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Original Article

Lower Work Engagement Is Associated with Insomnia, Psychological Distress, and Neck Pain among Junior and Senior High School Teachers in Japan

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School teachers are subject to both physical and mental health problems. We examined cross-sectional relationships between work engagement and major health outcomes among junior and senior high school teachers in Japan via a nationwide survey in 2019-2020. A total of 3,160 respondents were included in the analyses (19.9% response rate). Work engagement was assessed with the Utrecht Work Engagement Scale-9 (UWES-9), and we thus divided the teachers into quartiles according to their UWES-9 scores. Based on validated questionnaires, we assessed insomnia, psychological distress, and neck pain as health outcomes. A binomial logistic regression adjusted for age, gender, school type, teacher's roles, involvement in club activities, division of duties, employment status, and whether they lived with family demonstrated that the teachers with lower UWES-9 scores had higher burdens of insomnia, psychological distress, and neck pain (odds ratios [95% confidence intervals] in 4th vs. 1st quartile, 2.92 (2.34-3.65), 3.70 (2.81-4.88), and 2.12 (1.68-2.68), respectively; all trend $p < 0.001$). There were no significant differences in these associations between full-time and part-time teachers. Our findings indicate that low work engagement may contribute to physical and mental health issues among junior and senior high school teachers, thus providing insights for preventing health problems in this profession.

Key words: work engagement, school teachers, insomnia, psychological distress, neck pain

Healthcare (both physical and mental healthcare) among school teachers has recently become an important issue in industrial health. According to the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT), the number of teachers on sick leave is increasing annually throughout Japan. In 2023, approx. 9,000 (approx. 1% of all teachers in Japan) took a sick leave because of both physical and mental issues, and over 6,000 (0.7% of all teachers) were affected by mental illness alone [1]. School teachers have various activities involving extensive time commitments and psychosocial interactions for which they are responsible [2]. High job demands and stressful work environments, such as managing a large class of children, can lead to emotional exhaustion, depres-

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sion, and increased psychosomatic symptoms [3]. These factors may result in a loss of motivation among teachers [3,4]. High psychosocial demands that require extensive time management are considered potential stressors that increase the risk of stress-related disorders and burnout in this occupational group [4-8]. According to the Organisation for Economic Co-operation and Development (OECD) International Teaching and Learning Survey (TALIS) [2], Japanese teachers suffer from mental illness and insomnia.

Work engagement, which is the opposite of burnout, is defined as a fulfilling work-related state that consists of vigor, dedication, and absorption. It has been suggested that high levels of engagement lead to motivated, energetic work and help prevent turnover [9,10]. Several studies have shown that workers with lower work engagement experience more mental and physical problems than those with greater work engagement [11-13]. However, there have been few investigations in Japan of the impact of work engagement on psychological health issues among school teachers, a profession widely regarded as particularly susceptible to such issues [14,15]. Little is known about the association of work engagement with other heath conditions such as insomnia and musculoskeletal pain among school teachers in Japan. Globally, neck pain is the primary cause of disability and years lived with disabilities [16]; we thus focused the present study on neck pain as a primary musculoskeletal issue in school teachers. We hypothesized that lower work engagement is associated with higher burdens of physical and mental health problems among junior and senior high school teachers. We conducted this study to determine the cross-sectional relationships between work engagement and mental and physical health outcomes such as insomnia, psychological distress, and neck pain among junior and senior high school teachers by conducting a nationwide survey.

Participants and Methods

Participants and procedures. This was a cross-sectional random sampling study in which a single-stage cluster sampling method with schools as the cluster unit was used. Our survey targeted junior and senior high school staff from schools selected throughout Japan via the National School Directory. The sample included 130 of the country's 10,220 junior high schools (selection rate: 1.3%) and 109 of the 4,702 senior high schools (selection rate: 2.3%). The survey distribution and collection were carried out at full-time schools. All staff members enrolled in the sampled schools were subjects of this study: 6,420 staff members at junior high schools and 9,510 staff members at senior high schools. The survey periods were from August to September 2019 for the junior high schools and from August to September 2020 for the senior high schools.

