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# Association Between Low Back Pain, Workaholism, and Work Engagement in Japanese Hospital Workers

## A Quantitative Cross-sectional Study

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**Objective:** This study aimed to examine the association between two types of heavy work investment, workaholism and work engagement, and low back pain prevalence. **Methods:** We conducted a paper-based survey of Japanese hospital workers. The Dutch Workaholism Scale (DUWAS) and the Utrecht Work Engagement Scale (UWES) were used to classify the participants into four groups and perform multiple logistic regression analyses. **Results:** Among 699 participants, the group with low DUWAS and high UWES at 37.1% had the lowest low back pain prevalence. In order, the groups with low DUWAS and UWES were at 51.7%; those with high DUWAS and UWES, 58.5%; and those with high DUWAS and low UWES, 62.4%, with multivariate-adjusted odds ratios of 1.77, 2.01, and 2.33, respectively. **Conclusions:** Low back pain prevalence among Japanese hospital workers was reduced by high levels of work engagement, even at high levels of workaholism.

**Keywords:** low back pain, workaholism, work engagement, hospital, worker

Low back pain (LBP) is the leading cause of disability in the Global Burden of Disease study, which indexes years lived with disability.<sup>1</sup> Lower labor productivity, including sick leave due to LBP, leads to

economic losses.<sup>2-4</sup> In Japan, the health and hygiene industry, including hospitals and nursing facilities, has common occupations in which workers take sick leave per year  $\geq 4$  days because of LBP.<sup>5</sup> Among nurses, the prevalence of LBP in the past year has been as high as 60% to 85%.<sup>6-10</sup> Occupational LBP in nurses has been reported to be associated with ergonomic factors such as patient handling<sup>4,8,10</sup> and psychosocial factors such as depression, sleep problems, and mental-interpersonal relationships.<sup>11-13</sup> These LBP factors cannot be solved by nurses alone; the entire hospital staff must work together to improve the working environment.

Previous studies have investigated the association between work-related psychosocial factors and LBP. A meta-analysis of hospital nurses and nursing aides reported an association between LBP and “high psychosocial demands–low job control.”<sup>14</sup> A survey of tertiary industries such as health and hygiene showed an association between workaholism and LBP, with the high workaholism group having 1.8 times the risk of LBP compared with the low group.<sup>15</sup> Workaholism is defined as “an irresistible or uncontrollable need to work incessantly”<sup>16</sup> and has been shown to cause physical and mental exhaustion due to inability to repress it.<sup>17</sup> Against the detrimental effects of this workaholism, work engagement has been reported to have a possible buffering role.<sup>18,19</sup> Work engagement is defined as “a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption.”<sup>20,21</sup> Several studies have shown that workers with high work engagement are energetic and enthusiastic about their work and report fewer psychological distress and physical problems than workers who are not in such a state.<sup>22-24</sup> Those in the high work engagement group have been shown to have a lower risk of developing a major depressive episode than those in the low work engagement group.<sup>25</sup> In recent years, research has focused on positive psychological states with the aim of contributing to the prevention of physical and mental health problems and to work efficiency. It is important to understand and cope with the work-related psychological state to maintain the good health of workers. However, as far as we know, no previous research has investigated on the association between work engagement and LBP prevalence.

The relationship between workaholism and work engagement shows that workaholism is associated with increased ill-health, and work engagement is associated with decreased ill-health.<sup>26</sup> Crossing these two concepts classifies employees into four types: workaholic employees, engaged employees, engaged workaholics, and nonworkaholics/nonengaged employees; high engagement buffers the negative effects of workaholism.<sup>18</sup> The association between workaholism and LBP may differ depending on the degree of work engagement. Therefore, it is essential to clarify the impact of the work environment, including psychological conditions in the workplace, on LBP to promote health care for hospital workers. The present study aims to examine the association between two types of heavy work investment, workaholism and work engagement, with LBP prevalence in Japanese hospital workers.

## MATERIALS AND METHODS

### Study Population

This study was designed as a cross-sectional study at a single institution in Japan. The survey was conducted between March and

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Ethical Considerations and Disclosures: This study protocol was approved by the ethics committee of Tohoku University Graduate School of Medicine (ID 2018-1-8).

