

# Association between Workaholism and Sleep Problems among Hospital Nurses

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**Abstract:** The present study examined the association between workaholism, the tendency to work excessively hard in a compulsive fashion, and sleep problems among Japanese nurses. A cross-sectional survey was conducted among 600 nurses from 2 university hospitals in Japan using a self-reported questionnaire on workaholism, sleep, job-related variables (i.e., job demands, job control, and worksite support), and demographic variables. A total of 394 nurses returned the questionnaire (response rate=65.7%) and complete data from 312 female nurses were used for analyses (final coverage rate=52.0%). Workaholics, as measured using the Japanese version of the Dutch Workaholism Scale, were defined as those having high scores on both the “work excessively” and “work compulsively” subscales. Logistic regression analyses revealed that workaholics had higher risks for sleep problems in terms of subjective sleep insufficiency, excessive daytime sleepiness at work, difficulty awakening in the morning, and feeling tired when waking up in the morning (odds ratios [OR] of 4.40, 3.18, 3.48, and 4.61, respectively,  $p < 0.05$ ). These remained significant even after adjusting for demographic and job-related variables (OR 3.41, 5.36, 2.56, and 2.77, respectively). However, no significant associations were found between workaholism and insomnia symptoms. These results suggest that workaholic nurses had higher risks for impaired awakening, insufficient sleep, and workplace sleepiness.

**Key words:** Workaholism, Sleep problems, Nurse, Cross-sectional study, Logistic regression

## Introduction

Poor sleep is prevalent in modern industrialized society<sup>1, 2</sup>, and its consequences include functional impairments, reduced quality of life, and significant health care costs<sup>3</sup>. Moreover, among the working population, sleep problems are associated not only with deteriorated health (e.g., psychological distress, physical complaints), but also with poor work functioning, which can result in increased risk of accidents or injuries at work, absen-

teeism, reduced productivity, and job dissatisfaction<sup>1, 4</sup>. Various relevant factors have been identified with regard to sleep problems, including demographics (e.g., age, gender, and socioeconomics)<sup>5</sup>, health status (e.g., heart disease, diabetes, respiratory disease, and depression)<sup>5–7</sup>, and work-related factors (e.g., high job demands, low job control, and low social support, low organizational justice, over commitment, and shiftwork)<sup>4, 8–12</sup>.

Previous research has uncovered that cognitive aspects are associated with an increase in poor sleep. For example, research has shown that inability to stop worrying about work during leisure time is associated with reduced sleep quality<sup>13</sup>. In addition, anxiety about

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duties after working hours and/or during non-work days has been associated with difficulty falling asleep<sup>14</sup>). The apprehension of a difficult next day has been linked to decreased amounts of slow wave sleep, impaired subjective sleep quality, and increased difficulty in awakening<sup>15</sup>). Previous studies addressed mainly cognitive aspects (i.e., worrying about work, anxiety about duty, and apprehension of a subsequent working day), neglecting the association between behavioral aspects and sleep problems. The health effects of workaholism, or the tendency to work excessively hard (the behavioral dimension), and being obsessed with work, or working compulsively (the cognitive dimension), have received much attention<sup>16, 17</sup>). Workaholics have three common characteristics<sup>18</sup>). First, they spend a great deal of time on work activities when given the discretion to do so. Second, they are reluctant to disengage from work and think about work persistently and frequently even when they are not at work. Finally, they work beyond what is reasonably expected from them to meet organizational or economic requirements. These three characteristics suggest that workaholics may go as far as actively creating additional work for themselves (i.e., work excessively), for instance, by performing extra unnecessary work or by refusing to delegate work<sup>17</sup>). Therefore, increased job demands can lead to insufficient opportunities to recover from such excessive efforts, leaving workaholics emotionally or cognitively exhausted over time<sup>16</sup>). Such persistent cognitive activities (i.e., working compulsively) may also result in automatic arousal and emotional distress. Consequently, workaholics report relatively high levels of psychological distress and physical complaints<sup>19</sup>). Since sleep quality is associated with psychological and physical health<sup>3, 4, 11, 20</sup>), it can be speculated that workaholism could relate to poor sleep. However, to date, no studies have investigated the direct association between workaholism and sleep.