We requested the cooperation of the principals of these schools and sent individual self-reported questionnaires to their respective school staff populations. Before being asked to complete the questionnaire, the junior and senior high school teachers were informed that the survey was voluntary and that anonymity and confidentiality were ensured. Anonymous questionnaires and envelopes were provided to the staff for completion. Upon completion, the envelopes containing the questionnaires were sealed by each staff member him/herself and collected by the administrators, then returned to our institute unopened. A completed questionnaire was considered consent to participate in the study. This study was conducted in accord with the Declaration of Helsinki. All of the study procedures were reviewed and approved by the Institutional Review Board of Shimane University School of Medicine (no. 3274; approved July 24, 2018) and Okayama University (no. 2020-027; approved Jan. 31, 2020).

Responses were obtained from 48 junior high schools (school response rate: 36.9%) and 61 senior high schools (school response rate: 56.0%), with a total of 3,843 responses, accounting for 1,207 junior high school staff and 2,636 senior high school staff. Of the 3,843 responses, 683 were excluded from the analysis because of completion by school administrative staff or a lack of responses to required fields, such as the Utrecht Work Engagement Scale-9 (UWES-9) or the Athens Insomnia Scale (AIS).

The data of the remaining 3,160 responses were used for the analyses: 975 from junior high school teachers and 2,185 from senior high school teachers. The analyses included regularly employed teachers (including administrators), full-time teachers on annual contracts, and part-time teachers with hourly contracts. The response rates for the target teachers were 19.9% for the total schools, 15.1% for the junior high schools, and 23.1% for the senior high schools.

Measures. The participants were asked to report their age category, sex, junior or senior high school status, employment status (full-time or part-time), homeroom teacher status, allocated duties, club advisor status, number of leave days within the past year, and whether they lived with family. Work engagement was assessed with the UWES-9, a self-report instrument. The UWES-9 consists of three scales (vigor, dedication, and absorption) comprised of three items each and has shown encouraging psychometric features. Because the internal consistency of the nine-item scale is very high, the UWES-9 has been translated into >20 languages and is used as an international scale for work engagement [15]. Both the original and Japanese versions of the UWES-9 [15,17] have been demonstrated to have adequate reliability and validity. Each item is rated on a seven-point Likert scale from "never" (0) to "always or everyday" (6), and the total score on the UWES-9 ranges from 0 to 54 points. Higher scores indicate a stronger tendency toward high engagement at work. Because cutoff scores of the UWES-9 have not been proposed as international criteria, we used quartiles for the total UWES-9 score for the present analyses.

The AIS is composed of eight items assessing subjective complaints associated with sleep induction, nocturnal awakening, final awakening, total sleep duration, sleep quality, well-being during the day, functioning capacity during the day, and sleepiness during the day. Respondents rate whether they have experienced each symptom during the past month on a four-point Likert scale ranging from "no problem at all" (0) to "a very serious problem" (3). The total AIS score ranges from 0 to 24 points. A score ≥4 points is considered to indicate insomnia [18]. Internal consistency coefficients of the AIS ranged from 0.78 to 0.88, and the correlations between the AIS-J (the Japanese version of the AIS) and the aforementioned authorized scales were 0.81 and 0.85, respectively [19].

Psychological distress was evaluated via the Japanese version of the Kessler 6 (K6) scale [20]. The performance of the K6 scales in detecting Diagnostic and Statistical Manual of Mental Disorders (fourth edition) (DSM-IV) mood and anxiety disorders, as assessed by the areas under receiver operating characteristic (ROC) curves (AUCs), was excellent, with values as high as 0.94 (95% confidence interval [CI]: 0.88-0.99) for the K6 [20]. The K6 for nonspecific psychological distress consists of six items scored on a five-point Likert scale. The total K6 score ranges from 0 to 24 points, with higher scores indicating more severe psychological distress. Scores ≥5 points indicate psychological distress [21].