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May 2018. A paper-based self-administered questionnaire survey on LBP and psychosocial factors and physical function measurements of muscle strength, muscle mass, and body fat percentage were conducted. The subjects were all employees of a public foundation institution Hoshi General Hospital in Fukushima Prefecture, Japan, and were 1298 health care professionals 20 years or older. Of these, 1224 subjects were included in the survey, excluding 70 subjects who were pregnant or did not report, 1 with a spinal disease, and 3 who had undergone joint replacement surgery (Fig. 1).

All subjects were given an explanatory letter in advance, inviting them to participate in the study and assuring them that their participation was voluntary. Of these, 710 subjects (response rate, 58%) who understood the purpose of the study and gave written consent were administered all surveys and measurements by the principal investigator. Hospital staff completed a nonanonymous, self-administered questionnaire, and all questionnaires were collected by the principal investigator and were not accessible to supervisors or other staff. A total of 699 subjects with no missing data (completion rate, 57%) were included in the final analysis. The protocol of this survey was approved by the Ethics Committee of Tohoku University Graduate School of Medicine (ID 2018-1-8).

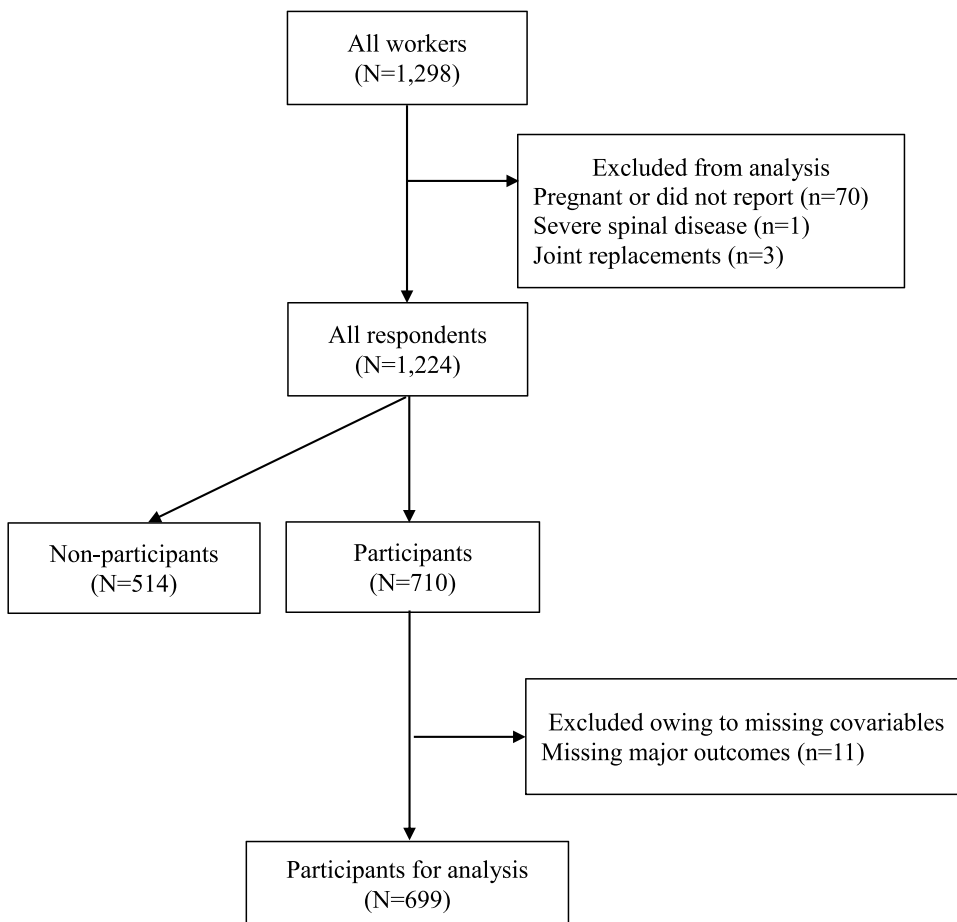
**Assessment**

The self-administered questionnaire included LBP, workaholism, work engagement, and psychosocial factors (job stress,<sup>27,28</sup> depression,<sup>28,29</sup> and sleep problems<sup>30</sup>) that have been associated with LBP in previous studies. In the basic information, we also included the following items that have been associated with LBP in previous studies: sex,<sup>31</sup>