In line with this discussion, the present study aimed to examine the association between workaholism and sleep problems among hospital nurses in Japan. It was hypothesized that workaholic nurses who are characterized by working excessively as well as compulsively have a higher risk for impaired sleep compared to non-workaholic nurses. Several studies have revealed a positive relationship among psychological distress, physical complaints, and sleep in Japanese nurses<sup>4</sup>), but only few have focused on workaholism. Nursing is among occupations that have the highest risk of poor sleep<sup>21</sup>), which may lead to burnout<sup>22</sup>).

## Subjects and Methods

### *Participants*

Initially, we approached 3 hospitals located in central Japan, and 2 of the hospitals agreed to participate in our study. A total of 600 registered nurses received a self-administered questionnaire and had two months (from October to November 2008) to complete it. In total, 394 nurses returned the questionnaire, which corresponds to a response rate of 65.7%. Responses from 66 respondents were excluded from the analysis due to missing data and/or existing chronic diseases (i.e., hypertension, diabetes mellitus, depression, cardiovascular disease, and asthma). Data from male respondents (n=16) were also excluded because 95 percent of those who returned completed questionnaires were females. Thus, the final number of respondents for analysis was 312 (overall coverage rate: 52.0%). The aims and procedures of this study were explained to all nurses prior to commencing the study. The Ethics Committees of The University of Tokyo Graduate School of Medicine approved the procedures of this study.

### Measures

#### *Workaholism*

Workaholism was measured using the Dutch Workaholism Scale (DUWAS) developed by Schaufeli and his colleagues<sup>23</sup>). The scale consists of two subscales: work excessively (WE) and work compulsively (WC). Each subscale consists of 5 items rated on a 4-point Likert scale (1=totally disagree, 4=totally agree). Example items are: "I seem to be in a hurry and racing against the clock" (WE) and "I feel that there's something inside me that drives me to work hard" (WC). The Cronbach's alpha coefficients of the subscales in this study were 0.71 and 0.60 for WE and WC, respectively. The respondents were classified into four quadrant groups using the median scores for WE and WC in the current study: (1) "Relaxed workers"—low on both WE and WC; (2) "Compulsive workers"—low on WE but high on WC; (3) "Hard workers"—high on WE but low on WC; and (4) "Workaholics"—high on both WE and WC<sup>23, 24</sup>).

#### *Sleep problems*

Based on previous epidemiological studies of sleep<sup>1, 2, 25, 26</sup>), 8 self-reported questions related to sleep problems were selected for this study, namely, (1) difficulty initiating sleep (DIS), (2) difficulty maintaining sleep (DMS), (3) early morning awakening (EMA), (4) dozing off or napping in daytime, (5) insufficiency

**Table 1. Sleep questions and criterion responses**

Question	Criterion response
(1) How long does it usually take you to fall asleep in bed? 1) 0–10 min 2) 11–30 min 3) 31–59 min 4) 1–2 h 5) 2+ h	Over 30 min
(2) How often do you have difficulty staying asleep? 1) never (or almost never) 2) few times a year 3) more than once a month 4) more than once a week 5) more than three times a week 6) almost every day	More than three times a week
(3) How often do you wake up too early and can't fall asleep again? 1) never (or almost never) 2) few times a year 3) more than once a month 4) more than once a week 5) more than three times a week 6) almost every day	More than three times a week
(4) How often do you take a nap while commuting time or during lunch break? 1) never (or almost never) 2) few times a year 3) more than once a month 4) more than once a week 5) more than three times a week 6) almost every day	More than three times a week
(5) Do you think your daily sleep is sufficient? 1) very much sufficient 2) fairly sufficient 3) somewhat insufficient 4) definitely insufficient	Somewhat insufficient
(6) How often do you feel very drowsy when you are at work? 1) never (or almost never) 2) few times a year 3) more than once a month 4) more than once a week 5) more than three times a week 6) almost every day	More than three times a week
(7) Do you feel difficulty waking up in the morning? 1) never (or almost never) 2) few times a year 3) more than once a month 4) more than once a week 5) more than three times a week 6) almost every day	More than once a week
(8) Do you feel restless when you wake up in the morning? 1) never (or almost never) 2) few times a year 3) more than once a month 4) more than once a week 5) more than three times a week 6) almost every day	More than once a week