The Japanese version of the Neck Disability Index (NDI) was used for measuring neck pain [22]. This scale contains 10 items (pain intensity, personal care, lifting, reading, headache, concentration, work, driving, sleeping, and recreation). The Cronbach α of the NDI-J (Japanese version) was 0.88, and the intraclass correlation coefficient for test-retest reliability was 0.91 (95%CI: 0.82-0.95) [22]. Each item is scored from 0 (no disability) to 5 (total disability) points, and the total score varies from 0 to 50 points. A score ≥5 points is considered to indicate neck pain [23].

Statistical analysis. The participants were divided into quartile groups according to their UWES-9 scores: ≥40 points in Quartile 1 (high), 30-39 points in Quartile 2 (modestly higher), 24-29 points in Quartile 3 (modestly lower), and ≤23 points in Quartile 4 (low). We compared the participants' characteristics and health status (insomnia, psychological distress, neck pain, and cumulative number of these variables) between quartile groups using the $\chi 2$-test. We analyzed the data by using binomial logistic regression, with the quartiles of UWES-9 scores as an explanatory variable and insomnia, psychological distress, and neck pain as outcome variables. Adjustments were made for factors such as age group (<40 or ≥40 years), sex, school type (junior or senior high school), part-time status (full- or part-time), homeroom teacher status (yes or no), allocating duties (yes or no), club advisor status (yes or no), leave days during the past 12 months (<10 or ≥10 days), and whether the respondent's family lives together (yes or no), each of which is a covariate selected based on previous studies [24-27].

The cutoff value for the number of sick leave days during the past 12 months was determined based on a survey report on teachers' working conditions conducted by MEXT [28]. As a sensitivity analysis, we also conducted a stratified analysis by job status (full- or part-time job); we further tested for interactions between work engagement and job status in relation to health outcomes. The analyses were conducted using STATA (Software for Statistics and Data Science, ver. 18; StataCorp, College Station, TX, USA), and all probability (p)-values were two-tailed at the 5% significance level.

Results

The characteristics of the 3,160 respondents classified by quartiles of UWES-9 scores are shown in Table 1. Respondents were divided 718 in Quartile 1st, 827 in Quartile 2nd, 764 in Quartile 3rd and 851 in Quartile 4th, respectively. The Quartile 4 group of teachers with lower UWES-9 scores had a higher prevalence of allocating duties and number of leave days ≥10 during the prior 12 months and lower prevalences of part-time status and living with family. Table 2 details the prevalences of insomnia, psychological distress, and neck pain across quartiles of UWES-9 scores. Insomnia was reported by 1,565 respondents (49.5%), psychological distress by 757 (24.0%), and neck pain by 1,119 (35.4%). The Quartile 4 group of teachers with low UWES-9 scores had significantly higher prevalences of insomnia, psychological distress, and neck pain. The cumulative number of respondents chose each in these three factors was higher with significantly lower UWES-9 scores.

Table 1 Characteristics of junior and senior high school teachers by quartiles of the Utrecht Work Engagement Scale-9 (UWES-9) scores

		Quartiles of the UWES-9 scores				
	All	Quartile 1 (≥40) high	Quartile 2 (30-39) modestly higher	Quartile 3 (24-29) modestly lower	Quartile 4 (≤23) low	*P*-value
	n=3,160	n=718	n=827	n=764	n=851	
Age category: ≥40 years old	2,049 (64.8)	444 (61.8)	537 (64.9)	501 (65.6)	567 (66.6)	0.239
Gender: males	1,965 (62.6)	462 (64.4)	499 (60.3)	454 (59.4)	550 (64.6)	0.236
School type: senior high schools	2,185 (69.2)	508 (70.8)	563 (68.1)	534 (69.9)	580 (68.2)	0.593
Work time: part-time	517 (16.4)	148 (20.6)	167 (20.2)	96 (12.6)	106 (12.5)	0.001
Homeroom teacher: yes	1,266 (40.1)	285 (39.7)	326 (39.4)	319 (41.8)	336 (39.5)	0.750
Allocating duties: yes	2,667 (84.4)	572 (79.7)	682 (82.5)	670 (87.7)	743 (87.3)	0.001
Club advisors: yes	2,516 (79.6)	553 (77.0)	651 (78.7)	626 (81.9)	686 (80.6)	0.092
Leave days during the past 12 months: ≥10 days	1,049 (33.8)	221 (31.4)	246 (30.3)	252 (33.8)	330 (39.2)	0.001
Living with family: yes	2,216 (77.9)	545 (75.9)	556 (67.2)	537 (70.3)	578 (67.9)	0.003

