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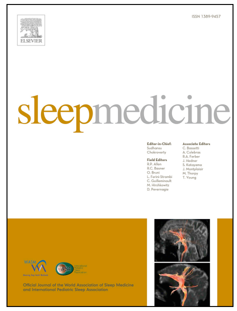

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Abstract

***Objective*:** To clarify sleep disorder risk factors among student athletes, this study examined the relationship between lifestyle habits, competition activities, psychological distress and sleep disorders.

***Methods*:** Student athletes (N = 906; male: 70.1%; average age: 19.1 ± 0.8 years) in five university sports departments in four Japanese regions were targeted for analysis. Survey items were attributes (age, gender, body mass index), sleep disorders (recorded through The Pittsburgh Sleep Quality Index), lifestyle habits (bedtime, wake-up time, smoking, drinking alcohol, meals, part-time jobs, use of electronics after lights out), competition activities (activity contents, competition stressors), and psychological distress (recorded through The K6 scale). The relation between lifestyle habits, competition activities, psychological distress and sleep disorders was explored using logistic regression analysis.

***Results*:** Results of multivariate logistic regression analysis with attributes as adjustment variables showed that “bedtime,” “wake-up time,” “psychological distress,” “part-time jobs,” “smartphone/cellphone use after lights out,” “morning practices,” and “motivation loss stressors,” were risk factors that were independently related to sleep disorders.

***Conclusions*:** Sleep disorders among student athletes are related to lifestyle habits such as late bedtime, early wake-up time, late night part-time jobs, use of smartphones/cellphones after lights out, psychological distress, and competition activities such as morning practices and motivation loss stressors related to competition. Therefore, this study suggests the importance of improving these lifestyle habits, mental health and competition activities.

Keywords

Sleep disorder; Lifestyle habits; Psychological distress; Competition activities; Student athletes

1. Introduction

Sleep plays an important role in mental and physical recovery for athletes training hard on a daily basis [1]. Multiple recent systematic reviews have suggested that athletes' insufficient quality and quantity of sleep leads to potential decline in physical performance (e.g., sudden power and endurance), decline in cognitive performance (e.g., attention and memory), and increase the risk of illness or injury [2,3]. It has also been reported that 30.6% of top athletes have sleep disorders [4]. Therefore, prevention and improvement of sleep disorders are essential for improving competitive abilities and maintaining athletic conditioning.

Lifestyle habits are serious risk factors for sleep disorders. Research on adolescents and adults has reported that smoking [5], drinking [6], regularity of mealtimes [7], skipping breakfast [8], late night part-time jobs [9], and use of electronics such as smartphones/cellphones after lights out [10] are all related to sleep disorders. However, the relation between these lifestyle habits and sleep disorders among athletes has not yet been studied.

In general, exercise is considered to contribute to improved sleep quality and longer sleep duration [11]; however, over-exercising can possibly increase arousal levels and inhibit sleep [12]. Thus far, research has reported that an increase in practices causes sleep disorders among athletes [13], and those with early morning practices have shorter sleep duration [14]. Yet these studies are insufficient.

Furthermore, empirical studies on sleep and psychological stressors have been conducted mainly in the work field, reporting that high occupational stressors related to poor sleep quality [15], long sleep latency [15], and insomnia [16]. Therefore, presumably, competition stress becomes a risk factor in sleep disorders for athletes. However it has only been reported that feeling stagnated with respect to competition results is related to sleep disturbances [17], and such studies are insufficient.

It is also well known that the impact of psychological factors such as depressive symptoms and psychological distress negatively affect sleep [18]. Previous studies found that depressive symptoms were strong risk factors of sleep disorders among university students [19,20]. Although a few study reported that depressive symptoms related sleep disorders among adolescent athletes [21], there is no study investigating these relationships considering the effect of lifestyle habits and competition activities.

Thus, the literature contains few studies on sleep disorder risk factors among athletes and no study comprehensively addresses lifestyle habits, competition activities, and psychological distress. Therefore, this study clarifies lifestyle habits, competition activities, and psychological distress that become sleep disorder risk factors for athletes.

2. Methods

2.1. Subjects and Methods

In this study, those who belonged to a university athletic club were taken to be "student athletes." This study targeted 1,875 students who attended the classes for freshman and sophomore students in five universities' Faculties of Physical Education in four Japanese regions. An anonymous self-administered questionnaire survey was conducted after class from April to November, 2016.