of sleep, (6) excessive daytime sleepiness (EDS) at work, (7) difficulty awakening in the morning (DAM), and (8) tiredness upon awakening in the morning. Each sleep question was dichotomized, and a criterion response was set (see Table 1). Insomnia symptoms were defined as at least one positive response either to (1) DIS, (2) DMS, or (3) EMA question.

#### *Work-related variables*

Job demands, job control, and worksite support were measured using a subscale of the Brief Job Stress Questionnaire<sup>27)</sup> measured on a 4-point Likert scale (1=strongly disagree, 4=strongly agree). Job demands and job control were calculated by summing the item scores of quantitative job overload (three items) and job control (three items). Additionally, worksite support was calculated by summing the item scores of supervisor support (three items) and coworker support (three items). The Cronbach's alpha coefficients were 0.71, 0.63, and 0.85 for job demand, job control, and worksite support, respectively, which were comparable with previous research<sup>27)</sup>. Respondents were classified into three about equally sized groups based on the sum scores for each scale (i.e., job demands, job control, and

worksite support).

#### *Covariates*

Demographic variables included age (21–29; 30–39; 40 or older years), education (professional school; junior college; university or higher), marital status (married; unmarried), shift (2-shift; 3-shift; day shift), ward specialty (surgical; medical; emergency; other), and caffeine intake (cups of coffee or tea per day—a continuous variable).

#### **Statistical analysis**

First,  $\chi^2$  test was used to examine the association between different workaholism groups and the dichotomized sleep quality. Next, a binary logistic regression analysis was performed to determine (1) any differences among workaholism groups (i.e., Relaxed workers, Compulsive workers, Hard workers, and Workaholics) on poor sleep quality, and (2) whether those differences remained after adjusting for job-related variables (i.e., job demand, job control, and worksite support). The odds ratios (ORs) and 95% confidence intervals were calculated using the relaxed workers as a reference

group. The level of significance was  $p < 0.05$  (two-tailed). SPSS 16.0J for Windows was used for the statistical analysis.

## Results

### *Characteristics of the respondents*

Table 2 shows the demographic characteristics of the respondents in this study. The mean age of the respondents was 30.9 (SD=7.5, range 21–60) yr. All respondents were women, and 95% (n=296) were scheduled for shift work. Overall, 35.6% worked in the surgical ward, 20.5% in the medical ward, 15.1% in the emergency ward (including the intensive care unit), and 28.8% in other wards.

### *Association between workaholism and sleep problems*

Table 3 shows the associations between the workaholism groups and sleep problem measures. Significant differences existed among workaholism groups on (5) insufficiency of sleep, (7) difficulty maintaining sleep (DAM), and (8) tiredness upon awakening in the morning. No significant differences among groups occurred with regards to the remaining sleep problems.

Table 4 shows the results of logistic regression analyses. In addition to demographic variables, the upper part was adjusted for demographic variables (i.e., age, education, marital status, shift, ward specialty, and caffeine intake) and the lower part was adjusted for job-related variables (i.e., job demands, job control, and worksite support).