Values are expressed as number (%).

Table 2 Insomnia, psychological distress, neck pain and cumulative number of them among junior and senior high school teachers by quartiles of the Utrecht Work Engagement Scale-9 (UWES-9) scores

		Quartiles of the UWES-9 scores				
	All	Quartile 1 (≥40) high	Quartile 2 (30-39) modestly higher	Quartile 3 (24-29) modestly lower	Quartile 4 (≤23) low	*P*-value
	n=3,160	n=718	n=827	n=764	n=851	
Insomnia	1,565 (49.5)	258 (35.9)	374 (45.2)	413 (54.1)	520 (61.1)	0.001
psychological distress	757 (24.0)	101 (14.1)	148 (17.9)	190 (24.9)	318 (37.4)	0.001
Neck pain	1,119 (35.4)	191 (26.6)	265 (32.0)	297 (38.9)	366 (43.0)	0.001
Cumulative number of disorders						
0	1,230 (38.9)	380 (52.9)	360 (43.5)	263 (34.4)	227 (26.7)	0.001
1	862 (27.3)	175 (24.4)	232 (28.1)	215 (28.1)	240 (28.2)	
2	625 (19.8)	114 (15.9)	150 (18.1)	173 (22.6)	188 (22.1)	
3	443 (14.0)	49 (6.8)	85 (10.3)	113 (14.8)	196 (23.0)	

Values are expressed as number (%).

The odds ratios (ORs) and 95% confidence intervals (CIs) for the prevalence of each of insomnia, psychological distress, and neck pain across the quartiles of the UWES-9 scores are shown in Table 3. In the binomial logistic regression adjusted for age category, gender, school type, part-time work status, homeroom teacher status, allocated duties, club advisor status, number of leave days used in the past year, we observed that the teachers with low UWES-9 scores (Quartile 4) had significantly higher odds of insomnia, psychological distress, and neck pain (ORs [95% CIs] for Quartile 4 (low) vs. Quartile 1 (high): 2.92 (2.34-3.65), 3.70 (2.81-4.88), and 2.12 (1.68-2.68), respectively; all trend *p*-values <0.001). There were no significant differences in these associations between the full-time and part-time teachers (all *p*-values for interaction >0.2) (Table 4).

Discussion

Our analyses of junior and senior high school teachers across Japan who responded to our wide survey revealed that the school teachers with lower UWES-9 scores had higher burdens of insomnia, psychological distress, and neck pain. Significant differences were not observed between the teachers with full-time and part-time jobs. Our findings suggest that lower work engagement was associated with physical and mental health problems among junior and senior high school teachers. To our knowledge, this is the first study to comprehensively examine the associations of work engagement with physical and mental health issues among junior and senior high school teachers.