age,<sup>31</sup> smoking,<sup>32</sup> exercise habits,<sup>33</sup> analgesics,<sup>34</sup> occupation,<sup>35</sup> night shift,<sup>30</sup> job position,<sup>36</sup> and lifting.<sup>27,32,37</sup> Physical function measures include muscle mass,<sup>38,39</sup> body fat percentage,<sup>28,32</sup> and muscle strength,<sup>40</sup> which have been associated with LBP in previous studies.

Low back pain has been defined as “pain that has lasted for more than one day in the last four weeks” by Dionne et al.<sup>41</sup> The site of the LBP was illustrated “between the lower costal margin and the gluteal folds” by Hagen et al.<sup>42</sup> Referring to the grades by Von Korff et al.,<sup>43</sup> the LBP during work for the last 4 weeks was classified into four grades: 0 as no LBP, 1 as LBP that did not interfere with work, 2 as LBP that interfered with work but did not require sick leave, and 3 as LBP that interfered with work and required sick leave. This grade has been adopted in previous studies.<sup>7,12,28,44,45</sup> In this study, those who selected 0 and 1 to 3 were classified as “without LBP” and “with LBP,” respectively.

Workaholism and work engagement were measured using the Dutch Workaholism Scale (DUWAS)<sup>46</sup> and the Utrecht Work Engagement Scale (UWES),<sup>47</sup> respectively. Dutch Workaholism Scale is a scale developed to investigate respondents' feelings about their work, reflecting the two components of working excessively and compulsively. Dutch Workaholism Scale has been adopted in previous studies<sup>11,15,23,45</sup>; its Japanese version has been confirmed to be valid.<sup>48</sup> It consists of ten questions using a four-point Likert scale ranging from “not feel (one point)” to “always feel (four points).” Scores range from 10 to 40, with a high score indicating high workaholism. Utrecht Work Engagement Scale is a scale developed to evaluate work-related positive and fulfilling psychological states (vigor, dedication, and absorption). Utrecht Work Engagement Scale has been adopted in previous studies<sup>23-25</sup>; its Japanese version has been confirmed to be valid.<sup>49</sup> It



**FIGURE 1.** Flow of the participants' selection procedure.

consists of nine questions using a seven-point Likert scale ranging from “not at all (0 points)” to “always feel (6 points).” Scores range from 0 to 54, and a high score indicates high work engagement status. Referring to a previous study that crossed workaholism and work engagement and classified them into four types,<sup>18</sup> in this study, we classified the respondents into four groups based on the median DUWAS and UWES scores: those with DUWAS low scores and UWES high scores as “low DUWAS and high UWES,” those with low scores in both DUWAS and UWES as “low DUWAS and low UWES,” those with high scores in both DUWAS and UWES as “high DUWAS and high UWES,” and those with DUWAS high scores and UWES low scores as “high DUWAS and low UWES” (Fig. 2).

For the assessment of psychosocial factors, work stress, depression, and sleep problems were measured. Job stress was assessed used in the Job Content Questionnaire (JCQ).<sup>50</sup> Job Content Questionnaire consists of three domains: “job control (JCQ-Control),” “job demand (JCQ-Demand),” and “job support (JCQ-Support).” This is a self-administered evaluation method that uses a four-point scale ranging from “not at all (1 point)” to “quite true (4 points)” for items that apply to all aspects of the job. The higher the score, the higher the degree of job control, job demands, and job support in the workplace. The Japanese version of JCQ has been confirmed to be valid.<sup>51</sup> Depression was assessed used the Kessler Screening Scale for Psychological Distress (K6).<sup>52</sup> This is a self-administered evaluation method that uses a five-point scale ranging from “never (zero points)” to “always (four points)” to determine how often each item occurred in the past 30 days. A score of 10 or more out of a total of 24 points on six items is considered to indicate a high likelihood of depression or anxiety disorder. The Japanese version of the K6 has been confirmed to be valid.<sup>53</sup> Sleep problems were measured on the Athens Insomnia Scale (AIS).<sup>54</sup> Athens Insomnia Scale evaluates insomnia disorders over the past month and consists of eight items, with a score of 6 or more out of 24 points indicating suspected insomnia. The Japanese version of the AIS has been confirmed to be valid.<sup>55</sup>

Physical function was assessed using measuring instruments. Skeletal muscle mass index (SMI) and body fat percentage were measured using bioimpedance (InBody 770; InBody Japan Inc, Tokyo, Japan). Muscle strength was measured using a grip dynamometer (T.

