Student-Teacher Ratio, Work Hours, and Workload Stress Experienced by Teachers

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Research Article

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RESEARCH

Student-Teacher Ratio, Work Hours, and Workload Stress Experienced by Teachers

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Abstract

Background: Too long work hours of Japanese school teachers, along with an increasing number of teachers taking leave due to mental illness, are well known and recognized as a serious social problem. In order to prevent the spread of COVID-19 by reducing the density in the classroom, the Japanese government has decided to reduce the upper-limit of class size in primary schools after 2021, which is expected to result in lowering the student-teacher ratio. The aim of this study was to examine the association between student-teacher ratio, teacher work hours and teacher stress.

Methods: Data on student-teacher ratio, teacher work hours, and teacher stress were obtained from a large-scale international survey conducted by OECD. The number of teachers participated in the survey was 3308 (primary school) and 3555 (lower-secondary school). After excluding teachers with missing observations, the analytic sample consisted of 2767 (primary school) and 3018 (lower-secondary school) teachers. Multivariate regression analysis was performed.

Results: Regression results revealed that student-teacher ratio was positively correlated with total work hours and workload stress of teachers, and was negatively correlated with their job satisfaction. In particular, teachers working in schools with high student-teacher ratio spent more time on time-consuming tasks such as marking/correcting student work and communication with parents or guardians. The coefficient estimates suggested that lowering student-teacher ratio by five at lower secondary school would decrease total working hours by 2.5 hours per week ($p < 0.001$).

Conclusion: Our empirical results suggested that the class-size reduction policy starting in 2021 could reduce teacher stress and long work hours through the consequent decrease in student-teacher ratios.

Keywords: Student-teacher ratio; Workload stress; Work hours; School teachers

Background

It is well known that school teachers in Japan work too long hours. According to the results of the OECD Teaching and Learning International Survey, an international, large-scale survey of teachers conducted in 2018 (hereafter TALIS 2018), the working hours of school teachers in Japan were the longest among the participating countries[1]. TALIS 2018 also showed

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that while school teachers in Japan devoted much time on individual planning or preparation of lessons, they spent lots of time on non-teaching tasks such as general administrative work and extracurricular activities. The number of school teachers taking leave due to mental illness has been increasing since 2000, and in recent years has exceeded 5000 per year[2]. Existing studies found significant association between occupational stress and mental health[3, 4], long working hours and psychological distress[5], poor mental health and lower job satisfaction[6], and prolonged fatigue and both quantitative and qualitative workload[7], among school teachers in Japan. A recent large-scale survey conducted by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) found significant correlation between work hours of teachers and student-teacher ratios[8]. In order to improve the working environment for school teachers, with the combined purpose of preventing the spread of COVID-19, the Japanese government has decided to reduce the upper-limit of class size, from 40 to 35, in primary schools after 2021.

The class-size reduction policy is expected to result in lowering student-teacher ratio (hereafter STR) because more teachers will be newly hired and assigned to schools. This paper examined the association between STR, working hours and workload stress of school teachers, by using teacher-level survey data obtained from TALIS 2018. Results of a simple regression analysis revealed that student-teacher ratios were positively associated with total working hours and workload stress of teachers. Specifically, a higher STR was associated with longer hours spent on tasks other than teaching, such as marking/correcting of student work, counselling students, communication with parents or guardians, and engaging in extracurricular activities. Our empirical results suggested that the class-size reduction policy starting in 2021 could reduce teacher stress and long work hours caused by non-teaching tasks through the consequent decrease in student-teacher ratio.

Methods

Study sample

Data on working environment for teachers and STR in Japanese schools were obtained from TALIS 2018 dataset[10]. TALIS is an international, large-scale survey that asks teachers and school leaders about working conditions and learning environments at their schools. In Japan, 197 primary schools and 196 lower-secondary schools participated in the 2018 survey. The number of teachers participated in the survey was 3308 for primary schools and 3555 for lower secondary schools. By excluding the teachers who were missing key variables used in the statistical analyses (see below), the sample included 2767 and 3018 teachers for primary and lower-secondary school, respectively.

