**	15,426	0.245
Language	−0.012	[0.032]	15,426	0.248
Social studies	−0.043	[0.032]	15,426	0.229
Mathematics	−0.095	[0.031]***	15,426	0.197
Science	−0.105	[0.033]***	15,426	0.213
English	−0.059	[0.033]*	15,426	0.204
All	−0.080	[0.031]**	15,426	0.229

Note: The table reports OLS estimates from separate regressions of the well-being or satisfaction on group work. The control variables are individual characteristics (birth cohort dummies, birth month dummies, gender dummy, dummy for "do not remember"), family characteristics (parents' education dummies, dummies for number of books at home, dummies for living with grandparents at the age of 12, and dummies for number of siblings at the age of 15), school characteristics (dummies for class size), community characteristics (city/ward/county dummies at the age of 12), and teacher characteristics (dummies for classroom disorder, bullying interventions, and corporal punishment). We include the gender dummy in columns (3) and (4). We adjust the sampling weight to ensure that out our observations are proportional to the overall Japanese population distribution. Numbers in brackets are Huber-White robust standard errors. ***, **, and * indicate statistical significance at levels of 1%, 5%, and 10% respectively.

Table 8. The Distributional Associations between Group Work and Academic Achievement

	Percentile				
Dependent variables	10	25	50	75	90
Main5	−0.175**	−0.109***	−0.062*	−0.022	−0.026
	[0.074]	[0.040]	[0.036]	[0.040]	[0.053]
Language	−0.093	−0.015	−0.002	0.000	0.033
	[0.056]	[0.045]	[0.035]	[0.045]	[0.045]
Social studies	−0.150**	−0.083**	−0.030	0.025	0.015
	[0.059]	[0.037]	[0.033]	[0.044]	[0.045]
Mathematics	−0.188***	−0.188***	−0.082**	0.023	0.022
	[0.070]	[0.047]	[0.034]	[0.035]	[0.037]
Science	−0.245***	−0.165***	−0.091**	−0.030	0.015
	[0.053]	[0.039]	[0.041]	[0.039]	[0.048]
English	−0.109*	−0.094**	−0.070*	−0.017	0.015
	[0.066]	[0.048]	[0.039]	[0.037]	[0.042]
All	−0.244***	−0.155***	−0.061*	0.013	−0.003
	[0.059]	[0.054]	[0.032]	[0.048]	[0.045]

Note: The table reports quantile regression estimates from separate regressions of academic grades on group work. The number of observations in each regression is 15,426. The dependent variables are the residuals of regressing each academic achievement variable on the independent variables in Table 6 without a group work variable and the dummy for "do not remember" by OLS. We adjusted the sampling weight to make our observations proportional to the overall Japanese population distribution. Numbers in parentheses are Huber-White robust standard errors.

Table 9. Non-Cognitive Skills

Dependent variables	Coef.	Robust S.E.	Obs.	Adj-R2
Altruism	0.154	[0.040]***	15,426	0.161
Trust	0.027	[0.035]	15,426	0.160
Positive reciprocity	0.214	[0.040]***	15,426	0.189
Negative reciprocity	0.009	[0.035]	15,426	0.159
Cooperation outcome	0.019	[0.037]	15,426	0.140
Cooperation satisfaction	0.123	[0.036]***	15,426	0.150

Note: The table reports OLS estimates from separate regressions of the non-cognitive skills on group work. The control variables are individual characteristics (birth cohort dummies, birth month dummies, gender dummy, dummy for "do not remember"), family characteristics (parents' education dummies, dummies for number of books at home, dummies for living with grandparents at the age of 12, and dummies for number of siblings at the age of 15), school characteristics (dummies for class size), community characteristics (city/ward/county dummies at the age of 12), and teacher characteristics (dummies for classroom disorder, bullying interventions, and corporal punishment). We include the gender dummy in columns (3) and (4). We adjust the sampling weight to ensure that out our observations are proportional to the overall Japanese population distribution. Numbers in brackets are Huber-White robust standard errors. ***, **, and * indicate statistical significance at levels of 1%, 5%, and 10% respectively.