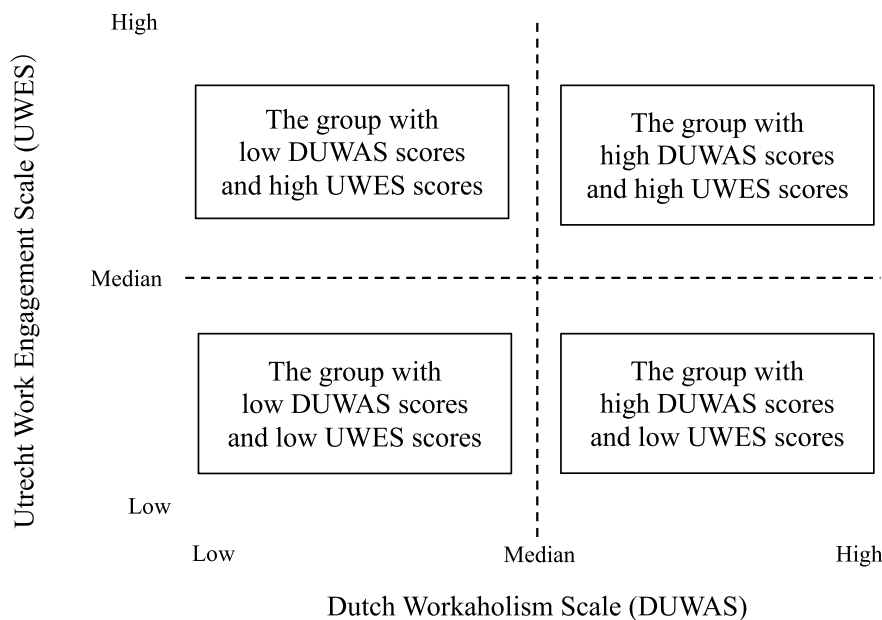
K.K. 5401; Takei Scientific Instruments, Niigata, Japan) and a toe grip dynamometer (T.K.K. 3364b; Takei Scientific Instruments, Niigata, Japan). The investigators used these instruments to perform measurements on all participants.

**Statistical Analysis**

Comparisons of the proportions of participants and nonparticipants by sex, age, and occupation were made using  $\chi^2$  tests. Participant characteristics based on the presence of LBP were represented by descriptive statistics, and group differences in the presence of LBP were compared by  $\chi^2$  or unpaired *t* tests. Low back pain prevalence was calculated for the four groups classified by DUWAS and UWES scales, and it was tested using the  $\chi^2$  test. The associations with LBP as the objective variable and four groups by DUWAS and UWES as the explanatory variables were verified by multivariate logistic regression analysis with six levels: model 0 was an analysis without adjustment variables, model 1 was an analysis with sex and age as explanatory variables, model 2 introduced physical function factors (muscle mass, body fat percentage, grip, and toe grip) to model 1, model 3 introduced lifestyle factors (smoking, exercise habits, and analgesics) to model 2, model 4 added working environmental factors (occupation, night shift, job position, and lifting) to model 3, and model 5 added psychosocial factors (JCQ, K6, and AIS) to model 4. Stratified analysis was also performed by sex (male, female), age (20–39 years, 40–59 years), and occupation (medical, nonmedical). All analyses were performed using the IBM SPSS Statistics version 25 (IBM Japan, Tokyo, Japan). The statistical significance level was set at <1%, considering the multiplicity of the test.