In the demographic-adjusted models, elevated risks of sleep problems were observed among the Workaholics group in terms of (5) insufficiency of sleep, (6) EDS at work, (7) DAM, and (8) tiredness upon awakening in the morning (OR 4.40, 3.18, 3.48, and 4.61, respectively). In addition, elevated risks were also observed among Compulsive workers in terms of (7) and (8) (OR 3.27 and 3.66, respectively). Furthermore, in the fully adjusted models, elevated risks of sleep problems were observed among Workaholics in terms of (5), (6), (7), and (8) (OR 3.41, 5.36, 2.56, and 2.77, respectively) and among Compulsive workers in terms of (7) and (8) (OR 3.13 and 3.96, respectively). However, no significant ORs were found among the Hard workers group on any sleep indices.

## Discussion

This study examined the association among workaholism, the tendency to work excessively hard in a compulsive fashion, and sleep problems among hospital nurses in Japan. It is important to identify individual

**Table 2. Demographic characteristics among participants of this study (only female; N=312)**

	n (%)
Age (yr)	
21–29	168 (53.8)
30–39	103 (33.0)
40 or older	41 (13.1)
Marital status	
married	92 (29.5)
unmarried	220 (70.5)
Education	
professional school	154 (49.4)
junior college	59 (18.9)
university or higher	99 (31.7)
Shift	
two-shift	114 (36.5)
three-shift	182 (58.3)
day shift	16 (5.1)
Ward specialty	
surgical ward	111 (35.6)
medical ward	64 (20.5)
emergency ward	47 (15.1)
others	90 (28.8)
Caffeine intake (cups of coffee or tea/day)	
almost none	47 (15.1)
one	84 (26.9)
two	81 (26.0)
three	52 (16.7)
four or more	48 (15.4)

risk factors, such as workaholism as well as work-related organizational risk factors for inadequate sleep. Whereas previous studies included primarily cognitive aspects, the present study addressed both cognitive as well as behavioral aspects of workaholism and their effect on sleep. To our knowledge, this is the first study to examine nurses' sleep problems as a function of these two aspects.

Logistic analyses revealed that, compared to Relaxed workers, Workaholics (defined as having tendencies to both work excessively and compulsively) had significantly higher risks for poor sleep, such as insufficiency of sleep, excessive daytime sleepiness at work, difficulty awakening in the morning, and tiredness upon awakening in the morning. Part of the adverse effects of workaholism is attributable to the fact that workaholics spend more time on their work<sup>18</sup>). At the same time, increased job demands may offer less opportunity for recovery from excessive efforts and higher exhaustion<sup>28</sup>). These associations between workaholism and sleep problems were still observed even after adjusting for demographic and job-related variables, including job demands. This fact suggests that increased sleep prob-

**Table 3. Associations between workaholism groups and sleep problem measures among hospital nurses in Japan (crude data; N=312)<sup>†</sup>**

	N	DIS <sup>‡</sup>		DMS <sup>‡</sup>		EMA <sup>‡</sup>		Dozing off or napping in daytime		Insufficiency of sleep		EDS at work <sup>‡</sup>		DAM <sup>‡</sup>		Tiredness awakening in the morning		Insomnia symptoms <sup>§</sup>		
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Workaholism <sup>††</sup>																				
Relaxed workers	113	26 (23.0)	4 (3.5)	2 (1.8)	9 (8.0)	61 (54.0)	8 (7.1)	54 (47.8)	58 (51.3)	28 (24.8)										
Compulsive workers	64	21 (32.8)	6 (9.4)	4 (6.3)	3 (4.7)	41 (64.1)	3 (4.7)	47 (73.4)	50 (78.1)	23 (35.9)										
Hard workers	46	15 (32.6)	2 (4.3)	1 (2.2)	2 (4.3)	29 (63.0)	2 (4.3)	32 (69.6)	29 (63.0)	15 (32.6)										
Workaholics	89	23 (25.8)	9 (10.1)	7 (7.9)	10 (11.2)	73 (82.0)	13 (14.6)	63 (70.8)	71 (79.8)	27 (30.3)										
total	312	85 (27.2)	21 (6.7)	14 (4.5)	24 (7.7)	204 (65.4)	26 (8.3)	196 (62.8)	208 (66.7)	93 (29.8)										
$\chi^2$ (df=3)		2.78	4.58	5.36	3.12	17.54	6.89	17.34	22.9	2.70										
p value		0.43	0.21	0.15	0.37	0.00**	0.07	0.00**	0.00**	0.44										