Table 10. Non-Cognitive Skills Split by Academic Achievement

	Coef.	Robust S.E.
Panel A. Main5 is less than p25 (Obs. = 6,022)		
Altruism	0.167	[0.070]**
Trust	0.018	[0.056]
Positive reciprocity	0.324	[0.070]***
Negative reciprocity	−0.044	[0.054]
Cooperation outcome	0.072	[0.062]
Cooperation satisfaction	0.068	[0.065]
Panel B. Main5 is p25−p50 (Obs. = 2,074)		
Altruism	0.292	[0.108]***
Trust	−0.117	[0.116]
Positive reciprocity	0.238	[0.132]*
Negative reciprocity	0.005	[0.122]
Cooperation outcome	−0.026	[0.111]
Cooperation satisfaction	0.053	[0.127]
Panel C. Main5 is p50−p75 (Obs. = 3,959)		
Altruism	0.099	[0.085]
Trust	0.018	[0.076]
Positive reciprocity	0.044	[0.089]
Negative reciprocity	0.115	[0.078]
Cooperation outcome	−0.076	[0.084]
Cooperation satisfaction	0.058	[0.079]
Panel D. Main5 is above p75 (Obs. = 3,371)		
Altruism	−0.053	[0.080]
Trust	0.134	[0.086]
Positive reciprocity	0.169	[0.084]**
Negative reciprocity	0.045	[0.078]
Cooperation outcome	0.001	[0.085]
Cooperation satisfaction	0.173	[0.078]**

Note: The table reports OLS estimates from separate regressions of the non-cognitive skills on group work. The control variables are individual characteristics (birth cohort dummies, birth month dummies, gender dummy, dummy for "do not remember"), family characteristics (parents' education dummies, dummies for number of books at home, dummies for living with grandparents at the age of 12, and dummies for number of siblings at the age of 15), school characteristics (dummies for class size), community characteristics (city/ward/county dummies at the age of 12), and teacher characteristics (dummies for classroom disorder, bullying interventions, and corporal punishment). We include the gender dummy in columns (3) and (4). We adjust the sampling weight to ensure that out our observations are proportional to the overall Japanese population distribution. Numbers in brackets are Huber-White robust standard errors. ***, **, and * indicate statistical

significance at levels of 1%, 5%, and 10% respectively. The number of observations for quartile subsamples are 6,022 (1st quartile), 2,074 (2nd quartile), 3,959 (3rd quartile), and 3,371 (4th quartile). This is because the distribution of main5 has some spikes. The distribution is provided in Figure B of Appendix B.

Appendix A: Wording of Questionnaire

Q1. This item gauges part of your experience at elementary school. Please respond to each statement.

- There was a task in which students worked together as a group. (1. Yes, 2. No, 3. I do not remember)
- Sometimes, there was no classroom lesson due to a teachers' strike. (1. Yes, 2. No, 3. I do not remember)
- There was classroom disorder. (1. Yes, 2. No, 3. I do not remember)
- The teacher intervened when bullying occurred. (1. Yes, 2. No, 3. I do not remember)
- The teacher did not use corporal punishment. (1. Yes, 2. No, 3. I do not remember)

Q2. How many students in your class were there when you were in 6^{th} grade at elementary school?

1. 1−5 persons
2. 6−10 persons
3. 11−15 persons
4. 16−20 persons
5. 21−25 persons
6. 26−30 persons
7. 31−35 persons
8. 36−40 persons
9. 41−45 persons
10. 46−50 persons
11. more than 51 persons

Q3. How many books were there in your house during your childhood (comics and magazines excluded)?

1. More than 100
2. 50 to less than 99
3. 10 to less than 49
4. 1 to less than 9
5. zero
6. I do not remember

Q4. How satisfied are you with each of the following?

	Satisfied				Unsatisfied
Your whole life	○	○	○	○	○
The place you live in	○	○	○	○	○
Your leisure activities	○	○	○	○	○

The current financial situation of your household	○	○	○	○	○		
Relationships with your friends	○	○	○	○	○		
Work	○	○	○	○	○	○	Do not work
Relationship with your spouse	○	○	○	○	○	○	Do not have spouse
Relationship with your family member(s) except for your spouse	○	○	○	○	○	○	Do not have any family except for spouse

Q5. Overall, how happy would you say you are currently? Using a scale from 0–10 where "10" is "very happy" and "0" is "very unhappy," how would you rate your current level of happiness?

Very happy Very Unhappy

10 9 8 7 6 5 4 3 2 1 0

Q6. When you were fifteen years old, where did your grades rank among others in your grade?