**RESULTS**

The two groups of 710 participants and 514 nonparticipants did not differ significantly by sex, age, or occupation (Table 1). The occupational breakdown of the 710 participants was as follows: there were 22 physicians, 287 nurses, 66 nursing aides, 68 physical therapists, 23 occupational therapists, 142 other medical staff, and 102 nonmedical staff, with nurses accounting for the largest number. Among the 699 participants, excluding 11 missing major outcomes, 370 (52.9%) had



**FIGURE 2.** The DUWAS measuring workaholism and the UWES measuring work engagement. DUWAS, Dutch Workaholism Scale; UWES, Utrecht Work Engagement Scale.

**TABLE 1.** Participants' and Nonparticipants' Basic Characteristics (n = 1224)

	Participants (n = 710)	Nonparticipants (n = 514)	P*
Sex			0.233
Male	187 (60.9)	120 (39.1)	
Female	523 (57.0)	394 (43.0)	
Age			0.060
20–29 y	235 (63.0)	138 (37.0)	
30–39 y	157 (54.9)	129 (45.1)	
40–49 y	135 (55.3)	109 (44.7)	
50–59 y	135 (60.3)	89 (39.7)	
≥60 y	48 (49.5)	49 (50.5)	
Occupation			0.053
Medical	608 (59.2)	419 (40.8)	
Nonmedical	102 (51.8)	95 (48.2)	

\* $\chi^2$  Test.

experienced LBP in the last 4 weeks. Comparisons between LBP groups showed that groups with LBP were more likely to be female, older, and significantly associated with more analgesics, night shifts, and lifting.  $\chi^2$  Test results showed that the group with LBP was significantly higher than the group without LBP in DUWAS, body fat percentage, JCQ-Demand, K6, and AIS and significantly lower in grip and JCQ-Support (Supplemental Digital Content, Supplementary Table 1, <http://links.lww.com/JOM/B189>). Utrecht Work Engagement Scale was not significantly different between the group with LBP and without LBP. The median values of 21 for DUWAS and 26 for UWES were used to classify the participants into four groups. The group with low DUWAS and high UWES had significantly lower LBP prevalence than other groups, and the group with high DUWAS and low UWES had significantly higher LBP prevalence.

The odds ratios (ORs) and 95% confidence intervals from the multivariate logistic regression analysis are shown in Table 2. In model 0, compared with the group with low DUWAS and high UWES, the other three groups were at significantly increased risk of LBP (the group with low DUWAS and UWES OR, 1.82 [1.17–2.81]; high DUWAS and UWES OR, 2.39 [1.56–3.68]; and high DUWAS and low UWES OR, 2.82 [1.80–4.39]). In model 1, adjusted for sex and age, the OR of the groups with “low DUWAS and UWES” and “high DUWAS and low UWES” increased by approximately 0.1 points

when compared with model 0. In model 2, with the addition of physical function factors, all groups showed an increase of approximately 0.1 points. In model 3, with the addition of lifestyle factors, all groups showed almost no changes. In model 4, with the addition of environmental factors, the groups with high DUWAS and UWES, and high DUWAS and low UWES showed an increase, and the group with low DUWAS and UWES showed a decrease. In model 5, with the addition of psychosocial factors, the ORs of all groups were still significant, although they decreased.

The results of the stratified analysis by sex, age, and occupation are shown in Table 3. Stratified analysis by sex showed significant associations for all groups of females (low DUWAS and UWES OR, 2.04 [1.09–3.82]; high DUWAS and UWES OR, 2.32 [1.21–4.44]; and high DUWAS and low UWES OR, 2.41 [1.24–4.67]). Stratified analysis by age showed no significant associations. Stratified analysis by occupation showed significant associations for all groups of medical staff (low DUWAS and UWES OR, 2.16 [1.21–3.87]; high DUWAS and UWES OR, 2.24 [1.26–4.00]; and high DUWAS and low UWES OR, 2.64 [1.41–4.94]).

## DISCUSSION

We conducted a cross-sectional study to examine the association between LBP prevalence, workaholism, and work engagement in Japanese hospital workers. We found an association between LBP and workaholism even when restricted to Japanese hospital workers. In addition, even at high levels of workaholism, LBP prevalence was low at high levels of work engagement, and the relationship was significant when adjusted for sex, age, physical function, lifestyle, work environment, and psychosocial factors. To the best of our knowledge, this study is the first to reveal an association of LBP prevalence, considering both work engagement and workaholism. The results of this study will provide new insights into countermeasures against LBP due to occupational causes in hospital workers.