<sup>†</sup> $\chi^2$  test was used. \*\* $p < 0.01$ .<sup>‡</sup>DIS, difficulty initiating sleep; DMS, difficulty maintaining sleep; EMA, early morning awakening; EDS, excessive daytime sleepiness; DAM, difficulty awakening in the morning.<sup>§</sup>Insomnia symptoms defined as at least one positive response to questions regarding DIS, DMS or EMA.<sup>††</sup>The participants were classified into four quadrants groups using the median scores for WE (work excessively) and WC (work compulsively). (1) "Relaxed workers" – low on both WE and WC; (2) "Compulsive workers" – low on WE and high on WC; (3) "Hard workers" – high on WE and low on WC and (4) "Workaholics" – high on both WE and WC.**Table 4. Associations between workaholism groups, job demand, job control, worksite support and sleep problem measures after adjusting for demographic and fully adjusted models among hospital nurses in Japan (N=312)<sup>†</sup>**

	DIS <sup>††</sup>		DMS <sup>††</sup>		EMA <sup>††</sup>		Dozing off or napping in daytime		Insufficiency of sleep		EDS at work <sup>††</sup>		DAM <sup>††</sup>		Tiredness awakening in the morning		Insomnia symptoms <sup>††</sup>	
	OR	(95%CI)	OR	(95%CI)	OR	(95%CI)	OR	(95%CI)	OR	(95%CI)	OR	(95%CI)	OR	(95%CI)	OR	(95%CI)	OR	(95%CI)
The demographic adjusted models <sup>‡</sup>																		
Workaholism <sup>††</sup>																		
Relaxed workers	1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Compulsive workers	1.63 (0.78–3.38)		3.35 (0.85–13.17)		4.33 (0.73–25.83)		0.50 (0.12–2.02)		1.50 (0.77–2.92)		0.59 (0.14–2.44)		3.27 (1.61–6.67)**		3.66 (1.74–7.68)**		1.73 (0.85–3.54)	
Hard workers	1.47 (0.64–3.35)		1.25 (0.21–7.67)		1.66 (0.13–20.87)		0.53 (0.10–2.83)		1.79 (0.82–3.91)		0.69 (0.13–3.75)		2.27 (1.01–5.08)*		1.57 (0.72–3.41)		1.33 (0.59–2.99)	
Workaholics	1.11 (0.55–2.25)		3.08 (0.85–11.21)		5.11 (0.95–27.58)		1.81 (0.63–5.17)		4.40 (2.12–9.13)**		3.18 (1.09–9.23)*		3.48 (1.76–6.87)**		4.61 (2.26–9.43)**		1.21 (0.61–2.39)	
The fully adjusted models <sup>§</sup>																		
Workaholism																		
Relaxed workers	1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Compulsive workers	1.61 (0.76–3.44)		3.77 (0.92–15.50)		5.19 (0.78–34.40)		0.32 (0.07–1.43)		1.48 (0.74–2.94)		0.44 (0.10–1.96)		3.13 (1.50–6.56)**		3.96 (1.82–8.63)**		1.71 (0.81–3.58)	
Hard workers	1.62 (0.66–3.99)		1.23 (0.17–8.81)		1.05 (0.06–17.57)		0.38 (0.06–2.32)		1.32 (0.56–3.08)		1.12 (0.18–6.92)		1.67 (0.69–4.00)		0.91 (0.38–2.19)		1.38 (0.57–3.35)	
Workaholics	1.11 (0.51–2.44)		3.28 (0.78–13.79)		3.76 (0.60–23.61)		1.50 (0.43–5.26)		3.41 (1.56–7.46)**		5.36 (1.46–19.67)*		2.56 (1.20–5.48)*		2.77 (1.27–6.05)*		1.15 (0.54–2.46)	
Job demand																		
Low	1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Middle	0.77 (0.39–1.50)		0.74 (0.21–2.63)		2.21 (0.40–12.11)		0.70 (0.21–2.31)		1.36 (0.73–2.54)		0.44 (0.14–1.36)		1.28 (0.68–2.40)		1.83 (0.96–3.48)		0.75 (0.39–1.44)	
High	0.98 (0.43–2.22)		1.26 (0.31–5.20)		4.29 (0.63–29.13)		1.11 (0.28–4.42)		2.69 (1.12–6.43)*		0.19 (0.04–0.93)*		2.42 (1.02–5.76)*		5.47 (2.10–14.25)**		1.02 (0.46–2.26)	
Job control																		
Low	1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Middle	1.75 (0.91–3.38)		0.72 (0.23–2.30)		0.42 (0.09–1.88)		0.46 (0.17–1.26)		0.92 (0.50–1.68)		0.74 (0.27–2.07)		1.01 (0.85–2.95)		1.01 (0.53–1.93)		1.44 (0.77–2.69)	
High	1.40 (0.62–3.14)		1.49 (0.41–5.44)		1.66 (0.35–7.87)		0.27 (0.07–1.16)		1.54 (0.72–3.31)		0.54 (0.14–2.04)		0.67 (0.32–1.41)		1.18 (0.53–2.61)		1.08 (0.49–2.38)	
Worksite support																		
Low	1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Middle	0.53 (0.28–0.99)*		0.59 (0.21–1.67)		0.28 (0.07–1.16)		0.66 (0.22–2.00)		0.80 (0.44–1.45)		1.04 (0.36–3.00)		0.91 (0.50–1.66)		0.70 (0.38–1.31)		0.44 (0.24–0.80)	
High	0.79 (0.39–1.61)		0.30 (0.07–1.26)		0.25 (0.04–1.40)		1.72 (0.54–5.45)		1.04 (0.51–2.14)		3.18 (0.96–10.58)		0.91 (0.45–1.85)		0.50 (0.24–1.05)		0.61 (0.30–1.23)	