	In lower lank	In rather lower rank	In the middle	In the rather higher rank	In higher lank
Average of All Subjects	○	○	○	○	○
Language	○	○	○	○	○
Mathematics	○	○	○	○	○
Science	○	○	○	○	○
Social Studies	○	○	○	○	○
English	○	○	○	○	○

Q7. How many brothers and sisters did you have when you were 15 years old?

- Older brothers
- Older sisters
- Younger brothers
- Younger sisters

Q8. Please indicate the highest level of education (or equivalent) completed by you.

1. Completed some grades from elementary school / junior high school
2. Dropped out of high school
3. Completed some grades from high school
4. Junior college – no degree
5. Completed some grades from junior college

6. College – no degree
7. Graduated from college
8. Masters' course – no degree
9. Masters' degree
10. Doctoral course – no degree
11. Doctoral degree
12. I do not like to answer.

Q9. Approximately how much was your annual earned income before taxes in 2014 (including business income if you are self-employed)?

1. less than 1 million yen
2. 1 million yen to less than 2 million yen
3. 2 million yen to less than 3 million yen
4. 3 million yen to less than 4 million yen
5. 4 million yen to less than 5 million yen
6. 5 million yen to less than 6 million yen
7. 6 million yen to less than 7 million yen
8. 7 million yen to less than 8 million yen
9. 8 million yen to less than 9 million yen
10. 9 million yen to less than 10 million yen
11. 10 million yen to less than 11 million yen
12. 11 million yen to less than 12 million yen
13. 12 million yen to less than 13 million yen
14. 13 million yen to less than 14 million yen
15. more than 14 million yen
16. I do not like to answer

Q10. Approximately how much is the balance of financial assets (savings, stocks, bonds, insurance, etc.) of your entire household? (If you are a student, please indicate the balance of financial assets of your parents' entire household.)

1. less than 2.5 million yen
2. 2.5 million yen to less than 5 million yen
3. 5 million yen to less than 7.5 million yen
4. 7.5 million yen to less than 10 million yen
5. 10 million yen to less than 15 million yen
6. 15 million yen to less than 20 million yen
7. 20 million yen to less than 30 million yen
8. 30 million yen to less than 50 million yen
9. 50 million yen to less than 100 million yen
10. more than 100 million yen
11. I do not like to answer/I do not remember

Q11. Please answer if you work. What is your type of employment?

1. Company employee/Organization staff
2. Government employee
3. Businessman/Director
4. Self-employee
5. Family business employee (in self-employed business)

Q12. Please answer if you work. How many years have you been working for your present company?

1. Less than a year
2. A year to less than 5 years
3. 5 years to less than 10 years
4. 10 years to less than 20 years
5. 20 years to less than 30 years
6. 30 years to less than 40 years
7. More than 40 years

Appendix B Figures and Tables

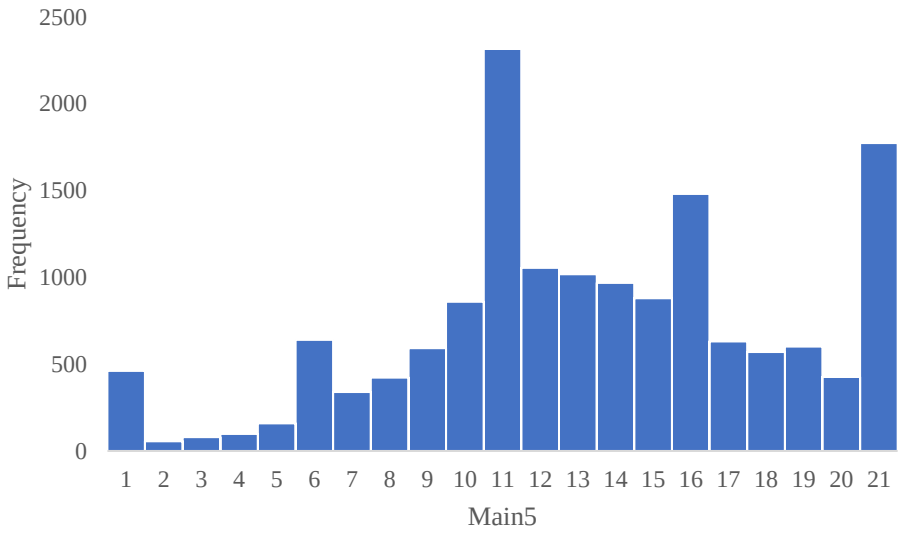

Figure A. Distribution of Subjective Academic Achievement Averages in Junior High School (Main5)