A survey of LBP and workaholism in Japanese tertiary industry workers carried out by Matsudaira et al<sup>15</sup> reported that the high DUWAS group had 1.8 times more LBP than the low DUWAS group, even if psychosocial factors were adjusted. The results of this study on Japanese hospital workers also showed that the high DUWAS group had a 2.0 to 2.3 times higher LBP prevalence than the low DUWAS group, even if psychosocial factors were adjusted. A new finding in this study is that, even with high workaholism, LBP prevalence depends on levels of work engagement. The OR of LBP risk was higher

**TABLE 2.** Result of the Multivariate Logistic Regression Analysis (n = 699)

	The Group With Low DUWAS and High UWES n = 159	The Group With Low DUWAS and Low UWES n = 174	The Group With High DUWAS and High UWES n = 193	The Group With High DUWAS and Low UWES n = 173	P
With LBP	59	90	113	108	
LBP prevalence (%)	37.1	51.7	58.5	62.4	
Model 0*	1.00 (Ref.)	1.82 (1.17–2.81)	2.39 (1.56–3.68)	2.82 (1.80–4.39)	<0.001
Model 1†	1.00 (Ref.)	1.96 (1.23–3.12)	2.38 (1.52–3.72)	2.92 (1.83–4.67)	<0.001
Model 2‡	1.00 (Ref.)	2.05 (1.28–3.29)	2.42 (1.54–3.80)	3.01 (1.87–4.85)	<0.001
Model 3§	1.00 (Ref.)	2.06 (1.28–3.23)	2.39 (1.51–3.78)	3.00 (1.85–4.88)	<0.001
Model 4	1.00 (Ref.)	1.90 (1.14–3.16)	2.59 (1.59–4.23)	3.11 (1.84–5.24)	<0.001
Model 5¶	1.00 (Ref.)	1.77 (1.05–2.98)	2.01 (1.19–3.37)	2.33 (1.32–4.09)	<0.001

The number in the model column is the odds ratio (95% confidence interval).

DUWAS, Dutch Workaholism Scale; UWES, Utrecht Work Engagement Scale; LBP: Low back pain; Ref., reference.

\*Not adjusted.

†Adjusted for sex and age.

‡Adjusted for model 1 + physical function factors.

§Adjusted for model 2 + lifestyle factors.

||Adjusted for model 3 + working environment factors.

¶Adjusted for model 4 + psychosocial factors.



**TABLE 3.** Result of Stratified Analysis (n = 699)

	The Group With Low DUWAS and High UWES n = 159	The Group With Low DUWAS and Low UWES n = 174	The Group With High DUWAS and High UWES n = 193	The Group With High DUWAS and Low UWES n = 173	P
Sex					
Male	1.00 (Ref.)	1.41 (0.49–4.03)	1.58 (0.62–4.04)	2.89 (0.86–9.72)	0.156
Female	1.00 (Ref.)	2.04 (1.09–3.82)	2.32 (1.21–4.44)	2.41 (1.24–4.67)	<0.001
Age					
20–39 y	1.00 (Ref.)	1.24 (0.62–2.50)	1.52 (0.73–3.16)	2.10 (0.97–4.55)	<0.001
40–59 y	1.00 (Ref.)	2.33 (0.87–6.21)	2.36 (0.98–5.69)	2.01 (0.78–5.16)	<0.001
Occupation					
Medical	1.00 (Ref.)	2.16 (1.21–3.87)	2.24 (1.26–4.00)	2.64 (1.41–4.94)	<0.001
Nonmedical	1.00 (Ref.)	0.97 (0.21–4.51)	1.57 (0.34–7.22)	3.92 (0.61–25.38)	0.038

The number in the model column is the odds ratio (95% confidence interval), and all the results are based on the analysis of model 5 (adjusted for sex, age, physical function factors, lifestyle factors, working environmental factors, and psychosocial factors).