<sup>†</sup>Binary logistic regression was used. OR, odds ratio; CI, confidence interval. Estimates for demographic variables were not shown. \* $p < 0.05$ , \*\* $p < 0.01$ .<sup>‡</sup>Adjusted for age, education, marital status, shift, ward specialty, and caffeine intake.<sup>§</sup>Additionally adjusted for job demand, job control, and worksite support.<sup>††</sup>DIS, difficulty initiating sleep; DMS, difficulty maintaining sleep; EMA, early morning awakening; EDS, excessive daytime sleepiness; DAM, difficulty awakening in the morning.<sup>‡‡</sup>Insomnia symptoms defined as at least one positive response to questions regarding DIS, DMS or EMA.<sup>‡‡‡</sup>The participants were classified into four quadrant groups using the median scores for WE (work excessively) and WC (work compulsively). (1) "Relaxed workers" – low on both WE and WC; (2) "Compulsive workers" – low on WE and high on WC; (3) "Hard workers" – high on WE and low on WC and (4) "Workaholics" – high on both WE and WC.

lems among workaholics may be independent of demographic and job characteristics.

Interestingly, difficulty awakening and tiredness upon awakening in the morning were found to be associated more with the cognitive component (i.e., work compulsively) of workaholism rather than behavioral component (i.e., work excessively), as indicated in the fully adjusted model (see Table 4). Regarding the cognitive component, low psychological detachment from work predicted negative morning activation and fatigue<sup>29</sup>. This may be because thinking about work persistently and frequently even when not working<sup>18</sup>) may cause autonomic arousal and emotional distress through cognitive activation, which in turn might result in greater feelings of fatigue, as expected from the cognitive model of insomnia<sup>20</sup>. This speculation is in line with observations from previous studies, which suggested that a strong inner drive (i.e., cognitive component of workaholism) may be the most harmful element of workaholism<sup>30-32</sup>).