The number of surveys recovered was 1,738 (a recovery rate of 92.7%).While students who were not freshmen or sophomores and did not belong to a university athletic club also attended these classes, the data of them were excluded. Thus, 1,117 respondents remained; from these, 906 respondents with complete response were selected for analysis (valid response rate: 81.1%). This study was conducted with the approval of the University of Tsukuba's Physical Education Stream Research Ethics Committee. Students sufficiently provided with informed consent for participation in this study.

2.2. Survey Items

2.2.1. Attributes

Attributes included age, gender, height, and weight. BMI was also calculated based on height and weight; 18.5 and under was considered "underweight," 18.5–25 as "normal weight," and over 25 as "obese."

2.2.2. Sleep disorders

Sleep disorders were measured by The Japanese version of the Pittsburgh Sleep Quality Index (PSQI) [22,23]. This scale asks 18 questions about the past month's sleep. From these question items, seven factor scores were calculated, "sleep quality," "sleep latency," "sleep duration," "habitual sleep efficiency," "sleep disturbances," "use of sleep medication," and "daytime dysfunction"; each was scored on a scale of 0–3 points. Overall scores ranged from 0 to 21 points, and higher scores indicated poorer sleep. The cut-off value was 5.5 points, and scores over and above 5.5 indicated "sleep disorders" (when used for insomnia screening, detection sensitivity was 85.7% and specificity was 86.6% [23]).

2.2.3. Lifestyle habits

Lifestyle habits included bedtime, wake-up time, smoking, drinking alcohol, regularity of mealtimes, skipping breakfast, lunch, or dinner, taking meals, alcoholic drinks, caffeinated drinks, and supplements before bed, part-time jobs (yes/no; late night shift 11:00 p.m. to 6:00 a.m., yes/no), and use of electronics after lights out (television, smartphone/cellphone, computer, gaming devices).

2.2.4 Competition activities

Regarding competition activities, activity contents and competition stressors were asked. For activity contents, the survey asked about competitive events, sports time during, morning (9:00 a.m. or earlier), and evening practices (9:00 p.m. or later) each day. Based on these responses, we calculated sports time, number of morning practices, and number of evening practices during a week. For competition stressors, we used the Competition Stressor Scale developed by Asanuma et al. [24]. This scale comprised 28 question items that record frequency over the past month. Each item is rated on a 4-point scale of 0 to 3, from "not at all" to "very often." This scale comprises five factors and the score range for each is as follows: "interpersonal relationships," 0–24 points; "competition results," 0–9 points; "evaluations from one's surroundings," 0–15 points; "expectations and pressure from others," 0–15 points; and "motivation loss," 0–21 points. Higher scores indicate higher stress. This scale's relevance has been shown by previous studies [24], and Cronbach's α coefficients for respondents were as follows: interpersonal relationships, 0.86; competition results, 0.87; evaluations from one's surroundings, 0.83; expectations and pressure from others, 0.82; and motivation loss, 0.87.

2.2.5 Psychological distress

The Japanese version of the K6 scale, a screening scale for psychological distress, was used [25]. The K6 scale is a powerful measurement to discriminate between community cases and non-cases of DSM-IV disorders [26]. Respondents answered six items rated on 5-point Likert scale, and responses on each item were transformed to scores ranging from 0 to 4 points. A higher total score corresponds to a worse mental health condition. The cut-off value was 5 points, and scores over and above 5 indicated “psychological distress” (when used for mood and anxiety disorders screening, detection sensitivity was 100.0% and specificity was 68.7% [27]). The Japanese version of the K6 has been validated [26], and the internal consistency reliability (Cronbach’s alpha) of this scale in this study was 0.86.

2.3. Analysis Method

Univariate and multivariate logistic regression analysis was performed with sleep disorders as the objective variable and lifestyle habits, competition activities, and psychological distress as explanatory variables. Multivariate logistic regression analysis adjusted age, gender, and BMI. Bedtime was divided into four groups, “before 11:00 p.m.,” “11:00–11:59 p.m.,” “12:00–12:59 a.m.,” and “after 1:00 a.m.”; wake-up time was divided into “before 6:00 a.m.,” “6:00–6:59 a.m.,” “7:00–7:59 a.m.,” and “after 8:00 a.m.” Both sports time per week and each factor for competition stressors were also divided into four groups by quartiles, and the number of morning practices per week and the number of evening practices per week were divided into three groups, “0 days,” “1–3 days,” and “4–7 days.” It was confirmed that no issue of multicollinearity existed among the explanatory variables. SPSS Statistics 23.0 J for Windows was used for all statistical analysis, and the statistical level of significance was 5%.