Table A. Descriptive Statistics

	Mean	S.D.	Min	Max
Male dummy	0.485	0.50	0.00	1.00
Father's education				
Junior high school	0.23	0.42	0.00	1.00
High school	0.36	0.48	0.00	1.00
Junior college/technical junior college	0.02	0.14	0.00	1.00
Bachelor’s degree	0.17	0.38	0.00	1.00
Master’s degree	0.01	0.09	0.00	1.00
Doctor of philosophy	0.00	0.07	0.00	1.00
Do not want to answer/Do not remember	0.20	0.40	0.00	1.00
Mother's education				
Junior high school	0.22	0.41	0.00	1.00
High school	0.45	0.50	0.00	1.00
Junior college/technical junior college	0.07	0.26	0.00	1.00
Bachelor’s degree	0.05	0.23	0.00	1.00
Master’s degree	0.00	0.04	0.00	1.00
Doctor of philosophy	0.00	0.03	0.00	1.00
Do not want to answer/Do not remember	0.20	0.40	0.00	1.00
Number of books				
1−9	0.15	0.36	0.00	1.00
10−49	0.40	0.49	0.00	1.00
50−99	0.12	0.33	0.00	1.00
More than 100	0.15	0.36	0.00	1.00
Nothing	0.02	0.13	0.00	1.00
Do not remember	0.15	0.36	0.00	1.00
Number of siblings	1.43	1.08	0.00	10.00
Class size at public elementary school	35.81	7.58	3.00	53.00
Teacher characteristics				
(1) There was classroom chaos				
Yes	0.19	0.39	0.00	1.00
Do not remember	0.08	0.28	0.00	1.00
(2) Teacher intervened with bullying				
Yes	0.29	0.45	0.00	1.00
Do not remember	0.38	0.48	0.00	1.00
(3) Teacher used corporal punishment				
Yes	0.64	0.48	0.00	1.00
Do not remember	0.10	0.30	0.00	1.00

Table B. The Determinants of Group Work Experience

	(1)		(2)	
	Coef.	Robust S.E.	Coef.	Robust S.E.
Male dummy	−0.068	[0.010]***		
Age 30−34 dummy	−0.037	[0.020]*	−0.061	[0.025]**
Age 35−39 dummy	−0.126	[0.021]***	−0.162	[0.026]***
Age 40−44 dummy	−0.148	[0.021]***	−0.186	[0.026]***
Age 45−49 dummy	−0.136	[0.021]***	−0.152	[0.025]***
Age 50−54 dummy	−0.137	[0.021]***	−0.188	[0.026]***
Age 55−59 dummy	−0.191	[0.021]***	−0.212	[0.026]***
Male dummy × Age 25−29 dummy			−0.125	[0.031]***
Male dummy × Age 30−34 dummy			−0.074	[0.025]***
Male dummy × Age 35−39 dummy			−0.052	[0.027]*
Male dummy × Age 40−44 dummy			−0.048	[0.027]*
Male dummy × Age 45−49 dummy			−0.093	[0.026]***
Male dummy × Age 50−54 dummy			−0.023	[0.027]
Male dummy × Age 55−59 dummy			−0.082	[0.027]***
City/Ward/County dummies	Yes		Yes	
Observations	15,426		15,426	
Adjusted R−squared	0.072		0.073	

Note: All estimations are implemented by OLS. We adjusted the sampling weight to ensure that out our observations were proportional to the overall Japanese population distribution. Numbers in brackets are Huber-White robust standard errors. ***, **, and * indicate statistical significance at levels of 1%, 5%, and 10% respectively.

Table C. Inequality of Academic Achievement by Group Work

	Group work			
	Yes	No	Yes − No	Do not remember
Panel A. Standard deviation				
Main5	5.041	4.742	0.299	4.968
Language	1.112	1.067	0.045	1.090
Social studies	1.165	1.079	0.086	1.115
Mathematics	1.282	1.185	0.097	1.240
Science	1.184	1.115	0.068	1.158
English (foreign language)	1.287	1.219	0.068	1.248
All	1.124	1.047	0.077	1.103
Panel B. Coefficient of variation				
Main5	0.288	0.266	0.023	0.298
Language	0.304	0.295	0.010	0.316
Social studies	0.329	0.299	0.029	0.330
Mathematics	0.373	0.330	0.043	0.375
Science	0.342	0.309	0.033	0.347
English (foreign language)	0.381	0.356	0.025	0.388
All	0.316	0.287	0.029	0.323