Student-teacher ratios

STR was measured at the school level and obtained from the TALIS dataset file (variable named as "stratio" in the dataset). The ratio was derived by dividing the total number of students enrolled by the number of employed teachers in a given school[9].

Work hours

Total working hours of teachers were obtained from the answers to the following question in teacher questionnaire: "During your most recent complete calendar week, approximately how many 60-minute hours did you spend in total on tasks related to your job at this school?"

Hours spent on individual tasks were obtained from the answers to the following question: "Approximately how many 60-minute hours did you spend on the following tasks during your most recent complete calendar week, in your job at this school?" Tasks are

Table 1 Item wording for workload stress, workplace well-being, and job satisfaction scales

Workload stress (t3wload)	
Thinking about your job at this school, to what extent are the following sources of stress in your work?	
Response options: "Not at all" (1), "To some extent" (2), "Quite a bit" (3), "A lot" (4).	
A.	Having too much lesson preparation
B.	Having too many lessons to teach
C.	Having too much marking
D.	Having too much administrative work to do (e.g. filling out forms)
E.	Having extra duties due to absent teachers
Workplace well-being (t3wels)	
In your experience as a teacher at this school, to what extent do the following occur?	
Response options: "Not at all" (1), "To some extent" (2), "Quite a bit" (3), "A lot" (4).	
A.	I experience stress in my work
B.	My job leaves me time for my personal life
C.	My job negatively impacts my mental health
D.	My job negatively impacts my physical health
Job satisfaction (t3jsenv)	
How strongly do you agree or disagree with the following statements?	
Response options: "Strongly disagree" (1), "Disagree" (2), "Agree" (3), "Strongly agree" (4).	
A.	I would like to change to another school if that were possible
B.	I enjoy working at this school
C.	I would recommend this school as a good place to work
D.	All in all, I am satisfied with my job
Source: [9]	

categorized into the following 10 types: a) Individual planning or preparation of lessons either at school or out of school; b) Team work and dialogue with colleagues within this school; c) Marking/correcting of student work; d) Counselling students (including student supervision, mentoring, virtual counselling, career guidance and behaviour guidance); e) Participation in school management; f) General administrative work (including communication, paperwork and other clerical duties); g) Professional development activities; h) Communication and co-operation with parents or guardians; i) Engaging in extracurricular activities (e.g. sports and cultural activities after school); j) Other work tasks.

Workload stress and related variables

Workload stress, workplace well-being, and job satisfaction were measured based on teachers' responses to several questions about school climate and job satisfaction, and were obtained from TALIS dataset file (variable named as "t3wload", "t3wels", and "t3jsenv" in the dataset, respectively). These variables were calculated by applying confirmatory factor analysis to the responses by teachers to the relevant questionnaire items[9]. The questionnaire items were summarized in Table 1.

Sample characteristics

Descriptive statistics of the study sample were reported in Table 2. The mean of STR was 17.4 and 13.6 for primary school and lower-secondary school, respectively. Over 90 percent of teachers were permanently employed. The average work hours per week were 54.1 and 55.9 for primary school and lower-secondary school, respectively, and 30–40% of working hours were devoted to teaching. Among individual tasks, average hours spent on engaging extracurricular activities were 7.6 per week for lower-secondary school teachers, while those for primary school teachers were only 0.6. This difference reflected the fact that