3. Results

Table 1 shows the respondents’ attributes, sleep disorders, lifestyle habits, competition activities, and psychological distress. Among them, 421 respondents (46.5%) had sleep disorders. Distribution of the respondents by competitive events are shown in Table 2. There were 167 track and field players (18.4%); most of the respondents belonged to this category. This was followed by 135 soccer players (14.9%), 118 baseball players (13.0%), 52 basketball players (5.7%), 47 handball players (5.2%), and 47 tennis players (5.2%).

Table 3 shows results of logistic regression analysis. In univariate analysis, significant relations with sleep disorders were seen for lifestyle habits, “bedtime,” “wake-up time,” “regularity of mealtimes,” “skipping breakfast,” “skipping lunch,” “skipping dinner,” “taking meals before bed,” “taking alcoholic drinks before bed," "taking caffeinated drinks before bed," "part-time jobs," and "use of smartphone/cellphone after lights out," for competition activities, "number of morning practices" and five types of "competition stressors," and for "psychological distress."

Multivariate analysis results showed significant relations with the lifestyle habits "bedtime," "wake-up time," "part-time jobs," and "use of smartphone/cellphone after lights out." Late bedtime indicated higher odds of causing sleep disorders; compared to "before 11:00 p.m.," "12:00–12:59 a.m." (OR 2.46, 95% CI 1.19–5.06, $p < 0.05$) and "after 1:00 a.m." (OR 5.61, 95% CI 2.51–12.55, $p < 0.001$) had significantly higher odds. Early wake-up time also had higher odds of causing sleep disorders; compared to "after 8:00 a.m.," "before 6:00 a.m." (OR 5.49, 95% CI 2.77–10.88, $p < 0.001$), "6:00–6:59 a.m." (OR 3.01, 95% CI 1.79–5.08, $p < 0.001$), and "7:00–7:59 a.m." (OR 1.76, 95% CI 1.10–2.82, $p < 0.05$) had significantly higher odds. In addition, compared to respondents without part-time jobs, those working late night part-time jobs (OR 1.85, 95% CI 1.16–2.94, $p < 0.01$) had significantly higher odds of developing sleep disorders, as did those using smartphones/cellphones after lights out compared to those who did not use them (OR 1.60, 95% CI 1.12–2.29, $p < 0.01$).

Among competition activities, there were significantly higher odds of developing sleep disorders among respondents with morning practices "4–7 days per week" compared to "0 days" (OR 1.96, 95% CI 1.18–3.26, $p < 0.01$) and among those with the highest quartile of "motivation loss stressors" for competition compared to the group with the lowest quartile (OR 1.80, 95% CI 1.03–3.15, $p < 0.05$).

Furthermore, presence of psychological distress had also had significantly higher odds than absence of that (OR 2.88, 95% CI 2.00–4.15, $p < 0.001$).

4. Discussion

For long, lifestyle habits, competition activities, and psychological distress that become sleep disorder risk factors for student athletes had not been sufficiently clarified. This study's results of univariate analysis revealed that many lifestyle habits, competition activities, and psychological distress were related to sleep disorders. However, as a result of controlling mutual influences among explanatory variables in multivariate analysis, risk factors independently related to sleep disorders are "bedtimes," "wake-up times," "part-time jobs," "use of smartphone/cellphone after lights out," "morning practices," "motivation loss stressor," and "psychological distress." Therefore, study results suggest that for preventing and/or improving sleep disorders, improving these lifestyle habits, competition activities and psychological distress might be important.

Particularly, “bedtimes” and “wake-up times” had the highest odds ratio, and thus these are considered the most important risk factors for student athletes’ sleep disorders. Previous studies had reported evening-type individuals are more prone to sleep disorders than morning-type individuals [28], but the findings of our study suggest that rising up excessively early also leads to decreased sleep duration and can create a risk for sleep disorders.

Psychological distress had the next highest odds ratio. Previous systematic review had suggested that psychological factors impact on sleep disorders in general [18]. Our study also found that psychological distress related to sleep disorders independently from lifestyle habits and competition activities among athletes. Thus, maintaining their mental health might be important for preventing sleep disorders.