DUWAS, Dutch Workaholism Scale; UWES, Utrecht Work Engagement Scale; Ref., reference.

in the group with high DUWAS and low UWES than in the group with high DUWAS and UWES. This suggests that both workaholism and levels of work engagement are related to LBP. Several previous studies have reported that higher work engagement is associated with less psychological distress, physical complaints, and ill-health and that high engagement buffers the negative effects of workaholism.<sup>18,23,26,56</sup> Furthermore, vitality, a component of work engagement, is positively associated with subjective health and is recognized as a physical health effect of positive sensations.<sup>57,58</sup> Vitality is an element that workaholics do not have, so the concept of work engagement is essential to physical health. High levels of work engagement were related to high levels of intrinsic motivation, and occupational LBP is related to psychosocial factors in the workplace, such as not feeling rewarded at work.<sup>59–61</sup> In other words, the finding that work-related psychological states are also associated with LBP is consistent with previous research findings. There was no significant difference in work engagement scores between groups with and without LBP. This suggests that considering workaholism and work engagement separately as risk factors for LBP is insufficient and that an interaction between the two types of heavy work investment needs to be considered.

The results of the stratified analysis revealed that the risk of LBP due to work engagement and workaholism was observed to be higher in female workers compared with male workers and higher in medical professionals compared with nonmedical professionals. The global prevalence rate was higher in females than in males,<sup>31</sup> and a Japanese study reported that the prevalence in a recent month was higher in females than in males.<sup>44</sup> This study also found that LBP prevalence in females (58%) was approximately 1.5 times higher than that in males (37%). This may be because the working environment differs between males and females, which may be related to LBP. It was suggested that women working in the medical field need to adjust their work environment so that they can experience a “positive and fulfilling psychological state.” Stratified analysis of occupational types indicated that the risk of LBP among the four groups differed among hospital workers. In this study, the prevalence of LBP among medical staff was 54%, higher than the 46% prevalence among nonmedical staff. Previous studies have shown that, among hospital workers, nurses have the highest prevalence of LBP and also have a higher frequency of LBP than clerical workers.<sup>35,62</sup> In this study, nurses were the most common occupation among the subjects. A study examining the association between work-related physical demands and LBP showed that workers with high-intensity work were more likely to be absent from work because of LBP than workers with sedentary jobs.<sup>63</sup> Therefore, ergonomic factors such as handling in nursing work are considered influential. In addition, a number of psychosocial factors at work have been reported to influence nurses, including night shifts,<sup>30</sup> time management,<sup>13</sup> high psychosocial demands,<sup>14</sup> low social support,<sup>14</sup>

and sleep problems.<sup>12</sup> Because the present study also found associations between the two groups with and without LBP in the night shift, JCQ-Control, JCQ-support, and AIS items, we believe that this may contribute to the high prevalence of LBP in the medical staff.

A limitation of this study is that, because it was a cross-sectional study, it is not known whether the psychological state of work engagement causes the onset of LBP or whether it changes as a result of LBP. Future longitudinal research is needed to examine this issue. Moreover, there is a limit to the generalizability of the results, as the study targeted only a single facility and did not investigate the characteristics of labor and the physical environment of work in detail. The response rate was low, which can be attributed to participants' reluctance to get their body fat percentage measured. This analysis used the median of this limited population to classify workaholism and work engagement, but the medians of other populations may differ. The stratified analysis of this study may have been insufficiently detected due to the biased sample size by sex, age, and occupation type.

The results of this study revealed an association between the LBP prevalence, workaholism, and work engagement in Japanese hospital workers. It has been pointed out that improving job resources and personal resources increases work engagement, and work engagement may promote positive interactions between work and home.<sup>64–66</sup> We believe that these data can be used as a basis for considering programs to prevent the onset and prolongation of LBP among hospital workers to maintain their mental and physical health.

## CONCLUSIONS

The prevalence of LBP among Japanese hospital workers was found to decrease with higher levels of workaholism but higher levels of work engagement and with lower levels of workaholism but higher levels of work engagement. Workaholism alone is not an adequate predictor of LBP prevalence. This suggests that two types of heavy work investigations, workaholism and work engagement, should be considered when examining the risk of LBP.

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