Table 2 Descriptive statistics

	Primary school ($N = 2767$)		Lower-secondary school ($N = 3018$)	
	Mean	Std. Dev.	Mean	Std. Dev.
Student-Teacher ratio	17.399	5.040	13.589	4.347
Gender (Male: 0, Female: 1)	0.402	0.490	0.588	0.492
Employment status (Fixed-term: 0, Permanent: 1)	0.937	0.243	0.906	0.292
School type (Public: 0, Private: 1)	0.015	0.121	0.101	0.301
Age group				
under 25	0.065	0.247	0.047	0.212
25–29	0.156	0.363	0.167	0.373
30–39	0.235	0.424	0.247	0.431
40–49	0.234	0.423	0.216	0.411
50–59	0.245	0.430	0.252	0.434
60 and above	0.065	0.247	0.071	0.257
Work hours per week (Hours)				
Total	54.131	14.260	55.939	18.143
Teaching	22.858	8.464	17.746	8.120
Preparation of lessons	8.506	7.183	8.381	6.998
Team work and dialogue with colleagues	4.066	3.354	3.603	3.426
Marking/correcting of student work	4.810	4.234	4.308	4.168
Counselling students	1.266	2.285	2.391	3.550
Participation in school management	3.142	5.432	2.871	5.011
General administrative work	5.122	6.347	5.562	6.760
Professional development activities	0.691	2.501	0.682	2.123
Communication and co-operation with parents	1.226	1.539	1.231	2.090
Engaging in extracurricular activities	0.569	1.968	7.572	7.678
Other work tasks	1.864	4.173	2.779	5.523
Workload stress	9.794	2.230	9.167	2.004
Workplace well-being	9.224	2.127	9.332	2.153
Job satisfaction	12.370	1.974	11.998	1.951

after-school club activities were widespread and enthusiastic in lower-secondary schools, and over 80% of lower-secondary school teachers engaged in the club activities as advisors[8].

Statistical analysis

A simple regression analysis was performed using Stata version 16.1. The estimation method was ordinary least squares (OLS). The dependent variables were work hours, workload stress, workplace well-being, and job satisfaction. The key explanatory variable was STR. The other control variables were dummy variables for gender (Male: 0, Female: 1), employment status (Fixed-term: 0, Permanent: 1), age group (the base category was under 25), and a dummy variable for school type (Public: 0, Private: 1). Because STR were measured at the school level, standard errors robust to within-school correlation were calculated.

Results

STR and work hours of teachers

Coefficient estimates of STR on work hours were reported in Table 3. STR was positively correlated with total work hours ($p < 0.001$) and teaching hours ($p < 0.1$ for primary school and $p < 0.001$ for lower-secondary school). Among other tasks, hours spent on marking/correcting of student work ($p < 0.01$), counselling students ($p < 0.05$), and communication with

Table 3 Coefficient estimates of STR on work hours

	Primary school		Lower-secondary school	
Dependent variables	Coef. of STR	95% CI	Coef. of STR	95% CI
Total work hours	0.221***	[0.092, 0.349]	0.499***	[0.321, 0.676]
Teaching	0.084	[-0.003, 0.172]	0.233***	[0.157, 0.308]
Preparation of lessons	-0.008	[-0.083, 0.068]	-0.017	[-0.090, 0.056]
Team work and dialogue with colleagues	0.100***	[0.069, 0.132]	0.023	[-0.008, 0.055]
Marking/correcting of student work	0.116***	[0.076, 0.157]	0.078**	[0.031, 0.124]
Counselling students	0.037***	[0.022, 0.053]	0.039*	[0.003, 0.076]
Participation in school management	-0.085**	[-0.138, -0.033]	-0.044	[-0.102, 0.015]
General administrative work	-0.111***	[-0.172, -0.050]	0.017	[-0.052, 0.086]
Professional development activities	-0.009	[-0.030, 0.012]	0.011	[-0.005, 0.027]
Communication and co-operation with parents	0.017**	[0.005, 0.030]	0.029***	[0.013, 0.045]
Engaging in extracurricular activities	0.009	[-0.011, 0.029]	0.073	[-0.020, 0.167]
Other work tasks	-0.004	[-0.039, 0.032]	-0.016	[-0.076, 0.043]

The confident intervals and p-values were calculated based on standard errors robust to within-school correlations.
*** p<0.001, ** p<0.01, * p<0.05

parents or guardians ($p < 0.05$) were found to be positively correlated with STR. Also, in lower secondary schools, hours spent on extracurricular activities were found to have positive but weak correlation with STR.