School teachers in Japan are considered one of the professions most susceptible to psychological and physical health problems [2]. However, there have been few investigations of the association between work engagement, measured with valid questionnaires (*i.e.*, UWES-9 scores), and psychological and physical health issues among school teachers. A questionnaire-based study conducted in a city in Japan with 403 teachers from elementary and junior high schools (mean age 40 years) showed that lower job satisfaction was associated with minor psychiatric disorders [29]. In another study involving 1,210 nursery school and kindergarten teachers in a prefecture in Japan, those with UWES-9 scores below the median had a higher likelihood of psychological distress, defined as a K6 score ≥5 points [14]. Our present findings based on a nationwide survey show that lower work engagement as measured by the UWES-9 was associated with psychological distress, insomnia, and neck pain among junior and senior high school teachers. Together with the aforementioned prior evidence, our findings indicate that work engage-

Table 3 Odds ratios (95% CIs) for the prevalence of insomnia, psychological distress, and neck pain across the quartiles of the Utrecht Work Engagement Scale-9 (UWES-9) scores among junior and senior high school teachers

	Quartiles the UWES-9 scores				Trend *P*
	Quartile 1 (≥40) high	Quartile 2 (30–39) modestly higher	Quartile 3 (24–29) modestly lower	Quartile 4 (≤23) low	
	n=718	n=827	n=764	n=851	
Insomnia					
No. (%)	258 (35.9)	374 (45.2)	413 (54.1)	520 (61.1)	
Odds ratio (95% CI)	1 (ref.)	1.52 (1.21–1.89)‡	2.00 (1.59–2.50)‡	2.92 (2.34–3.65)‡	<0.001
Psychological distress					
No. (%)	101 (14.1)	148 (17.9)	190 (24.9)	318 (37.4)	
Odds ratio (95% CI)	1 (ref.)	1.28 (0.94–1.73)	2.08 (1.55–2.78)‡	3.70 (2.81–4.88)‡	<0.001
Neck pain					
No. (%)	191 (26.6)	265 (32.0)	297 (38.8)	366 (43.0)	
Odds ratio (95% CI)	1 (ref.)	1.35 (1.06–1.72)*	1.64 (1.29–2.09)‡	2.12 (1.68–2.68)‡	<0.001

P (vs. Q1): *<0.05, †<0.01, ‡<0.001.

Logistic regression adjusted for age category, gender, school type, part-time work status, homeroom teacher status, allocated duties, club advisor status, number of leave days used during the past 12 months, whether the respondent's family lives together.

CI, confidence interval.

Table 4 Odds ratios (95% CIs) for the prevalence of insomnia, psychological distress, and neck pain across the quartiles of the Utrecht Work Engagement Scale-9 (UWES-9) scores among junior and senior high school teachers with full-time and part-time job

	Quartiles the UWES-9 scores					
	Quartile 1 (≥40) high	Quartile 2 (30–39) modestly higher	Quartile 3 (24–29) modestly lower	Quartile 4 (≤23) low	Trend *P*	*P* for interaction
Insomnia						
Teachers with full-time job						
No. (%)/No. at risk	202 (35.4)/570	310 (47.0)/660	357 (53.4)/668	457 (61.3)/745		
Odds ratio (95% CI)	1 (ref.)	1.61 (1.26–2.06)‡	1.98 (1.55–2.54)‡	3.00 (2.36–3.82)‡	<0.001	
Teachers with part-time job						
No. (%)/No. at risk	56 (37.8)/148	64(38.3)/167	56 (58.3)/96	63 (59.4)/106		
Odds ratio (95% CI)	1 (ref.)	1.23 (0.73–2.06)	2.74 (1.49–5.05)*	2.64 (1.48–4.72)*	<0.001	0.886
Psychological distress						
Teachers with full-time job						
No. (%)/No. at risk	77 (13.5)/570	118 (17.9)/660	159 (23.8)/668	282 (37.9)/745		
Odds ratio (95% CI)	1 (ref.)	1.36 (0.97–1.92)	2.06 (1.49–2.84)‡	4.05 (2.98–5.50)‡	<0.001	
Teachers with part-time job						
No. (%)/No. at risk	24 (16.2)/148	30 (18.0)/167	31 (32.3)/96	36 (34.0)/106		
Odds ratio (95% CI)	1 (ref.)	1.01 (0.52–1.99)	3.26 (1.58–6.72)‡	2.35 (1.19–4.64)*	0.001	0.279
Neck pain						
Teachers with full-time job						
No. (%)/No. at risk	146 (25.6)/570	214 (32.4)/660	256 (38.3)/668	324 (43.5)/745		
Odds ratio (95% CI)	1 (ref.)	1.45 (1.11–1.90)*	1.64 (1.26–2.14)‡	2.30 (1.78–2.97)‡	<0.001	
Teachers with part-time job						
No. (%)/No. at risk	45 (30.4)/148	51 (30.5)/167	41 (42.7)/96	42 (39.6)/106		
Odds ratio (95% CI)	1 (ref.)	1.03 (0.59–1.77)	2.23 (1.19–4.20)*	1.46 (0.80–2.65)	0.053	0.459