Inappropriate lifestyle habits such as late night part-time jobs and use of smartphones/cellphones after lights out impact life rhythms. Irregular life rhythms can disrupt secretion of melatonin, involved in internal body-clock adjustments, and cortisol, involved in arousal [29], and worsen sleep quality and quantity. Late night part-time jobs and using smartphones/cellphones after lights out might also delays bedtime and shorten sleep duration. Therefore, avoiding these inappropriate lifestyle habits and maintaining a steady life rhythm is important for preventing sleep disorders.

Among competition activities, morning practices were a risk factor for sleep disorders. Previous study reported athletes with morning practices have shorter sleep duration [14]. Therefore, it would be effective to reduce the number of morning practices, but if it is difficult to secure practice time as a result, then an earlier bedtime and falling asleep easily will be essential. The loss of motivation for competition was also a risk factor for sleep disorders. These were negative perceptions of competition activities, such as “I lost my confidence in competing,” “I was dissatisfied with the practice contents,” and “the practice contents were not fun.” Therefore, providing appropriate challenges for student athletes’ individual abilities in regular practices to build confidence through accumulation of successful experience, and maintaining close communication with student athletes to resolve dissatisfaction are considered critical for reducing the motivation loss stressors.

This study has several limitations. First, because this is a cross-sectional study, concluding causal relations between lifestyle habits, competition activities, psychological distress and sleep disorders is not possible. Going forward, longitudinal research is necessary to verify the causal relations. Second, since data was collected via self-reported questionnaires, reporting bias for sleep and competition activity situations cannot be ruled out. In the future, sleep and competition activities must be surveyed with an objective measuring method, such as an accelerometer. Third, this study did not survey naps, but another survey targeting top athletes reported that over 80% of the athletes take naps [4]. Although naps are reported to reduce daytime drowsiness [30], they might cause difficulty in falling asleep in the night [31] and reduce the sleep efficiency [32]. It is necessary to examine risk factors for sleep disorders while also considering the impact of naps.

Despite these limitations, this is first study to examine factors such as various lifestyle habits, competition activities, and psychological distress that might cause risks of sleep disorders among student athletes. These findings suggest that it might be necessary to improve student athletes' lifestyles, the competitive environment, and mental health to prevent sleep disorders among student athletes.

5. Conclusions

To prevent sleep disorders among student athletes, it is most important to secure sleep duration by going to sleep early and then waking up late. It was also suggested that it is important to improve lifestyle habits such as avoiding late night part-time jobs and refraining from using smartphones/cellphones after lights out, competitive environment such as avoiding morning practices and reducing motivation loss stressors, and mental status.

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Conflict of interest

The authors have no conflict of interest to declare.

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1 Table 1 Respondent characteristics

		n(%) or Mean ± SD	
Attributes			
Age		19.1	± 0.8
	Max	21	
	Min	18	
Gender	Male	635	(70.1)
	Female	271	(29.9)
Body mass index	Underweight	29	(3.2)
	Normal weight	761	(84.0)
	Obese	116	(12.8)
Sleep disorders	Yes	421	(46.5)
Lifestyle habits			
Bedtime		0:25	± 0:55
Wake–up time		6:51	± 1:02
Smoking	Yes	12	(1.3)
Drinking alcohol	Yes	200	(22.1)
Meals			
Regular mealtimes	Yes	688	(75.9)
Skipping breakfast	Yes	405	(44.7)
Skipping lunch	Yes	88	(9.7)
Skipping dinner	Yes	72	(7.9)
Taking meals before bed	Yes	537	(59.3)
Taking alcoholic drinks before bed	Yes	122	(13.5)
Taking caffeinated drinks before bed	Yes	361	(39.8)
Taking supplements before bed	Yes	297	(32.8)
Part–time Job	Yes (no late night)	345	(38.1)
	Yes (late night)	162	(17.9)
Use of electronics after lights out			
Television	Yes	135	(14.9)
Smartphone/cellphone	Yes	636	(70.2)
Computer	Yes	11	(1.2)
Gaming devices	Yes	93	(10.3)