No significant associations were found between workaholism and sleep problems in terms of difficulty initiating sleep, difficulty maintaining sleep, early morning awakening, or dozing off or napping during the daytime. These findings may be due to the small number of respondents compared to previous studies<sup>1, 2, 4</sup>). Additionally, the average age of respondents was relatively low compared to previous studies<sup>33, 34</sup>). It is known that the prevalence of insomnia symptoms increases with age<sup>5</sup>); therefore, the relationship between workaholism and sleep problems may have been underestimated. Although the four items that were used represent the primary symptoms of insomnia, percentages of respondents with insomnia were similar to or lower than those reported previously for the same occupation<sup>4, 35</sup>). These levels of insomnia would result in insignificant findings. Moreover, shift work is known to exert strong, acute effects on sleep and alertness during night and morning work<sup>10</sup>). In the present study, 95% of the participants were shift workers. This may have masked the association between workaholism and insomnia symptoms.

*Limitations*

Several limitations need to be discussed. First, because of the cross-sectional design of the study, a causal relationship cannot be determined. Long-term effects of workaholism are unknown. A prospective study needs to investigate the causal link between workaholism and sleep problems. Second, all indicators were measured using self-reported questionnaires. In addition to self-report bias due to (for example) negative affect, common method variance might have played

a role, although several studies have demonstrated that these influences are not as significant as expected<sup>36, 37</sup>). Nevertheless, our present findings should be validated with objective measures (e.g., sleep polysomnography, blood pressure, objective performance). Third, the participants were all female nurses from only two hospitals in Japan; thus, particular care must be taken when generalizing the findings reported here. However, it is likely that combined data from the two different hospitals increase the generalizability of our findings, as opposed to the data from only one hospital<sup>4, 35</sup>). Fourth, some of the odds ratios have 95% confidence intervals very close to 1.0 (e.g., EDS at work and DAM in the demographic adjusted models). These results may make it difficult to be confident about the association between workaholism and sleep problems. Indeed, odds ratio for DAM became non-significant in the fully adjusted model. However, note that odds ratio for EDS remained significant even in the fully adjusted model, suggesting that the observed association is stable. Finally, not much consideration was given to unmeasured factors such as smoking, alcohol consumption, leisure time physical activity<sup>2, 11</sup>), or other unknown factors. These potential confounders may influence the relationship between workaholism and sleep problems. It is especially notable that previous studies have shown that the smoking rate among Japanese nurses is higher compared to the general population<sup>38, 39</sup>).

*Practical implications*

Table 5 shows possible solutions for employees at risk of workaholism. In order to modify the tendency to work excessively, training programs focusing on time management and problem solving skills might be helpful because workaholics take more work than they can handle and accept new tasks before completing previous ones<sup>19</sup>). Cognitive reconstruction might also be effective in changing the workaholics' characteristics of not only being reluctant to disengage from work, but also of thinking about work persistently and frequently, even during their leisure time<sup>18</sup>).

**Table 5. The examples of training program for employee who are at the risk of workaholism**

Work excessively (behavioral aspects)	Work compulsively (cognitive aspects)
Time management	Modifying irrational belief
Problem solving skill	Cognitive reconstruction
Assertive skill	
Seeking support skill	

## Conclusion

The present study indicated that workaholic nurses who have the tendency to work excessively hard in a compulsive fashion have higher risks for impaired awakening, insufficient sleep, and workplace sleepiness. This suggests the importance of focusing on both behavioral and cognitive aspects of workaholism. Future research should examine the effects of work style as well as work environment on improving sleep quality among nurses.

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