P (vs. Q1): *<0.05, †<0.01, ‡<0.001.

Logistic regression adjusted for age category, gender, school type, part-time work status, homeroom teacher status, allocated duties, club advisor status, number of leave days used during the past 12 months, whether the respondent's family lives together.

CI, confidence interval.

ment is linked to psychological and physical health problems among school teachers.

In Japan, school teachers often feel overwhelmed due to the diversification of their duties, increasing overtime hours, and a worsening staff shortage [4, 30]. These issues may lead to reduced work engagement, which subsequently could decrease teachers' work efficiency [31, 32] and potentially create a negative cycle that results in longer overtime hours [33]. An increase in overtime can cause physical strain (such as neck pain) and substantially affect one's living environment, potentially leading to insomnia [34]. The amount of sleep a worker receives has been shown to be related to psychological distress, physical discomfort, and job-related stress [35]. In addition, lesions in neck muscles may attribute to vague, generalized symptoms via dysfunction of the parasympathetic nervous system [36]. In other words, insomnia may lead to autonomic nervous system disorders that can result in neck pain. When insomnia, psychological distress, and neck pain reinforce each other, the negative cycle can become more severe. If these symptoms occur frequently, they may be early signs of a psychiatric disorder [34].

Our findings highlight work engagement as a key factor influencing the physical and mental health of junior and senior high school teachers. The analysis results demonstrated that low work engagement was associated with insomnia, psychological distress, and neck pain, which are common issues among junior and senior high school teachers in Japan. By identifying work engagement as a modifiable factor, our results emphasize the need for policies to improve work conditions and prevent negative health impacts. Fostering high work engagement may also create a positive cycle, enabling teachers to fulfill their roles effectively and find career satisfaction. Workplace and workstyle reforms for teachers are being implemented to create an environment that promotes higher work engagement [37].

Increased work engagement is expected to contribute to the overall health and well-being of faculty members. Our present findings strengthen the call for support systems that enhance teachers' well-being and work efficiency.

Our study has several limitations. First, causal relationships cannot be clarified because this was a cross-sectional study. Second, attention should be given to generalizing the findings to all school teachers because the response rate was low. Only the data of the respondents were analyzed, representing those with high work engagement and thus potentially leading to overestimation of the individual respondents' work engagement scores. Conversely, health outcomes such as insomnia, psychological distress, and neck pain might have been underestimated. This study was conducted using a mail survey method and was distributed nationwide. It is thought that those who are aware of low work engagement may not return their answers. Third, our study lacked detailed information on the number of working hours, the number of sleeping hours, and other potential confounding factors (*e.g.*, depression, caregiving). We did not investigate the reasons for taking sick leaves, making it impossible to determine whether the leave was for active refreshment or other purposes. Finally, because the work style of Japanese teachers is unique and involves both classroom and extracurricular activities, comparisons of the present results with those of international work engagement studies should be performed with caution.

In conclusion, the results of this study demonstrated that lower work engagement was associated with higher burdens of insomnia, psychological distress, and neck pain among junior and senior high school teachers in Japan. These findings suggest that low work engagement may be a key factor contributing to the development of physical and mental health problems in junior and senior high school teachers. Together these insights could help junior and senior high schools and educational institutions develop strategies to improve teachers' physical and mental health.

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