Competition activities				
Activity contents				
Sports time per week (minutes)		1108.3	±	452.0
Number of morning practices per week	0 days	512	(56.5)	
	1–3 days	233	(25.7)	
	4–7 days	161	(17.8)	
Number of evenings practices per week	0 days	847	(93.5)	
	1–3 days	39	(4.3)	
	4–7 days	20	(2.2)	
Competition stressors				
Interpersonal relationships		6.5	±	4.9
Competition results		5.1	±	2.7
Evaluations from one’s surroundings		5.4	±	4.1
Expectations and pressure from others		4.5	±	3.5
Motivation loss		6.4	±	5.2
Psychological distress	Yes	256	(28.3)	

n = 906

1 Table 2 Distribution of respondents by competitive events

	n	(%)
Track and field	167	(18.4)
Soccer	135	(14.9)
Baseball	118	(13.0)
Basketball	52	(5.7)
Volleyball	47	(5.2)
Tennis	47	(5.2)
Swimming	43	(4.7)
Rugby	36	(4.0)
Kendo	34	(3.8)
Judo	31	(3.4)
Handball	24	(2.6)
Gymnastics	24	(2.6)
Ultimate frisbee	18	(2.0)
Badminton	15	(1.7)
Lacrosse	13	(1.4)
Bicycling	13	(1.4)
Softball	12	(1.3)
Futsal	11	(1.2)
Table tennis	9	(1.0)
Dance	8	(0.9)
Boating	6	(0.7)
Water polo	5	(0.6)
Canoeing	4	(0.4)
Triathlon	4	(0.4)
Japanese archery	4	(0.4)
Archery	3	(0.3)
Long sword	3	(0.3)
Wrestling	3	(0.3)
Rowing	3	(0.3)
Windsurfing	2	(0.2)
Sepak takraw	2	(0.2)

Diving	2	(0.2)
Outdoors	1	(0.1)
Orienteering	1	(0.1)
Golf	1	(0.1)
Cycling	1	(0.1)
Karate	1	(0.1)
Fencing	1	(0.1)
Yacht	1	(0.1)
Wandervogel	1	(0.1)
Shooting	1	(0.1)
Equestrian	1	(0.1)

1 Table 3 Relationship between lifestyle habits, competition activities, psychological distress and sleep disorders

			Unadjusted					Adjusted				
			OR	95%CI			p	OR	95%CI			p
Lifestyle habits												
Bedtime	(Ref: Before 11:00 p.m.)	11:00–11:59 p.m.	0.77	0.42	-	1.41	0.402	1.26	0.61	-	2.62	0.537
		12:00–12:59 a.m.	1.26	0.71	-	2.22	0.432	2.46	1.19	-	5.06	0.015
		After 1:00 a.m.	3.19	1.73	-	5.89	<0.001	5.61	2.51	-	12.55	<0.001
Wake–up time	(Ref: After 8:00 a.m.)	Before 6:00 a.m.	2.05	1.26	-	3.32	0.004	5.49	2.77	-	10.88	<0.001
		6:00–6:59 a.m.	1.19	0.81	-	1.76	0.374	3.01	1.79	-	5.08	<0.001
		7:00–7:59 a.m.	0.87	0.60	-	1.27	0.475	1.76	1.10	-	2.82	0.018
Smoking	(Ref: no)	Yes	0.87	0.28	-	2.71	0.805	0.77	0.21	-	2.87	0.696
Drinking alcohol	(Ref: no)	Yes	1.30	0.95	-	1.77	0.106	0.68	0.41	-	1.15	0.155
Meals												
Regularity of mealtimes	(Ref: yes)	No	1.97	1.44	-	2.68	<0.001	1.41	0.96	-	2.07	0.078
Skipping breakfast	(Ref: no)	Yes	1.68	1.29	-	2.19	<0.001	1.36	0.96	-	1.92	0.084
Skipping lunch	(Ref: no)	Yes	1.67	1.07	-	2.60	0.024	0.96	0.55	-	1.67	0.872
Skipping dinner	(Ref: no)	Yes	1.90	1.16	-	3.12	0.010	1.15	0.62	-	2.16	0.652
Taking meals before bed	(Ref: no)	Yes	1.63	1.25	-	2.14	<0.001	1.09	0.78	-	1.53	0.604
Taking alcoholic drinks before bed	(Ref: no)	Yes	1.73	1.17	-	2.54	0.006	1.57	0.88	-	2.79	0.129
Taking caffeinated drinks before bed	(Ref: no)	Yes	1.57	1.20	-	2.05	<0.001	1.31	0.94	-	1.83	0.115
Taking supplements before bed	(Ref: no)	Yes	0.94	0.71	-	1.24	0.669	0.77	0.54	-	1.09	0.141