Teacher stress and related variables

Coefficient estimates of STR on teacher stress and related variables were reported in Table 4. STR was positively correlated with workload stress ($p < 0.001$), while it was also positively correlated with workplace well-being ($p < 0.01$). The correlation between STR and job satisfaction was negative and statistically significant for both primary and lower-secondary school teachers ($p < 0.05$). Coefficient estimates for the other control variables were not reported in the table, but it was found that female teachers tended to report lower workload stress and higher job satisfaction than male teachers.

Discussion

Our simple statistical analysis clearly showed that a higher STR at the school level was an important determinant of long working hours of teachers. The coefficient estimates revealed that lowering STR by five at lower secondary school decreased total working hours by 2.5 hours per week. In addition, it was found that teachers working at high-STR schools tended to spend much time not only on teaching but on the other tasks such as marking/correcting of student work, counselling students, and communication with parents or guardians. Our empirical results suggested that the working hours of teachers in Japan, the longest in the world, could be reduced by lowering STR at the school level.

Our statistical analysis also showed that teachers in high-STR schools tended to experience higher workload stress. In light of the fact that the number of teachers taking leave due to mental illness has remained high, lowering STR could have a positive impact on decreasing mental illness of teachers through reducing work hours and workload stress. On the other hand, it was a somewhat puzzling result that teachers in high-STR schools tended to report higher workplace well-being, because they worked longer and experienced higher stress. This should be investigated further in future research.

The limitation of this study was that it only showed the correlation between STR, working hours and teacher stress, and thus it did not identify a causal relationship between them. If the local educational board,

Table 4 Coefficient estimates of STR on workload stress and related variables

	Primary school		Lower-secondary school	
Dependent variables	Coef. of STR	95% CI	Coef. of STR	95% CI
Workload stress	0.058***	[0.035, 0.082]	0.077***	[0.050, 0.104]
Workplace well-being	0.034**	[0.012, 0.057]	0.039***	[0.017, 0.060]
Job satisfaction	-0.026*	[-0.050, -0.002]	-0.028*	[-0.053, -0.004]

The confident intervals and p-values were calculated based on standard errors robust to within-school correlations.
*** $p<0.001$, ** $p<0.01$, * $p<0.05$

which had the discretion of assigning teachers to public schools, placed more teachers in schools where teachers had worked longer hours or where teachers had been more stressed, then the coefficient estimates reported above might be biased. However, even if such assignments of teachers had been made, the absolute value of the coefficient estimate of STR should be larger. In other words, the magnitude of the coefficient estimates of STR obtained in the above analysis would not be overestimated.

Conclusion

Too long work hours of Japanese school teachers, along with an increasing number of teachers taking leave due to mental illness, were well known and recognized as a serious social problem. The Japanese government has decided to reduce the maximum class size in primary schools after 2021, which is expected to result in lowering the student-teacher ratio. This paper examined the association between STR, working hours of school teachers and teacher stress, and found that STR was positively correlated with total work hours and workload stress of teachers. In particular, teachers in high-STR schools spent more time on time-consuming tasks such as marking/correcting student work. It was also found that teachers in high-STR schools tended to report lower job satisfaction. Although reducing class size would not bring about significant improvement in academic performance or socio-emotional skills of students[11, 12], our empirical results suggested that the class-size reduction policy starting in 2021 could reduce long work hours and workload stress of teachers and increase their job satisfaction through the consequent decrease in student-teacher ratios.

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Abbreviations

STR: Student-teacher ratios; OECD: Organisation for Economic Co-operation and Development; TALIS: Teaching and Learning International Survey; MEXT: Japan's Ministry of Education, Culture, Sports, Science, and Technology

Availability of data and materials

Data is publicly available and can be downloaded from the OECD website. http://www.oecd.org/education/talis/talis-2018-data.htm

Ethics approval and consent to participate

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Consent for publication

Not applicable.

Authors' contributions

Only one author conducted the study. The author read and approved the final manuscript.

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Tables