Part–time job	(Ref: no)	Yes (no late night)	1.08	0.81	-	1.45	0.585	1.06	0.74	-	1.53	0.736
		Yes (late night)	2.14	1.47	-	3.11	<0.001	1.85	1.16	-	2.94	0.010
Use of electronics after lights out												
Television	(Ref: no)	Yes	1.20	0.83	-	1.73	0.325	0.89	0.57	-	1.41	0.631
Smartphone/cellphone	(Ref: no)	Yes	1.98	1.48	-	2.66	<0.001	1.60	1.12	-	2.29	0.010
Computer	(Ref: no)	Yes	1.39	0.42	-	4.58	0.591	1.27	0.31	-	5.19	0.741
Gaming devices	(Ref: no)	Yes	1.26	0.82	-	1.93	0.294	0.77	0.45	-	1.30	0.325
Competition activities												
Activity contents												
Sports time per week	(Ref: 750 minutes or less)	751–970 minutes	0.77	0.52	-	1.12	0.169	0.73	0.46	-	1.15	0.172
		971–1360 minutes	1.04	0.71	-	1.51	0.848	1.19	0.75	-	1.90	0.458
		1361 minutes or more	0.95	0.65	-	1.39	0.802	0.78	0.48	-	1.28	0.329
Number of morning practices per week	(Ref: 0 days)	1–3 days	1.09	0.80	-	1.49	0.580	1.19	0.82	-	1.73	0.364
		4–7 days	1.63	1.14	-	2.33	0.007	1.96	1.18	-	3.26	0.009
Number of evening practices per week	(Ref: 0 days)	1–3 days	1.36	0.71	-	2.59	0.349	1.21	0.57	-	2.58	0.615
		4–7 days	0.95	0.39	-	2.33	0.918	0.83	0.29	-	2.36	0.723
Competition stressors												
Interpersonal relationships	(Ref: 0–2 points)	3–6 points	1.50	1.03	-	2.19	0.034	1.41	0.91	-	2.20	0.128
		7–9 points	1.76	1.21	-	2.58	0.003	1.12	0.70	-	1.79	0.635
		10 or more points	2.81	1.93	-	4.07	<0.001	1.30	0.80	-	2.11	0.295
Competition results	(Ref: 0–3 points)	4–5 points	1.34	0.92	-	1.95	0.125	1.15	0.73	-	1.80	0.554

			6points	1.85	1.25 - 2.72	0.002	1.34	0.83 - 2.17	0.225
			7 or more points	1.83	1.29 - 2.61	<0.001	1.07	0.68 - 1.68	0.768
	Evaluations from one’s surroundings	(Ref: 0–1 point)	2–5 points	1.94	1.33 - 2.83	<0.001	1.57	0.99 - 2.49	0.056
			6–8 points	2.02	1.37 - 2.99	<0.001	1.39	0.84 - 2.27	0.197
			9 or more points	2.91	1.98 - 4.28	<0.001	1.57	0.92 - 2.66	0.096
	Expectations and pressure from others	(Ref: 0–1 point)	2–4 points	1.01	0.69 - 1.47	0.960	0.82	0.52 - 1.28	0.379
			5–6 points	1.32	0.90 - 1.93	0.154	0.86	0.54 - 1.38	0.532
			7 or more points	1.91	1.32 - 2.77	<0.001	1.06	0.66 - 1.69	0.817
	Motivation loss	(Ref: 0–1 point)	2–6 points	1.39	0.95 - 2.04	0.089	1.02	0.64 - 1.62	0.930
			7–10 points	1.97	1.34 - 2.89	<0.001	1.13	0.68 - 1.88	0.644
			11 or more points	4.24	2.81 - 6.40	<0.001	1.80	1.03 - 3.15	0.040
Psychological distress		(Ref: No)	Yes	3.30	2.43 - 4.47	<0.001	2.88	2.00 - 4.15	<0.001

Logistic regression analysis

Adjusted for age, gender, and body mass index in the multivariate analysis

OR: Odds ratio, CI: Confidence Interval

Highlights

- Securing sleep duration is most important to prevent sleep disorder (SD).
- Psychological distress is the next highest risk factor for SD.
- Improving both lifestyles and the competitive environment is effective against SD.